Federal Register

Tuesday
October 27, 1998

Part II

Environmental Protection Agency

40 CFR Parts 51, 72, 75, and 96

Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone; Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 51, 72, 75, and 96

[FRL–6171–2]

RIN 2060–AH10

Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In accordance with the Clean Air Act (CAA), today's action is a final rule to require 22 States and the District of Columbia to submit State implementation plan (SIP) revisions to prohibit specified amounts of emissions of oxides of nitrogen (NO_X)—one of the precursors to ozone (smog) pollution—for the purpose of reducing NO_X and ozone transport across State boundaries in the eastern half of the United States.

Ground-level ozone has long been recognized, in both clinical and epidemiological research, to affect public health. There is a wide range of ozone-induced health effects, including decreased lung function (primarily in children active outdoors), increased respiratory symptoms (particularly in highly sensitive individuals), increased hospital admissions and emergency room visits for respiratory causes (among children and adults with pre-existing respiratory disease such as asthma), increased inflammation of the lung, and possible long-term damage to the lungs.

In today's action, EPA finds that sources and emitting activities in each of the 22 States and the District of Columbia (23 jurisdictions) emit NO_X in amounts that significantly contribute to nonattainment of the 1-hour and 8-hour ozone national ambient air quality standards (NAAQS), or will interfere with maintenance of the 8-hour NAAQS, in one or more downwind States. Further, by today's action, EPA is requiring each of the affected upwind jurisdictions (sometimes referred to as upwind States) to submit SIP revisions prohibiting those amounts of NO_X emissions which significantly contribute to downwind air quality problems. The reduction of those NO_X emissions will bring NO_X emissions in each of those States to within the resulting statewide NO_X emissions budget levels established in today's rule. The 23 jurisdictions are: Alabama, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Michigan, Missouri, North Carolina, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. These States will be able to choose any mix of pollution-reduction measures that will achieve the required reductions.

EFFECTIVE DATES: This rule is effective December 28, 1998. The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of December 28, 1998.

ADDRESSES: Dockets containing information relating to this rulemaking (Docket No. A–96–56 and Docket No. A–9–35) are available for public inspection at the Air and Radiation Docket and Information Center (6102), US Environmental Protection Agency, 401 M Street SW, room M–1500, Washington, DC 20460, telephone (202) 260–7548, between 8:00 a.m. and 4:00 p.m., Monday through Friday, excluding legal holidays. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: General questions concerning today's action should be addressed to Kimber S. Scavo, Office of Air Quality Planning and Standards, Air Quality Strategies and Standards Division, MD–15, Research Triangle Park, NC 27711, telephone (919) 541–3354; e-mail: scavo.kimber@epa.gov. Please refer to **SUPPLEMENTARY INFORMATION** below for a list of contacts for specific subjects described in today's action.

SUPPLEMENTARY INFORMATION:

Availability of Related Information

Documents related to the Ozone Transport Assessment Group (OTAG) are available on the Agency's Office of Air Quality Planning and Standards' (OAQPS) Technology Transfer Network (TTN) via the web at http://www.epa.gov/ttn/. If assistance is needed in accessing the system, call the help desk at (919) 541–5384 in Research Triangle Park, NC. Documents related to OTAG can be downloaded directly from OTAG's webpage at http://www.epa.gov/ttn/otag/. The OTAG's technical data are located at http://www.iceis.mcnc.org/OTAGDC. The notice of proposed rulemaking for this final action, the supplemental notice of proposed rulemaking, and associated documents are located at http://epa.gov/ttn/oarpg/otagsip.html. Information related to Sections II, Weight of Evidence Determination of Covered States, and IV, Air Quality Assessment, can be obtained in electronic form from the following EPA website: http://www.epa.gov/scram001/regmodcenter/t28.htm. Information related to Section III, Determination of Budgets, may be found on the following EPA website: http://www.epa.gov/capi. All information in electronic form may also be found on diskettes that have been placed in the docket to this rulemaking.

For Additional Information

For technical questions related to the air quality analyses, please contact Norm Possiel; Office of Air Quality Planning and Standards; Emissions, Monitoring, and Analysis Division; MD–14, Research Triangle Park, NC 27711, telephone (919) 541–5692. For legal questions, please contact Howard J. Hoffman, Office of General Counsel, 401 M Street SW, MC–2344, Washington, DC 20460, telephone (202) 260–5892. For questions concerning the statewide emissions budget revisions, please contact Laurel Schultz; Office of Air Quality Planning and Standards; Emissions, Monitoring, and Analysis Division; MD–14, Research Triangle Park, NC 27711, telephone (919) 541–5511. For questions concerning SIP reporting requirements, please contact Bill Johnson, Office of Air Quality Planning and Standards, Air Quality Strategies and Standards Division, MD–15, Research Triangle Park, NC 27711, telephone (919) 541–5245. For questions concerning the model cap-and-trade rule, please contact Rob Lacount, Office of Atmospheric Programs, Acid Rain Division, MC–6204J, 401 M Street SW, Washington, DC 20460, telephone (202) 564–9122. For questions concerning the regulatory cost analysis of electricity generating sources, please contact Ravi Srivastava, Office of Atmospheric Programs, Acid Rain Division, MC–6204J, 401 M Street SW, Washington DC 20460, telephone (202) 564–9093. For questions concerning the regulatory cost analysis of other stationary sources and questions concerning the Regulatory Impact Analysis (RIA), please contact Scott Mathias, Office of Air Quality Planning and Standards, Air Quality Strategies and Standards Division, MD–15, Research Triangle Park, NC 27711, telephone (919) 541–5310.

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I. Background

A. Summary of Rulemaking and Affected States

By notice of proposed rulemaking (NPR, proposal, or ''proposed SIP call'') (62 FR 60318, November 7, 1997) and by supplemental notice (SNPR or supplemental proposal) (63 FR 25902, May 11, 1998), EPA proposed to find that NO_X emissions from sources and emitting activities (sources) in 23 jurisdictions (hereinafter also referred to as States) will significantly contribute to nonattainment of the 1-hour and 8-hour ozone NAAQS, or will interfere with maintenance of the 8-hour NAAQS, in one or more downwind States throughout the Eastern United States. The EPA based these proposals on data generated by OTAG, public comments, and other relevant information. Today's final action confirms that proposed finding. It also requires, under CAA section 110(a)(1) and 110(k)(5), that the 23 jurisdictions adopt and submit SIP revisions that, in order to assure that their SIPs meet the requirements of section 110(a)(2)(D)(i)(I), contain provisions adequate to prohibit sources in those States from emitting NO_X in amounts that ''contribute significantly to nonattainment in, or interfere with maintenance by,'' a downwind State. The 23 jurisdictions are: Alabama, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Maryland, Michigan, Missouri, North Carolina, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin.

Each of these States and the District of Columbia is required to adopt and submit by September 30, 1999, a SIP revision. The SIP revision must contain measures that will assure that sources in the State reduce their NO_X emissions sufficiently to eliminate the amounts of NO_X emissions that contribute significantly to nonattainment, or that interfere with maintenance, downwind. By eliminating these amounts of NO_X emissions, the control measures will assure that the remaining NO_X emissions will meet the level identified in today's rule as the State's NO_X emissions budget. For simplicity, this final rule may refer to the amounts that such SIP provisions must prohibit in order to meet the statute as the ''significant amounts'' of NO_X emissions. After prohibiting these significant amounts of NO_X, the remaining amounts emitted by sources in the covered States will not ''significantly contribute to nonattainment, or interfere with maintenance by,'' a downwind State, under section 110(a)(2)(D)(i)(I). Section II.C, Weight-of-Evidence Determination of Covered States, describes how EPA determined which States include sources that emit NO_X in amounts of concern (the ''covered'' States), and Sections II.D, Cost Effectiveness of Emissions Reductions; II.E, Comparison of Upwind and Downwind Costs; and III, Determination of Budgets, describe how EPA determined the significant amounts of emissions and the resulting statewide emissions budgets for the States identified above. Section IV, Air Quality Assessment, discusses air quality analyses conducted by EPA which help confirm the decisions and requirements set forth in this rulemaking. Section V, NO_X Control Implementation and Budget Achievement Dates, primarily discusses the dates by which (1) the States must submit SIP revisions in response to today's action, (2) the sources must implement the measures the States choose for the purpose of prohibiting the significant amounts of NO_X, and (3) the States are projected to achieve the budget levels. Section VI, SIP Criteria and Emissions Reporting Requirements, describes the SIP requirements themselves.

The SIP requirements permit each State to determine what measures to adopt to prohibit the significant amounts and hence meet the necessary emissions budget. Consistent with OTAG's recommendations to achieve

NO_X emissions decreases primarily from large stationary sources in a trading program, EPA encourages States to consider electric utility and large boiler controls under a cap-and-trade program as a cost-effective strategy. The recommended cap-and-trade program is described in more detail in Section VII, NO_X Budget Trading Program. The EPA also recognizes that promotion of energy efficiency can contribute to a cost-effective strategy. In Section VIII, Interaction with Title IV NO_X rule, EPA explains that it is not adopting proposed revisions to the title IV NO_X rule concerning the relationship between this rulemaking and the title IV NO_X rule. The remaining parts of today's action include Section IX, Non-Ozone Benefits of NO_X Reductions, and Section X, Administrative Requirements.

The EPA also conducted a RIA which is available in the docket to this rulemaking as a technical support document (TSD), entitled ''Regulatory Impact Analysis for the Regional NO_X SIP Call'' (docket no. VI–B–09). A detailed explanation of how EPA calculated the budgets is also available as a TSD entitled ''Development of Modeling Inventory and Budgets for the Regional NO_X SIP Call'' (docket no. VI–B–10). These two TSDs have been revised for the final rulemaking. A detailed explanation of the air quality modeling analyses is also available, entitled ''Air Quality Modeling Technical Support Document for the Regional NO_X SIP Call'' (docket no. VI–B–11) for this final rulemaking. This preamble for today's notice responds to some of the comments, but another document, entitled ''Response to Significant Comments on the Finding of Significant Contribution and Rulemaking for Certain States in the OTAG Region for Purposes of Reducing Regional Transport of Ozone,'' is included in the docket (docket no. VI–C–01).

B. General Factual Background

In today's action, EPA takes a significant step toward reducing ozone in the eastern half of the country. Ground-level ozone, the main harmful ingredient in smog, is produced in complex chemical reactions when its precursors, volatile organic compounds (VOC) and NO_X, react in the presence of sunlight. The chemical reactions that create ozone take place while the pollutants are being blown through the air by the wind, which means that ozone can be more severe many miles away from the source of emissions than it is at the source.

The science of ozone formation, transport, and accumulation is complex. Ozone is produced and destroyed in a cyclical set of chemical reactions involving NO_X, VOC and sunlight. Emissions of NO_X and VOC are necessary for the formation of ozone in the lower atmosphere. In part of the cycle of reactions, ozone concentrations in an area can be lowered by the reaction of nitric oxide with ozone, forming nitrogen dioxide; as the air moves downwind and the cycle continues, the nitrogen dioxide forms additional ozone. The importance of this reaction depends, in part, on the relative concentrations of NO_X, VOC and ozone, all of which change with time and location.

At ground level, ozone can cause a variety of ill effects to human health, crops and trees. Specifically, ground-level ozone has been shown in clinical and/or epidemiologial studies to have the following health effects:

- Decreased lung function, primarily in children active outdoors
- Increased respiratory symptoms, particularly in highly sensitive individuals
- Hospital admissions and emergency room visits for respiratory causes among children and adults with pre-existing respiratory disease such as asthma
- Inflammation of the lung
- Possible long-term damage to the lungs or even premature death.

The new 8-hour primary ambient air quality standard (62 FR 38856, July 18, 1997) will provide increased protection to the public from these health effects.

Each year, ground-level ozone above background is also responsible for significant agricultural crop yield losses. Ozone also causes noticeable foliar damage in many crops, trees, and ornamental plants (i.e., grass, flowers, shrubs, and trees) and causes reduced growth in plants. Studies indicate that current ambient levels of ozone are responsible for damage to forests and ecosystems (including habitat for native animal species).

As part of the efforts to reduce harmful levels of smog, EPA, today, is establishing a requirement for certain States to revise their SIPs in order to implement the necessary regional-scale reductions in NO_X emissions, and, thereby, reduce transported NO_X and ozone. Since air pollution travels across county and State lines, it is essential for State governments and air pollution control agencies to cooperate to solve the problem.

Currently, the following areas, impacted by the 23 jurisdictions that are the subject of today's rulemaking, are designated nonattainment areas for ozone under the 1-hour NAAQS:

Atlanta, GA
Baltimore, MD
Birmingham, AL
Boston-Lawrence-Worcester (eastern MA), MA–NH
Chicago-Gary-Lake County, IL–IN
Cincinnati-Hamilton, OH–KY
Door County, WI
Greater Connecticut
Kent & Queen Anne's Counties, MD
Lancaster, PA
Louisville, KY–IN
Manitowoc County, WI
Milwaukee-Racine, WI
Muskegon, MI
New York-Northern New Jersey-Long Island, NY–NJ–CT
Philadelphia-Wilmington-Trenton, PA–NJ–DE–MD
Pittsburgh-Beaver Valley, PA
Portland, ME
Portsmouth-Dover-Rochester, NH
Providence (All RI), RI
St. Louis, MO–IL
Springfield (western MA), MA
Washington, DC–MD–VA

These areas include many of the major urban centers in the eastern half of the Nation. The combined population for these areas is approximately 61.5 million. As described elsewhere, the reductions called for in today's action will reduce ozone levels throughout these areas.

Many more areas currently violate the 8-hour NAAQS. The EPA estimates that a total population of approximately 73 million in the 23 jurisdictions live in counties for which air quality is monitored to be in violation of that NAAQS. The reductions called for in today's action will reduce ozone levels throughout these areas as well.

Moreover, as discussed below, many of these areas are expected to be classified as ''transitional,'' which means, in most cases, that they are expected to come into attainment solely as a result of the reductions required by today's action. Thus, for those who live in these areas, the reductions required under today's action, in-and-of-themselves, are expected to mean the difference between unhealthful ozone levels and acceptable ozone levels.

Please note that EPA will not designate ozone nonattainment areas for the 8-hour NAAQS until 2000, and these designations will be based on the data that are most recently available at that time.

C. Statutory and Regulatory Background

1. CAA Provisions

a. 1970 and 1977 CAA Amendments. For almost 30 years, Congress has focused major efforts on curbing ground-level ozone. In 1970, Congress amended the CAA to require, in title I, that EPA issue, and periodically review

and if necessary revise, NAAQS for ubiquitous air pollutants (sections 108 and 109). Congress required the States to submit SIPs to attain and maintain those NAAQS, and Congress included, in section 110, a list of minimum requirements that SIPs must meet. Congress anticipated that areas would attain the NAAQS by 1975.

In 1977, Congress amended the CAA by providing, among other things, additional time for areas that were not attaining the ozone NAAQS to do so, as well as by imposing specific SIP requirements for those nonattainment areas. These provisions first required the designation of areas as attainment, nonattainment, or unclassifiable, under section 107; and then required that SIPs for ozone nonattainment areas include the additional provisions set out in part D of title I, as well as demonstrations of attainment of the ozone NAAQS by either 1982 or 1987 (section 172).

In addition, the 1977 Amendments included two provisions focused on interstate transport of air pollutants: the predecessor to current section 110(a)(2)(D), which requires SIPs for all areas to constrain emissions with certain adverse downwind effects; and section 126, which, in general, authorizes a downwind State to petition EPA to impose limits directly on upwind sources found to adversely affect that State. Section 110(a)(2)(D), which is key to the present action, is described in more detail below.

b. 1990 CAA Amendments. In 1990, Congress amended the CAA to better address, among other things, continued nonattainment of the 1-hour ozone NAAQS; the requirements that would apply if EPA revised the 1-hour standard; and transport of air pollutants across State boundaries (Pub. L. 101–549, Nov. 15, 1990, 104 Stat. 2399, 42 U.S.C., 7401–7671q). Numerous provisions added, or revised, by the 1990 Amendments are relevant to today's proposal.

(1) 1-Hour Ozone NAAQS. In the 1990 Amendments, Congress required the States and EPA to review and, if necessary, revise the designation of areas as attainment, nonattainment, and unclassifiable under the ozone NAAQS in effect at that time, which was the 1-hour standard (section 107(d)(4)). Areas designated as nonattainment were divided into, primarily, five classifications based on air quality design values (section 181(a)(1)). Each classification carries specific requirements, including new attainment dates (sections 181–182). In increasing severity of the air quality problem, these classifications are marginal, moderate, serious, severe and extreme. The OTAG region includes nonattainment areas of all classifications except extreme.

As amended in 1990, the CAA requires States containing ozone nonattainment areas classified as moderate or above to submit several SIP revisions at various times. One set of SIP revisions included specified control measures, such as reasonably available control technology (RACT) for existing VOC and NO_X sources (section 182(b)(2), 182(f)). In addition, the CAA requires the reduction of VOC in the amount of 15 percent by 1996 from a 1990 baseline (section 182(b)(1)). Further, for nonattainment areas classified as serious and above, the CAA requires the reduction of VOC or NO_X emissions in the amount of 9 percent over each 3-year period from 1996 through the attainment date (the rate-of-progress (ROP) SIP submittals), under section 182(c)(2)(B). In addition, the CAA requires a demonstration of attainment, including air quality modeling, for the nonattainment area (the attainment demonstration), as well as SIP measures containing any additional reductions that may be necessary to attain by the applicable attainment date (section 182(c)-(e)). The CAA established November 15, 1994 as the required date for the ROP and attainment demonstration SIP submittals for areas classified as serious and above.[1]

(2) *Revised NAAQS.* Section 109(d) of the CAA requires periodic review and, if appropriate, revision of the NAAQS. As amended in 1990, the CAA further requires EPA to designate areas as attainment, nonattainment, and unclassifiable under a revised NAAQS (section 107(d)(1); section 6103, Pub. L. 105–178). The CAA authorizes EPA to classify areas that are designated nonattainment under the new NAAQS and to establish for those areas attainment dates that are as expeditiously as practicable, but not to exceed 10 years from the date of designation (section 172(a)).

(3) General Requirements. The CAA continues, in revised form, certain requirements, dating from the 1970 Amendments, which pertain to all areas, regardless of their designation. All areas are required to submit SIPs within certain timeframes (section 110(a)(1)), and those SIPs must include specified provisions, under section 110(a)(2). In addition, SIPs for nonattainment areas are generally required to include additional specified control requirements, as well as controls providing for attainment of any revised NAAQS and periodic reductions providing ''reasonable further progress'' in the interim (section 172(c)).

(4) Provisions Concerning Transport of Ozone and Its Precursors. The 1990 Amendments reflect general awareness by Congress that ozone is a regional, and not merely a local, problem. As described above, ozone and its precursors may be transported long distances across State lines to combine with ozone and precursors downwind, thereby exacerbating the ozone problems downwind. The phenomenon of ozone transport was not generally recognized until relatively recently. Yet, ozone transport is a major reason for the persistence of the ozone problem, notwithstanding the imposition of numerous controls, both Federal and State, across the country.

Section 110(a)(2)(D) provides one of the most important tools for addressing the problem of transport. This provision, which applies by its terms to all SIPs for each pollutant covered by a NAAQS, and for all areas regardless of their attainment designation, provides that a SIP must contain adequate provisions prohibiting its sources from emitting air pollutants in amounts that will contribute significantly to nonattainment, or interfere with maintenance, in one or more downwind States.

Section 110(k)(5) authorizes EPA to find that a SIP is substantially inadequate to meet any CAA requirement. If EPA makes such a finding, it must require the State to submit, within a specified period, a SIP revision to correct the inadequacy.

The CAA further addresses interstate transport of pollution in section 126, which Congress revised slightly in 1990. Subsection (b) of that provision authorizes each State (or political subdivision) to petition EPA for a finding designed to protect that entity from upwind sources of air pollutants.[2]

In addition, the 1990 Amendments added section 184, which delineates a multistate ozone transport region (OTR) in the Northeast, requires specific additional controls for all areas (not only nonattainment areas) in that region, and establishes the Ozone Transport Commission (OTC) for the purpose of recommending to EPA regionwide controls affecting all areas in that region. At the same time, Congress added section 176A, which authorizes

[1] For moderate ozone nonattainment areas, the attainment demonstration was due November 15, 1993 (section 182(b)(1)(A)), except that if the State elected to conduct an urban airshed model, EPA allowed an extension to November 15, 1994.

[2] In addition, section 115 authorizes EPA to require a SIP revision when one or more sources within a State ''cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country.''

the formation of transport regions for other pollutants and in other parts of the country.

2. Regulatory Structure

a. March 2, 1995 Policy. Notwithstanding significant efforts, the States generally were not able to meet the November 15, 1994 statutory deadline for the attainment demonstration and ROP SIP submissions required under section 182(c). The major reason for this failure was that at that time, States with downwind nonattainment areas were not able to address transport from upwind areas. As a result, in a memorandum from Mary D. Nichols, Assistant Administrator for Air and Radiation, dated March 2, 1995, entitled ''Ozone Attainment Demonstrations,'' (March 2, 1995 Memorandum or the Memorandum), EPA recognized the efforts made by States and the remaining difficulties in making the ROP and attainment demonstration submittals. The EPA recognized that development of the necessary technical information, as well as the control measures necessary to achieve the large level of reductions likely to be required, had been particularly difficult for the States affected by ozone transport.

Accordingly, as an administrative remedial matter, the Memorandum indicated that EPA would establish new timeframes for SIP submittals. The Memorandum indicated that EPA would divide the required SIP submittals into two phases. Phase I generally consisted of (i) SIP measures providing for ROP reductions due by the end of 1999, (ii) an enforceable SIP commitment to submit any remaining required ROP reductions on a specified schedule after 1996, and (iii) an enforceable SIP commitment to submit the additional SIP measures needed for attainment. Phase II consists of the remaining submittals, beginning in 1997.

The Phase II submittals primarily consisted of the remaining ROP SIP measures, the attainment demonstration and additional rules needed to attain, and any regional controls needed for attainment by all areas in the region. The March 2, 1995 Memorandum indicated that the attainment demonstration, target calculations for the post-1999 ROP milestones, and identification of rules needed to attain and for post-1999 ROP were due in mid-1997. To allow time for States to incorporate the results of the OTAG modeling into their local plans, EPA extended the mid-1997 submittal date to April 1998.[3]

b. OTAG. In addition, the March 2, 1995 Memorandum called for an assessment of the ozone transport phenomenon. The Environmental Council of the States (ECOS) had recommended formation of a national work group to allow for a thoughtful assessment and development of consensus solutions to the problem. The OTAG was a partnership between EPA, the 37 easternmost States and the District of Columbia, industry representatives, and environmental groups. The OTAG's air quality modeling and recommendations formed the basis for today's action.

c. EPA's Transport SIP Call Regulatory Efforts. Shortly after OTAG began its work, EPA began to indicate that it intended to issue a SIP call to require States to implement the reductions necessary to address the ozone transport problem. On January 10, 1997 (62 FR 1420), EPA published a notice of intent that articulated this goal and indicated that before taking final action, EPA would carefully consider the technical work and any recommendations of OTAG. The EPA published the NPR for the NO_X SIP call by notice dated November 7, 1997 (62 FR 60319). The NPR proposed to make a finding of significant contribution due to transported NO_X emissions to nonattainment or maintenance problems downwind and to assign NO_X emissions budgets for 23 jurisdictions. The EPA published a supplemental notice of proposed rulemaking (SNPR) by notice dated May 11, 1998 (63 FR 25902) which proposed a model NO_X budget trading program and State reporting requirements and provided the air quality analyses of the proposed statewide NO_X emissions budgets. The EPA received approximately 700 comments on these proposals. The comment periods are described in Section I.F, Discussion of Comment Period and Availability of Key Information. Throughout the course of the rulemaking, EPA has added information to the docket. By notice dated August 24, 1998 (63 FR 45032), EPA published a notice of availability listing the additional documents placed in the docket.

d. Revision of the Ozone NAAQS. On July 18, 1997 (62 FR 38856), EPA issued its final action to revise the NAAQS for ozone. The EPA's decision to revise the standard was based on the Agency's review of the available scientific evidence linking exposures to ambient ozone to adverse health and welfare effects at levels allowed by the pre-existing 1-hour ozone standards. The 1-hour primary standard was replaced by an 8-hour standard at a level of 0.08 parts per million (ppm), with a form based on the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration measured at each monitor within an area. The new primary standard will provide increased protection to the public, especially children and other at-risk populations, against a wide range of ozone-induced health effects. Health effects are described in paragraph I.B, General Factual Background. The EPA retained the applicability of the 1-hour NAAQS for existing nonattainment areas until such time as EPA determines that an area has attained the 1-hour NAAQS (40 CFR 50.9(b)).

The pre-existing 1-hour secondary ozone standard was replaced by an 8-hour standard identical to the new primary standard. The new secondary standard will provide increased protection to the public welfare against ozone-induced effects on vegetation.

D. Section 126 Petitions

In a separate rulemaking, EPA is proposing action on petitions submitted by eight northeastern States under section 126 of the CAA. Each petition specifically requests that EPA make a finding that NO_X emissions from certain major stationary sources significantly contribute to ozone nonattainment problems in the petitioning State. The eight States are Connecticut, Massachusetts, Maine, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont.

Both the NO_X SIP call and the section 126 petitions are designed to address ozone transport through reductions in upwind NO_X emissions. However, the EPA's response to the section 126 petitions differs from EPA's action in the NO_X SIP call rulemaking in several ways. In today's NO_X SIP call, EPA is determining that certain States are or will be significantly contributing to nonattainment or maintenance problems in downwind States. The EPA is requiring the upwind States to submit SIP provisions to reduce the amounts of each State's NO_X emissions that significantly contribute to downwind air quality problems. The States will have the discretion to select the mix of control measures to achieve the necessary reductions. By contrast, under section 126, if findings of significant contribution are made for any sources identified in the petitions, EPA would determine the necessary emissions

[3] Guidance for Implementing the 1-hour Ozone and Pre-Existing PM10 NAAQS, Memorandum from Richard D. Wilson, dated December 29, 1997.

limits to address the amount of significant contribution and would directly regulate the sources. A section 126 remedy would apply only to sources in States named in the petitions.

Based on the view that the SIP call and section 126 petitions are both designed to achieve the same goal, several commenters urged EPA to coordinate the two actions to the maximum extent possible. The EPA agrees that the two actions are closely related and, therefore, should be coordinated. This will help provide certainty for State and business planning requirements. In addition, this coordination can help to facilitate a trading program among sources in SIP call States that choose to participate in the NO_X trading program, and any section 126 sources that would be subject to a Federal NO_X trading program.

The section 126 provisions require that any control remedy be implemented within 3 years from the date of the finding that major sources or a group of stationary sources emit or would emit in violation of the relevant prohibition in section 110(a)(2)(D). Under EPA's anticipated rulemaking schedule [4] on the petitions, the compliance date for sources for which EPA makes such a finding could be April 30, 2002; November 30, 2002; or May 1, 2003. Several commenters expressed concern that the compliance deadline under section 126 was driving EPA's decision on the compliance deadline for the NO_X SIP call. Therefore, they believed that no changes would be made in the proposed NO_X SIP call deadline in response to comments.

While EPA believes it is advantageous to coordinate the section 126 and NO_X SIP call actions, EPA disagrees that this constrains EPA from being responsive to public comments and considering alternative compliance dates. See discussion below in Section V, NO_X Control Implementation and Budget Attainment Dates.

In the NO_X SIP call NPR, EPA proposed that States be required to submit SIPs within 12 months of the final SIP call. One commenter asserted that the timing and terms of the rulemaking schedule for the section 126 petitions precludes EPA from considering public comments advocating different SIP due dates for the NO_X SIP call. The section 126 rulemaking schedule provides several options. One option would allow findings on the petitions to be deferred pending certain actions by the States and EPA on State submittals in response to the NO_X SIP call. The premise for the specified schedule is that the SIP due date would be September 30, 1999 (i.e., roughly 12 months from signature of the notice on the final NO_X SIP call). As discussed below in Section VI, SIP Revision Criteria and Schedule, EPA continues to believe 12 months is an appropriate timeframe. However, had EPA determined that a longer timeframe for SIP submittal was warranted, the section 126 rulemaking schedule would not have restricted EPA from establishing a later due date.

One commenter supported the section 126 rulemaking schedule because they thought it had the effect of using the SIP process rather than the source-based petitions in that it provides an option of deferring section 126 findings if EPA approves a State's NO_X SIP. Another commenter thought that the conditions for deferring section 126 findings were too stringent, and, therefore, section 126 would inevitably be triggered prior to approval of any SIP provisions. This issue is discussed in detail in Section II.A.2.c. in the NPR EPA just issued on the section 126 petitions, which appears in the docket.

E. OTAG

As discussed in the proposed SIP call, OTAG completed the most comprehensive analyses of ozone transport ever conducted. The EPA participated extensively in this process. The EPA believes that the OTAG process was successful and generated much useful technical and modeling information on regional ozone transport. This information provided EPA with the foundation for this rulemaking.

The EPA received numerous comments regarding the relationship between the OTAG recommendations and EPA's proposed SIP call. Some commenters asserted that the Agency's proposal was inconsistent with the OTAG recommendations, while others believed that EPA used the information and recommendations from OTAG appropriately. Primarily, commenters stated that OTAG recommended a range of controls for utility sources instead of a uniform level of control for all of the included States.

The OTAG did recommend consideration of a range of controls, and although it did not specifically recommend uniform controls across a broad region, such a control scheme is within the range of its recommendation. The EPA's action today is based on its consideration of OTAG's recommendations, as well as information resulting from EPA's additional work, and extensive public input generated through notice-and-comment rulemaking. The EPA continues to believe, for reasons explained in Section III.F.1, Uniform vs. Regional Controls, that requiring NO_X emissions reductions across the region in amounts achievable by uniform controls is a reasonable, cost-effective step to take at this time to mitigate ozone nonattainment in downwind States for both the 1-hour and 8-hour standards.

Commenters also stated that EPA applied an electric utility control level that was more stringent than the upper limit of the OTAG range of utility controls. The OTAG recommended a range of utility controls that falls between specific CAA-required controls and the less stringent of 85 percent reduction from the 1990 rate (lb/mmBtu), or 0.15 lb/mmBtu. In determining the appropriate level of emissions reductions, EPA considered what levels of NO_X reductions could be obtained by applying, to various source sectors, controls that are among the most cost effective and feasible with today's proven pollution control technologies. The EPA chose emissions reductions that are equivalent to an emission limit from utilities of 0.15 lb/mmBtu. The EPA acknowledges that this level may be more protective than the most protective level contained in the OTAG recommendation in some cases, but, as discussed below in Section IV, Air Quality Assessment, EPA believes that it provides the most improvement in air quality while staying within the bounds of the most highly cost-effective technology available. (Cost effectiveness is discussed in Section II.D.) In addition, by relying on actual 1995–1996 continuous emission monitoring data, rather than relying on estimated 1990 emission data, this approach provides a more accurate way of determining the States' budgets since it minimizes any chances of over-or under-estimation of emissions.

Commenters asserted that OTAG recommended 12 months for additional modeling—especially subregional modeling—before promulgating the SIP call; and these commenters expressed concern that EPA did not provide this amount of time following publication of the NPR. As discussed in more detail in Section I.F, Discussion of Comment Period and Availability of Key

[4] The eight northeastern States that filed section 126 petitions also filed suit in the District Court for the Southern District of New York, to compel EPA to take action on those petitions within prescribed periods. *State of Connecticut* v. *Browner,* No. 98–1376 (S.D.N.Y., filed Feb. 25, 1998). The EPA and the eight northeastern States jointly filed a motion to enter a consent order prescribing certain dates for EPA action.

Information, the Agency ultimately provided approximately 1 year from the conclusion of OTAG for States and other members of the public to complete and submit subregional and other types of modeling. The EPA has considered this additional modeling in finalizing today's rule.

Some commenters stated that the goal of OTAG was to address attainment of the ozone NAAQS. This is incorrect. The OTAG's goal was to reduce ozone transport, which is one of the steps necessary to enable attainment; the goal was not to recommend an overall strategy that would yield attainment through regional measures alone. The OTAG articulated its overall goal as follows:

> * * * identify and recommend a strategy to reduce transported ozone and its precursors which, in combination with other measures, will enable attainment and maintenance of the national ambient ozone standard in the OTAG region. A number of criteria will be used to select the strategy including, but not limited to, cost effectiveness, feasibility, and impacts on ozone levels.[5]

It is also EPA's goal to ensure that sufficient regional reductions are achieved to mitigate ozone transport in the eastern half of the United States and thus, in conjunction with local controls, enable nonattainment areas to attain and maintain the ozone NAAQS.

Commenters indicated that OTAG focused only on the 1-hour standard nonattainment problem and did not assess compliance implications of the 8-hour standard. For this reason, according to commenters, EPA should not base today's action on the nonattainment of the 8-hour NAAQS. It is true that OTAG was established to address transport issues associated with meeting the 1-hour standard. The EPA did not promulgate the 8-hour standard until shortly after OTAG concluded; thus, OTAG did not recommend strategies to address the 8-hour NAAQS. However, because EPA had proposed an 8-hour standard, OTAG did examine the impacts of different strategies on 8-hour average ozone predictions.

In light of OTAG's work and additional information, EPA is able to assess ozone transport as it relates to the 8-hour NAAQS and to set forth requirements as necessary to address the 8-hour standard in this rulemaking. Ozone transport causes problems for downwind areas under either the 1-hour or 8-hour standard. The regional reductions of NO_X that will be achieved through this SIP call for the 1-hour NAAQS are key components for meeting the new 8-hour ozone standard in a cost-effective manner. Therefore, EPA believes that the OTAG recommendations for how to address ozone transport are valid for both NAAQS.

Several commenters urged EPA to adopt and implement all Federal measures identified in the OTAG recommendations.[6] The Agency is committed to continue implementing national control measures for NO_X, as recommended by OTAG. In addition, EPA has adopted the following national measures for purposes of reducing VOC: architectural and industrial maintenance coatings, consumer/commercial products, and autobody refinishing. The EPA has made no decisions regarding further VOC reductions beyond the reductions specified as phase I in the OTAG recommendations.[7]

Other more specific comments concerning the OTAG recommendations will be addressed throughout this rulemaking as the issues are discussed.

F. Discussion of Comment Period and Availability of Key Information

The EPA received numerous comments concerning the adequacy of the comment period for the November 7, 1997 NPR and May 11, 1998 SNPR. Some commenters remarked that the comment period for the NPR should be extended to allow for development and review of technical information, including inventory data, growth factors, and the resulting budget. Commenters stated that the additional time was particularly necessary for subregional air quality modeling, which is modeling designed to isolate the impacts of emissions from a particular State or group of States on downwind areas. Many specifically requested an additional 120 days, and one requested an additional 9 months. Some commenters indicated that EPA did not incorporate their comments from the NPR into the SNPR. Other commenters insisted that key information supporting the rule is not publicly available. The EPA also received comments that additional public hearings should be held in other locations of the OTAG region.

1. Request for Extension of the Comment Period

The EPA allowed a 120-day public comment period for the November 7, 1997 NPR, which closed on March 9, 1998. By notice (63 FR 17349, April 9, 1998), EPA reopened the comment period for members of the public to submit additional modeling analyses, as well as comments concerning the implications that any additional modeling may have for the State NOx budgets under consideration in the November 7, 1997 proposal. The comment period was reopened through the end of the comment period on the SNPR. The SNPR, which was published on May 11, 1998, allowed a comment period until June 25, 1998. Thus, for most issues addressed in the NPR, including air quality modeling issues, commenters received an almost 8-month formal comment period. Indeed, many commenters had access to the NPR immediately after October 10, 1997, when it was signed and posted on an EPA website. The Agency also received a number of comments after June 25, 1998, which were also reviewed and considered in developing the final rule.

The EPA believes this additional opportunity for the public to submit comments was reasonable. After March 9, 1998—the initial date for close of the comment period on the NPR—EPA received numerous comments on various issues raised in the NPR, including air quality issues. Many of these comments were extensive, which indicates that commenters received adequate time.

With respect to the concern that EPA did not incorporate comments received on the NPR into the SNPR, it would not have been practical for EPA to incorporate comments received on the NPR into the SNPR because the SNPR was completed soon after the close of the comment period for the NPR. In general, the SNPR addressed different aspects of the rule than the NPR, and one of the purposes of the SNPR was to take comment on several new issues, as noted above. The EPA has addressed comments on both the NPR and SNPR in today's action.

The major issues raised in the comments are responded to throughout the preamble of this final rule. A comprehensive summary of all significant comments, along with EPA's response to the comments which have not been responded to in the preamble (Response to Comments), can be found in the docket for this rulemaking (Docket No. A–96–56).

[5] Ozone Transport Assessment Group Policy Paper approved by the Policy Group on December 4, 1995.

[6] The OTAG recommendations are located in Appendix B of the November 7, 1997 NPR (62 FR 60376).

[7] Letter to the Honorable Ken Calvert, Chairman, Subcommittee on Energy and Environment, U.S. House of Representatives, from Robert D. Brenner, Acting Deputy Assistant Administrator for Air and Radiation, U.S. EPA, June 26, 1998, transmitting EPA's responses to questions following the May 20, 1998 congressional hearing on EPA's proposed rule on paints and coatings.

2. Request for Time to Conduct Additional Modeling

The OTAG Policy Group, at its June 3, 1997 meeting, recommended that States have the opportunity to conduct additional local and subregional modeling and air quality analyses, as well as to develop and propose appropriate levels and timing of controls. The EPA received numerous comments related to OTAG's recommendation. The commenters requested that the Agency give States more time to conduct this additional modeling so that EPA could more accurately assess each State's contribution to downwind nonattainment.

The EPA signed the NPR on October 10, 1997, and posted it on a website at that time, although it was not published in the **Federal Register** until November 7, 1997. As noted above, EPA reopened the comment period through June 25, 1998 for submittal of additional air quality modeling runs. In effect, this has extended the amount of time for modeling analyses to over a year from the date OTAG submitted its recommendations, and to over 8 months from the signature date for the NPR. By the close of the comment period on June 25, 1998, EPA had received numerous comments containing new and extensive air quality modeling studies. Accordingly, EPA believes that commenters received adequate time.

3. Availability of Key Information

A number of commenters asserted that EPA failed to make publicly available key information, such as modeling and emissions inventory data. Specifically, commenters stated that they did not have access to the emissions data on which EPA based the air quality modeling for the NPR. In addition, according to some commenters, several models used by EPA and OTAG are proprietary models and have not been generally available to the public.

In Section III.A.2, Availability, the Agency discusses the availability of emissions inventory data to the public.

The OTAG and EPA conducted air quality modeling runs to determine the level of contribution from emissions in upwind areas to ozone nonattainment in downwind areas. Some of this modeling employed UAM–V.[8] The UAM–V has generally been available to the public for the purpose of analyzing information relevant to today's rulemaking. State and local agencies, as well as utility companies and other stakeholders, have had access to licenses to use UAM–V.

Commenters objected that they were obliged either to purchase licenses for use of the UAM–V model or to employ as a contractor the model owner, and that these financial constraints restricted their access to the model. Because this model has, in general, been privately developed, EPA believes that reasonable fees for its use should be expected. The EPA did not receive information indicating that the associated expenses were other than reasonable. To the extent that commenters experienced delays in obtaining the UAM–V model, EPA believes that the extensions of the comment period resulted in adequate time for comment. In any event, any commenter who was not able to gain access in the timeframe desired was able to use a comparable model, such as the Comprehensive Air Quality Model with Extensions (CAMx), which is not proprietary. For the purpose of responding to public comments, EPA is considering all information based on CAMx and similar models.

The Agency made available additional modeling runs used to determine emissions changes, costs and cost effectiveness for electricity generating units (EGUs). These runs were placed on the IPM Analyses web site at www.epa.gov/capi, with links to EPA's Office of Air and Radiation Policy and Guidance web site.

On August 10, the EPA placed in the docket and made available on the web site, modeling analyses and other information supporting today's action. As noted above, by notice dated August 24, 1998 (63 FR 45032), EPA published a notice of availability which stated that throughout the course of the rulemaking, EPA had placed information in the docket or made it available on various web sites. This information included inventory data and additional modeling runs. By placing those materials in the docket and informing the public of their availability, EPA provided 4–6 weeks for review and comment by the public. The EPA did receive comments concerning this information from the Utility Air Regulatory Group on September 9, and EPA is responding to those comments in the Response To Comments document. The EPA notes that the additional modeling analyses were performed in response to comments received on the NPR urging EPA to conduct State-by-State modeling. The Agency does not believe it is required to provide for additional comment on every action it takes in response to comment, particularly where, as here, the new information confirms the Agency's proposed conclusions. Therefore, the Agency did not further extend the comment period.

4. Public Hearings

The Agency conducted two hearings in Washington, DC, including a 2-day hearing on February 3–4, 1998 for the NPR, and a 1-day hearing on May 29, 1998 for the SNPR. Some commenters believe that additional public hearings should have been held in other locations in the OTAG region. The EPA believes these hearings provided reasonable opportunity for oral comment on the proposed rulemaking given the timeframes associated with this rulemaking. Therefore, the Agency did not schedule any additional hearings. The public also had an opportunity to submit written testimony within approximately 30 days after each hearing date.

G. Implementation of Revised Air Quality Standards

On July 18, 1997, EPA published its final rule for strengthening the NAAQS for ozone by establishing an 8-hour standard (62 FR 38856). Current monitoring data indicate that many areas in the East, Midwest and South violate the 8-hour NAAQS. Along with areas violating the 1-hour NAAQS, areas violating the 8-hour NAAQS are also affected by the transport of ozone across the East. The regional NO_X reduction strategy finalized in today's action will provide a mechanism to achieve reductions that will assist States in attaining and maintaining this revised standard. In fact, the regional reductions alone should be enough to enable the vast majority of the new counties violating the 8-hour NAAQS that are located in States throughout the East to attain the revised 8-hour standard.[9]

On July 16, 1997, President Clinton issued a directive on the implementation of the revised air quality standards. This implementation policy was described in the NPR (62 FR 60318, 60362–64). The EPA received numerous comments on this implementation policy and on EPA's plan to create a transitional classification[10] for 8-hour ozone nonattainment areas that meet certain

[8] Variable-Grid Urban Airshed Model.

[9] In the NPR (62 FR 60318, 60363), EPA provided estimates of the number of counties expected to attain as a result of the NO_X SIP call. The EPA will update this list in the coming months. The updated estimates of which counties will attain will be based on more current air quality data and on the State-by-State emissions budgets contained in today's final rule.

[10] The ''transitional classification'' EPA intends for 8-hour ozone nonattainment areas is further discussed in the NPR (62 FR 60318, 60363).

criteria. Since these comments concern implementation efforts for the revised 8-hour ozone standard and do not relate directly to the NO_X SIP call on which EPA is taking final action in this rulemaking, EPA is not responding in detail to the comments. The EPA will address implementation of the revised standard separately. In August 1998, EPA issued proposed guidance for public comment to explain the implementation policy in further detail and to provide details on SIP requirements for transitional areas (63 FR 45060, August 24, 1998). The EPA expects to finalize the August 1998 draft guidance, as well as guidance for areas other than transitional, by December 1998.[11]

H. Summary of Major Changes Between Proposals and Final Rule

This summary describes the major changes that have occurred since the NPR and SNPR in each of the following sections of today's final rule.

1. EPA's Analytical Approach (Section II.A)

- The NPR proposed two interpretations for the section 110(a)(2)(D)(i)(I) provisions concerning the ''significant contribution'' test. Under the first, EPA would examine certain factors relating to level of emissions and their ambient impact to determine whether to make a finding that all of the emissions from a particular State's sources contribute significantly to nonattainment or maintenance problems downwind. If EPA made such a finding, then EPA would examine certain cost factors to determine the extent to which the SIP for the State must mitigate (reduce) its emissions. Under the second interpretation, EPA would examine all of those factors together—level of emissions, ambient impact, and costs—to determine whether to make the finding with respect to a specified amount of emissions. If EPA made the finding, then it would require the SIP to eliminate that amount. In today's final rule, EPA is adopting the second interpretation. The EPA indicates, however, that it would adopt the same rule if it were instead implementing the first interpretation.

2. Cost Effectiveness of Emissions Reductions (Section II.D.)

- The methodology of determining cost effectiveness has not changed. For all sources, the inventory and as a result, the source-specific costs, in some cases, have changed. This results in a different overall budget level and a different overall cost-effectiveness value. For the non-EGUs, while the methodology has not changed, the analysis focuses on large non-EGU sources. The methodology in the NPR focused on all non-EGU sources.

3. Determination of Budgets (Section III.)

- For EGU, the EPA maintained the approach to use the higher, by State, of 1995 or 1996 heat input data to calculate baseline heat input rates for the NFR, and added 577 smaller units to the State budget inventories which had erroneously been omitted from the NPR. These units included electricity generating sources of 25 megawatts (MW) or less of electrical output and additional units not affected under the Acid Rain Program. Additional controls are not assumed for these sources, but they are added to the budget at baseline levels. The Agency has decided to use State-specific growth factors derived from application of the IPM using the 1998 Base Case and chose to retain the 0.15 lbs/mmBtu as the assumed uniform control level for EGU budget emissions determination.
- The EPA examined alternatives that focus on non-EGU point source reductions from the largest source categories, and within each of these categories assumed controls that would result in a regionwide average cost effectiveness less than $2000/ton. The resulting budget assumes the emissions reductions from large non-EGU sources that are among the most cost effective to control and does not include reductions from smaller sources and sources that, as a group, are not quite as cost effective or efficient to control, or are already covered by other Federal measures. As a result, this final rule assumes, for purposes of calculating the State NO_X budgets, the following emissions decreases from uncontrolled levels for the large (generally greater than 250 mmBtu or 1 ton/day non-EGU sources (no emission reductions are assumed for the smaller sources):

—Non-EGU boilers and turbines—60 percent decrease.
—Stationary internal combustion engines—90 percent decrease.
—Cement manufacturing plants—30 percent decrease.

It should be noted that point sources with capacities less than 250 mmBtu/hr but with emissions greater than 1 ton/day are not treated differently from sources with capacities greater than 250 mmBtu/hr for purposes of calculating the budget. This is a change from the NPR which included RACT controls on units with capacities less than 250 mmBtu/hr and emissions greater than 1 ton/day (see Section III.G.2.a). As under the proposal, the rule allows States to choose control measures other than the EPA-assumed controls to meet the numerical budgets.

- The EPA has implemented the following changes that the Agency proposed in the NPR for calculating baseline NO_X emissions from highway vehicles. A 1995 baseline is used for the final rule in place of the 1990 baseline used in the NPR. The Highway Performance and Monitoring System data were used to estimate States' 1995 vehicle miles traveled (VMT) by vehicle category, except in those cases where EPA accepted revisions offered in the comments. Today's action includes those mobile source reductions which EPA has determined are appropriate to implement on a national basis, and which have been promulgated in final form or are expected to be promulgated in final form before States are required to comply with their budgets. The highway vehicle budget components include the emission reductions resulting from implementation of the National Low Emitting Vehicle (NLEV) program, including the phase-in schedule agreed to by the States, automobile manufacturers, and EPA. The highway budget components do not include the effect of Tier 2 light-duty vehicle and truck standards and any associated fuel standards since these standards have not yet been proposed. The extent of the reformulated gasoline (RFG) and inspection and maintenance (I/M) programs was not assumed to change beyond that assumed for the NPR, except for those States that were able to demonstrate that the NPR's modeling assumptions did not conform to the State's SIP and did not reflect CAA requirements.
- The EPA has chosen to retain the 1990 baseline inventories for nonroad mobile sources presented in the NPR for today's action, with additional changes made in response to public comments. The control strategies assumed for calculating the nonroad and stationary area source budget components have not changed from the SNPR.

4. NO_X Control Implementation and Budget Achievement Dates (Section V)

- The EPA proposed that the SIP revisions require full implementation of the necessary State measures by September 2002 and took comment on a range of dates from September 2002 through September 2004. Based on

[11] For a complete listing of the guidance and other actions EPA plans to issue to implement the revised ozone and PM NAAQS, see a table on EPA's implementation website: http://ttnwww.rtpnc.epa.gov/implement/actions.htm.

public comments and feasibility analyses conducted by EPA, the Agency is requiring an implementation date of May 1, 2003. The Agency is also providing some compliance flexibility to States for the 2003 and 2004 ozone seasons by establishing State compliance supplement pools. This is described in Section III.F.6.

5. SIP Criteria (Section VI.A)

- The Agency has determined that the additional SIP approvability criteria, as proposed in the SNPR, should apply not only when States choose to regulate EGUs (63 FR 25912), but also when States choose to regulate large steam-producing units (i.e., combustion turbines and combined cycle systems with a capacity greater than 250 mmBtu/hr).
- The Agency proposed revisions to part 51 requiring continuous emissions monitoring systems (CEMS) on all large electrical generating and steam-producing sources which States elect to subject to emissions reduction requirements in response to this rulemaking. The EPA took comment on requiring that, if a State chooses to regulate these sources to meet the SIP call, the SIP must require these sources to use the NO_X mass monitoring provisions of part 75, subpart H, to demonstrate compliance with applicable emissions control requirements. After considering comments, the Agency is requiring that, in these circumstances, the SIP specify that large sources comply with the monitoring provisions of part 75, subpart H, which includes non-CEMS monitoring options for units that are infrequently operated or units that have low mass emissions.

6. Emissions Reporting Requirements for States (Section VI.B)

- The proposed rule required that States report full-year, as well as ozone-season, emissions from all sources for the triennial inventories commencing with year 2002 emissions and the 2007 inventory, and for those sources for which reports had to be submitted annually starting with year 2003 emissions. The final rule requires only ozone-season emissions reporting for all sources.
- In the SNPR, the EPA proposed, for purposes of reporting requirements, to define a point source as a non-mobile source which has NO_X emissions of 100 tons/year or greater. Under today's action, States have the option of establishing a smaller emission threshold than 100 tons/year of NO_X emissions in defining point source. This will allow the definition of point source to remain consistent with current definitions in local areas.

7. NO_X Budget Trading Program (Section VII.)

- For States that choose to participate in the NO_X Budget Trading Program, the preamble clarifies the intent of the model rule and identifies areas of the rule where States have flexibility to include variations in their State rules.
- In the SNPR, the Agency solicited comment on a range of options for incorporating banking into the trading program. After considering these comments, the Agency is including banking provisions in the final rule. The provisions allow for unlimited banking starting in 2003 and includes a flow control mechanism to limit the emissions variability associated with banking.
- One of the banking approaches presented in the SNPR included the option for sources to generate and use early reduction credits. Consistent with the provisions of the NO_X SIP call which provide for State compliance supplement pools, the final rule allows States to issue early reduction credits for certain NO_X emissions reductions achieved between September 30, 1999 and May 1, 2003.
- The final rule clarifies the timing requirements for State submission of allowance allocations to EPA and, as proposed, lays out an allocation approach. Each State remains free to adopt the final rule's allocation approach or adopt an allocation scheme of its own, provided it meets the specified timing requirements, requires new sources to hold allowances, and does not allocate more allowances than are available in the State trading budget.

8. Interaction with Title IV NO_X Rule (Section VIII.)

- In the SNPR, EPA proposed revisions to part 76 addressing the interaction between title IV and the NO_X SIP call. In this final rule, EPA explains that the Agency is not adopting any of the proposed revisions to part 76.

9. Administrative Requirements (Section X.)

- NPR Section VIII, Regulatory Analyses, has been replaced in the final rule by Section X.A, Executive Order 12866: Regulatory Impacts Analysis. The new final rule Section X.A indicates that EPA has prepared a RIA for the final rule and cites the cost and benefit estimates from that analysis.
- The final rule adds several Sections under X, Administrative Requirements, that were absent from the NPR. These include: Paperwork Reduction Act; Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks; Executive Order 12898: Environmental Justice; Executive Order 12875: Enhancing the Intergovernmental Partnerships; Executive Order 13084: Consultation and Coordination with Indian Tribal Governments; Judicial Review; and Congressional Review Act. These new Sections provide a more comprehensive summary of the Acts and Executive Orders that could apply to the final rule. Each Section identifies the requirements of the relevant Act or Executive Order, indicates EPA's interpretation of whether the Act or Executive Order actually applies to this rulemaking, and, if so, indicates how the Agency has addressed the Act or Executive Order.

II. EPA's Analytical Approach

A. Interpretation of the CAA's Transport Provisions

As indicated in the NPR, 62 FR 60323, the primary statutory basis for today's action is the ''good neighbor'' provision of section 110(a)(2)(D)(i)(I), under which, in general, each SIP is required to include provisions assuring that sources within the State do not emit pollutants in amounts that significantly contribute to nonattainment or maintenance problems downwind. This statutory requirement applies to SIPs under both the 1-hour ozone NAAQS and the 8-hour ozone NAAQS.

1. Authority and Process for Requiring SIP Submissions Under the 1-Hour Ozone NAAQS

a. Authority for Requiring SIP Submissions under the 1-Hour NAAQS. Each State is currently required to have in place a SIP that implements the 1-hour ozone NAAQS for areas to which that standard still applies. In the NAAQS rulemaking, EPA determined that the 1-hour NAAQS would cease to apply to areas that EPA determines have air quality in attainment of that NAAQS (40 CFR 50.9(b)). In two recent rulemakings, EPA identified numerous areas of the country to which the 1-hour NAAQS no longer applies. ''Final Rule: Identification of Ozone Areas Attaining the 1-Hour Standard and to Which the 1-Hour Standard is No Longer Applicable,'' (63 FR 31014, June 5, 1998); ''Final Rule: Identification of Additional Ozone Areas Attaining the 1-Hour Standard and to Which the 1-Hour Standard is No Longer Applicable,'' (63 FR 27247, July 22, 1998).

The 1-hour NAAQS remains applicable to areas whose air quality continues to monitor nonattainment. As noted above in Section I.B, General

Factual Background, these include many major urban areas in the eastern half of the United States. States that contain these areas remain responsible for meeting CAA requirements applicable to those areas for the purpose of attaining the 1-hour NAAQS. For example, States are responsible for attainment demonstrations for areas designated nonattainment and classified as moderate or higher.

By the same token, States that are upwind of these areas are responsible to meet the ''good neighbor'' requirements of section 110(a)(2)(D). This responsibility is not alleviated simply because, for areas other than the current nonattainment areas, the 8-hour NAAQS has replaced the 1-hour NAAQS.

b. Process for Requiring SIP Submissions under the 1-Hour NAAQS. As explained in the NPR, the appropriate route for EPA to require SIP submissions under section 110(a)(2)(D)(i)(I) with respect to the 1-hour standard is issuance of a ''SIP call'' under section 110(k)(5).[12] Section 110(k)(5) authorizes EPA to find that a SIP is substantially inadequate to meet a CAA requirement and to require (''call for'') the State to submit, within a specified period, a SIP revision to correct the inadequacy. Specifically, section 110(k)(5) provides, in relevant part:

> Whenever the Administrator finds that the applicable implementation plan for any area is substantially inadequate to attain or maintain the relevant [NAAQS], to mitigate adequately the interstate pollutant transport described in section 176A or section 184, or to otherwise comply with any requirement of this Act, the Administrator shall require the State to revise the plan as necessary to correct such inadequacies. The Administrator shall notify the State of the inadequacies, and may establish reasonable deadlines (not to exceed 18 months after the date of such notice) for the submission of such plan revisions.

By today's action, EPA is determining that the SIPs for the specified jurisdictions are substantially inadequate to comply with the requirements of section 110(a)(2)(D)(i)(I) because the relevant SIPs do not contain adequate provisions prohibiting their sources from emitting amounts of NO_X emissions that contribute significantly to nonattainment in downwind areas that remain subject to the 1-hour NAAQS. Based on these determinations, EPA is requiring the identified States to submit SIP revisions containing adequate provisions to limit emissions to the appropriate amount.

If a State does not submit the required SIP provisions in response to this SIP call, EPA will issue a finding that the State failed to make a required SIP submittal under section 179(a). This finding has implications for sanctions as well as for EPA's promulgation of Federal implementation plans (FIPs). Sanctions and FIPs are discussed in Section VI, SIP Criteria and Emissions Reporting Requirements.

(1) Commenters' Arguments Concerning the Transport Provisions. Commenters argued that EPA does not have unilateral authority to issue a SIP call under section 110(k)(5) to require States to remedy SIPs that do not meet the requirements of section 110(a)(2)(D). The commenters noted that when Congress amended the CAA in 1990, Congress provided that the sole authority for EPA and States to address interstate transport of pollution is through transport commissions. In support, the commenters state that Congress: (i) Added sections 176A and 184, which authorize the establishment of transport regions and the formation of transport commissions; (ii) revised section 110(k)(5) to refer to those transport provisions; and (iii) revised section 110(a)(2)(D)(i) to require that SIP provisions designed to eliminate interstate pollutant transport be consistent with other CAA requirements. According to the commenters, these provisions, read as a whole, mandate that if EPA believes that a transport problem exists, EPA's sole recourse is to form a transport region under sections 176A and/or 184; EPA may issue a SIP call to mandate compliance with section 110(a)(2)(D)(i) only in response to a recommendation of the transport region. The commenters also claim that this scheme is sensible because it provides a consensual forum for States to address interstate pollution rather than allowing unilateral action on the part of EPA or a State.

The EPA disagrees with the commenters' conclusion that these statutory provisions make clear that EPA cannot require a State to address interstate transport without first establishing a transport commission and in the absence of a recommendation from the transport commission. There is no language of limitation in sections 110(a)(2)(D) or (k)(5), or 176A, or 184. Nor is there any support in the legislative history for such a narrow reading of the statute. Moreover, under the commenters' interpretation, the CAA Amendments of 1990 have placed greater constraints on States' and EPA's ability to address the interstate transport of pollution. Such an interpretation would be inconsistent with the overall purpose of the CAA to ensure healthful air. Thus, EPA believes that the transport provisions were added as an additional tool to address interstate transport but were not intended to preclude other methods of addressing interstate pollution than prior to passage of the amendments.

Under the 1990 Amendments, Congress recognized the growing evidence that ozone and its precursors can be transported over long distances and that the control of transported ozone was a key to achieving attainment of the ozone standard across the nation (Cong. Rec. S16903 (daily ed. Oct. 27, 1990) (statement of Sen. Mitchell); S16970 (conference report) S16986–87 (statement of Sen. Lieberman)). Thus, in 1990, Congress added a new mechanism to address interstate transport. Specifically, Congress enacted sections 176A and 184, which provide a mechanism for States to work together to address the interstate transport problem. However, by their terms, these sections simply provide authority for EPA to designate transport regions and establish transport commissions. There is nothing in the language of these provisions that indicates that they supersede the other statutory mechanisms for addressing interstate transport, or that they now provide the sole mechanism for resolving interstate pollution transport.

Moreover, although Congress expressly added these two provisions through the 1990 Amendments, Congress did not in any way limit section 110(a)(2)(D), which requires States to address interstate transport in their SIPs. The addition of the language providing that States' actions under section 110(a)(2)(D) be ''consistent with [title I] of the Act'' cannot be read to limit the controls States may adopt to meet section 110(a)(2)(D) to those recommended by a transport commission.[13] After all, the transport region provisions are only two of many provisions in title I. Rather, this

[12] As discussed in the NPR and in greater detail further below, the basis for requiring a transport-related SIP revision for the 8-hour standard is the requirement in section 110(a)(1) that States submit SIPs meeting the requirements of section 110(a)(2) within 3 years (or an earlier date established by EPA) of promulgation of a new or revised NAAQS. This is discussed in further detail below.

[13] Taken to its logical conclusion, the commenters' argument would mean that States are precluded from submitting a section 110(a)(2)(D) SIP unless it reflects measures recommended through the transport commission process. The EPA does not believe that Congress would first establish a specific mandate (to submit a SIP to address interstate transport) and then limit it in such a cryptic fashion. If Congress intended section 110(a)(2)(D) SIPs to only reflect transport commission recommendations, Congress could have specifically referenced sections 176A and 184 in section 110(a)(2)(D), rather than generally providing that SIPs be ''consistent'' with title I of the CAA.

language concerning consistency should be read as clarifying that any section 110(a)(2)(D) requirement must be consistent with other provisions of title I. Similarly, this language makes explicit that SIP revisions required in accordance with the procedures of the transport provisions would meet the requirements of section 110(a)(2)(D)(i).

Furthermore, it is significant that Congress did not in any sense bind EPA's ultimate discretion to determine whether State plans appropriately address interstate transport. Under sections 176A and 184, the States may only make recommendations to EPA. Thus, under the transport provisions, as well as the general SIP requirements of section 110(a)(2), EPA must ultimately decide whether the SIP meets the applicable requirements of the CAA. If, as the commenters contend, EPA is limited to calling on States to address interstate transport only by strategies recommended by the State, then EPA would be precluded from ensuring that States address interstate transport. For example, EPA could establish a transport commission but the commission could fail to make recommendations or make insufficient recommendations. (Section 176A provides that transport commissions may make recommendations to EPA only by ''majority vote of all members'' other than those representing EPA.) Such a reading of the statute would be absurd in light of the growing recognition at the time of the 1990 Amendments that transport is a real threat to the primary purpose of title I of the CAA—attainment of the NAAQS.

By the same token, in amending section 110(k)(5) in the 1990 Amendments, Congress did not add anything that explicitly provides that, in the case of interstate transport, section 110(k)(5) would apply only when EPA approved (or substituted measures for) a transport commission's recommendations. The reference in section 110(k)(5) to the transport provisions of sections 176A and 184 does not preclude EPA's use of the SIP call provision to call on States to ensure their SIPs meet the requirements of section 110(a)(2)(D)(i). Section 110(k)(5) also provides for EPA to call on States ''to otherwise comply with requirements of this Act;'' among the requirements in chapter I of the CAA is the requirement in section 110(a)(2)(D). The reference in section 110(k)(5) to the transport provisions simply makes explicit that EPA may employ section 110(k)(5) for the additional purpose of requiring SIPs to include the control measures as recommended by transport commissions and approved by EPA under the transport provisions.

Moreover, there is no indication in the legislative history of the 1990 Amendments that Congress intended the sections 176A and 184 transport provisions to supersede the section 110(k)(5) SIP call mechanism for ensuring compliance with section 110(a)(2)(D)(i). Reading the transport provisions to supersede the SIP call mechanism would constitute a significant change from the CAA as it read prior to the 1990 Amendments. Even if the statute is ambiguous as to whether the transport provisions supersede the SIP call mechanism—and EPA believes the statute is clear that the transport provisions do not supersede—congressional silence would suggest that Congress did not intend such a significant change (See generally *Harrison* v. *PPG Industries, Inc.*, 446 U.S. 578, 602, 100 S.Ct. 1889, 1902, 64 L.Ed.2d 525 (1980) (Rehnquist, J., dissenting), *cited with approval in Chisom* v. *Roemer*, 501 U.S. 380, 396 n. 23, 111 S.Ct. 2354, 2364 n. 23, 115 L.Ed.2d 348 (1991)).

Finally, the commenter asserts that EPA's interpretation of the CAA to allow a SIP call in the absence of a transport commission recommendation reads out of the CAA the consensual transport commission procedures under sections 176A and 184. This is simply not true. The EPA interprets the transport commission process to be one tool to assess and address interstate transport. In fact, the Northeast Ozone Transport Commission, under section 184, has been active since enactment of the 1990 Amendments. In 1995, EPA approved a recommendation of that commission (60 FR 4712 [14]). Transport commissions remain a viable means for dealing with interstate transport. Furthermore, contrary to the general implication of the commenter's remark, the OTAG process, though not a formal transport commission, provided an opportunity not only for Federal and State governments to assess jointly the transport issue, but also involved industry, environmental groups and others. The EPA based its SIP call on information developed through OTAG, as well as additional analyses performed by the Agency and information submitted by a variety of groups during the comment period on the proposed rule. Thus, the OTAG process contained consensual elements.

(2) Commenters' Arguments Concerning the Virginia case. Under one of the approaches described in the proposed rule, EPA proposed to determine, for each of various upwind States, the aggregate ''amounts'' of air pollutants (NO_X) that contribute significantly to nonattainment, and that, therefore must be prohibited by the various SIPs. The NO_X emissions budget for each State is an expression of the amount of NO_X emissions that would remain after the State prohibits the amount that contributes significantly to downwind nonattainment. In the final rule issued today, EPA has continued this approach, establishing emissions budgets for each of the 23 jurisdictions based on required reductions. This determination is an important step toward assuring that overall air quality standards are met downwind.

Commenters argue that even if EPA has authority to call on States to address interstate transport, EPA does not have the authority under section 110(a)(2)(D) to mandate that upwind States limit NO_X emissions to specified amounts. Rather, according to this view, EPA's authority is limited to determining that the upwind States' SIPs are inadequate, and generally requiring the upwind States to submit SIP revisions to correct the inadequacies. The upwind States would then, according to this view, submit a SIP revision that implements what the upwind States determine to be the appropriate amount of NO_X reductions. If EPA believes that those amounts are too small to correct the inadequacy, EPA could disapprove the SIP revisions.

Proponents of this view rely on the recent decision in *Virginia* v. *EPA*, 108 F.3d 1397, 1406–10 (D.C. Cir. 1997) (*Virginia*) (citing *Train* v. *NRDC*), in which the court vacated EPA's SIP call on the basis that through it, EPA gave States no choice but to adopt the California low emission vehicle (LEV) program. The court found that the language in section 110(k)(5) that provides EPA with the authority to call on a State to revise its SIP ''as necessary'' to correct a substantial inadequacy did not change the longstanding precept that States have the primary authority for determining the mix of control measures needed to attain the NAAQS.

The EPA disagrees that the CAA prohibits EPA from establishing an emissions budget through a SIP call requiring upwind States to prohibit emissions that contribute significantly to downwind nonattainment. Section

[14] In *Commonwealth of Virginia* v. *EPA*, 108 F.3d 1397 (D.C. Cir. 1997), the court vacated EPA's SIP call in response to the Northeast Ozone Transport Commission's recommendation on the basis that the EPA could not require States to adopt a specific control measure under its section 110(k)(5) authority and that, in any event, EPA could not require States to adopt stricter motor vehicle emission standards under either section 110(k)(5) or section 184.

110(a)(2)(D) is silent regarding whether States or EPA are to determine the level of emission reductions necessary to mitigate significant contribution. The caselaw cited by the commenters only provides that States are primarily responsible for determining the mix of control measures—not the aggregate emission reduction levels that are necessary. Moreover, *Train* v. *NRDC*, which underlies the *Virginia* court's decision, relied on section 107(a) of the CAA, which specifies only that each State is primarily responsible for determining a control strategy to attain the NAAQS ''within such State.''

Section 110(a)(2)(D) does not provide who—EPA or the States—is to determine the level of emission reductions necessary to address interstate transport. As quoted above, section 110(a)(2)(D)(i)(I) requires that SIPs contain ''adequate provisions prohibiting * * * [sources] from emitting any air pollutant in amounts which will contribute significantly to nonattainment'' downwind. Nor does this provision indicate the criteria for determining the ''amounts'' of pollutants that contribute significantly to nonattainment downwind. Nor does this provision indicate the process for determining those ''amounts,'' including whether EPA or the States should carry out this responsibility. [15] Under *Chevron U.S.A., Inc.* v. *Natural Resources Defense Council*, 468 U.S. 1227, 105 S.Ct. 28, 82 L.Ed.2d 921 (1984) (*Chevron*), because the statute does not answer these specific issues, EPA has discretion to provide a reasonable interpretation.

Neither the decision in *Virginia*, nor the body of caselaw upon which it relies, addresses this issue. Rather, these cases address solely the division between the States and EPA regarding the initial identification of control measures necessary to attain the ambient air quality standards. The issue before the court in Virginia was whether EPA had offered States a choice in selecting control measures or instead had mandated the adoption of a specific control measure. Relying on *Train* v. *NRDC*, 421 U.S. 60, 95 S.Ct. 1470, 43 L.Ed.2d 731 1975), the *Virginia* court found that under title I of the CAA, EPA is required to establish the overall air quality standards, but the States are primarily responsible for determining the mix of control measures needed to meet those standards and the sources that must implement controls, as well as the applicable level of control for those sources. The EPA must then review the State's determination only to the extent of assuring that the overall air quality standards are met. If EPA determines that the SIP's mix of control measures does not result in achieving the overall air quality standards, EPA is required to disapprove the SIP and promulgate a FIP, under which EPA selects the sources for emissions reductions (*Virginia*, 108 F.3d at 1407–08, *citing Train* v. *NRDC*, 421 U.S. 60, 95 S.Ct. 1470, 43 L.Ed.2d 731 (1975); *Union Electric Co.* v. *EPA*, 427 U.S. 246, 96 S.Ct. 2518, 49 L.Ed.2d 474 (1976)). This line of cases, which focuses on the selection of controls, does not address whether EPA or the States—in the first instance—should determine the aggregate amount of reductions necessary to address interstate transport.

Moreover, *NRDC* v. *Train* addresses State plans for purposes of intrastate emissions planning. In determining that States have the primary authority for determining the control measures needed to attain the standard, the court relied on section 107(a) of the CAA, which provided (and still provides) that:

> Each State shall have the primary responsibility for assuring air quality within the entire geographic area comprising such State by submitting an implementation plan which will specify the manner in which national primary and secondary ambient air quality standards will be achieved and maintained within each air quality region in such State.''

(421 U.S. at 64, 95 S.Ct at 1474–75 (emphasis added)).

Thus, the underlying support for the court's determination in *Train* v. *NRDC* applies only where a State is determining the mix of controls within its boundaries, not to the broader task of determining the aggregate emissions reductions needed in conjunction with emissions reductions from a number of other States in order to address the impact of transported pollution on downwind States. [16]

Although the cases to date have not addressed directly whether it is the province of EPA or the States to determine the aggregate amounts of emissions to be prohibited (and hence, the amounts that may remain—i.e., the emissions budgets), EPA believes it reasonable to interpret the ambiguity in section 110(a)(2)(D)(i)(I) to include this determination among EPA's responsibilities, particularly in the current circumstances. Determining the overall level of air pollutants allowed to be emitted in a State is comparable to determining overall standards of air quality, which the courts have recognized as EPA's responsibility, and is distinguishable from determining the particular mix of controls among individual sources to attain those standards, which the caselaw identifies as a State responsibility. In *Train*, a State was required to assure that its own air quality attained overall air quality standards and to implement emissions controls to do so. Under these circumstances, the court clarified that while the responsibility for determining the overall air quality standards was EPA's, the responsibility for determining the specific mix of controls designed to achieve that air quality was the State's. By comparison, as stated earlier, a transport case, under section 110(a)(2)(D)(i), does not concern any requirement of the upwind State to assure that its own air quality attains overall air quality standards. Rather, a transport case concerns the upwind State's requirement to assure that its emissions are reduced to a level that will not contribute significantly to nonattainment downwind. Determining this overall level of reductions for the upwind State is analogous to determining overall air quality standards, and, thus, should be the responsibility of EPA.

Once EPA determines the overall level of reductions (by assigning the aggregate amounts of emissions that must be eliminated to meet the requirements of section 110(a)(2)(D)), it falls to the State to determine the appropriate mix of controls to achieve those reductions. Unlike the regulation at issue in *Virginia*, today's regulation establishing emission budgets for the States does not limit the States to one set of emission controls. Rather, the States will have significant discretion to choose the appropriate mix of controls to meet the emissions budget. The EPA has based the aggregate amounts to be prohibited on the availability of a subset of cost-effective controls that are among the most cost effective available. As explained elsewhere in this final rule and the NPR, the State may choose from a broader menu of cost-effective, reasonable alternatives, including some (e.g., vehicle inspection and maintenance programs and reformulated

[15] The EPA is not contending that the ''as necessary'' language in section 110(k)(5) provides the basis for EPA's authority to identify the emissions budget for upwind States.

[16] The court's decision in *Train* v. *NRDC* appears to rely on the plain language of the statute in holding that a State is primarily responsible for determining the mix of control measures necessary to demonstrate attainment within that State's borders. The court in *Virginia* appears to adopt this ''plain meaning'' interpretation without addressing that the language in section 107(a) applies only to intrastate issues. This issue is not relevant in the present case, however, since States are free to decide the mix of control measures under today's final action.

standard. Additional requirements, such as the use of RFG and the use of vapor recovery devices on gasoline pumps, are also required for certain areas (see generally, CAA section 182 and, e.g., section 211(k)). Thus, downwind areas with nonattainment problems under the 1-hour NAAQS are under current obligations to submit SIP revisions containing local control measures for that standard. For these areas, local reductions needed to meet the 1-hour standard are already occurring and will be achieved prior to or on the same schedule as reductions States may require in response to the SIP call.

Furthermore, in many of the downwind areas, States have been taking action to reduce ozone levels for many years in order to meet the 1-hour ozone NAAQS. Although the fact that the 8-hour ozone NAAQS is a new form of the ozone standard, however, should not obscure the fact that the downwind States have been making efforts to reduce ozone levels for decades. The EPA believes that the history of implementation by downwind areas of ozone pollution controls further mitigates the commenters' argument that it is absurd to require upwind areas to implement controls in advance of downwind attainment demonstrations under the 8-hour NAAQS.[23]

Moreover, virtually all of the downwind States affected by today's rulemaking, due to 8-hour ozone nonattainment or maintenance problems, are themselves upwind contributors to problems further downwind, and, thus, are subject to the same requirements as the States further upwind.[24] The reductions these downwind States must implement due to their additional role as upwind States will help reduce their own 8-hour ozone problems on the same schedule as emissions reductions for the upwind States. Accordingly, for the most part, this rulemaking does not require upwind areas to take action in advance of any action by downwind areas to ameliorate the downwind problems.

Finally, even if EPA were requiring upwind States to take action to reduce downwind nonattainment and maintenance in advance of action by the downwind States, this would simply require upwind areas to take the first step by developing SIPs to eliminate their significant contribution to the downwind problem. The downwind areas will be required to take the next step by developing SIPs that address their share. Generally, an agency may resolve a problem (in this case, downwind nonattainment) on a step-by-step basis (see e.g., *Group Against Smog and Pollution, Inc.* v. *EPA*, 665 F.2d 1284, 1291–92 (D.C. Cir. 1981)).

A commenter has observed that under section 110(a)(1), EPA may authorize section 110(a)(2) submittals as late as 3 years after revision of a NAAQS, which, in this case, would run until July 2000. The Early Planning Guidance, described above, indicates that States are allowed until July 2000 to make submissions concerning other elements of section 110(a)(2). However, as described elsewhere, EPA has determined that the section 110(a)(2)(D) submittals should be submitted by the end of September 1999 to assure that the required NO_X reductions will be implemented as expeditiously as practicable, which EPA has determined is no later than the May 1 start of the 2003 ozone season (see Section V, below).

Citing section 107(a) of the CAA, the commenters assert that the CAA requires downwind areas to fully adopt and implement all statutorily required or necessary measures before EPA can require upwind areas to control emissions. Section 107 provides that States shall have the primary responsibility for assuring air quality within the State by submitting a plan that specifies how the NAAQS will be achieved and maintained in the State. The commenters attempt to read this statement regarding a State's authority to choose the mix of control measures within State boundaries as barring the control of emissions from upwind States.

This provision may be read as focusing on the State-Federal balance in controlling criteria pollutants, such as ozone, not any upwind-State, downwind-State balance. The provision indicates that although EPA may promulgate Federal measures that provide reductions to help States reach attainment, States bear the ultimate responsibility for assuring attainment. Further, this provision may be read to indicate that States may choose the mix of controls to reach attainment within their own boundaries. Nothing in this provision purports to address the need for upwind controls. By comparison, section 110(a)(2)(D) affirmatively requires States to submit a SIP prohibiting emissions that significantly contribute to downwind nonattainment or interfere with maintenance of the NAAQS. Thus, the statute, read as a whole, contemplates that interstate transport will be addressed as part of the downwind States' attainment responsibilities. Indeed, determining the upwind area's share of the problem is necessary in order for downwind attainment planning. In the absence of the upwind reductions that will be achieved, the downwind area would be required to submit an attainment plan to demonstrate attainment regardless of cost and without benefit of the reduction of upwind emissions that significantly contribute to nonattainment. In light of the statute as a whole, it is absurd to argue that Congress intended downwind areas to reduce emissions at any cost while upwind sources that significantly contribute to that nonattainment remain unregulated. Congress attempted to balance responsibilities, providing that States could choose the mix of controls within the State's borders (CAA section 107(a)) and are ultimately responsible for assuring attainment, but also recognizing that emissions reductions from upwind States may be needed for attainment (CAA section 110(a)(2)(D)(i)).

b. Process for Requiring SIP Submissions under the 8-Hour Standard. The time by which the section 110(a)(2)(D) SIP revision under the 8-hour NAAQS must be submitted is governed by section 110(a)(1), which requires the SIP revision to be ''adopt[ed] and submit[ed] to the Administrator, within 3 years (or such shorter period as the Administrator may prescribe) after the promulgation of a [NAAQS] (or any revision thereof) . . . .'' In the NPR, EPA indicated that the SIP revision would be due by the end of September 1999, which EPA expected to be 12 months from the date of completing today's final rule. In today's action, EPA is confirming that the SIP revision will be due September 30, 1999, for the reasons described below in Section VI.A.1, Schedule for SIP Revision.

3. Requirements of Section 110(a)(2)(D)

a. Summary. Today's action is driven by the requirements of CAA section 110(a)(2)(D). This provides that each SIP must—

[23] Although the SIP call will provide a benefit to a wide number of areas, the focus of the SIP call is to reduce boundary conditions for a number of areas that will have difficulty attaining either the 1-hour or 8-hour standard (or both) without the benefit of reductions from outside the nonattainment area. Based on current monitoring data and modeling, EPA predicts that there will be a number of areas that are meeting the 1-hour standard that will be designated nonattainment for the 8-hour standard. The EPA further predicts that many of these areas will come back into attainment due solely to the emission reductions achieved by the NO_X SIP call. However, this incidental benefit—which likely will occur without the need for local emission reductions—does not preclude EPA from requiring the SIP call reductions, which are needed to help other more seriously polluted areas that have long-standing pollution problems.

[24] Maine, New Hampshire, and Vermont are the only downwind States that are not subject to today's action.

* * * contain adequate provisions—(I) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will—(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard * * *

According to section 110(a)(2)(D), the SIP for each area, regardless of its designation as nonattainment or attainment (including unclassifiable), must prohibit sources within the area from emitting air pollutants in amounts that will ''contribute significantly'' to ''nonattainment'' in a downwind State, or that ''interfere with maintenance'' in a downwind State.

b. Determination of Meaning of ''Nonattainment'' (1) Geographic Scope. In determining the meaning and scope of section 110(a)(2)(D), it is useful first to determine the geographic scope of ''nonattainment'' downwind.

At proposal, EPA stated that it—

* * * proposes to interpret this term to refer to air quality and not to be limited to currently-designated nonattainment areas. Section 110(a)(2)(D) does not refer to ''nonattainment areas,'' which is a phrase that EPA interprets to refer to areas that are designated nonattainment under * * * section 107(d)(1)(A)(I) * * * . Rather, the provision includes only the term 'nonattainment' and does not define that term. Under these circumstances, EPA has discretion to give the term a reasonable definition, and EPA proposes to define it to include areas whose air quality currently violates the NAAQS, and will likely continue [to violate in the future], regardless of the designation of those areas * * *

(62 FR 60324).

To determine whether areas would continue to violate in the future, EPA proposed to take into account the reductions that would result from current CAA control requirements (apart from controls that may be required under section 110(a)(2)(D)). To take these reductions into account, EPA determined whether the area would be in nonattainment in the future based on air quality modeling that assumed CAA-mandated reductions and that accounted for growth. If an area would reach attainment based on required controls, EPA would not view that area as having a nonattainment problem to which any upwind areas may be considered to contribute.

As explained earlier, in today's action, EPA has determined that for purposes of the 8-hour NAAQS, the reference to ''nonattainment'' should be defined as EPA proposed. Thus, in determining whether an upwind area contributes significantly to ''nonattainment'' downwind, EPA would evaluate downwind areas for which monitors indicate current nonattainment, and air quality models indicate future nonattainment, taking into account CAA control requirements and growth.

For the 1-hour standard, EPA proposed to define nonattainment to include all grid cells within a county when a monitor in that county indicated nonattainment. Upon further study, EPA found that in some instances, a metropolitan area may consist of numerous counties, only a few of which contain monitors indicating nonattainment. The EPA recognizes that under the 1-hour NAAQS, nonattainment boundaries are generally used to describe the area with the nonattainment problem; accordingly, EPA believes that this geographic vicinity offers an appropriate indication of an area that may be expected to have nonattainment air quality. The EPA predicts that many 1-hour nonattainment areas that currently monitor nonattainment somewhere within the area will remain in nonattainment in 2007, in some cases because of predicted violations in counties that currently monitor attainment. The EPA believes that the entire area should be considered to be in nonattainment until all monitors in the area indicate attainment of the NAAQS. Thus, in today's action, EPA used the designated nonattainment area in determining the downwind nonattainment problem.[25]

As noted above, commenters disagreed with EPA's view that the term ''nonattainment'' covers areas with air quality that is currently in nonattainment, regardless of designation. The EPA's response to those comments is also set forth above.

(2) 2007 Projection Year. In the NPR, EPA indicated that it would adopt the year 2007 as the year for determining whether areas achieved their required NO_X budget levels. Accordingly, in determining whether downwind areas should be considered to be, and remain in, ''nonattainment,'' EPA would model their air quality in 2007, based on the implementation of CAA required controls by that date, and growth in emissions—generally due to economic growth and greater use of vehicles—by that date. At proposal, EPA adopted this same approach with respect to both the 1-hour and the 8-hour NAAQS (62 FR 60325). The EPA is continuing this approach.

c. Definition of Significant Contribution. As indicated in the NPR, neither the CAA nor its legislative history provides meaningful guidance for interpreting the term ''contribute significantly'' under section 110(a)(2)(D)(i)(I).

(1) ''Contribute.'' The initial step in defining the ''contribute significantly'' term is to determine the meaning of the term ''contribute.'' In the NPR, EPA stated that it believes this term should be defined broadly, so that emissions ''contribute'' to nonattainment downwind if they have an impact on nonattainment downwind (62 FR 60325). Air quality modeling indicated that emissions from the upwind States clearly impact downwind nonattainment problems; as a result, EPA generally folded this step of determining whether sources ''contribute'' to nonattainment downwind into the step of determining whether that contribution is ''significant,'' discussed below.

In addition, section 110(a)(2)(D)(i)(I) requires the SIP to prohibit amounts of emissions ''which *will* contribute significantly * * *'' (emphasis added). The EPA believes that the term ''will'' means that SIPs are required to eliminate the appropriate amounts of emissions that presently, or that are expected in the future, contribute significantly to nonattainment downwind.

Because ozone is a secondary pollutant formed as a result of complex chemical reactions involving numerous sources, it is not possible to determine the downwind impact on each individual source. In addition, ozone generally results from the contributions of numerous sources. As indicated in the NPR:

[U]nhealthful levels of ozone result from emissions of NO_X and VOCs from thousands of stationary sources and millions of mobile sources [and consumer products and other sources] across a broad geographic area. Each source's contribution is a small percentage of the overall problem; indeed, it is rare for emissions from even the largest single sources to exceed one percent of the inventory of ozone precursors even for a single metropolitan area. Under these circumstances, even complete elimination of any given source's emissions may well have no measurable impact in ameliorating the nonattainment problem. Rather, attainment requires controls on numerous sources across a broad area. Ozone is a regional scale

[25] It should be reiterated that EPA relied on the designated area solely as a proxy to determine which areas have air quality in nonattainment. This proxy is readily available under the 1-hour NAAQS because areas have long been designated nonattainment. The EPA's reliance on designated nonattainment areas for purposes of the 1-hour NAAQS does not indicate that the reference in section 110(a)(2)(D)(i)(I) to ''nonattainment'' should be interpreted to refer to areas designated nonattainment.

problem that requires regional scale reductions

(62 FR 60326).

Accordingly, EPA has adopted a ''collective contribution'' approach to determining whether sources ''contribute'' to nonattainment downwind: EPA determines the impact downwind of emissions in the aggregate from a particular geographic region. If the aggregated emissions are considered to contribute to nonattainment downwind, then all of the emissions in that region should be considered as contributors to that nonattainment problem. In today's action, EPA is continuing the same interpretation of the term ''contribute,'' for the reasons just described.

(2) ''Significantly''. (a) Notice of Proposed Rulemaking. In the NPR, EPA proposed a ''weight-of-evidence,'' or multi-factor, approach for determining whether a contribution is ''significant.''

The EPA proposed two separate interpretations for the term ''contribute significantly,'' which had implications as to which factors were to be considered in what parts of the analysis. Under the first interpretation, significant contribution is determined with reference to—

> * * * factors concerning amounts of emissions and their ambient impact, including the nature of how the pollutant is formed, the level of emissions and emissions density (defined as amount of emissions per square mile) in the particular upwind area, the level of emissions in other upwind areas, the amount of contribution to ozone in the downwind area from the upwind areas, and the distance between the upwind sources and the downwind nonattainment problem. Under this approach, when emissions and ambient impact reach a certain level, as assessed by reference to the factors identified above, those emissions would be considered to ''contribute significantly'' to nonattainment.

(62 FR 60325).

Under this interpretation, after identifying amounts of emissions that constitute a significant contribution, EPA then determines the amount of emissions reductions necessary to adequately mitigate these contributions. This determination entails—

> * * * [e]valuation of the costs of available measures for reducing upwind emissions * * * as well as to the extent known (at least qualitatively), the relative costs of, amounts of reductions from, and ambient impact of measures available in the downwind areas.

Id.

Under the second interpretation, EPA considers all of the factors under both the significant contribution prong and the mitigation prong of the first interpretation, and, once EPA determines an amount of emissions that does significantly contribute to downwind nonattainment, then EPA would determine that the SIP must contain provisions adequate to prohibit that amount of emissions. Id. at 60325–26.

(b) Today's Action. The EPA has determined that the second interpretation should be used; that is, that the determination of significant contribution includes both air quality factors relating to amounts of upwind emissions and their ambient impact downwind, as well as cost factors relating to the costs of the upwind emissions reductions. Once an amount of emissions is identified in an upwind State that contributes significantly to a nonattainment problem downwind, or interferes with maintenance downwind, the SIP must include provisions to eliminate that amount of emissions.

To reiterate, section 110(a)(2)(D)(i)(I) provides that the SIP must ''prohibit[]'' sources from ''emitting any air pollutant in amounts which will contribute significantly to nonattainment in, or interfere with maintenance by, any other State.'' The term ''prohibit'' is defined as ''to forbid by authority'' or ''prevent,'' or ''preclude.'' ''The American Heritage Dictionary of the English Language'' (3d ed. 1992, 1448). The EPA believes that the term ''prohibit'' means that SIPs must eliminate those amounts of emissions determined to contribute significantly to nonattainment or interfere with maintenance downwind. Moreover, EPA believes that whether emissions ''contribute significantly'' depends on a multifactor test, as described below. Thus, section 110(a)(2)(D)(i)(I) does not require the elimination of all upwind source emissions that impact downwind air quality problems, but only those amounts of emissions that, based on a multi-factor test, significantly contribute to downwind air quality problems.

d. Multi-factor Test for Determining Significant Contribution. In the NPR, EPA proposed a multi-factor test for determining whether emissions from an upwind State contribute significantly to a nonattainment or maintenance problem downwind. The EPA received numerous comments on the factors. Based on the comments and EPA's further analysis, EPA, in today's action, is continuing the multi-factor approach, with some refinements in response to comments, with respect to the factors EPA considered and the manner in which EPA considered them.

In determining whether emissions from upwind States affected by today's action contribute significantly to downwind nonattainment or maintenance problems, EPA specifically considered the following factors with respect to each such upwind State. These factors were the primary components in EPA's consideration.

► The overall nature of the ozone problem (i.e., ''collective contribution'')

► The extent of the downwind nonattainment problems to which the upwind State's emissions are linked, including the ambient impact of controls required under the CAA or otherwise implemented in the downwind areas

► The ambient impact of the emissions from the upwind State's sources on the downwind nonattainment problems

► The availability of highly cost effective control measures for upwind emissions.

The first three of these factors are related to air quality; the fourth is related to costs.

In addition, EPA generally reviewed several other considerations before concluding that upwind emissions contribute significantly to downwind nonattainment. The EPA did not consider it necessary, or did not have adequate information, to apply each of these factors with specificity with respect to each upwind State's emissions. In addition, in some instances, EPA did not have quantitative information to assess certain of these factors, and instead relied on qualitative information. These considerations were secondary aspects of EPA's analysis. They include:

► The consistency of the regional reductions with the attainment needs of the downwind areas with nonattainment problems

► The overall fairness of the control regimes required of the downwind and upwind areas, including the extent of the controls required or implemented by the downwind and upwind areas

► General cost considerations, including the relative cost-effectiveness of additional downwind controls compared to upwind controls

All of these factors and considerations are described in the following sections.

e. Air Quality Factors. As noted above, EPA specifically considered three air quality factors with respect to each upwind State, which factors, in conjunction with the cost factor discussed in the next section, were the primary components in EPA's consideration:

► The overall nature of the ozone problem (*i.e.,* ''collective contribution'')

► The extent of the downwind nonattainment problems to which the upwind State's emissions are linked,

including the ambient impact of controls required under the CAA or otherwise implemented in the downwind areas

► The ambient impact of the emissions from the upwind State's sources on the downwind nonattainment problems

(1) Collective Contribution. As indicated elsewhere, ozone generally results from the collective contribution of emissions from numerous sources over a large geographic area. For example, for urban nonattainment areas under the 1-hour NAAQS, the downwind sources, comprise numerous stationary sources as well as mobile on-road sources, mobile off-road sources, and consumer and commercial products. Further, additional contributions are made by numerous upwind States, both adjacent to and further away from the nonattainment area itself. The fact that virtually every nonattainment problem is caused by numerous sources over a wide geographic area is a factor suggesting that the solution to the problem is the implementation over a wide area of controls on many sources, each of which may have a small or unmeasureable ambient impact by itself.

(2) Extent of Downwind Nonattainment Problems, Including Ambient Impact of Required Controls. In determining whether a downwind area has a nonattainment problem under the 1-hour standard to which an upwind area may be determined to be a significant contributor, EPA determined whether the downwind area currently has a nonattainment problem, and whether that area area would continue to have a nonattainment problem as of the year 2007 assuming that in that area, all controls specifically required under the CAA were implemented, and all required or otherwise expected Federal measures were implemented. If, following implementation of such required CAA controls and Federal measures, the downwind area would remain in nonattainment, then EPA considered that area as having a nonattainment problem to which upwind areas may be determined to be significant contributors.

Thus, this analytical approach assumes that downwind areas implement all required controls and receive the benefit of reductions from Federal measures, and yet have a residual nonattainment problem (prior to the implementation of the regional reductions required by today's action). The fact that a nonattainment problem persists, notwithstanding fulfillment of CAA requirements by the downwind sources, is a factor suggesting that it is reasonable for the upwind sources to be part of the solution to the ongoing nonattainment problem.

The EPA undertook a comparable analysis with respect to the 8-hour NAAQS. That is, the major urban areas in the northeast, midwest, and south that are violating the 8-hour NAAQS are designated nonattainment under the 1-hour NAAQS as well. After these areas are designated nonattainment under the 8-hour NAAQS, they will become subject to the control requirements of section 172(c). However, for these areas, the section 172(c) requirements do not, by their terms, impose any specific controls other than what these areas have already implemented to fulfill the requirements under section 182 attendant to their designation and classification under the 1-hour NAAQS. Accordingly, the same air quality modeling analyses that shows residual nonattainment for at least one of the urban areas linked to each upwind State under the 1-hour standard shows residual nonattainment for those areas under the 8-hour NAAQS. Indeed, modeling analyses relied on for today's action indicate residual nonattainment for the major urban areas even after the implementation of regional reductions comparable to those required today.[26]

(3) *Ambient Impact of Emissions from the Upwind Sources.* In today's action, EPA examined the impact of numerous upwind States on numerous downwind areas with nonattainment problems.

Under the 1-hour NAAQS, EPA conducted various air quality modeling analyses that examined the impact of emissions from sources in each upwind State on ozone levels in downwind nonattainment areas, in light of the impact of emissions from sources in other upwind States on the downwind area's nonattainment problem. The EPA assessed the frequency and magnitude of each upwind State's contribution to downwind nonattainment problems. Some of the modeling analyses also permitted determining the magnitude of the average contribution and the peak contribution from each upwind State, as well as the percentage of each upwind State's contribution to the downwind nonattainment problem.

The EPA determined that for each upwind State affected by today's action, its contribution to a downwind nonattainment problem, in conjunction with the contribution from other upwind States, comprised a relatively large percentage of the nonattainment problem. The EPA further determined that, in this context, the impacts from each affected upwind State's NO_X emissions are sufficiently large and/or frequent so that the amounts of that State's emissions should be considered to be significant contributions, depending on the cost factor and other relevant considerations. For most upwind States, EPA conducted two types of modeling—UAM–V and CAMx—that isolated the impact of emissions from the upwind State alone on downwind nonattainment.

The EPA also conducted much the same analysis to determine the impact of emissions from each upwind State on ozone levels in downwind States under the 8-hour NAAQS. Because nonattainment problems under the 8-hour NAAQS are widespread, and because EPA has not designated individual nonattainment areas, EPA focused this part of its inquiry on the upwind State's impact on the entire downwind State.

The EPA's analysis under both the 1-hour and 8-hour NAAQS led EPA to conclude that, in light of both the collective contribution nature of the ozone problem, and the fact that downwind areas continue to suffer a nonattainment problem even after implementation of all required CAA measures and Federal measures, emissions from each of the affected upwind States have a sufficiently large and/or frequent ambient impact such that those emissions contribute significantly to nonattainment downwind, depending on the availability of highly cost-effective measures and on other considerations discussed below.

f. Determination of Highly Cost-effective Reductions and of Budgets. After determining the degree to which NO_X emissions, as a whole from the particular upwind States, contribute to downwind nonattainment or maintenance problems, EPA then determined whether any amounts of the NO_X emissions may be eliminated through controls that, on a cost-per-ton basis, may be considered to be highly cost effective. By examining the cost effectiveness of recently promulgated or proposed NO_X controls, EPA determined that an average of approximately $2,000 per ton removed

[26] The presence of residual nonattainment in major urban areas after their implementation of specifically required CAA controls supports the regional reductions required under today's action. Those regional reductions allow the major urban areas to progress towards attainment under the 8-hour NAAQS, and, at the same time, significantly ameliorate the nonattainment problems under the 8-hour NAAQS for numerous other areas. In fact, EPA projections indicate that numerous areas with nonattainment problems will achieve attainment of the 8-hour NAAQS as a result of the regional reductions.

is highly cost effective. The EPA then determined a set of controls on NO_X sources that would cost no more than an average of $2,000 per ton reduced. Specifically, EPA determined that one set of these controls would include a cap-and-trade program for (i) electricity generating boilers and turbines larger than 25 Mwe (''large EGUs''), and (ii) large non-electricity generating industrial boilers and turbines (''large non-EGU boilers and turbines''). The application of an emission rate of 0.15 lb/mmBtu and 1995–1996 utilization for EGUs and 60 percent for large non-EGUs to the emissions projected to occur in 2007 including growth and CAA measures, led to the determination of the amounts to be reduced. The remaining amount is a State's budget.

The EPA further determined that additional highly cost-effective controls are also available for cement manufacturing sources and internal combustion engines. On the basis of reasonable assumptions concerning growth to the year 2007, EPA then determined the amounts of emissions from these source categories that would be eliminated with those controls.

The EPA further determined that there were no other controls on other NO_X sources that qualify as highly cost effective (although several controls are reasonably cost-effective).

On the basis of the determinations just described for the various source categories, EPA determined an amount of NO_X emissions that may be eliminated through these highly cost-effective measures. Because EPA had also determined that the NO_X emissions from the affected upwind States have a large and/or frequent impact on downwind nonattainment or maintenance problems, EPA concludes that the amount of NO_X emissions from those States that can be eliminated through application of highly cost-effective control measures contributes significantly to nonattainment or maintenance problems downwind.

Under section 110(a)(2)(D)(i)(I), the SIP must include ''adequate provisions prohibiting'' sources from emitting these ''amounts.'' Because no highly cost-effective controls are available to eliminate the remaining amounts of NO_X emissions, EPA concludes that those emissions do not contribute significantly to downwind nonattainment or maintenance problems. As indicated below and in Section III, there are cost-effective alternatives available to States that choose not to adopt all of the highly cost-effective measures on which EPA based its selection of the significant amounts of NO_X emissions.

To implement EPA's determinations, each affected upwind State is required to submit for EPA approval SIP controls projected to be sufficient, by the year 2007, to eliminate the amount of NO_X emissions in the State that EPA determined contributes significantly to nonattainment. The EPA determined this amount of reductions, for each affected upwind State, as follows: EPA first determined the amount of NO_X emissions in that State by the year 2007, based on assumptions concerning both growth and emissions controls that are required under the CAA or that will be implemented due to Federal actions (the ''2007 base case''). Second, EPA applied the control measures identified as highly cost effective to the 2007 base case amount for the appropriate source categories. The amount of NO_X emissions remaining in the State after application of controls to the affected source categories constitutes the 2007 budget. The difference between the 2007 base case and the 2007 budget is the amount of NO_X emissions in that State by the year 2007 that EPA has determined to contribute significantly to nonattainment and that, therefore, the SIPs must prohibit.

The upwind State's SIP revision due in response to today's action must provide controls that, on the basis of the same assumptions (including concerning growth) made by EPA in determining the budget, would limit NO_X emissions in the year 2007 to no more than the 2007 budget. The State has full discretion in selecting the controls, so that it may choose any set of controls that would assure achievement of the budget.

As EPA stated in the NPR:

> States are not constrained to adopt measures that mirror the measures EPA used in calculating the budgets. In fact, EPA believes that many control measures not on the list relied upon to develop EPA's proposed budgets are reasonable—especially those, like enhanced vehicle inspection and maintenance programs, that yield both NO_X and VOC emissions reductions.[27] Thus, one State may choose to primarily achieve emissions reductions from stationary sources while another State may focus emission reductions from the mobile source sector. (62 FR 60328).

The EPA believes that its overall approach derives further support from the mandate in section 110(a)(2)(D) that each SIP include provisions prohibiting ''any source or other type of emissions activity within the State from emitting any air pollutant in amounts' that adversely affect downwind areas. The phrase ''any source or other type of emissions activity'' may be interpreted to require that the SIP regulate all sources of emissions to assure that the total amount of emissions generated within the State does not adversely affect downwind areas. By its terms, the phrase covers all emitters of any kind because every emitter—stationary, mobile, or area—may be considered a ''source or other type of emissions activity.'' This interpretation is consistent with the legislative history of the phrase. Prior to the CAA Amendments of 1990, the predecessor to section 110(a)(2)(D), which was section 110(a)(2)(E), referred to ''any stationary source within the State.'' In the 1990 Amendments, Congress revised the phrase to read as it currently does. A Committee Report explained, ''Where prohibitions in existing section 110(a)(2)(E) apply only to emissions from a single source, the amendment includes ''any other type of emissions activity,'' which makes the provision effective in prohibiting emissions from, for example, multiple sources, mobile sources, and area sources.'' V Leg. Hist. 8361, S. Rep. No. 228, 101st Cong., 1st Sess. 21 (1989).

For reasons explained below, if an upwind State chooses to achieve all or a portion of the required reductions from large EGUs or large non-EGU boilers and turbines, then the SIP must include a mass emissions limitation for those sources computed with reference to certain growth assumptions and the emission rate limits chosen by the State. The EPA recommends that this mass limitation, or cap, be accompanied by a trading program. Any such cap-and-trade program must be established by May 1, 2003. If the State chooses to achieve all or a portion of the required reductions from other sources, then the State must implement controls, by the year 2003, on those other sources that are projected to achieve the required level of reductions, based on certain assumptions (including growth), in the year 2007. The controls on these other sources may be rate-based, and no emissions cap on them is required. By the year 2007, any applicable mass emissions limitation for large EGUs or large non-EGU boilers and turbines must continue to be met, and any applicable controls on other sources must continue to be implemented. The amount of the 2007 overall budget is used to compute the level of controls that would result in the appropriate amount of emissions reductions, given assumptions concerning, for example,

[27] As indicated in the NPR, EPA considers that measures may be reasonable in light of their reduction of VOC and NO_X emissions, even though their cost-effectiveness in terms of cost per NO_X emissions removed is relatively high (62 FR 60346–48).

growth. To this extent, the 2007 overall budget is an important accounting tool. However, the State is not required to demonstrate that it has limited its total NO_X emissions to the budget amounts. Thus, the overall budget amount is not an independently enforceable requirement.

g. Other Considerations in Determination of Significant Contribution. The EPA reviewed several other considerations in support of its determination that the specified amounts of emissions from the affected upwind States contribute significantly to nonattainment downwind.

(1) Consistency of Regional Reductions with Downwind Attainment Needs. The EPA conducted modeling analyses of emission reductions of virtually the same magnitude as the regional reductions required under today's action. Although the impact on any downwind ozone problem of each upwind State's emissions reductions alone may be relatively small, the impact of those reductions, when combined with the reductions from the other States, is substantial. Based on this modeling, EPA determined that the regional reductions allow downwind nonattainment areas under the 1-hour NAAQS to make appreciable progress towards attainment. The EPA further determined that under the 8-hour NAAQS, many areas with nonattainment problems are expected to reach attainment based solely on the regional reductions, and that other (primarily urban) areas would benefit from the regional reductions but are expected to experience residual nonattainment. EPA further determined that none of the upwind States affected by today's action are affected by ''overkill,'' that is, required reductions that are more than necessary to ameliorate downwind nonattainment in every downwind area affected by that upwind State.

(2) Fairness. The EPA also considered the overall fairness of the control regimes required of the downwind and upwind areas, including the extent of the controls required or implemented by the downwind and upwind areas. Most broadly, EPA believes that overall notions of fairness suggest that upwind sources which contribute significant amounts to the nonattainment problem should implement cost-effective reductions. When upwind emitters exacerbate their downwind neighbors' ozone nonattainment problems, and thereby visit upon their downwind neighbors additional health risks and potential clean-up costs, EPA considers it fair to require the upwind neighbors to reduce at least the portion of their emissions for which highly cost-effective controls are available.

In addition, EPA recognizes that in many instances, areas designated as nonattainment under the 1-hour NAAQS have incurred ozone control costs since the early 1970s. Moreover, virtually all components of their NOx and VOC inventories are subject to SIP-required or Federal controls designed to reduce ozone. Furthermore, these areas have complied with almost all of the specific control requirements under the CAA, and generally are moving towards compliance with their remaining obligations. The CAA's sanctions and FIP provisions provide assurance that these remaining controls will be implemented. By comparison, many upwind States in the midwest and south have had fewer nonattainment problems and have incurred fewer control obligations.

(3) General Cost Considerations. The EPA also considered the fact that in general, areas that currently have, or that in the past have had, nonattainment problems under the 1-hour NAAQS, or that are in the Northeast Ozone Transport Region (OTR), have already incurred ozone control costs. The controls already implemented in these areas tend to be among the less expensive of available controls. As described in more detail below, EPA has determined that, in general, the next set of controls identified as available in the downwind nonattainment areas under the 1-hour NAAQS would cost approximately $4,300 per ton removed. By comparison, EPA has determined that the cost of the regional reductions required today would approximate $1,500 per ton removed. Thus, it appears that the upwind reductions required by today's action are more cost-effective per ton removed than reductions in the downwind nonattainment areas. Moreover, under the 1-hour NAAQS, the reductions required from each upwind State, in conjunction with reductions from other upwind States, result in ambient improvement in at least several downwind areas with nonattainment problems.

The EPA did not have available, and was not presented with, meaningful quantitative information indicating the cost-effectiveness of the regional reductions required today in light of their ambient impact downwind (e.g., the cost of emissions reductions per ppb improvement in ambient ozone levels in a downwind nonattainment area). This lack of information limited the extent to which EPA could rely on this consideration in making its determinations.

The various considerations just discussed point in the same direction as the other factors described above concerning air quality and costs. These factors and considerations lead EPA to conclude that the amounts of each upwind State's emissions that may be eliminated through highly cost-effective measures contribute significantly to nonattainment or maintenance problems downwind.

h. Interfere with Maintenance. Once a nonattainment area has attained the NAAQS, it is required to maintain that standard (e.g., sections 107(d)(3)(E)(iv), 110(a)(1)). Section 110(a)(2)(D)(i)(I) also requires that SIPs contain adequate provisions prohibiting amounts of emissions that ''interfere with maintenance by * * * any [downwind] State.'' The EPA explained and applied this requirement in the NPR as follows:

> This [interfere-with-maintenance] requirement * * * does not, by its terms, incorporate the qualifier of ''significantly.'' Even so, EPA believes that for present purposes, the term ''interfere'' should be interpreted much the same as the term ''contribute significantly,'' that is, through the same weight-of-evidence approach.
>
> With respect to the 1-hour NAAQS, the ''interfere-with-maintenance'' prong appears to be inapplicable. The EPA has determined that the 1-hour NAAQS will no longer apply to an area after EPA has determined that the area has attained that NAAQS. Under these circumstances, emissions from an upwind area cannot interfere with maintenance of the 1-hour NAAQS.
>
> With respect to the 8-hour NAAQS, the ''interfere-with-maintenance'' prong remains important. After an area has reached attainment of the 8-hour NAAQS, that area is obligated to maintain that NAAQS. (See sections 110(a)(1) and 175A.) Emissions from sources in an upwind area may interfere with that maintenance.
>
> The EPA proposes to apply much the same approach in analyzing the first component of the ''interfere-with-maintenance'' issue, which is identifying the downwind areas whose maintenance of the NAAQS may suffer interference due to upwind emissions. The EPA has analyzed the ''interfere-with-maintenance'' issue for the 8-hour NAAQS by examining areas whose current air quality is monitored as attaining the 8-hour NAAQS [or which have no current air quality monitoring], but for which air quality modeling shows nonattainment in the year 2007. This result is projected to occur, notwithstanding the imposition of certain controls required under the CAA, because of projected increases in emissions due to growth in emissions generating activity. Under these circumstances, emissions from upwind areas may interfere with the downwind area's ability to attain. Ascertaining the impact on the downwind area's air quality of the upwind area's emissions aids in determining whether the upwind emissions interfere with maintenance

(62 FR 60326).

In today's action, EPA is taking the same positions with respect to the interfere-with-maintenance test as described in the NPR. Because EPA generally interprets the ''interfere-with-maintenance'' test the same as the ''contributes-significantly-to-nonattainment'' test, for purposes of convenience, in this final rule, EPA sometimes refers to ''contributes-significantly-to-nonattainment'' to refer to both tests.

i. Dates. In today's action, EPA is determining that SIP submissions required under this rulemaking must be submitted by September 30, 1999 (see Section VI.A.1, Schedule for SIP Revision).

Further, in today's action, EPA is requiring that SIP controls required today must be implemented by no later than May 1, 2003, and they must achieve reductions computed with reference to an overall budget amount determined as of September 30, 2007 (see Section V, NO_X Control Implementation and Budget Achievement Dates).

j. Downwind Areas' Control Obligations. Commenters have argued that under the CAA, downwind States must implement additional controls before EPA may require controls in upwind States. Commenters base this argument in part on the provisions of CAA section 107(a), which provides,

> Each State shall have the primary responsibility for assuring air quality within the entire geographic area comprising such State by submitting an implementation plan for such State which will specify the manner in which [NAAQS] will be achieved and maintained within each air quality control region in such State.

Commenters further note that downwind States must implement additional reductions (beyond those specifically required by the CAA [28]) as needed to attain, under section 182(b)(1)(A)(i) and 182(c)(2)(A). The commenters add that section 179(d)(2) is a generally applicable provision that limits the stringency of required controls to what is feasible. The commenters read these provisions together to conclude that downwind States must first implement all feasible control measures in an effort to reach attainment, and only after EPA determines that such States have done so but have not reached attainment may EPA require upwind contributors to implement controls. The commenters further observe that some of the downwind States in the Northeast have not implemented all feasible SIP measures.

The EPA disagrees with this legal analysis. The provision in section 107(a) that accords to States the primary responsibility for the air quality of their air basins, in essence provides the underlying rationale for the requirement of States to submit SIP revisions that meet CAA requirements. This phrase clarifies that the requirement of assuring attainment does not fall, in the first instance, on EPA. This provision does not have implications for apportioning responsibility between the downwind State and upwind States for contributions from upwind States. Downwind States would still carry the primary responsibility of assuring clean air even after the upwind contributors have revised their SIPs to meet the requirements of section 110(a)(2)(D).

Furthermore, EPA disagrees that section 179(d)(2) has any application to today's rulemaking. That provision in essence provides a general rule that if a nonattainment area fails to attain by its attainment date, EPA may require the State to implement reasonable controls that can be ''feasibly implemented.'' This requirement is not relevant to today's rulemaking, which addresses the requirements under section 110(a)(2)(D)(i)(I) that SIPs include provisions eliminating amounts of emissions from their sources that contribute significantly to downwind nonattainment.

In addition, the requirement of downwind States to implement reductions beyond minimum CAA requirements if needed for attainment does not place the burden of implementing those reductions, in the first instance, on the downwind States. This requirement should be read to go hand-in-hand with the section 110(a)(2)(D) requirement that upwind States include SIP provisions that prohibit their sources from emitting air pollutants in amounts that ''significantly contribute'' to downwind nonattainment. In today's action, EPA is promulgating criteria for interpreting section 110(a)(2)(D) to take into account downwind attainment needs.

As a practical matter, EPA has reviewed the status of Northeast States' efforts to comply with the requirements of the 1990 CAA Amendments and has found that these States have complied with the vast majority of the SIP submission requirements. Even so, EPA is well aware that some of the States have not made certain required submissions. [29–30] However, EPA sees no basis in section 110(a)(2)(D) to mandate that downwind areas complete their SIP planning and implementation before upwind areas are required to begin that process. Upwind areas have been subject to the requirements of section 110(a)(2)(D)—in some form—since the predecessor to this provision was added in the 1977 CAA Amendments. The EPA has determined, through air quality modeling, that even after the downwind States fulfill their prescribed CAA requirements, they will have areas expected to remain in nonattainment. Under these circumstances, the downwind areas continue to constitute areas with air quality in ''nonattainment'' under section 110(a)(2)(D). As a result, upwind areas with emissions in amounts that ''significantly contribute'' to the nonattainment air quality downwind are subject to control requirements whether or not the downwind areas they affect have met all of their planning obligations.

k. Section 110(a)(2)(D) Caselaw. In the NPR, EPA noted that prior to the CAA Amendments of 1990, EPA had issued several rulemakings under section 110(a)(2)(E), the predecessor to section 110(a)(2)(D), and section 126 that addressed the issue of significant contribution in the context of pollutant transport. In those rulemakings, EPA generally applied a multi-factor test to determine whether the emissions from the sources in question constituted a signficant contribution to downwind jurisdictions. In each instance, EPA concluded that the emissions at issue from the upwind sources were not demonstrated to impact downwind air quality in a manner that would constitute significant contribution. Several of these determinations resulted in judicial challenges, but in each instance the courts upheld the Agency's determination of no significant contribution. The EPA indicated in the NPR that the prior rulemakings and the related court holdings, provide limited precedents for today's action. The EPA noted that these decisions have limited relevance because they involved different facts and circumstances, including different pollutants, different

[28] Reductions specifically required by the CAA include, for example, the 3 percent-per-year ROP reductions required of ozone nonattainment areas classified as serious or higher, under section 182(c)(2)(B).

[29–30] If downwind areas fail to meet their planning obligations, they are subject to sanctions (See Section VI, below. As EPA noted in the NPR, 62 FR 60322–23, in some instances, States in the Northeast failed to submit all of their required SIP revisions or other commitments under Phase 1 of the March 2, 1995 Memorandum and as a result, EPA initiated the sanctions process by starting sanctions clocks. In general, those States have since made the required Phase 1 submissions, and EPA terminated the sanctions process by stopping the clocks.

upwind sources, and different downwind effects.

Several commenters asserted that these prior rulemakings and cases are relevant to today's action, and compel EPA to conclude that the emissions from the upwind States affected by today's action do not contribute significantly to downwind nonattainment or maintenance problems. The EPA disagrees that these earlier determinations are controlling and that these earlier determinations are inconsistent with today's action. The EPA responds to these comments in detail in the Response to Comment document.

B. Alternative Interpretation of Section 110(a)(2)(D)

As discussed above, in the NPR EPA advanced an alternative interpretation of section 110(a)(2)(D) (62 FR 60327). Under this alternative interpretation, EPA would determine the level of emissions that significantly contribute to nonattainment downwind based on factors relating to the entire amount of upwind emissions from a particular upwind State and their ambient impact downwind. The EPA would then determine what emissions reductions must be required to adequately mitigate that significant contribution based on factors relating to cost effectiveness of reductions and attainment needs downwind.

The EPA continues to believe that this alternative interpretation remains a permissible interpretation of the statute for the reasons described in the NPR (62 FR 60327). In any event, it should be noted that for purposes of today's action, EPA finds no practical difference between the requirements that would result from the interpretation of section 110(a)(2)(D) adopted today and those that would result from the alternative interpretation described in the NPR. That is, even under the alternative interpretation, today's rulemaking would contain the same findings and require the same SIP revisions as under the interpretation adopted today (62 FR 60327).

C. Weight-of-Evidence Determination of Covered States

As discussed above, EPA applied a multi-factor approach to identify the amounts of NO_X emissions that contribute significantly to nonattainment. The EPA evaluated three air quality factors for each upwind jurisdiction (hereafter referred to as ''States'' or ''upwind States'') to determine whether each has emissions whose contributions to downwind nonattainment problems are large and/or frequent enough to be of concern. Further, for those States whose emissions are large and/or frequent enough to be of concern, EPA applied highly cost-effective controls to determine the amount of NO_x in upwind States which significantly contributes to nonattainment in, or interferes with maintenance by, a downwind State. The EPA also generally reviewed several other considerations before drawing final conclusions. Even though the actual finding of significant contribution applies only to the portion of a State's emissions for which EPA has identified highly cost-effective controls, for ease of discussion, the term ''significant'' (or like term) is used in the discussion in this section to characterize the emissions of each upwind State that make a large and/or frequent contribution to nonattainment in downwind States sufficient to warrant eliminating a portion of its emissions equivalent to what can be removed through those controls.

The purpose of this section is to describe the technical analyses performed by EPA to (a) quantify the air quality contributions from emissions in each upwind State on both 1-hour and 8-hour nonattainment, as well as 8-hour maintenance, in each downwind State, and (b) determine whether these contributions are significant.

In the proposed weight-of-evidence approach, EPA specifically applied several factors to each upwind State, as discussed in Section II.A.3.c, Definition of Significant Contribution. These factors include:

- The overall nature of ozone problem (i.e., ''collective contribution'');
- The extent of the downwind nonattainment problems to which the upwind State's emissions are linked, including the ambient impact of controls required under the CAA or otherwise implemented in the downwind areas; and
- The ambient impact of the emissions from the upwind State's sources on the downwind nonattainment problems.

As part of the analysis of these factors, EPA considered the findings from OTAG's technical analyses, as well as the findings from a number of other studies performed by OTAG participants independent of OTAG. The major findings from these analyses are described below. This is followed by an overview of the approach used by EPA in the proposal for considering the above factors to identify States that make a significant contribution to downwind nonattainment. The comments and EPA's response to comments on EPA's weight-of-evidence proposal are then discussed. Following that discussion, the results of additional State-by-State UAM–V modeling and State-by-State CAM_X [31] source apportionment modeling performed by EPA in response to comments are summarized.[32] The EPA's analysis of the modeling results in terms of the significance of the contributions of upwind States to downwind nonattainment is presented in Section II.C.4, Confirmation of States Making a Significant Contribution to Downwind Nonattainment.

1. Major Findings From OTAG-Related Technical Analyses

The major findings from the air quality and modeling analyses by OTAG and individual OTAG participants that are most relevant to today's rulemaking are as follows:

- several different scales of transport (i.e., intercity, intrastate, interstate, and inter-regional) are important to the formation of high ozone in many areas of the East;
- emissions reductions in a given multistate region/subregion have the most effect on ozone in that same region/subregion;
- emissions reductions in a given multistate region/subregion also affect ozone in downwind multistate regions/subregions;
- downwind ozone benefits decrease with distance from the source region/subregion (i.e., farther away, less effect);
- downwind ozone benefits increase as the size of the upwind area being controlled increases, indicating that there is a cumulative benefit to extending controls over a larger area;
- downwind ozone benefits increase as upwind emissions reductions increase (the larger the upwind reduction, the greater the downwind benefits);
- a regional strategy focusing on NO_X reductions across a broad portion of the region will help mitigate the ozone problem in many areas of the East;
- both elevated and low-level NO_X reductions decrease ozone concentrations regionwide;
- there are ozone benefits across the range of controls considered by OTAG; the greatest benefits occur with the most emissions reductions; there was no ''bright line'' beyond which the benefits of emissions reductions diminish significantly;
- even with the large ozone reductions that would occur if the most

[31] Comprehensive Air Quality Model with Extensions.

[32] The UAM–V and CAM_X models are described in the Air Quality Modeling TSD.

stringent controls considered by OTAG were implemented, there may still remain high concentrations in some portions of the OTAG region; and a regional NO_X emissions reduction strategy coupled with local NO_X and/or VOC reductions may be needed to enable attainment and maintenance of the NAAQS in this region.

The above findings provide technical evidence that transport within portions of the OTAG region results in large contributions from upwind States to ozone in downwind areas, and that a regionwide approach to reduce NO_X emissions is an effective way to address these interstate contributions.

2. Summary of Notice of Proposed Rulemaking Weight-of-Evidence Approach

The EPA relied on OTAG data to develop the information necessary to evaluate the weight-of-evidence factors identified above. These data include emissions (tons) and emission density (tons per square mile), air quality analyses, trajectory, wind vector, and ''ozone cloud'' analyses, and subregional zero-out modeling. In brief, EPA's proposed approach was as follows:

- the OTAG transport distance scale was applied to identify, based on the meteorological potential for transport, which States may contribute to ozone in downwind States;
- the results of the OTAG subregional modeling runs (described below) were used to quantify the extent to which each subregion contributes to downwind nonattainment for the 1-hour and/or 8-hour NAAQS;
- the OTAG 2007 Base Case NO_X emissions and emissions density were used to identify States which emit large amounts of NO_X and/or have a high density of NO_X emissions compared to other States in the OTAG region and, therefore, have NO_X emissions which may be great enough to contribute to downwind nonattainment; and the OTAG 2007 Base Case NO_X emissions were also used to translate the findings from the subregional modeling to a State-by-State basis.

a. Quantification of Contributions. As part of OTAG's assessment of transport, a series of model runs were performed to examine the impacts of emissions from each of 12 multistate subregions on ozone in downwind areas. The locations of these subregions are shown in Figure II–1.

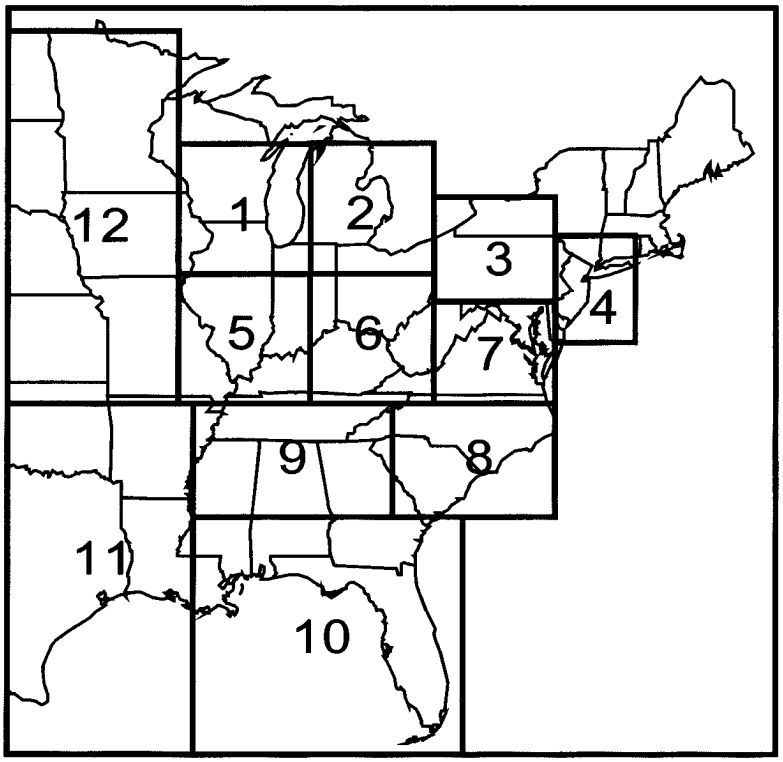

Figure II-1. OTAG Subregions

In each subregional model run, all manmade emissions were removed from one upwind subregion and the model was run for the OTAG July 1988 and 1995 episodes. The ''parts per billion (ppb)'' differences in ozone between each subregional zero-out run compared to the corresponding 2007 Base Case run were used to quantify the air quality impacts of the subregion on nonattainment downwind.

In the proposed NO_X SIP call, EPA considered areas as ''nonattainment'' if air quality monitoring indicates that the area is currently measuring nonattainment and if air quality modeling indicates future nonattainment, taking into account CAA control requirements and growth. In this regard, areas were considered nonattainment for the 1-hour NAAQS if

they had 1994–1996 [33] monitoring data indicating measured 1-hour violations and 2007 Base Case 1-hour predictions >=125 ppb. Areas were considered to be nonattainment for the 8-hour NAAQS if they had 1994–1996 monitoring data indicating measured 8-hour violations and 2007 Base Case 8-hour predictions >=85 ppb. The inconsistency between the form of the 8-hour NAAQS, which considers 3 years of data for determining the average of the fourth-highest 8-hour daily maximum concentration at a monitor, and the limited predictions available from the OTAG episodes introduced a complication to the analysis of 8-hour contributions. It was not possible to use the model predictions in a way that explicitly matched the form of the 8-hour NAAQS. Instead, an analysis of seasonal and episodic ozone measurements was performed in an attempt to link 8-hour measured concentrations during the OTAG episodes to the form of the 8-hour NAAQS, as closely as possible. The results of that analysis indicated that the 3-episode average of the second highest 8-hour ozone concentrations measured during the OTAG 1991, 1993, and 1995 episodes corresponded best, overall, to the 3-year average of the fourth highest 8-hour daily ambient data. However, since OTAG subregional modeling was only available for the 1988 and 1995 episodes, EPA used the concentrations during these two episodes in calculating average second high 8-hour concentrations.[34]

b. Evaluation of 1-Hour and 8-Hour Contributions. In the proposal, EPA summarized the ''ppb'' contributions to downwind nonattainment from each subregion in terms of both the frequency and the magnitude of the downwind impacts over specific concentration ranges (e.g., 2 to 5 ppb, 5 to 10 ppb, 10 to 15 ppb, etc.). The results indicate that, in general, large contributions to downwind nonattainment occur on numerous occasions. Although the level of downwind contribution varies from subregion to subregion, a consistent pattern is apparent for both 1-hour nonattainment and 8-hour nonattainment. Specifically, the results of the subregional modeling indicate that emissions from States in subregions 1 through 9 produce large 1-hour and 8-hour contributions downwind in terms of the magnitude and frequency, including geographic extent, of the downwind impacts. In addition, nonattainment areas within many States in the OTAG region receive large and/or frequent contributions from emissions in these subregions. The EPA proposed to find that most of the States whose emissions are wholly or partially contained within one or more of these subregions (i.e., Alabama, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin, as well as the District of Columbia) are making a significant contribution to downwind nonattainment. In addition to the ambient impact demonstrated by the subregional modeling, this proposed finding was based on a determination that:

- OTAG strategy modeling and non-OTAG modeling indicate that NO_X emissions reductions across these States would produce large reductions in 1-hour and 8-hour ozone concentrations across broad portions of the region including 1-hour and 8-hour nonattainment areas;
- these States are upwind from nonattainment areas within the 1- to 2-day distance scale of transport;
- these States form a contiguous area of manmade emissions covering most of the core portion of the OTAG region;
- 11 of the States that are wholly within subregions 1 through 9 have a relatively high level of NO_X emissions from sources in their States; these States are ranked in the top 50 percent of all States in the region in terms of total NO_X emissions and/or have NO_X emissions exceeding 1000 tons per day;
- States wholly within subregions 1 through 9 with lesser emissions have a relatively high density of NO_X emissions;
- for the seven States that are only partially contained in one of subregions 1 through 9, the State total NO_X emissions, as well as each State's contribution to NO_X emissions in the subregions in which they are located, indicate that six of the States each have: NO_X emissions that are more than 10 percent of the total NO_X emissions in one of these subregions, NO_X emissions in the top 50 percent among all States, and/or a majority of its NO_X emissions within one of these subregions.

For the New England States that were not included in any of the OTAG zero-out subregions, EPA found that two of these States (i.e., Massachusetts and Rhode Island) have a high density of NO_X emissions. Also, the trajectory and wind vector analyses indicated that these States are immediately upwind of nonattainment areas in other States.

For the nine States in the OTAG region which are wholly within subregions 10, 11, and 12 (i.e., Florida, Kansas, Louisiana, Minnesota, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas), and for Arkansas, Iowa, and Mississippi, EPA proposed that emissions from each of these States should be considered not to significantly contribute to downwind nonattainment. These States are further discussed below in Section II.C.5, States Not Covered by this Rulemaking.

c. Comments and Responses on Proposed Weight-of-Evidence Approach to Significant Contribution. The EPA received a number of comments on various elements of the proposed weight-of-evidence approach. In addition, EPA received new modeling and analyses performed by commenters which address the issue of significant contribution. The following is a summary of the major comments received by EPA and the responses to these comments. Additional comments and EPA's response to these comments are provided in the Response to Comment document.

Comment: Some commenters stated that it was inappropriate to use a weight-of-evidence approach to determine the significance of upwind emissions on downwind nonattainment. Rather, it was argued that EPA should use a specific ''bright line'' criterion. Other commenters supported the weight-of-evidence approach.

Response: The magnitude and frequency of contributions from an upwind State to downwind nonattainment depend on the extent of the nonattainment problem in the downwind area, the emissions in the downwind area, the emissions in the upwind State, the distance between the upwind State and the downwind area, and weather conditions (i.e., winds and temperatures which favor ozone formation and transport). Because these factors vary in a complex way across the OTAG region, it is not possible to develop a single bright line test for significance that will be applicable and appropriate for all potential upwind-State-to-downwind-area linkages. Therefore, EPA believes that it is more appropriate to use a weight-of-evidence approach to account for all of these factors than establishing a bright line criterion.

Comment: Some commented that EPA should not use the trajectory, wind vector, and ''ozone cloud'' analyses as a

[33] Data for 1994–1996 were used because these were the most recent quality-assured data available at the time the analysis was performed.

[34] In response to comments, EPA has reexamined the method for relating 8-hour model predictions during the OTAG episodes to the form of the 8-hour NAAQS. This is discussed further in Section II.C.2.c, Comments and Responses on the Proposed Weight of Evidence Approach to Significant Contribution.

basis for determining significant contribution because these techniques indicate air movement and do not account for ozone formation and depletion due to photochemical reactions and other processes. Other commenters argued in favor of using this information as means of linking upwind States with downwind nonattainment.

Response: The EPA agrees that information from such techniques should not be used as the sole basis for finding that certain upwind States significantly contribute to nonattainment in specific downwind States. However, EPA believes that it is important to consider the ''movement'' of ozone and/or precursors as part of the air quality evaluation of contributions from upwind States. This factor is incorporated into the air quality models used by EPA for this rulemaking. The inclusion of this information, in conjunction with numerous other air quality factors in the models, provides for a more technically robust analysis than can be provided by the trajectory, ozone cloud, and wind vector analyses alone.

Comment: A number of commenters stated that CAA section 110(a)(2)(D) requires a State-by-State demonstration that emissions within an upwind State make a significant contribution to nonattainment in another State and thus, EPA's proposed approach of using subregional (i.e., multistate) modeling, together with each upwind State's NO_X emissions, to establish these linkages is legally flawed. These commenters argued that section 110(a)(2)(D) requires ''each implementation plan submitted by a State'' to contain provisions that prohibit any source or other type of emissions activity ''within the State'' from emitting air pollutants in amounts that contribute significantly to a downwind nonattainment problem. The commenters concluded that these provisions require, as a matter of technical procedure, that EPA must base its determination that emissions from a particular State significantly contribute to nonattainment downwind on a technical analysis of that particular State's emissions. According to the commenters, section 110(a)(2)(D) by its terms, prohibits EPA from making that technical determination by examining the impact of emissions from a group of States on a downwind nonattainment problem, and then extrapolating from that information to determine whether emissions from each State within that group should be considered to make a significant contribution.

As a technical matter, these commenters argue that if emissions from more than one State are lumped together in assessing the contribution to a downwind State, there is no way to determine the amount of emissions in each contributing State that must be reduced. The commenters argue that the only way to establish specific upwind State to downwind State linkages is through air quality modeling on a State-by-State basis. Further, the commenters contend that once an area beyond a particular State's boundaries is modeled, there is no way of knowing how much farther upwind to go in terms of defining a source area. In order to address these issues, many commenters stated that EPA must do State-by-State zero-out UAM–V modeling and/or State-by-State source apportionment modeling using the CAMx model to determine downwind contributions from upwind States.

Response: On the legal issue, EPA disagrees that the above-referenced provisions of section 110(a)(2)(D), by their terms, mandate the technical procedure for EPA to make the determination of significant contribution. These provisions simply indicate that EPA must make that determination on a SIP-by-SIP basis, that is, for EPA to issue a SIP call with respect to a particular State, EPA must determine that the provisions of that SIP fail to adequately control emissions from sources within the State. However, these provisions do not mandate any particular technical procedure for making that determination. As a result, EPA may employ any technical procedure that is sufficiently accurate. As discussed below, EPA believes that its subregional approach is sufficiently accurate to justify the SIP call. However, in response to this and other comments, EPA did conduct State-by-State modeling. The results of this modeling, as discussed below, confirm the results of the subregional modeling.

On the technical issue, EPA used the subregional modeling as part of the proposed approach because OTAG had developed and relied on this modeling as part of its analysis to quantify the impacts of manmade emissions in upwind areas on ozone in downwind areas. In addition, in conjunction with other information, EPA believes that it is possible to make rational extrapolations from the subregional results in order to draw conclusions as to the contribution of individual States. The EPA believes that it is credible to use NO_x emissions in each State, along with the subregional modeling results, in the determination of significance in view of the results of OTAG modeling which indicate that, in addition to local emissions, the level of ozone in a downwind State is directly related to the magnitude of NO_x emissions in upwind areas and the proximity of the upwind area to the downwind State. A more detailed discussion of the technical validity of the subregional modeling is contained in the Response to Comment Document.

The EPA recognizes that State-by-State modeling would provide some additional precision to the magnitude and frequency of individual State-to-State contributions. In response to the recommendations for additional modeling, EPA performed both State-by-State UAM–V zero-out modeling and State-by-State CAMx source apportionment modeling for many of the upwind States in the OTAG region which were proposed as significant contributors. The EPA's analysis of the contributions to downwind nonattainment using the State-by-State modeling confirms the overall finding, based on the proposed subregional modeling, that the 23 jurisdictions identified in the proposal significantly contribute to nonattainment in downwind States. Specifically, the subregional modeling indicates that manmade emissions from sources in subregions 1 through 9 make large and/or frequent contributions to 1-hour and 8-hour nonattainment in specific downwind States. The EPA's analysis of the State-by-State modeling demonstrates that each of the 23 upwind jurisdictions identified through subregional modeling significantly contribute to nonattainment in specific downwind States. In addition, the results of the State-by-State modeling show that the specific upwind-State-to-downwind-nonattainment linkages indicated by the subregional modeling are confirmed overall by the State-by-State modeling. The State-by-State modeling analyses are summarized below and more fully documented in the Air Quality Modeling TSD.

Comment: The EPA received comments that zero-out modeling introduces sharp spatial changes in emissions and pollutants along the edges of the zero-out area. The commenters contend that this is not credible and provides an incorrect assessment of transport.

Response: The EPA disagrees with this comment, as discussed in the Response to Comments document. Also, as indicated above, in response to other comments, EPA has performed CAMx source apportionment modeling which does not use a zero-out technique for quantifying ozone contributions from upwind States. In general, EPA has found that the source apportionment technique and zero-out modeling

provide consistent information on the relative contribution of upwind States to downwind nonattainment. In cases where the two techniques do not provide consistent results, the source apportionment technique tends to indicate larger contributions than the zero-out modeling. The differences between these two modeling techniques are described further in the Air Quality Modeling TSD.

Comment: Some comments referenced a study which analyzed the ''noise'' (i.e., uncertainty) in the UAM–V modeling system. This study purports to show that the contributions from some States EPA proposed as significant are within the ''noise'' of the model.

Response: This study focuses on model uncertainty by varying many, but not all, inputs to the model. The study does not contend that the inputs selected by OTAG are incorrect, but rather that there may be other plausible values for these inputs. The results indicate that there is a range of uncertainty in predicted ozone associated with the range of possible values for the particular inputs studied by the commenter. The study does not indicate that there is any bias in the model's predictions (i.e., there is no indication that the predictions are too high or too low). The specific values for the inputs being used by EPA in its air quality modeling are the same values that were used by OTAG. These values were selected by the OTAG Regional and Urban Scale Modeling Work Group, which included experts in air quality modeling from the public and private sector, in conjunction with the model's developers, Systems Application International. The predictions from OTAG's model runs using these same input values were evaluated against ambient measurements and found by OTAG to provide acceptable results. The EPA continues to believe that the specific inputs selected by OTAG are technically sound and the modeling results are credible. A further discussion of EPA's response to this comment is in the Response to Comments document.

Comment: Several commenters stated that emissions from large point sources of NO_x in specific States do not contribute significantly to downwind nonattainment.

Response: As discussed in Section II.A.3.c, Definition of Significant Contribution, under EPA's collective contribution approach, if emissions in the aggregate from a particular geographic region or State are found to contribute significantly to nonattainment downwind, then the emissions in that region or State are considered to be significant contributors to that nonattainment problem. Moreover, EPA treats emissions as ''contributing significantly'' only to the extent they may be eliminated through highly cost-effective reductions. Thus, if all emissions from a State, when considered in the aggregate, are found to contribute significantly to nonattainment downwind, and if there are highly cost-effective controls for NO_x emissions from sources in the upwind State, then the amount of NO_x emissions from these sources that can be eliminated with such controls are considered to be making a significant contribution. The amount of emissions determined through this approach to make a significant contribution may be relatively small, compared to the upwind State's entire inventory; and the ambient impact downwind of eliminating that amount may be relatively small as well. However, this small impact does not mean that the emissions themselves are not significant insofar as their contribution to nonattainment downwind. Further, as discussed in Section IV, Air Quality Assessment, when the amount of emissions required to be eliminated from upwind States are combined and modeled collectively, their ambient impact downwind is larger.

Comment: One commenter provided a recommendation for dealing with the concern that the spatial resolution of meteorological inputs to the air quality model may be too coarse to require that predicted exceedences correspond exactly with a county violating the NAAQS. The commenter's recommendations were to base the selection of 1-hour nonattainment receptors on model predicted exceedences in either (a) all counties within the metropolitan statistical area containing the nonattainment area or (b) all counties comprising the designated 1-hour nonattainment area.

Response: The EPA believes that the appropriate way to address this issue is to use all counties comprising the designated 1-hour nonattainment area. That is, all counties in a designated 1-hour nonattainment area should be considered as possible nonattainment receptors for the purposes of evaluating contributions to nonattainment under the 1-hour NAAQS. The EPA recognizes that not all counties within a designated nonattainment area have monitors, and that some counties may have monitors that indicate attainment in that county. Even so, EPA recognizes that under the 1-hour NAAQS, nonattainment boundaries are generally used to describe an area with the nonattainment problem. Thus, EPA believes that this geographic vicinity offers the best indication of an area that may be expected to have nonattainment air quality somewhere within its boundaries. The EPA believes that it is appropriate to include all counties in the designated nonattainment area because the entire nonattainment area is responsible for meeting the 1-hour NAAQS, even if only one monitor measures nonattainment at any one time. As noted elsewhere, EPA predicts that many 1-hour nonattainment areas that currently monitor nonattainment somewhere within the area will remain in nonattainment in 2007, in some cases because of predicted violations in counties that currently monitor attainment. The EPA believes that the entire area should be considered to be in nonattainment until all monitors in the area indicate attainment of the NAAQS. Thus, in today's rulemaking, EPA used the designated 1-hour nonattainment area in selecting the receptors to be used to evaluate impacts on downwind nonattainment problems.

Comment: Several commenters questioned the validity of EPA's approach of using the 3-episode average of the second highest 8-hour daily maximum concentration to represent the form of the 8-hour NAAQS (i.e., the 3-year average of the fourth highest 8-hour daily maximum values at a monitor [35]). Commenters expressed the concern that the average second high may not be representative for all areas across the OTAG domain. However, none of the commenters provided any suggested alternatives to EPA's approach.

Response: The analysis performed by EPA to establish a relationship between the air quality during the OTAG episodes and the form of the 8-hour NAAQS was based upon an analysis of 3 years of monitoring data compared to monitoring data during the OTAG episodes. In response to comments, EPA performed an analysis to determine how the predicted average second high 8-hour values, as well as several alternative 8-hour values, compared to ambient 8-hour design values, based on 1994 to 1996 measured data. Based on this analysis, EPA determined that, overall, the model-predicted average second high values underestimate the corresponding ambient design values for those counties in the OTAG domain with 1994–1996 ambient values >=85 ppb. In addition to the average second high, EPA also compared six other measures of 8-hour model predictions to ambient design values. The six other measures include the highest, second

[35] For the purposes of discussion in this Section, these values are referred to as ''design'' values.

highest, third highest, and fourth highest ozone predictions across the July 1991, 1993, and 1995 episodes; the 3-episode average of the highest concentrations; and the 3-episode average of the highest, second highest, and third highest concentrations. The EPA also developed the same measures using model predictions from all 4 episodes for comparison to the ambient design values. The results indicate that none of the alternative measures provides a universal best match to ambient 8-hour design values in all States. Each of the indicators overestimates values in some areas and underestimates values in other areas to a varying extent. Furthermore, the best representation of 8-hour design values using predictions from the OTAG episodes varies from State to State. Given that the predicted average second high underestimates ambient 8-hour design values and that none of the other 8-hour indicators examined by EPA provides a ''best'' match to ambient values in all cases, EPA has decided to analyze the contributions to 8-hour nonattainment problems using all 8-hour predictions >=85 ppb. The EPA believes that this approach is appropriate given that EPA is using modeling results for the 8-hour NAAQS merely as an indicator of the likelihood that areas that currently monitor violations of the 8-hour NAAQS will continue to be nonattainment for the 8-hour NAAQS and/or have 8-hour maintenance problems in 2007.[36] Thus, the air quality analysis of 8-hour contributions, described below, focuses on all 8-hour values >=85 ppb.

Comment: Several commenters submitted new State-by-State zero-out modeling using UAM–V and CAM_x source apportionment modeling purporting to show that contributions from particular upwind States are insignificant.

Response: The EPA reviewed the commenters' modeling to determine and assess (a) the technical aspects of the models that were applied; (b) the types of episodes modeled; (c) the methods for aggregating, analyzing, and presenting the results; (d) the completeness and applicability of the information provided; and (e) whether the technical evidence supports the arguments made by the commenters. Overall, the modeling submitted by commenters is viewed by EPA as generally technically credible, although not complete in all cases. The EPA's ability to fully evaluate and utilize the modeling submitted by commenters was hampered in some cases because only limited information on the results was provided. For example, a commenter may have provided results for only 1 or 2 days in an episode, or for only one of several episodes with no information presented on the results for the remaining days or episodes that were modeled. As another example, results were presented for only the peak ozone day in an episode while greater contributions may have been predicted on other high ozone days of the episode. For some of the modeling, the information was only presented in graphical form which made the results difficult to evaluate in a quantitative way. Also, in some cases the model predictions were only presented as episode composite values without information on peak contributions. The EPA's full assessment of the modeling submitted by commenters is provided in the Response to Comments document.

In light of the absence of complete information in the modeling provided by commenters and other comments calling for State-by-State analyses, EPA decided to perform additional air quality modeling of the type submitted by commenters in order to consider all of the data resulting from such model runs. The EPA modeling includes State-by-State zero-out modeling using UAM–V and State-by-State CAM_x source apportionment modeling.

EPA conducted further analysis of other factors included in the multi-factor approach for significant contribution. The results of EPA's consideration of these factors and EPA's modeling are described next.

3. Analysis of State-specific Air Quality Factors

a. Overall Nature of Ozone Problem (''Collective Contribution''). As described above, EPA believes that each ozone nonattainment problem at issue in today's rulemaking is the result of emissions from numerous sources over a broad geographic area. The contribution from sources in an upwind State must be evaluated in this context. This ''collective contribution'' nature of the ozone problem supports the proposition that the solution to the problem lies in a range of controls covering sources in a broad area, including upwind sources that cause a substantial portion of the ozone problem. This upwind share is typically caused by NOx emissions from sources in numerous States. States adjacent to the State with the nonattainment problem generally make the largest contribution, but States further upwind, collectively, make a contribution that constitutes a large percentage in the context of the overall problem. As an example to illustrate the overall nature of the ozone problem, EPA discusses below the ozone problem in the New York City nonattainment area.

b. Extent of Downwind Nonattainment Problems. For each downwind area to which an upwind State may be linked, EPA also examined the extent of the downwind nonattainment problem, including the air quality impacts of controls required in downwind areas under the CAA, as well as of controls required or implemented on a national basis. As indicated elsewhere, EPA determined that a downwind area should be considered ''nonattainment'' for purposes of section 110(a)(2)(D)(i)(I) under the 1-hour NAAQS if the area currently (as of the 1994–96 time period) has nonattainment air quality[37] and if the area is modeled to have nonattainment air quality in the year 2007, after implementation of all measures specifically required of the area under the CAA as well as implementation of Federal measures required or expected to be implemented by that date. The EPA determined that each such downwind area had a residual nonattainment problem even after implementation of all these control measures. The presence of residual nonattainment is a factor that supports the need to reduce emissions from upwind sources to allow further progress towards attainment.[38] As an example, the residual nonattainment for the New York City area is discussed in more detail below.

[36] Similarly, the EPA is also using 1-hour model predictions >=125 ppb as an indicator that areas currently designated nonattainment for the 1-hour NAAQS will continue to be nonattainment for the 1-hour NAAQS in 2007.

[37] As explained elsewhere, for the 1-hour standard, EPA based its determination as to the boundaries of the area with air quality violating the NAAQS on the boundaries of the area designated as nonattainment.

[38] Indeed, the modeling relied on in today's action indicates that many downwind nonattainment areas carry a residual nonattainment problem even after implementation of regional reductions by all the States affected by today's action. Although not essential to EPA's conclusions, the presence of this nonattainment problem even after implementation of regional controls, based on the modeling used in today's rulemaking, indicates that even further reductions, regionally or locally, would be needed to assure attainment in those downwind areas.

c. Air Quality Impacts of Upwind Emissions on Downwind Nonattainment. As indicated above, in response to comments, additional air quality modeling was performed by EPA to confirm the proposed approach which relied on subregional modeling to quantify the impacts of emissions from upwind States on nonattainment in downwind areas. The additional modeling consisted of State-by-State zero-out modeling using UAM–V and State-by-State source apportionment modeling using the CAMx Anthropogenic Precursor Culpability Assessment (APCA) technique.[39] A description of these models is contained in the Air Quality Modeling TSD. Both models are currently being used by the scientific and regulatory community for air quality assessments. The EPA is not aware of any information that would indicate that either model provides more credible predictions than the other. Each modeling technique (i.e., zero-out and source apportionment) provides a different technical approach to quantifying the downwind impact of emissions in upwind States. The zero-out modeling analysis provides an estimate of downwind impacts by comparing the model predictions from a Base Case run to the predictions from a run in which the Base Case manmade emissions are removed from a specific State. In contrast, the source apportionment modeling quantifies downwind impacts by tracking formation, chemical transformation, depletion, and transport of ozone formed from emissions in an upwind source area and the impacts that ozone has on nonattainment in downwind areas. The EPA ran both models for all four OTAG episodes (i.e., July 1–11, 1988; July 13–21, 1991; July 20–30, 1993; and July 7–18, 1995) using the 2007 SIP Call Base Case emissions. The development of emissions for this Base Case scenario are described in Section IV, Air Quality Assessment.

The EPA selected several metrics in order to evaluate the downwind contributions from emissions in upwind States. The metrics were designed to provide information on the three fundamental factors for evaluating whether emissions in an upwind State make large and/or frequent contributions to downwind nonattainment. These factors are (a) the magnitude of the contribution, (b) the frequency of the contribution, and (c) the relative amount of the contribution. The magnitude of contribution factor refers to the actual amount of ''ppbs'' of ozone contributed by emissions in the upwind State to nonattainment in the downwind area. The frequency of the contribution refers to how often the contributions occur and how extensive the contributions are in terms of the number of grids in the downwind area that are affected by emissions in the upwind State. The relative amount of the contribution is used to compare the total ''ppb'' contributed by the upwind State to the total ''ppb'' of nonattainment in the downwind area.

As indicated above, two modeling techniques (i.e., UAM–V zero-out and CAMx source apportionment) were used for the State-by-State evaluation of contributions. The EPA developed metrics for both modeling techniques for each of the three factors. However, because of the differences between the two techniques, some of the metrics used for the UAM–V modeling and the CAMx modeling are different. The specific UAM–V and CAMx metrics and how they relate to the three factors used for the evaluation of contributions are described below.

The EPA examined the contributions from upwind States to downwind nonattainment for several types of nonattainment receptors. Nonattainment receptors for the 1-hour analysis include those grid cells that (a) are associated with counties designated as nonattainment for the 1-hour NAAQS and (b) have 1-hour Base Case model predictions >=125 ppb. These grid cells are referred to as ''designated plus modeled'' nonattainment receptors. Using these receptors, the metrics were calculated for each 1-hour nonattainment area as well as for each State. To calculate the metrics by State, all of the 1-hour nonattainment receptors in that State were pooled together.[40] Table II–1 lists the 1-hour nonattainment areas that were considered in this analysis, along with the State(s) in which the nonattainment area is located. In addition to the areas listed in Table II–1, EPA also evaluated the contributions of upwind States to ozone concentrations over Lake Michigan because modeled air quality over the lake can be indicative, under certain weather conditions, of air quality in portions of the States surrounding the lake.[41]

TABLE II–1.—1-HOUR NONATTAINMENT AREAS EVALUATED

Nonattainment area	State(s)
Atlanta	Georgia.
Baltimore	Maryland.
Birmingham	Alabama.
Boston/Portsmouth 1	Massachusetts, New Hampshire.
Chicago/Milwaukee [2]	Illinois, Indiana, Wisconsin.
Cincinnati	Kentucky, Ohio.
Greater Connecticut	Connecticut.
Louisville	Indiana, Kentucky.
Memphis	Mississippi, Tennessee.
New York City	Connecticut, New Jersey, New York.
Philadelphia	Delaware, Maryland, New Jersey, Pennsylvania.
Pittsburgh	Pennsylvania.
Portland	Maine.
Rhode Island	Rhode Island.
Southwestern Michigan [3]	Michigan.

[39] For ease of discussion, EPA is using the term ''UAM–V'' to refer to the UAM–V State-by-State zero-out modeling and the term ''CAMx'' to refer to the CAMx source apportionment modeling.

[40] For ease of discussion in this Section, the 1-hour nonattainment areas and the set of nonattainment receptors pooled over an entire State are referred to as downwind areas.

[41] High measured ozone concentrations in portions of Illinois, Indiana, Michigan, and Wisconsin near the shoreline of Lake Michigan are often associated with weather conditions which cause ozone precursor pollutants to be blown offshore over the lake during the morning, where they can form high ozone concentrations which then return onshore during ''lake breeze'' wind flows in the afternoon. Because the size of the grid cells used in the OTAG modeling is relatively large compared to the spatial scale of the lake breeze, the high ozone concentrations predicted over the lake may not be blown back onshore in the model. Since high concentrations over the lake do, in reality, impact air quality along the shoreline of one or more of these States, the EPA believes that it is appropriate to use predicted contributions to ozone over Lake Michigan as a surrogate for contributions to any one of the surrounding States (i.e., Illinois, Indiana, Michigan, and Wisconsin).

TABLE II–1.—1-HOUR NONATTAINMENT AREAS EVALUATED—Continued

Nonattainment area	State(s)
St. Louis	Illinois, Missouri.
Washington, DC	District of Columbia, Maryland, Virginia.
Western Massachusetts	Massachusetts.

[1] For the purposes of this analysis EPA has combined the Greater Boston nonattainment area which includes portions of Massachusetts and New Hampshire, with the Portsmouth, New Hampshire nonattainment area into a single downwind nonattainment receptor area.
[2] For the purposes of this analysis EPA has combined the 1-hour nonattainment counties that are along the shoreline of Lake Michigan in the States of Illinois, Indiana, and Wisconsin into a single downwind nonattainment receptor area.
[3] For the purposes of this analysis EPA has combined the 1-hour nonattainment counties that are along the shoreline of Lake Michigan in the State of Michigan into a single downwind nonattainment receptor area.

For the 8-hour analysis, nonattainment receptors are those grid cells that (a) are associated with counties currently violating the 8-hour NAAQS (based on 1994–1996 data) and (b) have 8-hour Base Case model predictions >=85 ppb. These grid cells are referred to as ''violating plus modeled'' nonattainment receptors. The metrics for the 8-hour contribution analyses were calculated on a State-by-State basis by pooling together the ''violating plus modeled'' receptors in a State.

(1) UAM–V State-by-State Modeling. In the UAM–V zero-out model runs all manmade emissions in a given upwind State were removed from the Base Case scenario. Each zero-out scenario was run for all 4 episodes and the ozone predictions in downwind States were then compared to those from the Base Case run in order to quantify the downwind impacts of emissions from the upwind State (i.e., the State in which the manmade emissions were removed). The EPA performed zero-out runs for the following set of States:

- Alabama, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Michigan, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin.

Zero-out modeling for Massachusetts was performed because this State was the only State in the Northeast with relatively large NO_X emissions that was not included in any of the OTAG subregional modeling. The other States listed above were selected for zero-out modeling in order to respond to comments that emissions in all or portions of each of these States do not contribute significantly to downwind nonattainment.

The EPA analyzed the model-predicted ozone concentrations from the zero-out runs using the four metrics described below. The results for these metrics are too voluminous to include in the notice in their entirety. The full set of results is contained in the Air Quality Modeling TSD. Each metric was calculated using 1-hour daily maximum concentrations >=125 ppb as well as 8-hour daily maximum concentrations >=85 ppb. Model predictions from all 4 episodes were used for calculating the metrics.[42]

UAM–V Metric 1: Exceedences. This metric is the total number of predicted concentrations exceeding the NAAQS (i.e. 1-hour values >=125 ppb and 8-hour values >=85 ppb) within the downwind area. In calculating this metric, EPA summed the number of occurrences of values above the applicable standard (i.e., 1-hour or 8-hour) for all nonattainment receptors within the downwind area. For example, in Downwind Area #1 there are five 1-hour ''designated plus modeled'' nonattainment receptors. For this downwind area, the Base Case value for Metric 1 is calculated by first counting the number of days, across all four episodes, that had 1-hour daily maximum values >=125 ppb at each of the five receptors. The result is the total number of exceedences at each receptor over all days in all four episodes. The total number of exceedences at each receptor is then summed across all five receptors to produce the total number of exceedences in Downwind Area #1, which is the value for Metric 1 for this area.

UAM–V Metric 2: Ozone Reduced—ppb. This metric shows the magnitude and frequency of the ''ppb'' impacts from each upwind State on ozone concentrations in each downwind area. These impacts are quantified by calculating the difference in ozone concentrations between the zero-out run and the Base Case. The results are then tabulated in terms of the number of ''impacts'' within six concentration ranges: >=2 to 5 ppb, >=5 to 10, >=10 to 15, >=15 to 20, >=20 to 25, and >=25 ppb. The impacts for 1-hour daily maximum values and 8-hour daily maximum values are determined by tallying the total ''number of days and grid cells'' >=125 ppb or >=85 ppb that receive contributions within the concentration ranges. In the analysis of contributions, as described below, the data from Metric 2 are used in conjunction with Metric 1 to determine the percent of the exceedences in the downwind area that receive contributions of >=2 ppb, >= 5 ppb, >=10, ppb, etc. The maximum ''ppb'' impact within the downwind area is also calculated.

UAM–V Metric 3: Total ppb Reduced. This metric quantifies the total ppb contributed in the downwind area from an upwind State, not including that portion of the contribution that occurs below the level of the NAAQS. For 1-hour concentrations, Metric 3 is calculated by taking the difference between the Base Case predictions in each nonattainment receptor and either (a) the corresponding value in the zero-out run, or (b) 125 ppb, whichever is greater (i.e., 125 ppb or the prediction in the zero-out run). The Base Case vs. zero-out differences are summed over all days and across all nonattainment receptors in the downwind area. The calculation of this metric is illustrated by the following example. If the Base Case 1-hour daily maximum ozone prediction is 150 ppb and the corresponding value from the zero-out run is 130 ppb, then the difference used in this metric is 20 ppb. However, if the value from the zero-out run is 115 ppb, then the difference used in this metric is 25 ppb (i.e., 150 ppb–125 ppb, because 115 ppb is less than 125 ppb).

For analyzing the contributions using Metric 3, the values of this metric are compared to the total amount of ozone above the NAAQS (i.e., 125 ppb, 1-hour or 85 ppb, 8-hour) in the Base Case. This baseline measure of the ''total amount of nonattainment'' (i.e., the total ''ppb'' of ozone that is above the NAAQS) is calculated by summing the ''ppb'' values in the Base Case that are above the level of the NAAQS. The total contribution from an upwind State to a particular downwind area calculated by Metric 3 is expressed in relation to the

[42] Model predictions from the first few days of each episode are considered ''ramp-up'' days and were excluded from the analysis, following the procedures adopted by OTAG. The ramp-up days include the first 3 days of the July 1988, 1991, and 1995 episodes and the first 2 days of the July 1993 episode.

amount that the downwind area is in nonattainment. For example, if Upwind State #1 contributes a total of 50 ppb >=125 ppb to Downwind Area #2 and the total Base Case ozone >=125 ppb in Downwind Area #2 is 500 ppb, then the contribution from Upwind State #1 (i.e., 50 ppb) to Downwind Area #2 is equivalent to 10 percent of Downwind Area #2's nonattainment problem (i.e., 50 ppb divided by 500 ppb, times 100).

UAM–V Metric 4: Population-Weighted Total ppb Reduced. This metric is similar to the ''Total ppb Reduced'' metric except that the calculated contributions are weighted by (i.e., multiplied by) population. In calculating this metric, the ''ppb'' contributions are determined for each nonattainment receptor, then summed across all nonattainment receptors in a particular downwind area. During this calculation, the population in the nonattainment receptor is multiplied by the total contribution in that receptor (i.e., grid cell) and then this value is added to the corresponding values for the other receptors in the downwind area. The results for this metric are expressed relative to the population-weighted Base Case amount similar to the approach followed with Metric 3, as described above.

(2) CAMx Source Apportionment Modeling. In the CAMx modeling, the source apportionment technique was used to calculate the contributions from upwind States to ozone concentrations above the NAAQS in downwind areas. Due to computational constraints, it was not possible for EPA to treat each State in the OTAG region as a separate source area. Several of the smaller States in the Northeast were grouped together as were seven States in the far western portion of the region. The following States were treated as individual source areas:

- Alabama, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia, and Wisconsin.

The following States were grouped together:

- Connecticut and Rhode Island were combined; Maryland, Delaware and the District of Columbia were combined; New Hampshire and Vermont were combined; and Arkansas was combined with the portions of Oklahoma, Kansas, Minnesota, Nebraska, North Dakota, and South Dakota that lie within the OTAG region.

The contributions from each of these source areas to downwind nonattainment were evaluated using four metrics. As indicated above, the CAMx metrics are calculated for the same types of nonattainment receptors as the UAM–V zero-out metrics. The CAMx metrics are calculated in a way that is different from the metrics used for the zero-out runs in large part because of the differences between the two techniques. The zero-out modeling calculates contributions using the difference in predictions between two model runs (i.e., a Base Case and a State-specific zero-out run). In contrast, the CAMx source apportionment technique calculates contributions by internally tracking ozone formed from emissions in each source area. In raw form, the source apportionment technique produces a ''ppb'' contribution from each source area to hourly ozone in each receptor grid cell. The individual hourly ''ppb'' contributions were treated in the way described below to calculate 1-hour and 8-hour values for the four metrics. The approach was based on recommendations to EPA by Environ, the developers of CAMx. For 1-hour concentrations the metrics are calculated based on contributions to all hourly predictions >=125 ppb. For 8-hour concentrations, the metrics are calculated based on the contribution to every 8-hour period in a day with an average concentration >=85 ppb. In order to provide a link to the way 1-hour and 8-hour concentrations were treated for the zero-out runs, EPA also calculated the CAMx metrics for 1-hour daily maximum values >=125 ppb and 8-hour daily maximum values >=85 ppb.[43] The full set of results for all of the CAMx metrics is contained in the Air Quality Modeling TSD.

The CAMx Metrics 1 and 2 provide information on the magnitude and frequency of contributions in a form that is similar to UAM–V Metrics 1 and 2.

CAMx Metric 3: Highest Daily Average Contribution. This metric is the highest daily average ozone ''ppb'' contribution from each upwind source area to each downwind nonattainment receptor area over all days modeled in all four episodes. The following example illustrates how this metric is calculated for 1-hour ozone concentrations. Similar procedures are followed for calculating this metric for 8-hour concentrations. First, the hourly ''ppb'' contributions from a particular upwind source area to each nonattainment receptor in a downwind area are summed across all receptors in the downwind area. This total daily contribution is then divided by the number of hours and grid cells >=125 ppb in the downwind area to determine the daily average ''ppb'' contribution. This calculation is performed on a day by day basis for each day in the 4 episodes. After the average contributions are calculated for each day, the highest daily average value across all episodes is selected for analysis. In addition, the highest daily average contribution is expressed as a percent of the downwind area's average ozone >=125 ppb. That is, the highest daily average ''ppb'' contribution is divided by the average of the ozone concentrations >=125 ppb on that day (i.e., the day on which the highest average ppb contribution occurred). For example, if the highest daily average contribution from an upwind State to nonattainment downwind is 15 ppb and the average of the hourly ozone values >=125 ppb on this day in the downwind area is 150 ppb, then the 15 ppb contribution, expressed as a percent, is 10 percent.

CAMx Metric 4: Percent of Total Manmade Ozone Contribution. This metric represents the total contribution from emissions in an upwind State relative to the total ozone for all hours above the NAAQS in the downwind area. This metric, which is referred to as the ''average contribution,'' is calculated for each episode as well as for all four episodes combined. The following example is used to illustrate how this metric is calculated for a single episode for a particular downwind area. In step 1, all predicted Base Case hourly values >=125 ppb in the downwind area are summed over all nonattainment receptors and all days in an episode. In step 2, the ''ppb'' contributions from a source area to this downwind area are summed over all nonattainment receptors in the downwind area and all days in the episode to yield a total ppb contribution. The total contribution calculated in Step 2 is then divided by the total ozone >=125 ppb in the downwind area to produce the fraction of ozone >=125 ppb in the downwind area that is due to emissions from the upwind source area. This fraction is multiplied by 100 to express the result as a percent.

4. Confirmation of States Making a Significant Contribution to Downwind Nonattainment

In the proposal, EPA made findings of significant contribution based on a

[43] As described in the Air Quality Modeling TSD, the metrics calculated using the hourly contributions >= 125 ppb are consistent with the metrics calculated using 1-hour daily maximum contributions >= 125 ppb. Similarly, the metrics calculated using all 8-hour periods >= 85 ppb are consistent with the metrics calculated using 8-hour daily maximum values >= 85 ppb.

weight-of-evidence approach that included consideration of air quality contributions based on subregional modeling. As discussed in section II.C.2, Summary of Notice of Proposed Rulemaking Weight-of-Evidence Approach, EPA believes that the subregional modeling provides an adequate independent basis for determining which States contribute significantly to downwind nonattainment. The evaluation of the State-by-State modeling confirms the overall findings that were based on the subregional modeling and provides more refined information regarding the impacts of specific upwind States on nonattainment in individual downwind areas. This State-by-State modeling is discussed in more detail below.

a. Analysis Approach. The EPA has analyzed the results of the State-by-State UAM–V zero-out modeling and the State-by-State CAMx source apportionment modeling for each of the 23 jurisdictions for which this modeling is available.[44] Both UAM–V and CAMx modeling results are available for fifteen States (i.e., Alabama, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Michigan, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin). For an additional eight States (i.e., Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, and Rhode Island), CAMx modeling is available. Also, as noted above in Section II.C.3, State-by-State Air Quality Modeling, Connecticut and Rhode Island were combined as a single source area, and Maryland, the District of Columbia, and Delaware were also combined as a single source area. Because the NO_X emissions and/or NO_X emissions density is large in each jurisdiction within both of these combined source areas, EPA believes that the downwind contributions from these combined source areas can be attributed to each jurisdiction within the source area.

For the 1-hour NAAQS, EPA evaluated downwind impacts in two ways using the factors described in Section II.C.3, State-by-State Air Quality Modeling. First, EPA evaluated the contributions from each upwind State to nonattainment in each downwind State. Second, the EPA evaluated the contributions from each upwind State to nonattainment in each downwind 1-hour nonattainment area. In downwind States which only contain a single intrastate nonattainment area (e.g., Atlanta), the results of the downwind State and downwind nonattainment area analyses are the same because the same nonattainment receptors are used in both cases. For the 8-hour NAAQS, EPA evaluated the contributions from upwind States to 8-hour nonattainment in each downwind State.

The EPA used the following process in determining whether a particular upwind State contributes significantly to 1-hour nonattainment in an individual downwind area. First, EPA reviewed the extent of the nonattainment problem in the downwind area using ambient design values and model predictions of future ozone concentrations after the application of (a) 2007 Base Case controls, (b) additional local NO_X reductions, and (c) regional reductions (additional local plus upwind NO_X reductions).[45] As indicated above, EPA determined that each downwind area had a residual nonattainment problem even after implementation of the control measures in the 2007 Base Case.

Second, using the information from CAMx Metric 4[46], EPA reviewed (a) the relative portion of the ozone problem in each downwind area that is due to ''local'' emissions (i.e., emissions from the entire State or States in which the downwind area is located), (b) the total contribution from all upwind emissions (i.e., the sum of the contributions from manmade emissions in all upwind States, combined), and (c) the contribution from manmade emissions in individual upwind States. The local versus upwind contributions for each downwind area are provided in the Air Quality Modeling TSD. The EPA analyzed this information to determine whether upwind emissions are an important part of the downwind areas' nonattainment problem. In general, the data indicate that, although a substantial portion of the 1-hour nonattainment problem in many of the downwind areas is due to local emissions, a substantial portion of the nonattainment problem is also due to emissions from upwind States. In addition, for most upwind-State-to-downwind-area linkages there is no single upwind State that makes up all of the upwind contribution. Rather, the total contribution for all upwind States combined is comprised of individual contributions from a number of upwind States many of which are relatively similar in magnitude such that there is no ''bright line'' which distinguishes between the contributions from most of the individual upwind States.

Third, EPA determined whether each individual upwind State significantly contributes to nonattainment in a particular downwind area using the UAM–V and CAMx metrics to evaluate three aspects, or factors of the contribution.[47] These factors include the magnitude, frequency, and relative amount of the contribution. The specific UAM–V and CAMx metrics which correspond to each of the factors are identified in Table II–2. As indicated in the table, there is at least one metric from each modeling technique that corresponds to each of the three factors.

TABLE II–2.—METRICS ASSOCIATED WITH EACH CONTRIBUTION FACTOR

Factor	UAM–V	CAMx
Magnitude of Contribution	Maximum ''ppb'' contribution (Metric 2)	Maximum ''ppb'' Contribution (Metric 2); and Highest Daily Average Contribution (Metric 3).
Frequency of Contribution	Number and percent of exceedences with contributions in various concentration ranges (Metric 1 and 2)	Number and percent of exceedences with contributions in various concentration ranges (Metric 1 and 2).
Relative Amount of Contribution.	Total ''ppb'' contribution relative to the total ''ppb'' that the downwind area is above the NAAQS (Metric 3); and Total population-weighted ''ppb'' contribution relative to the total population-weighted ''ppb'' that the downwind area is above the NAAQS (Metric 4)	Four-episode average percent contribution from the upwind State to nonattainment in the downwind area (Metric 4); and Highest single-episode average percent contribution from the upwind State to nonattainment in the downwind area (Metric 4).

[44] The approach for dealing with the 15 States in the OTAG domain which were not proposed to make a significant contribution to downwind nonattainment are discussed below in Section II.C.5, States Not Covered by this Rulemaking.

[45] Scenarios (b) and (c) refer to the runs used to assess transport as described in Section IV.

[46] This information represents the average contributions across all four episodes. In addition to the four-episode average contribution, EPA also examined the highest single-episode average contribution from each upwind State to each downwind area.

[47] The factors used to interpret the metrics should not be confused with the multi-factor approach used to identify the amounts of NO_X emissions that contribute signficantly to nonattainment.

It should be noted that the relative contributions of individual upwind States to a particular downwind area add up to 100 percent for the CAMx 4-episode average percent contribution. However, this is not the case for the CAMx highest single-episode average percent contribution since the value from one upwind State can occur in a different episode than the value from another upwind State for the same downwind area. In addition, it should be noted that UAM–V Metrics 3 and 4 are used in combination to express the total contribution above the NAAQS relative to the total amount that the downwind area is above the NAAQS. The values for each of these metrics also do not add up to 100 percent when considering contributions from multiple upwind States to an individual downwind area.

The EPA compiled the UAM-V and CAMx metrics by downwind area in order to evaluate the contributions to downwind nonattainment. The data on 1-hour and 8-hour contributions were compiled and analyzed separately. The data were reviewed to determine how large of a contribution a particular upwind State makes to nonattainment in each downwind area in terms of the magnitude of the contribution and the relative amount of the total contribution. The data were also examined to determine how frequently the contributions occur.

The first step in evaluating this information was to screen out linkages for which the contributions were very low, as described in the Air Quality Modeling TSD. The finding of significance for linkages that passed the initial screening criteria was based on EPA's technical assessment of the values for the three contribution factors. Each upwind State that had large and/or frequent contributions to the downwind area, based on these factors, is considered as contributing significantly to nonattainment in the downwind area. The EPA believes that each of the factors provides an independent legitimate measure of contribution. However, there had to be multiple factors that indicate large and/or frequent contributions in order for the linkage to be significant. In this regard, the finding of a significant contribution for an individual linkage was not based on any single factor.

For many of the individual linkages the factors yield a consistent result (i.e., either large and/or frequent contributions or small and/or infrequent contributions). In some cases, however, not all of the factors are consistent. For upwind-downwind linkages in which some of the factors indicate high and/or frequent contributions while other factors do not, EPA considered the overall number and magnitude of those factors that indicate large and/or frequent contributions compared to those factors that do not. Based on an assessment of all the factors in such cases, EPA determined that the upwind State contributes significantly to nonattainment in the downwind area if on balance the factors indicate large and/or frequent contributions from the upwind State to the downwind area.

The EPA's evaluation of the contributions to 1-hour nonattainment in New York City is presented as an example to illustrate this process. The New York City area, which consists of portions of New York, New Jersey, and Connecticut, is designated as a severe nonattainment area under the 1-hour NAAQS. The ambient 1-hour design value in New York City, based on 1994 through 1996 monitoring data is 144 ppb. During the four OTAG episodes, 39 percent of the days are predicted to have 1-hour exceedences in 2007 after the implementation of all CAA controls and Federal measures.[48] Moreover, EPA's air quality modeling of the benefits of regional NO_X strategies, as described in Section IV, Air Quality Assessment, indicates that there would still be exceedences of the 1-hour NAAQS remaining in New York City even with eliminating the significant amounts of emissions required by this NO_X SIP Call.

In the assessment of contributions to New York City, EPA examined the local versus upwind contributions to 1-hour nonattainment in this area, as shown in Table II–3. Local emissions in the New York City nonattainment area are spread among numerous stationary sources, area sources, highway sources, and nonroad sources, each of which contributes only a very small, indeed sometimes immeasurable, amount to New York City's ozone nonattainment problem. Combined, these emissions result in approximately 55 percent of the New York City area's ozone problem. Emissions from States upwind of New York, New Jersey, and Connecticut, on average across all four episodes, contribute 45 percent of the nonattainment problem in New York City is due to. However, no single State stands out as contributing most of the total upwind contribution. The biggest single contributor is Pennsylvania (18 percent) followed by Maryland/Washington, DC/Delaware (5 percent). The total contribution from all Northeast States is 23 percent. A similar amount (22 percent) of the total contribution is due to emissions in those States outside the Northeast. The data in Table II–3 indicate that 19 percent of the 22 percent is fairly evenly divided among ten States, whose contributions range from 1 percent (6 States) to 4 percent (Ohio and Virginia). The remaining 3 percent (i.e., 19 percent vs 22 percent) is from States that each contribute less than 1 percent, on average. The highest single-episode contributions from States upwind of the Northeast range from 1 percent (Tennessee) to 8 percent (Virginia). In general, the contribution data in Table II–3 indicate that a substantial amount of New York City's nonattainment problem is due to the collective contribution from emissions in a number of upwind States both within and outside the northeast. That these upwind contributions are a meaningful part of New York City's nonattainment problem is particularly evident in light of the fact that the contribution to the problem made by New York City itself is comprised of the collective contribution of numerous sources.

TABLE II–3.—PERCENT CONTRIBUTION FROM UPWIND STATES TO 1-HOUR NONATTAINMENT IN NEW YORK CITY [1]

Downwind area: New York City	Percent of total manmade emissions over 4 episodes	Highest single-episode percent contribution [2]
Amount due to "Local" Emissions [3]	55	[4]NA
Total Amount from all "Upwind" States	45	NA
Contributions from Individual Upwind States		
PA	18	19
MD/DC/DE	5	6

[48] This is further described in the Air Quality Modeling TSD.

TABLE II–3.—PERCENT CONTRIBUTION FROM UPWIND STATES TO 1-HOUR NONATTAINMENT IN NEW YORK CITY [1]—Continued

Downwind area: New York City	Percent of total manmade emissions over 4 episodes	Highest single-episode percent contribution [2]
OH	4	6
VA	4	8
WV	3	7
IL	2	3
IN	1	2
KY	1	3
MI	1	4
MO	1	2
NC	1	2
TN	1	1
Total Amount from All Other States, combined	3	NA.

[1] These values are based on CAMx Metric 3 calculated across all 4 episodes.
[2] These values are based on CAMx Metric 3 calculated for each episode individually. These values do not add up to 100 percent.
[3] 3. Total contribution from the State(s) in which the Nonattainment area is located.
[4] 4. Not applicable.

The extent of New York City's nonattainment problem and the nature of the contributions from upwind States were considered in determining whether the values of the metrics indicate large and/or frequent contributions for individual upwind States. Specifically, additional controls beyond the local and upwind NO_X reductions which are part of the regional NO_X strategy may be needed to solve New York City's 1-hour nonattainment problem. Also, the total contribution from all upwind States is large and there is no single State or small number of States which comprise this total upwind portion. In this regard, the contributions to New York City from some States may not appear to be individually ''high'' amounts. However, (as described below) these contributions, when considered together with the contributions from other States (i.e., the collective contribution) produce a large total contribution to nonattainment in New York City.

The EPA evaluated the magnitude, frequency, and relative amount of contribution from emissions in individual upwind States to determine which States contribute significantly to 1-hour nonattainment in New York City. The UAM–V and CAMx metrics which quantify each upwind State's contribution to New York City for each of the three factors are provided in the Air Quality Modeling TSD and described below. Examination of the values for these metrics indicates that the upwind States can be divided into three general groups, based on the magnitude, frequency, and relative amount of contribution. The first group contains those upwind States for which the UAM–V and CAMx metrics all clearly indicate a significant contribution to 1-hour nonattainment in New York City. The second group contains those States for which the CAMx and UAM–V metrics are not quite as consistent, but overall the metrics indicate a significant contribution to 1-hour nonattainment in New York City.[49] The third group contains those States for which the CAMx and UAM–V metrics clearly indicate that the impacts do not make a significant contribution to New York City.

Group 1 Upwind States:

The CAMx and UAM–V metrics all clearly indicate that emissions from Maryland/Washington, DC/Delaware, Ohio, Pennsylvania, Virginia, and West Virginia make large and/or frequent contributions to 1-hour nonattainment in New York City. For Pennsylvania the magnitude of contribution, as indicated by the highest daily average contribution (CAMx Metric 3), is 25 ppb and the relative amount of contribution is 18 percent (CAMx Metric 4). For the other upwind areas, the magnitude of the contributions range from 9 ppb to 15 ppb (CAMx Metric 3, highest daily average contributions) with contributions in the range of 5 ppb to 10 ppb—from Ohio, Virginia, and West Virginia (UAM–V Metric 2, maximum ''ppb'' contribution). In terms of the frequency of the contribution, 7 percent to 11 percent of the total number of grid-hours >=125 ppb in New York City receive contributions of 10 ppb from each of these States (CAMx Metric 1 and 2). Also, the relative amounts of the contribution are in the range of 6 percent to 8 percent (CAMx Metric 4, highest single-episode average percent contribution) and the total contribution from each of three States (i.e., Ohio, Virginia, and West Virginia) is large compared to the total amount of nonattainment, ranging from 8 percent to 11 percent (UAM–V Metric 3).

Group 2 Upwind States:

The CAMx and UAM–V metrics are somewhat less consistent on the extent of contributions from each of 5 States: Kentucky, Illinois, Indiana, Michigan, and North Carolina. None of the metrics for either model indicate extremely low or extremely high contributions. Rather, for these States most of the metrics indicate relatively high contributions while a few metrics indicate relatively low contributions. The rationale used by EPA for evaluating the contributions from these States involved comparing and contrasting each piece of data for these States on an individual ''upwind State-by-upwind State'' basis and as a group (i.e., for all 5 States, together) in order to weigh the relative magnitude and frequency of the contributions for making a determination of significance.

UAM–V Metrics—For each of these 5 States the ''weakest'' factor is the magnitude contribution (UAM–V Metric 2) in that the highest contributions are in the range of 2 to 5 ppb. The other UAM–V Metrics, however, indicate that the contributions from each State are of a larger frequency and relative amount. Specifically, four of these States (Kentucky, Indiana, Illinois, and

[49] For New York City, each of the ''Group 2'' States were found to make a significant contribution. However, this was not the case for all of the Group 2 linkages in other nonattainment areas. For example, the contribution from Kentucky to Philadelphia and the contribution from Tennessee to Baltimore were Group 2 situations in which EPA determined that the contributions were not significant.

Michigan) each contribute 2 to 5 ppb to as many as 3 percent to 4 percent of the exceedences in New York City (UAM–V Metrics 1 and 2). While North Carolina contributes to somewhat fewer exceedences (2 percent), this slight weakness is out-weighed by the relative amount of contribution (UAM–V Metrics 3 and 4) which indicates that the total contribution from North Carolina alone is equivalent to 3 percent of the total ''ppb'' >=125 ppb and 4 percent of the population-weighted ''ppb'' >=125 ppb in New York City. For Indiana, Illinois, and Michigan the relative amount of contribution (UAM–V Metrics 3 and 4) is also relatively high and ranges from 3 percent to 5 percent. The relative amount of contribution from Kentucky is somewhat weaker at 2 percent.

CAMx Metrics—For Illinois, all of the CAMx metrics indicate relatively large and/or frequent contributions, as described below. For Kentucky, Indiana, Michigan, and North Carolina the magnitude of contribution is large, as indicated by the maximum contribution which ranges from 6 ppb (Indiana) to 11 ppb (North Carolina). Also, the highest daily average contribution from Kentucky, Michigan, and North Carolina are all in the range of 5 ppb to 7 ppb. In terms of the frequency of contribution, Indiana and North Carolina contribute in the range of 5 ppb to 10 ppb to 3 percent and 6 percent of the exceedences, respectively, in New York City. For Kentucky, Indiana, Michigan, and North Carolina the relative amounts of contribution is somewhat mixed in that the 4-episode average percent contribution is only 1 percent, but the highest single-episode average percent contributions are higher at 2 percent from both Indiana and North Carolina, 3 percent from Kentucky, and 4 percent from Michigan (CAMx Metric 4).

Overall contributions considering UAM–V and CAMx Metrics—Considering the CAMx and UAM–V metrics, as described below, the majority of the contribution factors indicate that, overall, each of the Group 2 States contributes significantly to 1-hour nonattainment in New York City.

Kentucky—

Metrics indicating relatively high and/or frequent contributions:

—Magnitude of Contribution: the maximum contribution from CAMx is 9 ppb (CAMx Metric 2) and highest daily average contribution is 7 ppb (CAMx Metric 3);

—Frequency of Contribution: 4 percent of the exceedences receive contributions of more than 2 ppb (UAM–V Metrics 1 and 2); and

—Relative Amount of Contribution: the highest single-episode average contribution is 3 percent (CAMx Metric 4).

Metrics indicating relatively low and/or infrequent contributions:

—Magnitude of Contribution: the maximum contribution from UAM–V is 2 ppb; and

—Relative Amount of Contribution: the 4-episode average percent contribution is 1 percent (CAMx Metric 4).

Indiana—

Metrics indicating relatively high and/or frequent contributions:

—Magnitude of Contribution: the maximum ''ppb'' contribution is 6 ppb (CAMx Metric 2);

—Frequency of Contribution: 4 percent of the exceedences receive contributions of more than 2 ppb (UAM–V Metrics 1 and 2) ; and

—Relative Amount of Contribution: the total ''ppb'' contribution is equivalent to 3 percent of total amount of nonattainment (UAM–V Metric 3).

Metrics indicating relatively low and/or infrequent contributions:

—Magnitude of Contribution: the maximum contribution from is 2 ppb (UAM–V Metric 2); and

—Relative Amount of Contribution: the 4-episode average percent contribution is 1 percent (CAMx Metric 4).

Illinois—

Metrics indicating relatively high and/or frequent contributions:

—Magnitude of Contribution: the maximum contribution is 8 ppb (CAMx Metric 2); the highest daily average contribution is 6 ppb;

—Frequency of Contribution: 3 percent of the exceedences receive contributions of more than 2 ppb; and

—Relative Amount of Contribution: the highest single-episode average contribution is 3 percent (CAMx Metric 4); the total ''ppb'' contribution is equivalent to 3 percent of total amount of nonattainment.

Metrics indicating relatively low and/or infrequent contributions:

—Magnitude of Contribution: the maximum contribution from UAM–V is 2 ppb.

Michigan—

Metrics indicating relatively high and/or frequent contributions:

—Magnitude of Contribution: the maximum contribution is 7 ppb (CAMx Metric 2); the highest daily average contribution is 5 ppb (CAMx Metric 3);

—Frequency of Contribution: 3 percent of the exceedences receive contributions of more than 2 ppb (UAM–V Metrics 1 and 2); and

—Relative Amount of Contribution: the highest single-episode average contribution is 4 percent (CAMx Metric 4); the total ''ppb'' contribution is equivalent to 3 percent of the total amount of nonattainment.

Metrics indicating relatively low and/or infrequent contributions:

—Magnitude of Contribution: the maximum contribution from UAM–V is 2 ppb

—Frequency of Contribution: 1 percent of the exceedences receive contributions of 5 ppb or more (CAMx Metrics 1 and 2); and

—Relative Amount of Contribution: the 4-episode average percent contribution is 1 percent (CAMx Metric 4).

North Carolina—

Metrics indicating relatively high and/or frequent contributions:

—Magnitude of Contribution: the maximum contribution is 11 ppb (CAMx Metric 2); the highest daily average contribution is 6 ppb (CAMx Metric 3);

—Frequency of Contribution: 6 percent of exceedences receive contributions of 5 ppb or more (CAMx Metrics 1 and 2); and

—Relative Amount of Contribution: the total ''ppb'' contribution is equivalent to 3 percent of total amount of nonattainment.

Metrics indicating relatively low and/or infrequent contributions:

—Relative Amount of Contribution: the 4-episode average percent contribution is 1 percent (CAMx Metric 4).

Group 3 Upwind States: The CAMx and UAM–V metrics clearly indicate that the emissions from the following States do not make large and/or frequent contributions to 1-hour nonattainment in New York City: Alabama, Georgia, Massachusetts, Missouri, South Carolina, Tennessee, and Wisconsin. The rationale for this conclusion is as follows:

—Magnitude of Contribution: all of these upwind States individually contribute less than 2 ppb to 1-hour daily maximum exceedences in New York City (UAM–V Metric 2); the highest daily average contribution was 1 ppb or less from Alabama, Georgia, and Massachusetts, and 2

ppb from South Carolina, Tennessee, and Wisconsin (CAMx Metric 3); and

—Relative Amount of Contribution: the 4-episode average contributions from Alabama, Georgia, Massachusetts, South Carolina, and Wisconsin are less than 1 percent (CAMx Metric 4); the total contributions from Missouri and Tennessee are each equivalent to 1 percent of the total amount of nonattainment in New York City (UAM–V Metric 3).

Based on the preceding evaluation, EPA believes that emissions in each of the following twelve jurisdictions contribute significantly to 1-hour nonattainment in the New York City nonattainment area: the District of Columbia, Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia.

b. States Which Contain Sources That Significantly Contribute to Downwind Nonattainment. The results of EPA's assessment of the State-by-State UAM–V and CAMx modeling confirms the findings based on subregional modeling that the 23 jurisdictions contribute large and/or frequent amounts to downwind nonattainment under both the 1-hour and 8-hour NAAQS and forms an independent basis for those findings. The specific upwind States which significantly contribute to nonattainment in specific downwind States are listed in Tables II–4 and II–5 for the 1-hour NAAQS and Table II–6 and Table II–7 for the 8-hour NAAQS. The information on the 1-hour contribution linkages are presented by upwind State in Table II–4 and by downwind State in Table II–5. In Table II–4 the upwind States are each listed in the first column and the downwind States to which each upwind State contributes significantly are listed in the second column. In Table II–5, the same information is presented by downwind State. In this table, each downwind State is listed in the first column and the upwind States that contribute to that downwind State are listed in the second column. The 8-hour contribution linkages are presented by upwind State in Table II–6 and by downwind State in Table II–7.

TABLE II–4.—DOWNWIND STATES FOR WHICH UPWIND STATES CONTAIN SOURCES THAT CONTRIBUTE SIGNIFICANTLY TO 1-HR NONATTAINMENT [1]

Upwind state	Downwind states
Alabama	GA, IL*, IN*, MI*, TN, WI*.
Connecticut	ME, MA, NH.
Delaware	CT, ME, MA, NH*, NJ, NY, PA, RI, VA.
District of Columbia	CT, ME, MA, NH*, NJ, NY, PA, RI, VA.
Georgia	AL, TN.
Illinois	CT*, IN, MD, NJ*, NY, MI, MO, WI*.
Indiana	CT*, DE*, DC*, IL*, KY, MD, NJ*, NY, MI, OH, VA*, WI*.
Kentucky	AL, CT*, DC*, GA, IL*, IN, MD, MI*, NJ, NY, MO, OH, VA, WI*.
Maryland	CT, ME, MA, NH*, NJ, NY, PA, RI, VA.
Massachusetts	ME, NH.
Michigan	CT, DC*, MD, NJ, NY, VA*.
Missouri	IL, IN, MI, WI*.
New Jersey	CT, ME, MA, NH, NY, PA, RI.
New York	CT, ME, MA, NH, NJ, RI.
North Carolina	CT*, DC*, GA, KY, MD, NJ, NY, OH, PA, VA*.
Ohio	CT, DE, DC*, KY, MD, MA, NH*, NJ, NY, PA, RI, VA.
Pennsylvania	CT, DE, DC, ME, MD, MA, NH, NJ, NY, RI, VA.
Rhode Island	ME, MA, NH.
South Carolina	AL, GA, TN.
Tennessee	AL, GA, IL*, IN, KY, MI*, OH, WI*.
Virginia	CT, DE, DC, KY*, MD, MA, NH*, NJ, NY, PA, RI.
West Virginia	CT, DE, DC, MD, MA, NJ, NY, PA, RI, VA.
Wisconsin	IL*, IN*, MI* .

[1] States marked with an asterisk (*) are included because they are part of an interstate nonattainment area that receives a contribution from the upwind State. New Hampshire is included because it is part of the combined Boston/Portsmouth area; Connecticut and New Jersey are included because they are part of the New York City area; Kentucky is included because it is part of the Cincinnati area; Delaware is included because it is part of the Philadelphia area; Illinois is included because it is part of the St. Louis area; Illinois, Indiana, Michigan, and Wisconsin are included because they are part of the Lake Michigan area; and Maryland, Virginia, and the District of Columbia are included because they are part of the Washington, DC area.

TABLE II–5.—UPWIND STATES THAT CONTAIN SOURCES THAT CONTRIBUTE SIGNIFICANTLY TO 1-HR NONATTAINMENT IN DOWNWIND STATES [1]

Downwind state	Upwind states
Alabama	GA, KY, SC, TN.
Connecticut	DE, DC, IL*, IN*, KY*, MD, MI*, NJ, NY, NC*, OH, PA, VA, WV.
Delaware	IN*, OH, PA, VA, WV.
District of Columbia	IN*, KY*, MI*, NC*, OH*, PA, VA, WV.
Georgia	AL, KY, NC, SC, TN.
Illinois	AL*, IN*, KY*, MO, TN*, WI*.
Indiana	AL*, IL, KY, MO, TN, WI*.
Kentucky	IN, NC, OH, TN, VA*.
Maine	CT, DE, DC, MD, MA, NJ, NY, PA, RI.
Maryland	IL, IN, KY, MI, NC, OH, PA, VA, WV.
Massachusetts	CT, DE, DC, MD, NJ, NY, OH, PA, RI, VA, WV.
Michigan	AL*, IL, IN, KY*, MO, TN*, WI*.
Missouri	IL, KY.

TABLE II–5.—UPWIND STATES THAT CONTAIN SOURCES THAT CONTRIBUTE SIGNIFICANTLY TO 1-HR NONATTAINMENT IN DOWNWIND STATES [1]—Continued

Downwind state	Upwind states
New Hampshire	CT, DC*, DE*, MD*, MA, NJ, NY, OH*, PA, RI, VA*.
New Jersey	DE, DC, IL*, IN*, KY, MD, MI, NY, NC, OH, PA, VA, WV.
New York	DE, DC, IL, IN, KY, MD, MI, NJ, NC, OH, PA, VA, WV.
Ohio	IN, KY, TN, NC.
Pennsylvania	DE, DC, MD, NJ, NC, OH, VA, WV.
Rhode Island	DE, DC, MD, NJ, NY, OH, PA, VA, WV.
Tennessee	AL, GA, SC.
Virginia	DE, DC, IN*, KY, MD, MI*, NC*, OH, PA, WV.
Wisconsin	AL*, IL*, IN*, KY*, MO*, TN* .

[1] Upwind States marked with an asterisk (*) are considered to significantly contribute to the downwind State because they contribute to an interstate nonattainment area that includes part of the downwind State. New Hampshire is included in the Boston/Portsmouth area; Connecticut and New Jersey are included in the New York City area; Kentucky is included in the Cincinnati area; Delaware is included in the Philadelphia area; Illinois is included in the St. Louis area; Illinois, Indiana, Michigan, and Wisconsin are included in the Lake Michigan area; and Maryland and Virginia are included in the Washington, DC area.

TABLE II–6.—DOWNWIND STATES TO WHICH SOURCES IN UPWIND STATES CONTRIBUTE SIGNIFICANTLY FOR THE 8-HOUR STANDARD

Upwind state	Downwind states
Alabama	GA, IL, IN, KY, MI, MO, NC, OH, PA, SC, TN, VA.
Connecticut	ME, MA, NH, RI.
Delaware	CT, ME, MA, NH, NJ, NY, PA, RI, VA.
District of Columbia	CT, ME, MD, MA, NH, NJ, NY, PA, RI, VA.
Georgia	AL, IL, IN, KY, MI, MO, NC, SC, TN, VA.
Illinois	AL, CT, DC, DE, IN, KY, MD, MI, MO, NJ, NY, OH, PA, RI, TN, WV, WI.
Indiana	DE, IL, KY, MD, MI, MO, NJ, NY, OH, PA, TN, VA, WV, WI.
Kentucky	AL, DC, DE, GA, IL, IN, MD, MI, MO, NJ, NY, NC, OH, PA, SC, TN, VA, WV, WI.
Maryland	CT, DE, DC, ME, MA, NH, NJ, NY, PA, RI, VA.
Massachusetts	ME, NH
Michigan	CT, DC, DE, MD, MA, NJ, NY, OH, PA, WV.
Missouri	IL, IN, KY, MI, OH, PA, TN, WI.
New Jersey	CT, ME, MA, NH, NY, PA, RI.
New York	CT, ME, MA, NH, NJ, PA, RI.
North Carolina	AL, CT, DE, GA, IN, KY, ME, MD, MA, NJ, NY, OH, PA, RI, SC, TN, VA, WV.
Ohio	CT, DC, DE, IN, KY, MD, MA, MI, NJ, NY, NC, PA, RI, TN, VA, WV.
Pennsylvania	CT, DC, DE, ME, MD, MA, NH, NJ, NY, OH, RI, VA.
Rhode Island	ME, MA, NH.
South Carolina	AL, GA, IN, KY, NC, TN, VA.
Tennessee	AL, DC, DE, GA, IL, IN, KY, MD, MI, MO, NC, OH, PA, SC, VA, WV, WI.
Virginia	CT, DE, DC, ME, MD, MA, NJ, NY, NC, OH, PA, RI, SC, WV.
West Virginia	CT, DC, DE, IN, KY, MD, MA, NJ, NY, NC, OH, PA, RI, SC, TN, VA.
Wisconsin	MI.

TABLE II–7.—UPWIND STATES THAT CONTAIN SOURCES THAT CONTRIBUTE SIGNIFICANTLY TO 8-HOUR NONATTAINMENT IN DOWNWIND STATES.

Downwind state	Upwind states
Alabama	GA, IL, KY, NC, SC, TN.
Connecticut	DE, DC, IL, MD, MI, NJ, NY, NC, OH, PA, VA, WV.
District of Columbia	IL, KY, MD, MI, OH, PA, TN, VA, WV.
Delaware	IL, IN, KY, MI, NC, OH, PA, TN, VA, WV.
Georgia	AL, KY, NC, SC, TN.
Illinois	AL, GA, IN, KY, MO, TN.
Indiana	AL, GA, IL, KY, MO, NC, OH, SC, TN, WV.
Kentucky	AL, GA, IL, IN, MO, NC, OH, SC, TN, WV.
Maine	CT, DE, DC, MD, MA, NJ, NY, NC, PA, RI, VA
Maryland	DC, IL, IN, KY, MI, NC, OH, PA, TN, VA, WV.
Massachusetts	CT, DE, DC, MD, MI, NJ, NY, NC, OH, PA, RI, VA, WV.
Michigan	AL, GA, IL, IN, KY, MO, OH, TN, WI.
Missouri	AL, GA, IL, IN, KY, TN.
New Hampshire	CT, DE, DC, MD, MA, NJ, NY, PA, RI.
New Jersey	DE, DC, IL, IN, KY, MD, MI, NC, NY, OH, PA, VA, WV.
New York	DE, DC, IL, IN, KY, MD, MI, NC, NJ, OH, PA, VA, WV.
North Carolina	AL, GA, KY, OH, SC, TN, VA, WV.
Ohio	AL, IL, IN, KY, MI, MO, NC, PA, TN, VA, WV.
Pennsylvania	AL, DE, DC, IL, IN, KY, MD, MI, MO, NJ, NY, NC, OH, TN, VA, WV.
Rhode Island	CT, DE, DC, IL, MD, NJ, NY, NC, OH, PA, VA, WV.

TABLE II–7.—UPWIND STATES THAT CONTAIN SOURCES THAT CONTRIBUTE SIGNIFICANTLY TO 8-HOUR NONATTAINMENT IN DOWNWIND STATES.—Continued

Downwind state	Upwind states
South Carolina	AL, GA, KY, NC, TN, VA, WV.
Tennessee	AL, GA, IL, IN, KY, MO, NC, OH, SC, WV.
Virginia	AL, DE, DC, GA, IN, KY, MD, NC, OH, PA, SC, TN, WV.
West Virginia	IL, IN, KY, MI, NC, OH, TN, VA.
Wisconsin	IL, IN, KY, MO, TN.

c. Examples of Contributions From Upwind States to Downwind Nonattainment. A full discussion of EPA's analysis supporting the determination that specific upwind States contribute significantly to individual downwind States under the 1-hour and 8-hour NAAQS is provided in the Air Quality Modeling TSD. Examples of the types of contributions which link individual upwind States to downwind areas are provided below for the 1-hour NAAQS for the 23 upwind jurisdictions.

—Alabama's Contribution to 1-Hour Nonattainment in Atlanta

Magnitude of Contribution: The maximum contribution is 39 ppb (CAMx Metric 2); the highest daily average contribution is 31 ppb (CAMx Metric 3).

Frequency of Contribution: Alabama contributes at least 10 ppb to 12 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from Alabama is equivalent to 14 percent of the total amount >=125 ppb in Atlanta (UAM–V Metric 3); Alabama contributes 8 percent of the total manmade ppb >= 125 ppb in Atlanta (CAMx Metric 4; 4-episode average percent contribution).

—Connecticut/Rhode Island's Contribution to 1-Hour Nonattainment in Western Massachusetts

Magnitude of Contribution: The maximum contribution is 61 ppb (CAMx Metric 2); the highest daily average contribution is 50 ppb (CAMx Metric 3).

Frequency of Contribution: Connecticut/Rhode Island contribute at least 10 ppb to 100 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: Connecticut/Rhode Island contribute 35 percent of the total manmade ppb >= 125 ppb in Western Massachusetts (CAMx Metric 4; 4-episode average percent contribution).

—Georgia's Contribution to 1-Hour Nonattainment in Birmingham

Magnitude of Contribution: The maximum contribution is 51 ppb (CAMx Metric 2); the highest daily average contribution is 24 ppb (CAMx Metric 3).

Frequency of Contribution: Georgia contributes at least 10 ppb to 11 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from Georgia is equivalent to 12 percent of the total amount >=125 ppb in Birmingham (UAM–V Metric 3); Georgia contributes 3 percent of the total manmade ppb >= 125 ppb in Birmingham (CAMx Metric 4; 4-episode average percent contribution).

—Illinois's Contribution to 1-Hour Nonattainment in New York City

Magnitude of Contribution: The maximum contribution is 8 ppb (CAMx Metric 2); the highest daily average contribution is 6 ppb (CAMx Metric 3).

Frequency of Contribution: Illinois contributes at least 5 ppb to 20 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Illinois is equivalent to 3 percent of the total amount >=125 ppb in New York City (UAM–V Metric 3); Illinois contributes 3 percent of the total manmade ppb >= 125 ppb in New York City (CAMx Metric 4; single highest episode percent contribution).

—Indiana's Contribution to 1-Hour Nonattainment in Baltimore

Magnitude of Contribution: The maximum contribution is 8 ppb (CAMx Metric 2); the highest daily average contribution is 6 ppb (CAMx Metric 3).

Frequency of Contribution: Indiana contributes at least 5 ppb to 26 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Indiana is equivalent to 4 percent of the total amount >=125 ppb in Baltimore (UAM–V Metric 3); Indiana contributes 3 percent of the total manmade ppb >= 125 ppb in New York City (CAMx Metric 4; single highest episode percent contribution).

—Kentucky's Contribution to 1–Hour Nonattainment in Baltimore

Magnitude of Contribution: The maximum contribution is 9 ppb (CAMx Metric 2); the highest daily average contribution is 8 ppb (CAMx Metric 3).

Frequency of Contribution: Kentucky contributes at least 5 ppb to 24 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Kentucky is equivalent to 3 percent of the total amount >=125 ppb in Baltimore (UAM–V Metric 3); Kentucky contributes 5 percent of the total manmade ppb >= 125 ppb in Baltimore (CAMx Metric 4; single highest episode percent contribution).

—Maryland/District of Columbia/Delaware's Contribution to 1-Hour Nonattainment in New York City

Magnitude of Contribution: The maximum contribution is 50 ppb (CAMx Metric 2); the highest daily average contribution is 15 ppb (CAMx Metric 3).

Frequency of Contribution: Maryland/District of Columbia/Delaware contribute at least 10 ppb to 14 percent of the 1-hr exceedences and at least 5 ppb to 38 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: Maryland/District of Columbia/Delaware contribute 5 percent of the total manmade ppb >= 125 ppb in New York City (CAMx Metric 4; 4-episode average percent contribution).

—Massachusetts' Contribution to 1-Hour Nonattainment in Portland, ME

Magnitude of Contribution: The maximum contribution is 79 ppb (CAMx Metric 2); the highest daily average contribution is 67 ppb (CAMx Metric 3).

Frequency of Contribution: Massachusetts contributes at least 10 ppb to 100 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from Massachusetts is equivalent to 100 percent of the total amount >=125 ppb in Portland, ME

(UAM–V Metric 3); Massachusetts contributes 56 percent of the total manmade ppb >= 125 ppb in Portland, ME (CAMx Metric 4; 4-episode average percent contribution).

—Michigan's Contribution to 1-Hour Nonattainment in Baltimore

Magnitude of Contribution: The maximum contribution is 9 ppb (CAMx Metric 2); the highest daily average contribution is 8 ppb (CAMx Metric 3).

Frequency of Contribution: Michigan contributes at least 5 ppb to 7 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Michigan is equivalent to 5 percent of the total amount >=125 ppb in Baltimore (UAM–V Metric 3); Michigan contributes 5 percent of the total manmade ppb >= 125 ppb in Baltimore (CAMx Metric 4; single highest episode percent contribution).

—Missouri's Contribution to 1-Hour Nonattainment over Lake Michigan

Magnitude of Contribution: The maximum contribution is 19 ppb (CAMx Metric 2); the highest daily average contribution is 12 ppb (CAMx Metric 3).

Frequency of Contribution: Missouri contributes at least 10 ppb to 66 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Missouri is equivalent to 22 percent of the total amount >=125 ppb over Lake Michigan (UAM–V Metric 3); Missouri contributes 9 percent of the total manmade ppb >= 125 ppb over Lake Michigan (CAMx Metric 4; 4-episode average percent contribution).

—New Jersey's Contribution to 1-Hour Nonattainment in Western Massachusetts

Magnitude of Contribution: The maximum contribution is 30 ppb (CAMx Metric 2); the highest daily average contribution is 23 ppb (CAMx Metric 3).

Frequency of Contribution: New Jersey contributes at least 10 ppb to 100 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: New Jersey contributes 16 percent of the total manmade ppb >= 125 ppb in Western Massachusetts (CAMx Metric 4; 4-episode average percent contribution).

—New York's Contribution to 1-Hour Nonattainment in Western Massachusetts

Magnitude of Contribution: The maximum contribution is 25 ppb (CAMx Metric 2); the highest daily average contribution is 23 ppb (CAMx Metric 3).

Frequency of Contribution: New York contributes at least 10 ppb to 100 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: New York contributes 18 percent of the total manmade ppb >= 125 ppb in Western Massachusetts (CAMx Metric 4; 4-episode average percent contribution).

—North Carolina's Contribution to 1-Hour Nonattainment in Philadelphia

Magnitude of Contribution: The maximum contribution is 10 ppb (CAMx Metric 2); the highest daily average contribution is 9 ppb (CAMx Metric 3).

Frequency of Contribution: North Carolina contributes at least 2 ppb to 4 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from North Carolina is equivalent to 4 percent of the total amount >=125 ppb in Philadelphia (UAM–V Metric 3); North Carolina contributes 2 percent of the total manmade ppb >= 125 ppb in Philadelphia (CAMx Metric 4; single highest episode percent contribution).

—Ohio's Contribution to 1-Hour Nonattainment in Baltimore

Magnitude of Contribution: The maximum contribution is 13 ppb (CAMx Metric 2); the highest daily average contribution is 12 ppb (CAMx Metric 3).

Frequency of Contribution: Ohio contributes at least 5 ppb to 51 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Ohio is equivalent to 11 percent of the total amount >=125 ppb in Baltimore (UAM–V Metric 3); Ohio contributes 4 percent of the total manmade ppb >= 125 ppb in Baltimore (CAMx Metric 4; 4-episode average percent contribution).

—Pennsylvania's Contribution to 1-Hour Nonattainment in Greater Connecticut

Magnitude of Contribution: The maximum contribution is 28 ppb (CAMx Metric 2); the highest daily average contribution is 23 ppb (CAMx Metric 3).

Frequency of Contribution: Pennsylvania contributes at least 10 ppb to 60 percent of the 1-hr exceedences and at least 5 ppb to 98 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: Pennsylvania contributes 10 percent of the total manmade ppb >= 125 ppb in Greater Connecticut (CAMx Metric 4; 4-episode average percent contribution).

—South Carolina's Contribution to 1-Hour Nonattainment in Atlanta

Magnitude of Contribution: The maximum contribution is 24 ppb (CAMx Metric 2); the highest daily average contribution is 23 ppb (CAMx Metric 3).

Frequency of Contribution: South Carolina contributes at least 5 ppb to 6 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from South Carolina is equivalent to 4 percent of the total amount >=125 ppb in Atlanta (UAM–V Metric 3); South Carolina contributes 2 percent of the total manmade ppb >= 125 ppb in Atlanta (CAMx Metric 4; single highest episode percent contribution).

—Tennessee's Contribution to 1–Hour Nonattainment Over Lake Michigan

Magnitude of Contribution: The maximum contribution is 12 ppb (CAMx Metric 2); the highest daily average contribution is 11 ppb (CAMx Metric 3).

Frequency of Contribution: Tennessee contributes at least 5 ppb to 14 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from Tennessee is equivalent to 6 percent of the total amount >=125 ppb over Lake Michigan (UAM–V Metric 3); Tennessee contributes 10 percent of the total manmade ppb >= 125 ppb over Lake Michigan (CAMx Metric 4; single highest episode percent contribution).

—Virginia's Contribution to 1-Hour Nonattainment in New York City

Magnitude of Contribution: The maximum contribution is 25 ppb (CAMx Metric 2); the highest daily average contribution is 11 ppb (CAMx Metric 3).

Frequency of Contribution: Virginia contributes at least 10 ppb to 11 percent of the 1-hr exceedences and at least 5 ppb to 36 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: The total contribution from Virginia is equivalent to 11 percent of the total amount >=125 ppb in New York City (UAM–V Metric 3); Virginia contributes 4 percent of the

total manmade ppb >= 125 ppb in New York City (CAMx Metric 4; 4-episode average percent contribution).

—West Virginia's Contribution to 1-Hour Nonattainment in New York City

Magnitude of Contribution: The maximum contribution is 14 ppb (CAMx Metric 2); the highest daily average contribution is 10 ppb (CAMx Metric 3).

Frequency of Contribution: West Virginia contributes at least 5 ppb to 9 percent of the 1-hr exceedences and at least 2 ppb to 28 percent of the 1-hr exceedences (UAM–V Metrics 1 and 2).

Relative Amount: The total contribution from West Virginia is equivalent to 9 percent of the total amount >=125 ppb in New York City (UAM–V Metric 3); West Virginia contributes 7 percent of the total manmade ppb >= 125 ppb in New York City (CAMx Metric 4; single highest episode percent contribution).

—Wisconsin's Contribution to 1–Hour Nonattainment Over Lake Michigan

Magnitude of Contribution: The maximum contribution is 43 ppb (CAMx Metric 2); the highest daily average contribution is 8 ppb (CAMx Metric 3).

Frequency of Contribution: Wisconsin contributes at least 10 ppb to 11 percent of the 1-hr exceedences (CAMx Metrics 1 and 2).

Relative Amount: Wisconsin contributes 4 percent of the total manmade ppb >= 125 ppb over Lake Michigan (CAMx Metric 4; 4-episode average percent contribution).

d. Conclusions From Air Quality Evaluation of Downwind Contributions. As indicated above, EPA is following a multi-step approach for determining whether emissions from an upwind State significantly contribute to nonattainment downwind. The first step involves an air quality evaluation to determine whether the air quality factors, and particularly the extent of the downwind contributions from emissions in the upwind State, indicate that those contributions are large and/or frequent enough to be of concern under the 1-hour and/or 8-hour NAAQS. The second step, as described below, employs a cost-effectiveness analysis to determine which of the upwind emissions may be eliminated through highly cost-effective controls. Any emissions that may be so eliminated are considered to be emissions that significantly contribute to nonattainment downwind. Finally, to confirm that the emissions considered to significantly contribute, taken as a whole, have a meaningful impact on nonattainment in downwind areas, EPA modeled the air quality effects of eliminating that amount of emissions (see Section IV, Air Quality Assessment, below).

The EPA's conclusions from the first step in this process, the air quality evaluation, is that emissions from sources in each of the 23 jurisdictions listed below make a significant contribution to nonattainment downwind for both the 1-hour and 8-hour NAAQS and interfere with maintenance of the 8-hour NAAQS. This determination was based on two independent sets of analyses, each of which EPA believes provides an independent basis for these conclusions. These two independent analyses are (1) subregional modeling using UAM–V, and (2) State-by-State modeling using CAMx and UAM–V. For the subregional modeling, EPA examined the frequency and magnitude of the impacts from each subregion along with State emissions data and other air quality information to evaluate the contributions from upwind States to nonattainment in downwind areas. For the UAM–V and CAMx State-by-State techniques, a number of measures of ozone contribution, or metrics, were used to assess, from several perspectives, the air quality effect of contributions from sources in different upwind States.

The EPA weighed the results of its analysis of these several air quality metrics to determine which upwind States contain sources whose emissions contribute significantly to downwind nonattainment or maintenance problems. By examining the results of several air quality metrics, EPA assured that no one metric determined whether a State contains sources whose emissions contribute to downwind air quality problems. Rather, the determination of whether an upwind State contained sources whose emissions contribute significantly to a downwind nonattainment problem was based on the extent of the contributions reflected by multiple metrics. The EPA concluded that each set of modeling (i.e., subregional and State-by-State) when considered independently under EPA's weight-of-evidence approach provides a sound technical basis for finding that NO_X emissions from sources in the following 23 jurisdictions make a significant contribution to nonattainment of the 1-hour and 8-hour NAAQS in, or interfere with maintenance of the 8-hour NAAQS by, one or more downwind States:

Alabama
Connecticut
Delaware
District of Columbia
Georgia
Illinois
Indiana
Kentucky
Maryland
Massachusetts
Michigan
Missouri
New Jersey
New York
North Carolina
Ohio
Pennsylvania
Rhode Island
South Carolina
Tennessee
Virginia
West Virginia
Wisconsin

The remaining 15 OTAG States not covered by this final rule are discussed below.

5. States Not Covered by This Rulemaking

In Section VI of the NPR, EPA proposed to find that emissions from sources in the following 15 States in the OTAG region do not significantly contribute to downwind nonattainment under the 1-hour or 8-hour ozone NAAQS, or interfere with maintenance under the 8-hour NAAQS: Arkansas, Florida, Iowa, Kansas, Louisiana, Maine, Minnesota, Mississippi, North Dakota, Nebraska, New Hampshire, Oklahoma, South Dakota, Texas, Vermont (62 FR 60369). The EPA received comments on this section of the NPR and has recently conducted some additional CAMx analyses.[50] The CAMx modeling suggested that further analysis using UAM–V State-by-State modeling would be warranted in order to have a set of information comparable to that for other States that are subject to this rule. In today's rulemaking, EPA is taking no action on whether emissions from sources in these 15 States do or do not contribute significantly to downwind nonattainment, or interfere with maintenance downwind, under either NAAQS. Thus, by today's rulemaking, EPA is not requiring these 15 States to submit SIP revisions providing for NO_X emissions controls to meet a statewide NO_X emissions budget; nor is EPA determining that these States will not be required to make these SIP submissions in the future. The EPA is continuing to review available information on the downwind impacts of these States, including comments submitted on the NPR. In addition, EPA plans to conduct State-by-State modeling to determine whether a SIP revision under section 110(a)(2)(D)(i)(I) should be required from any of these States in the future.

[50] See ''Notice of Availability'' 63 FR 45032 (August 24, 1998).

The EPA intends to begin this modeling in the fall of 1998.

As discussed in the NPR (62 FR 60318 at 60370), EPA reiterates that these 15 States may need to cooperate and coordinate SIP development activities with other States that are subject to today's action. Also, States with interstate nonattainment areas for the 1-hour standard and/or the new 8-hour standard should cooperate in reducing emissions to mitigate local-scale interstate transport problems (e.g., transport from one State in a multi-state urban nonattainment area to another State in that area) to provide for attainment in the nonattainment area as a whole. The EPA encourages the 15 States to conduct additional analyses on ozone transport recommended by the OTAG Policy Group, which indicated that these States, ''* * * will, in cooperation with EPA, periodically review their emissions, and the impact of increases, on downwind nonattainment areas and, as appropriate, take steps necessary to reduce such impacts including appropriate control measures.'' [51]

Comment: A number of commenters supported the proposal to exclude the proposed States, either in general or for specific States. Others opposed the proposal in general, or for specific States.

Response: Because EPA is taking no action on the 15 States at this time, EPA will not respond to comments concerning these States at this time. As discussed above, EPA intends to continue to review ambient air quality data, air quality modeling results, and other technical information on the downwind contribution from all States not found to be significant contributors in today's action.

Comment: Several commenters stated that if EPA revisits which States should be included in the rulemaking, EPA must reopen the public comment period.

Response: The EPA agrees. Because today's action does not propose a change from the NPR concerning which States should be covered, no new comment period is needed at this time. As EPA noted in the NPR, if results from additional modeling and technical analyses indicate that States other than the 22 States (and the District of Columbia) that are the subject of today's action should be required to submit a SIP revision under section 110(a)(2)(D)(i)(I), EPA will publish a new NPR as to any such States and provide an additional comment period. As also stated in the NPR, in 2007, EPA will reassess transport in the full OTAG region to evaluate the effectiveness of the regional NO_X measures and the need, if any, for additional regional controls.

[51] OTAG Recommendation: Utility NO_X Controls, approved by the Policy Group, June 3, 1997.

D. Cost Effectiveness of Emissions Reductions

As discussed above, in today's action, EPA considers control costs in determining whether, and the extent to which, upwind emissions contribute significantly to nonattainment, or interfere with maintenance downwind. The EPA considers cost factors in conjunction with other factors generally related to levels of emissions.

1. Sources Included In the Cost-Effectiveness Determination

This subsection describes the rationale used to determine the cost effectiveness of emissions reductions measures. The EPA evaluates the relative costs of the available control measures using average cost effectiveness, measured as dollars per ton of NO_X reduced relative to a baseline, to identify those emissions reductions that are ''highly cost-effective.'' In performing this evaluation, EPA considers the cost savings of a regionwide NO_X emissions trading system for large electricity generating boilers and turbines (i.e., boilers and turbines serving a generator larger than 25 MWe). As described in this section, EPA has determined that these emissions reductions are highly cost effective on a regionwide basis.

To assure equity among the various source categories and the industries they represent, EPA considered the cost effectiveness of controls for each source category separately throughout the SIP call region. Sources are combined into a common source category if they serve the same general industry (e.g., boilers and turbines that are used by the electricity generation industry are combined in the same category). In general, this means that the sources in the same source category share the same six-digit source code classification (SCC). One exception is in the case of boilers and turbines which are combined and then separated into (1) a category of boilers and turbines serving generators that produce electricity for sale to the grid; or (2) a category of boilers and turbines that exclusively generate steam and/or mechanical work (e.g., provide energy to an industrial pump), or produce electricity primarily for internal use and not for sale. The EPA believes that this categorization better reflects the industrial sectors served.

For each source category, the required emission levels (in tons per ozone season) were determined based on the application of NO_X controls that achieve the greatest feasible emissions reduction while still falling within a cost-per-ton-reduced range that EPA considers to be highly cost-effective (hereinafter also referred to as ''highly cost-effective'' measures). Marginal or incremental costs of control are additional cost-effective measures that may provide important information about alternatives. In particular, incremental cost-effectiveness helps to identify whether a more stringent control option imposes much higher costs relative to the average cost per ton for further control. The use of an average cost-effectiveness measure may not fully reveal costly incremental requirements where control options achieve large reductions in emissions (relative to the baseline).

In this rulemaking, EPA has chosen to focus on an average cost-effectiveness measure in identifying highly cost-effective control options for several reasons. Since EPA's determination for the core group of sources is based on the adoption of a broad-based trading program, average cost-effectiveness serves as an adequate measure across sources because sources with high marginal costs will be able to take advantage of this program to lower their costs. In addition, average cost-effectiveness estimates are readily available for other recently adopted NO_X control measures.

The EPA examined a representative sample of potentially available controls. NO_X controls for this rulemaking were considered highly cost-effective for the purposes of reducing ozone transport to the extent they achieve the greatest feasible emissions reduction but still cost no more than $2,000 per ton of ozone season NO_X emissions removed (in 1990 dollars), on average, for each source category. The discussion below further describes the basis for this cost amount and the techniques used for each category. Many may consider certain controls that cost more than $2,000 per ton of NO_X reduced to be reasonably cost-effective in reducing ozone transport or in achieving attainment with the ozone NAAQS in specific nonattainment areas; however, EPA has determined to focus today's rulemaking on only highly cost-effective reductions. In the future, as EPA continues to consider the impact of ozone transport and the most effective ways to assure downwind attainment, EPA may reconsider whether State NO_X budget levels should be lowered to reflect application of additional controls

that, although more expensive, are nevertheless cost-effective. In addition, as discussed below, in determining whether to assume reductions from source categories with only a few sources or relatively small emissions, EPA considered administrative efficiency in developing conclusions about whether to assume emissions reductions for these sources.

In determining the cost of NO_X reductions by large electricity generating units (EGUs), EPA assumed an emissions trading system. As discussed in Section IV below, EPA evaluated and compared the likely air quality impacts of this rulemaking with and without a regionwide NO_X emissions trading system for electricity generating sources. This analysis shows that a regionwide trading program causes no significant adverse air quality impacts. Because such a program would result in significant cost savings, EPA's cost-effectiveness determination for large electricity generating boilers and turbines assumes that each State will adopt the lowest cost approach, i.e., the States will elect to include these sources in a regionwide NO_X emissions trading program. However, States retain the option of choosing other, perhaps more expensive, approaches to achieving the necessary reductions. For non-EGU sources in the core group of the trading program, EPA used a least cost method which is equivalent to an assumption of an intrastate trading program. Inclusion of these sources in a regionwide trading program would provide further cost savings. For other source categories for which EPA identified highly cost-effective controls (i.e., internal combustion engines and cement manufacturing), EPA assumed source-specific controls. However, a State may choose to include such categories in the trading program and realize further cost savings.

For the purposes of this rulemaking, EPA considers the following sizes of point sources to be large: (1) electricity generating boilers and turbines serving a generator greater than 25 MWe; or (2) other point sources with a heat input greater than 250 mmBtu/hr or which emit more than one ton of NO_X per average summer day.

In the NPR, EPA based the cost-effectiveness determination on NO_X emissions controls that are available and of comparable cost to other recently undertaken or planned NO_X measures. Table 1 provides a reference list of measures that EPA and States have recently undertaken to reduce NO_X and their average annual costs per ton of NO_X reduced. Most of these measures fall below $2,000 per ton. With few exceptions, the average cost-effectiveness of these measures is representative of the average cost-effectiveness of the types of controls EPA and States have needed to adopt most recently because their previous planning efforts have already taken advantage of opportunities for even cheaper controls. The EPA believes that the cost-effectiveness of measures that EPA or States have adopted, or proposed to adopt, forms a good reference point for determining which of the available additional NO_X control measures can most easily be implemented by upwind States whose emissions impact downwind nonattainment problems.

TABLE 1.—AVERAGE COST-EFFECTIVENESS OF NO_X CONTROL MEASURES RECENTLY UNDERTAKEN

[1990 dollars]

Control measure	Cost per ton of NO_X Removed
NO_X RACT	150–1,300
Phase II Reformulated Gasoline	[52] 4,100
State Implementation of the Ozone Transport Commission Memorandum of Understanding	950–1,600
New Source Performance Standards for Fossil Steam Electric Generation Units	1,290
New Source Performance Standards for Industrial Boilers	1,790

[52] Average cost representing the midpoint of $2,180 to $6,000 per ton. This cost represents the projected additional cost of complying with the Phase II RFG NO_X standards, beyond the cost of complying with the other standards for Phase II RFG.

The Federal Phase II RFG costs presented in Table 1 are not strictly comparable to the other costs cited in the table. Federal Phase II RFG will provide large VOC reductions in addition to NO_X reductions. Federal RFG is required in nine cities with the nation's worst ozone nonattainment problems; other nonattainment areas have chosen to opt into the program as part of their attainment strategy. The mandated areas and those areas in the OTAG region that have chosen to opt into the program are areas where significant local reductions in ozone precursors are needed; such areas may value RFG's NO_X and VOC reductions differently for their local ozone benefits than they would value NO_X reductions from RFG or other programs for ozone transport benefits.

Commenters on the proposal generally agreed with basing the cost-effectiveness determination on the cost effectiveness of other recently undertaken measures. Therefore, EPA has considered controls with an average cost-effectiveness less than $2,000 per ton of NO_X removed to be highly cost effective and has calculated the amounts of emissions that States must prohibit based on application of these controls. Some commenters believed that a more appropriate measure of cost effectiveness was incremental—instead of average—dollars per ton of NO_X removed. Other commenters believed that a more appropriate measure was dollars per ppb of ozone removed from a nonattainment area. The EPA continues to depend on regionwide average dollars per ton of NO_X removed when evaluating what control measures are highly cost-effective for the purposes of this rulemaking.

Table 2 summarizes the control options investigated for each source category and the resulting average, regionwide cost effectiveness.

TABLE 2.—AVERAGE COST EFFECTIVENESS OF OPTIONS ANALYZED [53]

[1990 dollars in 2007]

Source category			
	Average Cost-effectiveness ($/ozone season ton) for each control option		
Boilers and Turbines Generating Electricity	0.20 lb/mmBtu	0.15 lb/mmBtu	0.12 lb/mmBtu.
	$1,263	$1,468	$1,760.
Boilers and Turbines not Generating Electricity	50% reduction	60% reduction	70% reduction.
	$1,235	$1,467	$2,140.
Other Stationary Sources [54]	$3,000/ton maximum per source.	$4,000/ton maximum per source.	$5,000/ton maximum per source.
Cement Manufacturing	$1,458	$1,458	$1,458
Glass Manufacturing	$2,020	$2,339	$4,758.
Incinerators	$2,118	$2,118	$2,118.
Internal Combustion Engines	$1,213	$1,213	$1,215.
Process Heaters	$2,860	$2,896	$2,896.

[53] The cost-effectiveness values in Table 2 are regionwide averages. The cost-effectiveness values represent reductions beyond those required by Title IV or Title I RACT, where applicable.

[54] For cement manufacturing, incinerators, internal combustion engines and process heaters, the table indicates that the same control technology (at the same cost) would be selected whether the cost ceiling for each source is $3,000, $4,000, or $5,000 per ton; thus the average cost-effectiveness number for these source categories is the same in each column. For glass manufacturing, the table indicates that additional emissions reductions would be obtained from more effective and more costly control technologies as the cost ceiling increase.

The following discussion explains the controls determined by EPA to be highly cost-effective for each source category.

The EPA has analyzed the implications of each State limiting trading within its borders compared to entering into a common trading program with all other States, provided that States choose to control EGUs at an average level of 0.15 lb/mmBtu. In the case of intrastate trading, EPA found that the average cost per ton of the resulting ozone season NO_X reduction was about $1,499 per ton. This result from the IPM model was for all the States together considering changes in dispatch and other aspects of the future operation of the nation's power system. Individual State results were not provided by the model. As explained below, EPA expects that individual State cost per ton results are likely to be fairly close to this collective result.

For a regionwide budget based on 0.15 lb/mmBtu, EPA's analyses suggest that whether (1) there were individual State trading programs, or (2) a single regionwide trading program, all States experienced a substantial reduction in summer NO_X emissions from Base Case emissions levels. For this to occur, there have to be similar opportunities throughout the SIP call region for highly cost-effective reductions to occur at EGUs. If this were not true, EPA would have found, in the case where there is a single trading program across the entire SIP call region, that some States reduce a much greater share of their NO_X emissions than other States do. The fact that there are similar opportunities for NO_X reductions in each of the States indicates that if there were individual State trading programs in place they would each generally have an average cost effectiveness for reducing ozone season NO_X emissions that is fairly close to the cost effectiveness of trading programs in other States. Therefore, each State is generally likely to have an average cost effectiveness of about $1,550 per ton, the amount we found in the results of the IPM model run for a scenario where each State ran its own trading program.

a. Electricity Generating Boilers and Turbines. For EGUs larger than 25 MWe, the control level was determined by applying a uniform NO_X emissions rate regionwide. The cost-effectiveness for each control level was determined using the IPM. Details regarding the methodologies used can be found in the Regulatory Impact Analysis of this rulemaking. Table 2 summarizes the control levels and resulting cost-effectiveness of three options analyzed.

A regionwide level of 0.20 lb/mmBtu was rejected because though it resulted in an average cost effectiveness of less than $2,000 per ton, the air quality benefits were less than those for the 0.15 lb/mmBtu level which was also less than $2,000 per ton. The results suggest that a regionwide level of 0.15 lb/mmBtu should be assumed for this source category when calculating the amount of emissions that should be considered significant and therefore prohibited in each covered State. This control level has an average cost-effectiveness of $1,468 per ozone season ton removed. This amount is consistent with the range for cost-effectiveness that EPA has derived from recently adopted (or proposed to be adopted) control measures. As discussed later in this preamble, EPA has determined that EGU sources are fully capable of implementing this level of control by May 1, 2003.

The EPA estimates that a control level based on 0.12 lb/mmBtu, has a cost effectiveness of $1,760 per ozone season ton removed, which is within the upper range of cost effectiveness. This estimate is based on the Agency's best estimates of several key assumptions on the performance of pollution control technologies and electricity generation requirements in the future which the Agency thoroughly researched over the last two years. Given that the cost per ton estimate for 0.12 lb/mmBtu trading is much closer to $2,000 than the 0.15 lb/mmBtu trading, EPA is not as confident about the robustness of the results. Also, although EPA is very comfortable that a 0.15 lb/mmBtu trading program beginning in 2003 will not lead to installation of SCR technology at a level and in a manner that will be difficult to implement or result in reliability problems for electric power generation, the Agency's level of comfort is not as high in considering 0.12 lb/mmBtu-based trading.[55] With a strong need to implement a program by 2003 that is recognized by the States as practical, necessary, and broadly accepted as highly cost effective, the Agency has decided to base the

[55] For reasons explained in Section V., below, EPA has determined that May 1, 2003 is the earliest practicable date for achieving the level of emissions reductions EPA selected, and therefore is the appropriate date for achieving these reductions in light of the CAA's attainment date requirements.

emissions budgets for EGUs on a 0.15 lb/mmBtu trading level of control.

It should be noted that the cost-effectiveness values for EGUs were calculated using a slightly older version of the final EGU inventory. Changes made to the inventory and growth assumptions resulted in decreasing the final regionwide allowable emission level for EGUs, under the 0.15 option, to 543,825 tons per year from 563,785 tons per year. Reducing the allowable regionwide emissions increased the average cost-effectiveness value of the 0.15 option from $1,468/ton, to $1,503/ton.

b. Other Stationary Sources. The appropriate cost-effective control level for large non-EGU source categories was determined by evaluating various regulatory alternatives. For industrial boilers and turbines (i.e., boilers and turbines greater than 250 mm/Btu per hour or with NO_X emissions greater than 1 tpd), the control level was determined by applying a uniform percent reduction regionwide in increments of 10 percent. For all other stationary sources, the control level was determined by applying source-category-specific cost-effectiveness thresholds, because trading was not assumed to be readily available for these source categories. Details regarding the methodologies used are in the Regulatory Impact Analysis. Table 2 summarizes the control levels and resulting cost-effectiveness for each option under each category.

Further, for large non-EGUs, the cost-effectiveness determination includes estimates of the additional emissions monitoring costs that sources would incur in order to participate in a trading program. Some non-EGUs already monitor their emissions. In the NPR, EPA had not included monitoring costs in the cost-effectiveness determination because such costs had not been estimated at that time. Since then, EPA has evaluated monitoring system costs. These costs are defined in terms of dollars per ton of NO_X removed so that they can be combined with the cost-effectiveness figures related to control costs. Since monitoring costs do not vary with the level of control, the cost per ton for monitoring varies in accordance with the amount of control being required. For purposes of this analysis, the level of control was assumed to be the level of control used to calculate the budget. Monitoring costs varied from about $150 to $400 per ton of NO_X removed, depending on the type of source category.

The EPA, therefore, determines that: (1) For large non-electricity-generating industrial boilers and turbines, a control level corresponding to 60 percent reduction from baseline levels is highly cost-effective (this percent reduction corresponds to a regionwide control level of about 0.17 lb/mmBtu); and (2) for large internal combustion engines and cement manufacturing sources, a control level corresponding to the application of NO_X reduction technology costing no more than $5,000/ton for each source is, on average, highly cost effective. As indicated in Table 2 and described in detail in the RIA, these control levels are associated with a cost effectiveness of approximately $1,467/ton for boilers and turbines, $1,458/ton for cement manufacturing, and $1,215/ton for internal combustion engines. This results in an average emissions reduction from uncontrolled emissions of 90 percent for internal combustion engines and 30 percent for cement manufacturing sources. The EPA notes that States may include these source categories in the model NO_X budget trading program, further assuring that each source would be able to cost-effectively meet its reduction requirements. The EPA determined that controlling glass manufacturing sources, incinerators, and process heaters was not highly cost-effective because all the options analyzed for these source categories cost more than $2,000 per ton of NO_X removed. Thus, no additional controls are assumed for these sources when determining the significant amounts that must be reduced in each State.

2. Sources Not Included In the Cost-effectiveness Determination

For the following groups of sources, EPA is determining that no additional control measures or levels of control should be assumed in this rulemaking, for the reasons described.

a. Area Sources. In the NPR, EPA noted that control levels for area sources (i.e., sources other than mobile or point sources) could not be determined based on available information concerning applicable control technologies. Comments to the NPR did not identify specific NO_X control technologies that were both technologically feasible and highly cost-effective. Because EPA has no new information on applicable control technologies for area sources, no additional control level is assumed for these sources in this rulemaking. Further discussion concerning area sources can be found in Section III, below, of this preamble.

b. Small Point Sources. For the purposes of this rulemaking, EPA considers the following sizes of point sources to be small: (1) Electricity generating boilers and turbines serving a generator 25 MWe or less, and (2) other point sources with a heat input of 250 mmBtu/hr or less and which emit less than one ton of NO_X per average summer day. In the NPR, EPA stated that the collective emissions from small sources were relatively small (in the context of this rulemaking) and the administrative burden, to the States and regulated entities, of controlling such sources was likely to be considerable. As a result, in the NPR, EPA proposed not to assume reductions from these sources in establishing the State budgets.

Comments to the NPR did not identify specific approaches that would result in significant emission reductions and be administratively efficient in controlling these sources. On the contrary, many comments encouraged EPA to exclude small point sources from any budget calculations for this rulemaking.

Therefore, in today's action, EPA is not assuming additional control levels for these sources. Further discussion concerning small point sources may be found in section III, below, of this preamble.

c. Mobile Sources. In the NPR, EPA noted that it could not identify any additional NO_X controls that States could implement for mobile or nonroad sources beyond those already reflected in the proposed State NO_X budgets that were both technologically feasible and cost-effective, relative to point sources covered by this rule, for the purposes of reducing NO_X. Several commenters stated that the EPA should require States to implement additional reductions for mobile sources. However, these commenters did not identify specific, new, technologically feasible mobile source NO_X controls that were highly cost-effective by the standards of today's action. The EPA has re-examined the availability of mobile source control measures available to States, as discussed in more detail in sections III.D. and III.E. below, and has not identified any such controls that are both technologically feasible and highly cost-effective for NO_X control. Therefore, the States' final NO_X budgets promulgated in today's action do not assume implementation of additional highway or nonroad mobile source controls or expansion of existing controls beyond those described in the NPR. Further discussion concerning mobile sources, including the national measures EPA has assumed for purposes of today's rule, can be found in Section III, Determination of Budgets.

d. Other stationary sources. The EPA does not assume, in this rulemaking, any additional control measures or

lower emissions levels for municipal waste combustors because these combustors are already being controlled through MACT regulations. Moreover, no additional control measures were assumed for source categories with relatively small NO_X emissions (e.g., iron and steel mills, nitric acid manufacturing sources, space heaters, lime kilns, recovery plants, and engine test facilities). Further discussion concerning why controls were not assumed for these source categories may be found in Section III of this preamble.

e. Conclusion. The above discussion described the controls for various source categories that EPA considers to be highly cost-effective. The next step in the process is to determine the amounts of NO_X emissions that would be eliminated by applying these highly cost-effective controls to the respective source categories. The EPA considers those emissions to be the amounts that contribute significantly to nonattainment in, or interfere with maintenance by, downwind States. By assuming that reductions of this magnitude should occur, EPA determined the resulting State-specific ''budget.'' Section III, Determination of Budgets describes the process EPA used to determine each State's budget and discusses comments received on the NPR.

E. Other Considerations

As described above, EPA determined the amount of emissions that significantly contribute to downwind nonattainment from sources in a particular upwind State primarily by (i) evaluating, with respect to each upwind State, several air quality related factors, including determining that all emissions from the State have a sufficiently great impact downwind (in the context of the collective contribution nature of the ozone problem); and (ii) determining the amount of that State's emissions that can be eliminated through the application of cost-effective controls. Before reaching a conclusion, EPA evaluated several secondary, and more general, considerations. These include:

- The consistency of the regional reductions with the attainment needs of the downwind areas with nonattainment problems
- The overall fairness of the control regimes required of the downwind and upwind areas
- General cost considerations, including the relative cost-effectiveness of additional downwind controls compared to upwind controls This section discusses these additional considerations.

1. Consistency of Regional Reductions With Attainment Needs of Downwind Areas

a. General Discussion. Currently, air quality levels in the eastern part of the United States are above the 1-hour NAAQS in various, primarily urban, areas. Air quality levels are also above the 8-hour NAAQS in those same areas, as well as many others.

The OTAG, and subsequently EPA, have conducted region-wide air quality modeling, using the UAM-V model, which shows that in approximately 20 primarily urban areas, the 1-hour nonattainment problem will persist by the year 2007, even after all of the controls specifically required under the CAA as well as Federal measures are implemented.[56] This nonattainment problem that remains after implementation of those mandated controls may be termed ''residual nonattainment.'' For the 8-hour NAAQS modeling shows that under the same circumstances, at least one urban area that is linked to each upwind State will continue to experience residual nonattainment, and significantly more areas will be in nonattainment as well.

Further, as discussed above, OTAG's subregional modeling as well as EPA's CAMx modeling and State-by-State zero-out UAM–V modeling, indicate that upwind States contribute significantly to those downwind nonattainment problems under both standards. In general, under the 1-hour standard, emissions from each upwind State affect at least several, primarily urban, nonattainment areas downwind. For example, each of the midwest/southern States of Ohio, Kentucky, Tennessee, West Virginia, Virginia, and North Carolina affects between five and eight downwind nonattainment areas. Under the 8-hour standard, emissions from each upwind State affect nonattainment problems that comprise an even larger geographic area. For example, Ohio, Kentucky, Tennessee, West Virginia, Virginia, and North Carolina each affect between eight to thirteen downwind States with nonattainment problems.

As described in section IV below, EPA has conducted additional regionwide modeling which shows that upwind reductions comparable to those required under today's rule have an appreciable impact on downwind nonattainment problems under both NAAQS. The downwind impact from each individual upwind State's reductions may be relatively small, but the impact from all upwind reductions, collectively, is appreciable. This regionwide modeling— which employs the UAM–V model relied upon by OTAG and also used by EPA for today's action— indicates that even after implementation of the regional reductions, which help downwind areas make progress toward attainment, certain downwind areas under the 1-hour NAAQS, and numerous downwind areas under the 8-hour NAAQS, will experience residual nonattainment. In addition, under the 8-hour NAAQS, many other areas with nonattainment problems are expected to reach attainment based solely on the regional reductions.

Furthermore, as mentioned earlier, the above-described modeling indicates no upwind States whose required regional reductions, in combination with the other regional reductions and CAA required controls, provide more ozone reduction than is necessary for every downwind nonattainment problem affected by that upwind State to attain under each NAAQS. That is, there is no instance of ''overkill,'' so that none of the upwind reductions required under today's action is more than necessary to ameliorate downwind nonattainment.

b. 8-Hour Nonattainment Problems. As indicated above, the upwind reductions are useful in ameliorating downwind nonattainment under both NAAQS, but they are particularly useful in areas with nonattainment problems under the 8-hour NAAQS because more areas have such problems under that standard. Emissions reductions from each upwind State affect a broader swath of downwind 8-hour nonattainment problems, including problems adjacent to, and further away from, the upwind State. For example, emissions from Ohio affect nonattainment problems in each State adjacent to Ohio, as well as numerous States further away. As noted above, in some cases, the upwind reductions eliminate the downwind nonattainment problem; in other cases, those reductions ameliorate the downwind problem but residual nonattainment remains.

Moreover, under the 8-hour NAAQS, upwind contributions tend to be a particularly large percentage of the downwind nonattainment problem. For example, along the Northeast corridor, cumulatively upwind States including adjacent States, contribute 83 percent of

[56] As described elsewhere, the controls specifically required under the CAA include the controls identified in the modeling baseline, as well as certain Federal controls such as NLEV. These controls do not include any additional reductions that may be required in the local nonattainment areas as part of their attainment demonstrations.

Washington, DC's nonattainment problem; 68 percent of Maryland's nonattainment problem; 65 percent of Pennsylvania's nonattainment problem; and 85–88 percent of each of New Jersey's, New York's, Connecticut's, and Massachusett's nonattainment problems. These high levels of upwind contributions to widespread nonattainment problems—both near to, and far from, the upwind State—indicate that the regional reductions from the upwind areas may be expected to be useful in ameliorating downwind nonattainment under the 8-hour NAAQS.

c. Commenters' Concerns. Commenters argued that in the NPR that EPA failed to demonstrate that the proposed reductions in upwind emissions were necessary for downwind areas to demonstrate attainment. Commenters pointed out the lack of local attainment demonstrations under the 1-hour NAAQS.[57]

The EPA does not believe a local attainment demonstration is required before EPA can call on upwind States to reduce emissions pursuant to section 110(a)(2)(D). The EPA believes that available modeling analyses demonstrate that upwind reductions are necessary to help downwind areas come into attainment. The OTAG and EPA subregional modeling, UAM–V State-by-State zero-out modeling, and the CAMx modeling, described above, link each upwind State's emissions and downwind attainment needs, in a manner that is sufficient to support today's action. To reiterate, under the 1-hour NAAQS, the emissions reductions from each upwind State, combined with other emissions reductions, are needed to reduce downwind nonattainment problems. That need is underlined by the fact that the modeling relied on for today's action indicates residual nonattainment after implementation of all required controls and Federal measures. Even after implementation of the regional reductions, there is residual nonattainment for at least one downwind area linked to each upwind State. The same is true for the 8-hour NAAQS, as noted above.

The EPA recognizes that in the future, additional information may become available that would shed further light on the amount of emissions reductions needed for downwind areas to attain the NAAQS. Local-scale modeling may indicate more precisely the ambient impact of regional and local reductions on downwind nonattainment areas and the amount of any residual nonattainment. Nevertheless, it should be emphasized that the models relied on for today's action are state-of-the-art, and that their various inputs—particularly the inventories—have recently undergone close scrutiny and careful refinement through public comment and expert analysis. Accordingly, EPA believes that the overall model results indicating the general impact of upwind emissions and reductions in emissions should be viewed as valid. Accordingly, EPA believes that it has an adequate base of information to require the regional reductions under the 1-hour and 8-hour NAAQS at this time.

2. Equity Considerations

The EPA believes further justification for today's action is provided by overall considerations of fairness related to the control regimes required of the downwind and upwind areas, including the extent of the controls required or implemented by those areas.

The OTAG and EPA modeling analyses clearly indicate that upwind emissions contribute more than trivial amounts to downwind nonattainment problems. As a result, upwind emitters are exacerbating the health and welfare risks faced by those who live and work in downwind areas afflicted with unhealthful levels of ozone. The EPA believes that the principle of simple fairness applies here: upwind States should reduce their emissions that visit those health and welfare problems upon their downwind neighbors. Otherwise, their downwind neighbors would be obliged to pay additional costs to reduce local emissions beyond what would otherwise be necessary to protect their health from upwind emissions. In EPA's judgment, it is fair to require the upwind sources to reduce at least the portion of their emissions for which highly cost-effective controls are available. Indeed, fairness considerations would point towards requiring upwind reductions even if there were some degree of cost inefficiency.

Further, it should be recognized that the major urban nonattainment areas have been required to incur control costs for ozone precursors since shortly after the 1970 CAA Amendments. In general, over the past quarter of a century, these areas have implemented SIP controls that, in combination with Federal measures, place ozone-related controls on virtually all portions of their inventory of ozone precursors, including VOCs as well as NO_x. The Air Quality Modeling TSD includes descriptions of the control measures in place for several major urban nonattainment areas. Although not every major urban nonattainment area has complied with every CAA requirement for ozone precursors, the major urban nonattainment areas have complied with almost all of these requirements, and the CAA provides remedies to assure complete implementation of the required provisions. These measures have already lead to substantial reductions in ozone levels. By comparison, upwind States have not implemented reductions intended to reduce their impact on downwind nonattainment areas.

3. General Cost Considerations

The EPA also generally considered the cost-effectiveness of additional local reductions in the 1-hour ozone nonattainment areas. The EPA conducted this analysis as part of its Regulatory Impact Analysis, completed under Executive Order 12866, for the rulemaking in which EPA revised the ozone NAAQS, 62 FR 38866 (July 18, 1997). The EPA surveyed the additional VOC and NO_x controls available in areas throughout the country that are expected to be nonattainment under either NAAQS. The EPA ascertained that nationally, on average, these additional measures would cost approximately $4,300 per ton removed during the ozone season. See ''Control Measures Analysis of Ozone and PM Alternatives: Methodology and Results,'' July 17, 1997, table VII–2, p. 56. Although this figure is a national average, it provides a basis to conclude that local reductions may be expected to be more expensive than the approximately $1,500 in cost per ozone-season ton removed for the regional NO_x reductions required in today's rulemaking.

Commenters criticized EPA's proposal to measure cost-effectiveness in terms of cost per ton of emissions removed because it did not take into account the ambient impact downwind of the emissions reductions. Commenters cautioned that under certain circumstances, a high level of emissions reductions upwind may result in high costs (even though cost-effective on a per-ton basis), but relatively little ambient benefit downwind. Commenters emphasized that emissions reductions tend to have the greatest ambient benefit when they are within, or adjacent to, the area with the nonattainment problem. Commenters also said that emissions reductions further upwind have less ambient benefit. Accordingly, commenters stated that EPA's cost-effectiveness

[57] As noted in Section II.A., EPA proposed two analytical approaches, the second of which is the same as EPA is today promulgating. The commenters's criticisms seem to apply equally to both approaches.