ANL/EAIS/TM-98

Title I Implementation: Status Report on Nonattainment Areas

by L.D. Kenkeremath and T.C. Snyder

Environmental Assessment and Information Sciences Division,
Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60439

January 1993

Work sponsored by United States Department of Energy, Office of Environmental Analysis

CONTENTS

FIGURES

TABLES

TABLES (Cont.)

NOTATION

The following is a list of the acronyms, initialisms, and abbreviations (including chemical symbols and units of measurement) used in this document.

ACRONYMS, INITIALISMS, AND ABBREVIATIONS

ACT	alternative control technique
AQMA	Air Quality Management Area
CAAA	Clean Air Act Amendments of 1990
CMSA	consolidated metropolitan statistical area
EIP	Economic Incentive Program
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
FR	*Federal Register*
LAER	lowest achievable emission rate
MSA	metropolitan statistical area
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NSR	new source review
OAQPS	Office of Air Quality Planning and Standards
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
RACM	reasonably available control measure
RACT	reasonably available control technology
RFP	reasonable further progress
ROMNET	Regional Oxidant Modeling for Northeast Transport
SCR	selective catalytic reduction
SIP	state implementation plan
SNCR	selective noncatalytic reduction
STAPPA/ALAPCO	State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials
TSP	total suspended particulates
VMT	vehicle miles traveled

CHEMICAL SYMBOLS AND ABBREVIATIONS

NO_2	nitrogen dioxide
NO_x	nitrogen oxides
O_3	ozone
PM-10	fine particulates
SO_2	sulfur dioxide
VOC	volatile organic compound

UNITS OF MEASURE

gal	gallon(s)
h	hour(s)
lb	pound(s)
µm	micrometer(s)
ppm	part(s) per million
ton/yr	ton(s) per year
yr	year(s)

TITLE I IMPLEMENTATION: STATUS REPORT ON NONATTAINMENT AREAS

by

L.D. Kenkeremath and T.C. Snyder

ABSTRACT

Key provisions of Title I of the Clean Air Act Amendments of 1990 (CAAA) focus on bringing cities and other areas into attainment of the National Ambient Air Quality Standards for ozone, carbon monoxide (CO), and fine particulates (PM-10). The CAAA's new classification scheme for pollutant nonattainment areas is based on the relative severity of pollution in these areas and determines the stringency of control measures and the dates by which attainment of the standards will be required. The U.S. Environmental Protection Agency's (EPA's) final rule on air quality designations and classifications, published in late 1991, shows that ozone pollution remains a persistent problem; the number of counties that fail to meet the ozone standard has sharply increased since 1987. In contrast, incidence of PM-10 pollution has decreased; many counties have achieved the PM-10 standard since 1987. Nationwide, the number of CO nonattainment areas has increased, though not dramatically.

Many of the new Title I requirements focus on the role of nitrogen oxides (NO_x) in the formation of ground-level ozone. In ozone nonattainment areas and ozone transport regions, Title I generally requires major sources of NO_x to have the same control measures as those that apply to major sources of volatile organic compounds (VOCs). This requirement compels state regulators to adopt an integrated VOC/NO_x control strategy. The NO_x emission standards proposed by state regulators are considerably more stringent than those given in federal guidelines. Both the EPA and the states plan to allow the use of multifacility emissions averaging in state NO_x control strategies, thereby providing industry flexibility in determining appropriate control measures for specific facilities. Proposed federal Economic Incentive Program (EIP) rules would also allow sources in states with approved EIPs to use mobile source emission reduction credits to meet certain stationary source emission reduction requirements.

1 INTRODUCTION

Stringent new requirements under Title I of the Clean Air Act Amendments of 1990 (CAAA) attempt to rectify the persistent failure of U.S. metropolitan areas to attain or maintain the National Ambient Air Quality Standards (NAAQS) for ozone (O_3) and carbon monoxide (CO). The CAAA build on the structure of the Clean Air Act, as amended in 1977, and require states to develop and implement plans, subject to U.S Environmental Protection Agency (EPA) approval, to clean up polluted (nonattainment) areas and to protect clean (attainment) areas from deterioration.

This report updates data on nonattainment areas and discusses how new Title I requirements will apply to these areas. Section 2 provides an overview of the new Title I requirements, with emphasis on the new provisions for nitrogen oxides (NO_x) control. Section 3 updates nonattainment designations for the various criteria pollutants and compares the current (1991) status of nonattainment areas with their 1987 status. Section 4 addresses upcoming federal regulatory actions under Title I and their implications for energy sources. Section 5 discusses recent state actions to implement the NO_x control provisions of the CAAA. An appendix provides a state-by-state summary of progress or decline in attaining ambient air quality standards from 1987 to 1991.

2 OVERVIEW OF NEW CLEAN AIR ACT REQUIREMENTS UNDER TITLE I

2.1 INTRODUCTION

The CAAA of 1990 (Public Law 101-549) revised Clean Air Act requirements for attaining and maintaining NAAQS. Key provisions of Title I of the CAAA focus on bringing cities and other areas into attainment of the NAAQS for ozone, CO, and fine particulates (PM-10).

Section 101(a)(4)(A)(iv) of the CAAA automatically expands the boundaries of ozone and CO nonattainment areas ranked serious or worse to include the entire metropolitan statistical area (MSA) or consolidated metropolitan statistical area (CMSA). Because the 1990 U.S. census expanded the geographic extent of certain MSAs and CMSAs, some nonattainment areas include new counties not previously considered part of that area's air quality control region. To address interstate transport of ozone pollution, Section 184 of the CAAA creates an ozone transport region (OTR) in the Northeast, while Section 176A provides general authority to create additional interstate transport regions. Stringent control requirements will apply in these areas.

In a major departure from the Clean Air Act, as amended in 1977, Title I of the CAAA classifies areas into different nonattainment categories on the basis of the extent to which the NAAQS are exceeded. Title I also establishes specific controls and attainment dates for each classification. Thus, corresponding controls are more closely tailored to local and regional pollution abatement needs.

The EPA released air quality designations and classifications on November 6, 1991 (40 *Code of Federal Regulations* 81). New designations were issued for ozone, CO, PM-10, and lead nonattainment areas. Designation of existing sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) areas was retained by operation of law.

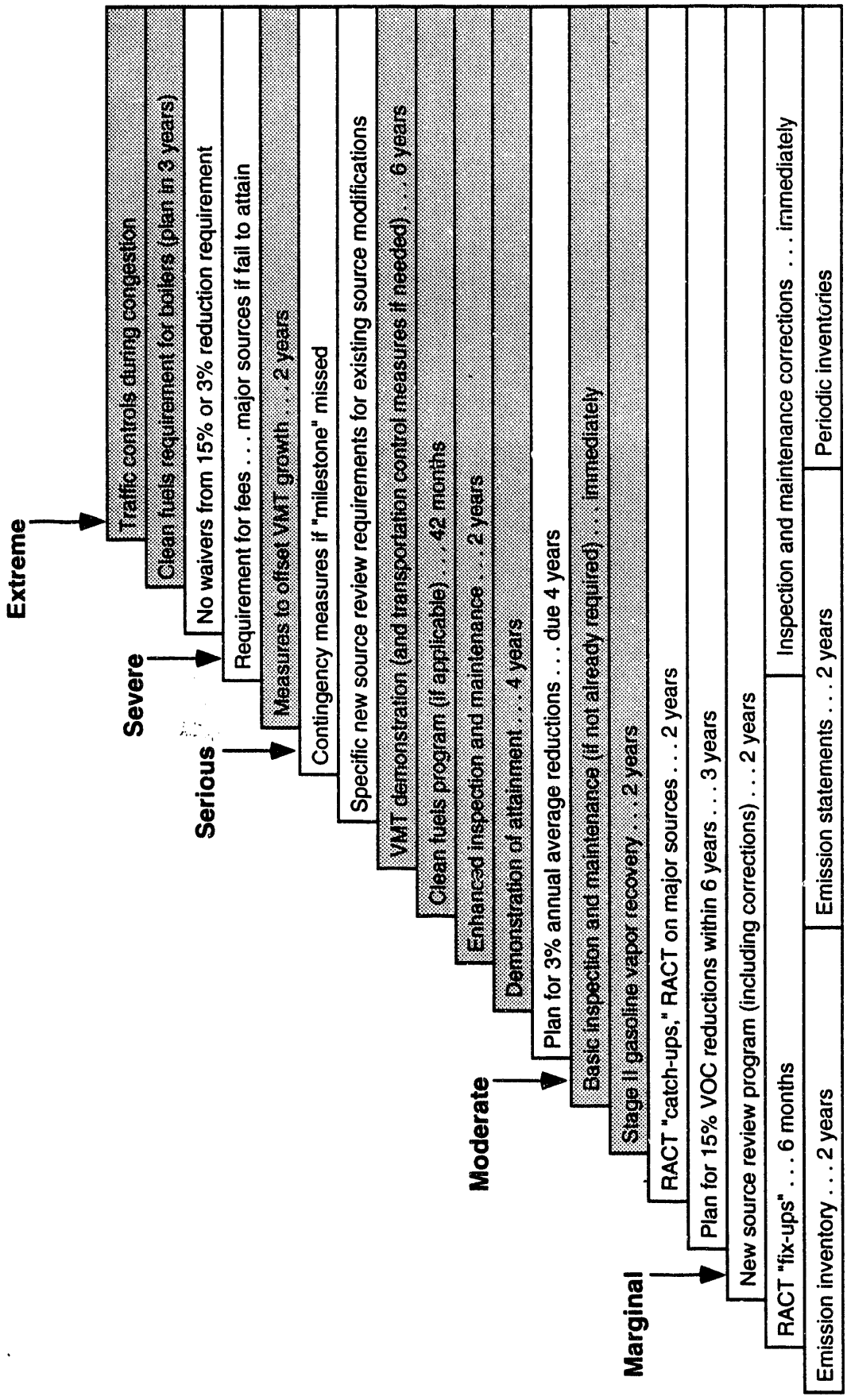
The new classification scheme for ozone and CO areas determines the stringency of control measures required for these areas and the dates by which these areas must attain the standards. Ozone areas are classified either marginal (3 years to attain); moderate (6 years to attain); serious (9 years to attain); severe (15 or 17 years to attain, depending on the severity of the pollution); or extreme (20 years to attain). Carbon monoxide areas are classified either moderate or serious, with more stringent and varied control measures required in serious areas. Moderate areas must attain the standard by the end of 1996, serious areas by the end of 1999, severe areas by the end of 2005, and extreme areas by the end of 2010. For PM-10 areas, the EPA initially categorized all areas not in compliance with the standard as moderate; however, on November 21, 1991, the EPA reclassified 14 PM-10 areas as serious. Moderate areas generally must attain the standard by the end of 1994, serious areas by the end of 2001.

With the exception of marginal nonattainment areas, ozone nonattainment areas are required to achieve a 15% reduction in volatile organic compound (VOC) emissions within six years of enactment. Thereafter, serious, severe, and extreme areas are required to achieve VOC reductions of 3% per year until they reach attainment. Title I also imposes additional controls on smaller polluters: major sources are now defined as those polluters who emit as little as 50 ton/yr of VOCs in serious areas, 25 ton/yr in severe areas, and 10 ton/yr in extreme areas. Previously, the cutoff was 100 ton/yr for all ozone nonattainment areas. These major new sources must meet stringent new source requirements, including construction permits, lowest achievable emission rate (LAER), and emissions offset requirements; major existing sources must install reasonably available control technology (RACT); and both must obtain operating permits as required by the CAAA. Title I also increases the offset ratio from 1-to-1 to 1.1-to-1 in marginal areas; 1.15-to-1 in moderate areas; 1.2-to-1 in serious areas; 1.3-to-1 in severe areas; and 1.5-to-1 in extreme areas. In ozone nonattainment areas and OTRs, Title I generally requires the same control measures for major sources of NO_x as those that apply to major sources of VOCs, unless the EPA finds that NO_x reductions would not produce net air quality benefits or contribute to attainment of the ozone standard. Title I requires many other control measures for specific categories of ozone areas. These measures become more stringent as nonattainment areas progress from marginal to severe. Figure 1 provides an overview of CAAA requirements for state ozone control plans for marginal, moderate, serious, severe, and extreme ozone nonattainment areas.

Title I establishes only one OTR, the Northeast Corridor from Washington, D.C., to Boston, Massachusetts, but additional regions may be created. Each such region must have an Ozone Transport Commission to oversee and coordinate regional requirements.

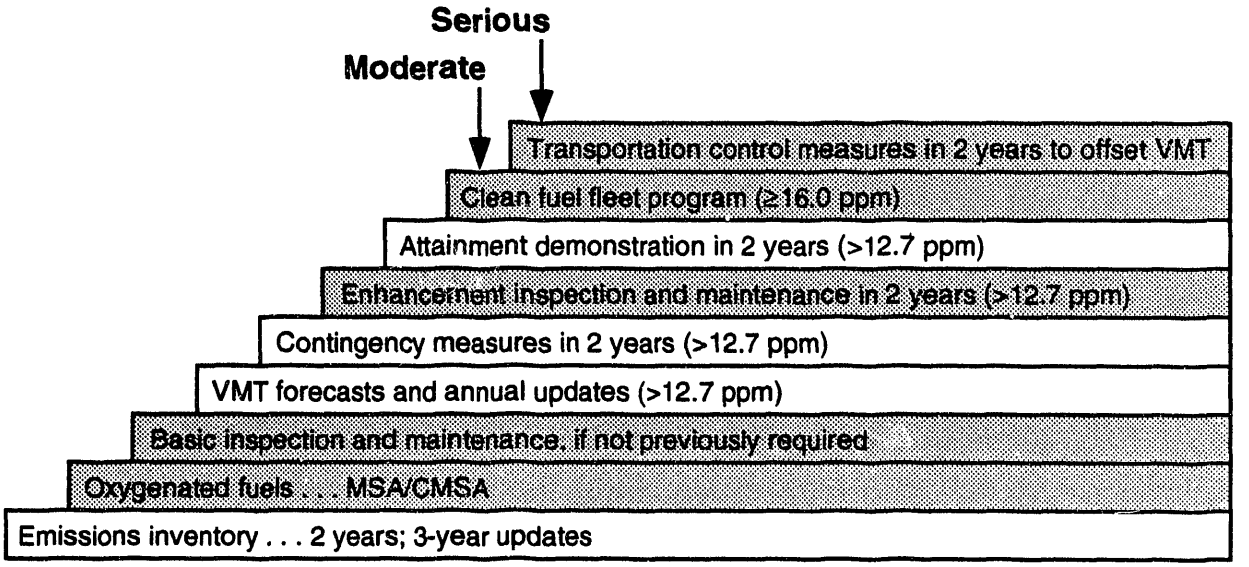
Control requirements for CO nonattainment areas include development of oxygenated fuels programs in all nonattainment areas, as well as measures specific to moderate and severe areas. Requirements for moderate areas include (1) enhanced motor vehicle inspection and maintenance programs similar to those required for serious ozone areas, with testing for CO; (2) a showing that the plan provides for annual emissions reductions sufficient to attain the standard by the deadline; and (3) contingency measures in case the area fails to attain the standard by the deadline or if annual projections predict an increase in vehicle miles traveled (VMT). Requirements for serious areas include (1) transportation control measures selected by the state if growth in VMT exceeds projections; (2) controls on stationary sources that have the potential to emit 50 ton/yr or more, where such emissions contribute significantly to the CO problem; and (3) achievement of emissions reduction milestones by the end of 1995, with implementation of economic incentives programs if milestones are not achieved, as in serious and severe ozone areas. Figure 2 summarizes requirements for state CO control plans in moderate and severe areas.

The PM-10 nonattainment areas are subject to sanctions, milestones, and other requirements analogous to those for ozone nonattainment areas, but the EPA and the states have more discretion to set specific requirements for PM-10 areas than for ozone or CO areas. In moderate areas, reasonably available control measures (RACMs) are required. In serious



Shading indicates items that may require new state legal authority.

FIGURE 1 CAAA Requirements for State Ozone Control Plans for Nonattainment Areas (Source: U.S. Environmental Protection Agency 1991a)



Shading indicates items that may require new state legal authority.

FIGURE 2 CAAA Requirements for State CO Control Plans for Moderate and Severe Areas (Source: U.S. Environmental Protection Agency 1991a)

areas, best available control measures are required, and new and existing sources with the potential to emit 70 ton/yr or more of PM-10 must be controlled as major sources.

Section 101 of the CAAA reaffirms the major role of the states in developing and implementing state implementation plans (SIPs) to attain the NAAQS. Such plans for nonattainment areas must contain pollution control measures that will achieve interim pollution reduction milestones and bring areas into attainment by the deadlines specified in the statutes. These plans must also contain the control measures prescribed by law. States that fail to submit and implement an adequate plan for a nonattainment area are subject to federal sanctions (e.g., cutoff of federal funds for highway projects or a requirement that new plants or plant modifications obtain offsetting emissions reductions from other pollution sources at a ratio of at least 2 to 1). States were required to submit revised SIPs by November 15, 1992. At present, EPA regional offices are conducting a completeness review of SIPs received from state agencies and will conduct two levels of quality review through June 1993.

2.2 NEW TITLE I NO_x REQUIREMENTS

New Title I NO_x requirements differ from NO_x requirements under the Clean Air Act, as amended in 1977, and from the NO_x requirements under the CAAA's Title IV acid rain provisions, in that they focus on the role of NO_x in the formation of ground-level ozone. Title I recognizes the limitations of a VOC-only control strategy and therefore requires state regulators to adopt an integrated VOC/NO_x control strategy. Title I NO_x provisions significantly affect a wide range of new and existing sources, including electric utilities (the largest stationary sources of NO_x emissions), industrial boilers, gas turbines, internal

combustion engines, process heaters, cement kilns, iron and steel facilities, and glass manufacturing facilities (Novello 1992, p. 938). In addition to the Title I provisions aimed at NO_x reductions, Title IV mandates NO_x reductions of about 2 million tons from the 1980 level. These reductions are to be achieved through emissions limits at specified coal-fired electric utility plants.

Two important new requirements, which states must include in their November 1992 ozone SIP revisions, apply to major NO_x sources in ozone nonattainment areas, as well as in attainment and unclassifiable areas located in OTRs. First, existing major sources, except those in marginal or better nonattainment areas, must install and implement NO_x RACT by May 31, 1995. The EPA is developing guidance that defines which types of controls (alternative control techniques [ACTs]) could be considered RACT for various industrial sources.[1] Second, new major sources and major modifications must comply with the new source review (NSR) program, which requires emissions offsets and LAERs. Guidance from the EPA will determine whether a source can offset NO_x emissions with VOC reductions, or vice versa, and how such pollutant trading would be regulated.

The EPA was expected to release guidance interpreting various aspects of the Title I NO_x requirements by the end of 1991. However, the guidance was delayed because of failure to reach agreement on electric utility NO_x controls that respond to RACT requirements and Title IV acid rain requirements. As a result, the EPA released its general preamble for Title I implementation, without NO_x provisions, on April 16, 1992 (57 *Federal Register* [FR] 13498), followed by a NO_x supplement on November 25, 1992 (57 FR 55620). The NO_x supplement to the preamble provides guidance on NO_x RACT, new source review, interaction of Title I and Title IV, ozone transport regions, and NO_x exemptions under Section 182(f) of the CAAA. The EPA plans to issue additional guidance on NO_x control in separate documents, including the following:

- A guidance document concerning substitution of NO_x controls for VOC controls to reduce ambient ozone concentrations. These reductions would be at least equivalent to those that would result from the VOC reductions already required.

- A report on the extent and availability of NO_x controls. This report is part of the study required by Section 185B of the CAAA to examine the role of VOCs and NO_x in ozone formation.

- A guidance document concerning provisions of Section 182(f). These provisions outline conditions under which NO_x NSR and RACT requirements would not apply.

---

[1] As of July 1992, the EPA had issued one ACT document that pertains to nitric acid plants. The agency plans to issue about 10 more by the end of 1993 (Novello 1992, p. 940).

The delay in issuing the NO_x implementation guidance resulted in states developing their own NO_x emissions guidelines through existing air quality associations. These states were concerned that they might be unable to submit their SIP revisions by the CAAA-mandated deadline in the absence of federal guidance. The proposed state-developed guidelines are more stringent than the EPA guidelines. Federal and state NO_x control proposals are discussed in Sections 4 and 5 of this report, respectively.

3 DESIGNATION OF NONATTAINMENT AREAS

Section 101(a)(3) of the CAAA requires states to submit to the EPA a list of areas to be designated nonattainment for various criteria pollutants. On November 6, 1991, the EPA published its final rule on air quality designations and classifications (56 FR 56693). Ozone and CO areas designated nonattainment, attainment, or unclassifiable immediately before enactment of CAAA (November 15, 1990) retained these designations by operation of law; however, boundaries of the nonattainment areas were expanded to include the entire CMSA or MSA. The nonattainment designations also included classifications of the ozone and CO areas according to the severity of the pollution: marginal, moderate, serious, severe, or extreme for ozone and moderate or serious for CO. Some additional classifications were used to designate certain areas: transitional, submarginal, rural transport, and incomplete data areas (ozone), and CO "not classified" areas. These distinctions are described briefly as follows (56 FR 56697-56698):

- *Transitional areas* — areas for which a nonattainment designation was retained by operation of law, but whose ozone levels from 1987 to 1989 did not exceed the NAAQS. The EPA is required to determine whether the area attained the NAAQS by December 31, 1991.

- *Submarginal ozone areas* — areas that violated the ozone standard from 1987 to 1989 and had a design value during that period of less than 0.121 parts per million. The EPA explains that the submarginal category can occur "when there is not a complete set of data so that the expected exceedance rate is higher than the NAAQS exceedance rate of 1.0/yr even though the estimated design value is less than the level of the standard."

- *Rural transport areas* — areas designated nonattainment and that neither include nor are adjacent to any part of a CMSA or MSA. The EPA has discretion to treat an area as a rural transport area on the basis of "a finding that emissions within the area do not make a significant contribution to the ozone concentrations measured in the area or in other areas." This distinction allows a rural transport area to be treated as a marginal area, although, on the basis of its design value, it would be classified as a moderate or worse nonattainment area.

- *Ozone incomplete data areas* — areas for which sufficient air quality monitoring data do not exist to allow a determination of whether they are or are not violating the NAAQS. As a result, SIP submittal requirements do not apply to these areas.

- *Carbon monoxide "not classified" areas* — areas designated non-attainment by law by virtue of their preenactment designation, but which did not experience a violation of the NAAQS during 1988 and

1989. The area was not classified in cases where the EPA believed a violation would not have occurred (on the basis of an examination of historical trends when complete data for the relevant period were not available). The SIP submittal requirements for CO areas do not apply to these areas.

Tables 1, 2, and 3 provide an overview of the prevalence of nonattainment areas for various criteria pollutants. Table 1 provides a state-by-state summary of counties or parts of counties currently located in nonattainment areas. States are organized by EPA region. Table 2 is a national summary of air quality improvement and deterioration that allows comparison of the total number of counties nationwide located in nonattainment areas in 1987 with the total number of such counties at the end of 1991. Similar comparisons on a state-by-state basis can be found in the appendix. Table 3 provides a regional comparison of progress or deterioration on the basis of the total number of counties located in nonattainment areas in 1987 and 1991.

Table 1 demonstrates that ozone pollution is the most prevalent problem in the United States, followed by CO. Ozone pollution is a regional problem, while CO is a local one, with CO nonattainment areas limited to urban areas. Ozone nonattainment areas are most heavily concentrated in the mid-Atlantic area, the industrial Midwest, the South, New England, and California — all densely populated areas. The most severely polluted areas occur in California, Texas, and the industrial Midwest. Carbon monoxide nonattainment areas are scattered throughout the country; the greatest number of counties in nonattainment areas are in Regions II (New Jersey and New York) and IX (primarily California). The PM-10 nonattainment areas are found mainly in the arid West. Sulfur dioxide nonattainment areas, which are scattered throughout the country, result from emissions from power plants and nonferrous smelters. Nonattainment of the NO_2 standard, which results from fuel combustion emissions from both motor vehicles and stationary combustion sources (e.g., power plants and industrial boilers), is limited to southern California. The greatest number of counties in nonattainment areas for all pollutants occurs in the industrial Midwest (Region V), the mid-Atlantic region (Region III), and California (Region IX).

Table 2 presents a national summary of air quality improvement and deterioration for all of the criteria pollutants except lead. The table updates data presented in Loughe et al. (1987) and allows comparison of the number of counties in nonattainment areas as of November 1991, when the latest EPA designations were published (56 FR 56694-56857), with the number of counties in nonattainment areas in 1987. Table 3 assigns Table 2 data to EPA regions. In Table 2, as in the appendix tables, the subtotals for SO_2 and PM-10 under the "Improvement" and "Deterioration" headings may not sum to the totals for these categories. The reason is twofold. First, a single county may be in nonattainment of both primary and secondary SO_2 standards. Second, before the primary and secondary total suspended particulates (TSP) standards were changed to a single standard for particulates, many counties were in nonattainment of both primary and secondary standards in 1987. However,

TABLE 1 National Summary of Counties in Air Quality Nonattainment Areas by Pollutant, 1991

EPA Region	State	Number of Counties in Nonattainment					
		SO_2[a]	PM-10	CO	Ozone	NO_2	Lead
I	Connecticut	0/0	1	6	8	0	0
	Maine	2/0	1	0	12	0	0
	Massachusetts	0/0	0	5	14	0	0
	New Hampshire	0/0	0	1	7	0	0
	Rhode Island	0/0	0	0	5	0	0
	Vermont	0/0	0	0	0	0	0
	Total Region I	2/0	2	12	46	0	0
II	New Jersey	1/1	0	15	21	0	0
	New York	0/1	0	8	22	0	0
	Total Region II	1/2	0	23	43	0	0
III	Delaware	0/0	0	0	3	0	0
	Maryland	0/0	0	3	14	0	0
	Pennsylvania	3/0	1	2	45	0	0
	Virginia	0/0	0	2	29[b]	0	0
	West Virginia	1/0	1	0	6	0	0
	Total Region III	4/0	2	7	97	0	0
IV	Alabama	0/2	0	0	2	0	1
	Florida	0/0	0	0	6	0	0
	Georgia	0/0	0	0	13	0	1
	Kentucky	1/1	0	0	15	0	0
	Mississippi	0/0	0	0	0	0	0
	North Carolina	0/0	0	4	9	0	0
	South Carolina	0/0	0	0	1	0	0
	Tennessee	3/3	0	1	7	0	2
	Total Region IV	4/6	0	5	53	0	4
V	Illinois	2/1	3	0	12	0	0
	Indiana	5/0	2	2	8	0	1
	Michigan	0/0	1	3	37	0	0
	Minnesota	8/0	2	9	0	0	1
	Ohio	7/3	2	1	28	0	0
	Wisconsin	5/2	0	0	11	0	0
	Total Region V	27/6	10	15	96	0	2
VI	Arkansas	0/0	0	0	0	0	0
	Louisiana	0/0	0	0	17	0	0
	New Mexico	1/0	1	1	0	0	0
	Oklahoma	0/0	0	0	0	0	0
	Texas	0/0	1	1	17	0	1
	Total Region VI	1/0	2	2	34	0	1

TABLE 1 (Cont.)

EPA Region	State	Number of Counties in Nonattainment					
		SO_2[a]	PM-10	CO	Ozone	NO_2	Lead
VII	Iowa	0/0	0	0	0	0	0
	Kansas	0/0	0	0	2	0	0
	Missouri	0/0	0	1	7	0	2
	Nebraska	0/0	0	0	0	0	1
	Total Region VII	0/0	0	1	9	0	3
VIII	Colorado	0/0	11	10	6	0	0
	Montana	2/1	6	3	0	0	1
	North Dakota	0/0	0	0	0	0	0
	South Dakota	0/0	0	0	0	0	0
	Utah	2/2	2	3	2	0	0
	Wyoming	0/0	1	0	0	0	0
	Total Region VIII	4/3	20	16	8	0	1
IX	Arizona	5/0	7	2	1	0	0
	California	0/0	14	23	35	4	0
	Nevada	1/0	2	4	1	0	0
	Total Region IX	6/0	23	29	37	4	0
X	Idaho	0/0	5	1	0	0	0
	Oregon	0/0	5	9	5	0	0
	Washington	0/0	6	6	4	0	0
	Total Region X	0/0	16	16	9	0	0
	Alaska	0/0	2	2[b]	0	0	0
	Total for all regions	49/17	77	128	432	4	11

[a] When two values are given, primary nonattainment/secondary nonattainment.

[b] Seventeen Virginia cities and two Alaska boroughs are treated as counties for purposes of tabulation.

only one status change is counted for each county in tabulating the number of counties that improved or deteriorated since 1987. For example, the PM-10 data show that 161 counties changed from secondary nonattainment to full attainment and that 46 counties changed from primary nonattainment to full attainment, because 26 of these 207 counties were in nonattainment of both primary and secondary standards in 1987, their improvement to full attainment was counted as a single status change for each in the total.

Great improvement can be noted nationwide for PM-10: 185 counties that failed to attain primary or secondary standards or both in 1987 are now in full attainment of the revised PM-10 standard. Although 31 counties fell out of attainment from 1987 to 1991, the net result points to apparent major progress in cleaning up areas with particulate pollution.

TABLE 2 National Summary of Air Quality Improvement and Deterioration

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	Ozone	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	52/7	123/177	119	329	4
Number of counties containing nonattainment areas in 1991	49/17	77	128	432[c]	4
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	161	d	d	d
Number of counties that changed from primary nonattainment to full attainment	5	46	15	9	0
Total number of counties that improved	5	185	15	9	0
Deterioration (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	6[b]	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	1	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	1	31[e]	25	112[c]	0
Total number of counties that deteriorated	2	36[b,e]	25	112[c]	0
Net change (improvement — deterioration)	+3	+149	-10	-103[c]	0

[a] When two values are given, primary nonattainment/secondary nonattainment.

[b] Total suspended particulates (TSP) primary and secondary standards were replaced by the standard for PM-10 on July 31, 1987.

[c] Twenty-three of these counties (i.e., about 22% of the increase from 1987 to 1991 of counties in nonattainment areas) were designated nonattainment as a result of the automatic expansion under the CAAA of 1990 of nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[d] No secondary standard exists for PM-10, CO, ozone, or NO_x.

[e] Includes Alaska, in which two counties were found in violation of the PM-10 standard and two urban areas were found in violation of the CO standard in 1991; data on Alaska were not included in Loughe et al. (1987).

TABLE 3 Number of Counties Designated in Violation of the NAAQS as of December 31, 1987, and November 6, 1991

EPA Region	Total Number of Counties	Number of Counties in Nonattainment									
		SO_2		PM-10		CO		Ozone		NO_x	
		1987	1991	1987	1991	1987	1991	1987	1991	1987	1991
I	67	1	2	16	2	11	12	43	46	0	0
II	83	1	1	15	0	21	23	30	43	0	0
III	243	4	4	26	2	8	7	55	97[a]	0	0
IV	735	9	7	22	0	8	5	33	53[b]	0	0
V	524	32	29	117	10	12	15	81	96[c]	0	0
VI	502	1	1	9	2	2	2	30	34[d]	0	0
VII	411	0	0	23	0	4	1	9	9	0	0
VIII	291	4	4	21	20	14	16	8	8	0	0
IX	88	7	6	34	23	27	29	35	37	0	0
X	119	0	0	17	16	12	16	5	9	4	4
Alaska		NA[e]	0	NA	2	NA	2	NA	0	NA	0
Total		59	54	300	77	119	128	329	432	4	4

[a] Nine of these counties were newly designated nonattainment areas as a result of the automatic expansion under the CAAA of 1990 of the boundaries of ozone nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[b] As a result of automatic expansion of boundaries under the CAAA of 1990, two counties were newly designated nonattainment.

[c] As a result of automatic expansion of boundaries under the CAAA of 1990, five counties were newly designated nonattainment.

[d] As a result of automatic expansion of boundaries under the CAAA of 1990, seven counties were newly designated nonattainment. (Three counties in Region VI were brought into attainment during 1987-1991.)

[e] NA = not available.

However, the apparent improvement in particulate levels may be overstated by the data shown in the tables because the particulate standard was changed in 1987. On July 31, 1987, the primary and secondary standards for TSP were replaced by a single standard for PM-10 pollutants (i.e., the smaller particles less than 10 μm in diameter that are considered more hazardous to human health). Thus, on the basis of the nonattainment designations, it is not possible to ascertain whether significant improvement in levels of PM-10 pollutants has occurred since 1987; however, since 1987, an overall positive change in status occurred for counties designated as nonattainment for particulate standards. Improvement has been most dramatic in the eastern and central United States (Regions I through VII). Considerably less improvement has occurred in the western states (Regions VIII through X). Two counties in Alaska were newly designated PM-10 nonattainment areas in 1991.

In contrast, the number of counties nationwide failing to meet the ozone standard has sharply increased. Since 1987, only 9 counties previously designated nonattainment areas have been brought into attainment of the ozone standard, while 112 counties were newly designated nonattainment in 1991. However, this deterioration may be overstated by the data tables. The boundaries of existing nonattainment areas classified as serious or worse were statutorily extended to include entire CMSAs and MSAs. This fact accounts for a significant increase in the number of counties in nonattainment areas but does not necessarily point to an increased number of air violations in these areas. The extended boundaries also acknowledge that the ozone problem is not likely to be corrected by actions in a single city or county and that pollution sources must be controlled in a wider area. (Nevertheless, most newly designated nonattainment counties are in marginal and moderate ozone nonattainment areas, many of which were newly designated as such in 1991; existing areas classified marginal or moderate were not automatically expanded under the CAAA.) Many of the counties designated nonattainment also are in transitional (21 counties), rural transport (4 counties), or incomplete data (50 counties) areas (Table 4). In spite of these caveats, the data clearly show that ozone pollution remains a persistent problem for U.S. cities. The most significant deterioration, in terms of number of counties failing to attain, occurred in the mid-Atlantic and southern states and in the industrial Midwest (Regions II through V).

Fifteen CO nonattainment counties had been brought into attainment by 1991, but 25 counties[2] were newly designated nonattainment for this pollutant. (The automatic expansion under the CAAA of serious CO nonattainment areas to include the entire MSA or CMSA did not affect the total number of CO nonattainment areas; all newly designated counties are classified as moderate.) Levels of SO_2 improved in five counties and worsened in two. No change occurred in NO_x nonattainment area designations.

---

[2] Two boroughs containing the Anchorage and Fairbanks urban areas in Alaska are treated as "counties" for purposes of tabulation.

TABLE 4 Classification of Ozone Nonattainment Areas, November 1991

Classification	Area Involved	Number of Counties
Extreme	Los Angeles-South Coast Air Basin, Calif. etc.	4
Severe-17	Southeast Desert Modified AQMA,[a] Calif.	3
	New York-New Jersey-Long Island metro area, Conn./N.J./N.Y.	25
	Chicago-Gary-Lake County, Ill./Ind.	10
	Houston-Galveston-Brazoria, Texas	8
	Milwaukee-Racine, Wis.	6
	Total	52
Severe-15	San Diego, CA, Ventura County, Calif.	1
	Baltimore, Md.	5
	Philadelphia-Wilmington-Trenton metro area, Md./N.J./Penn.	12
	Total	18
Serious	Sacramento metro area, Calif.	6
	San Joaquin Valley, Calif.	8
	Greater Connecticut	8
	District of Columbia	Entire district
	Atlanta, Ga.	13
	Baton Rouge, La.	6 parishes
	Washington suburbs, Md.	5
	Boston-Lawrence-Worchester, Mass./N.H.	12
	Springfield, Mass.	4
	Muskegon, Mich.	1
	Portsmouth-Dover-Rochester, N.H.	2
	Providence, R.I. (all Rhode Island)	5
	Beaumont-Port Arthur, Texas	3
	El Paso, Texas	1
	Washington suburbs, Va.	10 counties and cities
	Sheboygan, Wis.	1
	Total	86

TABLE 4 (Cont.)

Classification	Area Involved	Number of Counties
Moderate	Phoenix, Ariz.	1
	Monterey Bay, Calif.	3
	San Francisco-Bay area, Calif.	9
	Santa Barbara-Santa Maria-Lompoc, Calif.	1
	Miami-Ft. Lauderdale-West Palm Beach, Fla.	3
	Louisville metro area, Ky./Ind.	5
	Lewiston-Auburn, Maine	2
	Portland, Maine	3
	Detroit-Ann Arbor, Mich.	7
	Grand Rapids, Mich.	2
	St. Louis metro area, Mo./Ill.	5
	Atlantic City, N.J.	2
	Charlotte-Gastonia, N.C.	2
	Greensboro-Winston Salem-High Point, N.C.	4
	Raleigh-Durham, N.C.	3
	Cincinnati-Hamilton metro area, Ohio/Ky.	7
	Cleveland-Akron-Lorain, Ohio	8
	Dayton-Springfield, Ohio	4
	Toledo, Ohio	2
	Pittsburgh-Beaver Valley, Penn.	7
	Reading, Penn.	1
	Nashville, Tenn.	5
	Dallas-Ft. Worth, Texas	4
	Salt Lake City, Utah	2
	Richmond-Petersburg, Va.	7
	Charleston, W.Va.	2
	Huntington-Ashland, W.Va./Ky.	4
	Parkersburg, W.Va.	1
	Kewaunee County, Wis.	
	Manitowoc County, Wis.	
	Total	108
Marginal	Birmingham, Ala.	2
	Sussex County, Del.	
	Tampa-St. Petersburg-Clearwater, Fla.	2
	Jersey County, Ill.	
	Evansville, Ind.	1
	Indianapolis, Ind.	1
	South Bend-Elkhart, Ind.	2
	Kansas City, Kans.	2, submarginal[b]

TABLE 4 (Cont.)

Classification	Area Involved	Number of Counties
Marginal (cont.)	Edmonson County, Ky.	Rural transport
	Lexington-Fayette, Ky.	2
	Owensboro, Ky.	2
	Paducah, Ky.	2
	Lake Charles, La.	1
	Hancock and Waldo counties, Maine	
	Kent and Queen Anne's counties, Md.	
	Kansas City, Mo.	3, submarginal[b]
	Reno, Nev.	1
	Manchester, N.H.	3
	Allentown-Bethlehem-Easton, N.J./Penn.	4
	Albany-Schenectady-Troy, N.Y.	6
	Buffalo-Niagara Falls, N.Y.	2
	Essex County, N.Y.	Rural transport
	Jefferson County, N.Y.	
	Poughkeepsie, N.Y.	1
	Canton, Ohio	1
	Columbus, Ohio	3
	Youngstown-Warren-Sharon, Ohio/Penn.	3
	Portland, Vancouver AQMA, Ore./Wash.	4
	Altoona, Penn.	1
	Erie, Penn.	1
	Harrisburg-Lebanon-Carlisle, Penn.	4
	Johnstown, Penn.	2
	Lancaster, Penn.	1
	Scranton-Wilkes-Barre, Penn.	5
	York, Penn.	2
	Cherokee County, S.C.	
	Knoxville, Tenn.	1
	Memphis, Tenn	1
	Norfolk-Virginia Beach-Newport News, Va.	11 counties and cities
	Smyth County, Va.	Rural transport
	Seattle-Tacoma, Wash.	3
	Greenbrier County, W.Va.	
	Door County, Wis.	Rural transport
	Walworth County, Wis.	
	Total	94

TABLE 4 (Cont.)

Classification	Area Involved	Number of Counties
Transitional[c]	Chico, Calif.	1
	Imperial County, Calif.	
	Yuba City, Calif.	2
	Denver-Boulder, Colo.	6
	Jacksonville, Fla.	1
	Lafayette, La.	1 parish
	New Orleans, La.	4 parishes
	Flint, Mich.	1
	Lansing-East Lansing, Mich.	3
	Clinton County, Ohio	
	Preble County, Ohio	
	Steubenville, Ohio	1
	Total	21
Incomplete data[b]	Beauregard Parish, La.	
	Grant Parish, La.	
	LaFourche Parish, La.	
	St. Mary Parish, La.	
	St. James Parish, La.	
	Franklin County, Maine	
	Oxford County, Maine	
	Somerset County, Maine	
	Allegan County, Mich.	
	Barry County, Mich.	
	Battle Creek, Mich.	1
	Benton Harbor, Mich.	1
	Branch County, Mich.	
	Cass County, Mich.	
	Gratiot County, Mich.	
	Hillsdale County, Mich.	
	Huron County, Mich.	
	Ionia County, Mich.	
	Jackson, Mich.	1
	Kalamazoo, Mich.	1
	Lapeer County, Mich.	
	Lenawee County, Mich.	
	Montcalm County, Mich.	
	Saginaw-Bay City-Midland, Mich.	3
	Sanilac County, Mich.	
	Shiawassee County, Mich.	
	St. Joseph County, Mich.	
	Tuscola County, Mich.	
	Van Buren County, Mich.	
	Belknap County, N.H.	
	Cheshire County, N.H.	

TABLE 4 (Cont.)

Classification	Area Involved	Number of Counties
Incomplete data (cont.)	Sullivan County, N.H. Columbiana County, Ohio Salem, Ore. Crawford County, Penn. Franklin County, Penn. Greene County, Penn. Juniata County, Penn. Lawrence County, Penn. Northumberland County, Penn. Pike County, Penn. Schuylkill County, Penn. Snyder County, Penn. Susquehanna County, Penn. Warren County, Penn. Wayne County, Penn. Victoria, Texas	2 1
	Total	50

[a] AQMA = Air Quality Management Area.

[b] Subsequently redesignated attainment (59 FR 27939, 27942, June 23, 1992).

[c] Prior designation retained by operation of law.

Table 4 lists ozone nonattainment areas with their classifications, including those areas designated transitional and incomplete data areas. Rural transport areas are indicated under marginal areas. Note that the tables do not distinguish between whole counties and parts of counties included in the nonattainment areas. Because different parts of a single county may be included in different nonattainment areas, the county totals for each classification will sum to a total greater than the total of all counties located in ozone nonattainment areas indicated in Tables 1 and 2. For example, parts of Riverside, Los Angeles, and San Bernardino counties in southern California are located in the Los Angeles-South Coast Air Basin extreme ozone nonattainment area; other parts of the same three counties are part of the severe-17 Southeast Desert Modified Air Quality Management Area (AQMA) nonattainment area. Thus, these counties are effectively counted twice in Table 4. The Table 4 data are helpful, however, because they give a broad overview of the relative severity of ozone pollution in nonattainment areas nationwide. Most counties are located in moderate and marginal areas, which together account for more counties than serious, severe, and extreme areas combined. Table 5 provides a list of newly designated nonattainment areas, as distinct from those areas whose boundaries have been expanded since 1987. All but 2 of the 31 new areas are classified as marginal.

TABLE 5 Newly Designated Ozone Nonattainment Areas[a]

Area Involved	Classification	Number of Counties Involved
Sussex County, Del.	Marginal	
Jersey County, Ill.	Marginal	
Evansville, Ind.	Marginal	1
Edmonson County, Ky.	Marginal	Rural transport
Lexington-Fayette, Ky.	Marginal	2
Owensboro, Ky.	Marginal	2
Paducah, Ky.	Marginal	2
Kent and Queen Anne's counties, Md.	Marginal	
Reno, Nev.	Marginal	1
Albany-Schenectady-Troy, N.Y.	Marginal	6
Buffalo-Niagara Falls, N.Y.	Marginal	2
Essex County, N.Y.	Marginal	Rural transport
Jefferson County, N.Y.	Marginal	
Poughkeepsie, N.Y.	Marginal	1
Greensboro-Winston-Salem-High Point, N.C.	Moderate	4
Raleigh-Durham, N.C.	Moderate	3
Columbus, Ohio	Marginal	3
Altoona, Penn.	Marginal	1
Johnstown, Penn.	Marginal	2
Cherokee County, S.C.	Marginal	
Knoxville, Tenn.	Marginal	1
Norfolk-Virginia Beach-Newport News, Va.	Marginal	11 counties and cities
Smyth County, Va.	Marginal	Rural transport
Seattle-Tacoma, Wash.	Marginal	3
Charleston, W.Va.	Moderate	2
Greenbrier County, W.Va.	Marginal	
Parkersburg, W.Va.	Moderate	1
Door County, Wis.	Marginal	Rural transport
Kewaunee County, Wis.	Moderate	
Manitowoc County, Wis.	Moderate	
Walworth County, Wis.	Marginal	
Total[b]		61

[a] Designated new ozone attainment areas on November 6, 1991. These areas are those that do not constitute expansion under the Clean Air Act of ozone nonattainment areas existing at the time of enactment.

[b] New marginal = 56; new moderate = 5.

4 NO_x CONTROLS: FEDERAL ACTIONS

Federal actions on NO_x controls are governed by Titles I and IV of the CAAA. The NO_x RACT provisions are appended to the Title I preamble (57 FR 55620), and these provisions are identical to the "presumptive" limits set forth in Title IV of the CAAA and adopted in the recent proposed rule on the Title IV NO_x emission reduction program. The NO_x guidance for Title I nonattainment areas and the proposed Title IV acid rain rules for certain utility boilers were published on November 25, 1992 (57 FR 55620 and 57 FR 55632). In addition, the EPA proposed on February 23, 1993, rules for economic incentive programs (EIPs) for ozone and CO nonattainment areas (58 FR 11110). The proposed rules establish parameters for emissions trading, including NO_x trading guidelines.

4.1 NO_x RACT

In November 1992, the EPA released long-delayed CAAA regulatory measures addressing NO_x emissions from utilities. The NO_x supplement to the Title I preamble, which gives states guidance for developing SIPs for nonattainment areas, sets RACT standards at 0.45 lb of $NO_x/10^6$ Btu for tangentially fired, dry-bottom, coal-fired units and at 0.50 lb of $NO_x/10^6$ Btu for wall-fired, dry-bottom coal units. These limits are identical to the NO_x emission limit default values under Title IV of the CAAA to achieve acid rain reductions. The NO_x RACT guidance also sets forth limits of 0.20 lb of $NO_x/10^6$ Btu for tangentially fired, gas- or oil-burning utility boilers and 0.30 lb of $NO_x/10^6$ Btu for wall-fired, gas- or oil-burning utility boilers. This guidance applies to electric utilities in the northeastern United States and in ozone nonattainment areas in other areas of the country. These utilities are subject to NO_x controls regardless of the type of fuel used, while acid rain NO_x provisions apply only to coal-fired facilities.

Table 6 lists affected coal-fired units subject to Title IV phase 1 NO_x reductions in ozone nonattainment areas. These units must meet (1) NO_x RACT requirements under Title I, as well as any other applicable Title I requirements, and (2) the Title IV NO_x reduction requirements under the acid rain program. The NO_x emission reductions at these utilities that result from the Title I program may be used to meet Title IV requirements; furthermore, the guidance states that NO_x emissions reductions that result from the Title IV program may be considered for purposes of meeting certain Title I requirements "under appropriate conditions."

The guidance allows utilities to average annual emissions across affected units at one or more facilities and allows the EPA to grant less stringent "alternative" emissions limits when a plant shows that it cannot meet the proposed standards through use of low-NO_x burner technology. The EPA may also allow states, on a conditional approval basis, to defer the adoption of RACT for existing large NO_x sources for up to two years in cases where states have not previously considered NO_x reductions in their control strategy and air quality modeling analyses. In cases of equipment unavailability, where the installation of required

TABLE 6 1989 NO_x Emissions from Phase 1 Power Plants in Ozone Nonattainment Areas Compared with Estimated Allowable NO_x Emissions under EPA and State Proposals

State	Plant and Unit		1989 NO_x Emissions (10^3 tons)	Estimated Maximum Allowed NO_x Emissions (10^3 tons)	
				Title IV[a]	STAPPA/ ALAPCO[b]
Alabama	Gaston	1	15.4	8.2	6.9
		2	15.4	8.2	6.9
		3	15.4	8.2	6.9
		4	13.1	6.6	5.5
		5	27.0	16.9	13.0
Florida	Big Bend	1	19.1	9.0	7.6
		2	18.3	8.8	7.5
		3	20.3	9.1	7.7
Georgia	Yates	1	2.5	2.3	1.7
		2	2.5	2.3	1.7
		3	2.5	2.3	1.7
		4	3.0	2.7	2.1
		5	3.0	2.7	2.1
		6	9.9	8.2	6.2
		7	10.2	8.5	6.4
	McDonough	1	7.2	6.0	4.5
		2	7.0	5.8	4.4
Illinois	Baldwin	1	22.4	NA[c]	NA
		2	22.5	NA	NA
		3	21.4	16.5	12.4
Indiana	Bailly	7	6.7	NA	NA
		8	12.6	NA	NA
	Stout	5	1.6	1.6	0.9
		6	1.6	1.6	0.9
		7	8.2	6.3	4.8
	Gallagher	1	12.0	7.7	6.5
		2	12.6	8.1	6.8
		3	13.3	8.5	7.2
		4	13.6	8.7	7.3

TABLE 6 (Cont.)

State	Plant and Unit		1989 NO_x Emissions (10^3 tons)	Estimated Maximum Allowed NO_x Emissions (10^3 tons)	
				Title IV[a]	STAPPA/ ALAPCO[b]
Kentucky	Coleman	1	15.5	9.9	8.4
		2	15.8	10.1	8.5
		3	17.0	10.9	9.2
	Smith	1	7.2	NA	NA
		2	11.1	9.2	7.0
Maryland	Chalk Point	1	16.2	7.6	6.5
		2	16.3	7.7	6.5
	Crane	1	10.8	ND[d]	ND
		2	11.5	ND	ND
	Morgantown	1	17.8	12.6	9.6
		2	17.6	12.7	9.5
Michigan	Campbell	1	14.3	11.9	9.0
		2	17.6	7.9	6.7
New Hampshire	Merrimack	1	6.4	ND	ND
		2	18.8	NA	NA
New Jersey	England	1	6.2	NA	NA
		2	6.9	NA	NA
New York	Northport[e]	1	1.5	NA	NA
		2	1.5	NA	NA
		3	1.5	NA	NA
	Port Jefferson	3	31.3	28.5	21.6
		4	31.0	28.2	21.4
Ohio	Ashtabula	5	9.5	7.9	6.0
	Avon Lake	8	17.3	8.7	7.3
		9	24.6	9.2	7.9
	Cardinal	1	32.9	12.3	10.5
		2	30.7	11.5	9.8
	Eastlake	1	0.8	0.7	0.6
		2	0.8	0.7	0.6
		3	0.8	0.7	0.6
		4	7.2	6.0	4.5
		5	25.2	9.1	7.6

TABLE 6 (Cont.)

State	Plant and Unit		1989 NO_x Emissions (10^3 tons)	Estimated Maximum Allowed NO_x Emissions (10^3 tons)	
				Title IV[a]	STAPPA/ ALAPCO[b]
Ohio (cont.)	Edgewater	4	4.6	3.2	2.7
	Miami Fort	5	6.3	4.4	3.7
		6	5.3	4.8	3.7
		7	26.4	9.9	8.5
	Muskingum	1	11.7	6.6	5.6
		2	11.8	6.6	5.7
		3	5.9	NA	NA
		4	5.4	NA	NA
		5	28.0		
	Niles	1	2.3	NA	NA
		2	2.3	NA	NA
	Picway	5	2.4	1.7	1.4
	Sammis	5	19.0	9.5	8.0
		6	31.7	11.9	10.1
		7	31.7	11.9	10.1
	Beckjord	5	7.6	6.3	4.8
		6	29.1	19.5	14.8
	Armstrong	1	13.5	8.6	7.3
		2	12.9	8.3	7.0
Pennsylvania	Brunner Island	1	11.1	9.2	7.0
		2	12.9	9.9	7.5
		3	23.1	16.4	11.8
	Hatfield	1	27.9	ND	ND
		2	28.9	ND	ND
		3	24.9	ND	ND
	Martin's Creek	1	15.6	10.0	8.4
		2	15.6	10.0	8.4
	Portland	1	6.0	5.5	4.1
		2	9.5	7.9	6.0

TABLE 6 (Cont.)

State	Plant and Unit		1989 NO_x Emissions (10^3 tons)	Estimated Maximum Allowed NO_x Emissions (10^3 tons)	
				Title IV[a]	STAPPA/ ALAPCO[b]
Pennsylvania (cont.)	Sunbury	3	7.7	ND	ND
		4	14.8	9.5	8.0
Tennessee	Allen	1	8.6	NA	NA
		2	9.4	NA	NA
		3	9.0	NA	NA
	Gallatin	1	6.8	5.6	4.3
		2	7.4	6.1	4.7
		3	8.5	7.1	5.4
		4	8.8	7.3	5.5

[a] Based on a comparison of Title IV NO_x emission limits for tangentially and wall-fired boilers to 1985 Electric Power Research Institute (EPRI) NO_x emission factors for coal-fired units of 100- to 800-MW capacity. These limits, established by Title IV of the CAAA of 1990 and adopted in the proposed rule for the Title IV NO_x emission reduction program (57 FR 55632), are 0.45 lb/10^6 Btu for dry-bottom, wall-fired boilers and 0.5 lb/10^6 Btu for dry-bottom, tangentially fired boilers.

[b] Based on a comparison of State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO)-proposed NO_x emission limits for tangentially and wall-fired, dry-bottom boilers with 1985 EPRI NO_x emission factors for coal-fired units of 100- to 800-MW capacity. The STAPPA/ALAPCO-proposed limits are 0.38 lb/10^6 Btu for both tangentially and wall-fired boilers.

[c] NA = not applicable.

[d] ND = no data are available on boiler type.

[e] Northport 1, 2, and 3 are oil-fired units. The NO_x emission factor was calculated at 42 lb of NO_x/1,000 gal of fuel oil (EPA 1985).

controls by May 31, 1995, would be impracticable for certain large NO_x sources, the EPA guidance defines a phased program of equipment installation that may extend beyond the deadline for some sources.

The EPA guidance indicates that RACT for utilities implies low-NO_x burners, with or without overfire air, depending on the case; some situations may require no control. Combustion modifications could also include low excess air, biased burner firing, burners out of service, reduced air preheat, and steam or water injection. The guidance does not recommend a specific RACT level for source categories and boiler types other than the tangentially fired and wall-fired coal and gas/oil utility boilers specified.

The EPA limits, which are based on a 30-day rolling average, have been sharply criticized by state and environmental groups as being too weak to combat effectively the urban ozone problem; these groups maintain that the relatively weak federal limits will tend to undermine aggressive state actions to impose more stringent NO_x controls. Under the CAAA, states are allowed to set limits more stringent than federal limits but are nevertheless obliged to meet the statute's guidelines and requirements for "reasonable further progress" (RFP) apart from the statutory guidance levels. Table 6 provides a comparison of estimated required NO_x emission reductions by May 31, 1995, by coal-fired plants in ozone nonattainment areas under the EPA-proposed RACT limits and under state proposals for NO_x emission limits.

4.2 NO_x EMISSIONS TRADING

The use of economic incentives to increase flexibility and stimulate the use of control strategies that are more cost effective is explicitly allowed in the general SIP requirements, the general provisions for nonattainment SIPs, and the system of regulations for controlling emissions from consumer and commercial products under Title I. Economic Incentive Program rules (58 FR 11110, February 23, 1993) under Sections 182 and 187 of the CAAA will provide states with flexibility in developing innovative market-based programs for stationary, area, and mobile sources.

Economic incentive programs will be discretionary in most cases. An EIP will be required in the Los Angeles Basin extreme ozone nonattainment area if RFP milestones are not met; in severe and serious ozone nonattainment areas, states may adopt EIPs in lieu of either having the area reclassified to the next higher designation (for example, serious to severe) or implementing EPA-determined measures to meet the next RFP milestone, as provided in a state's SIP contingency plan. The EIPs are mandated for serious CO nonattainment areas; they are discretionary in all other areas. They may be adopted by the states for any criteria pollutant in attainment as well as nonattainment areas.

The EIP-proposed rules are broadly applicable to any type of statutory (mandated) or discretionary EIP. The EIP elements may not interfere with other Clean Air Act requirements or other federal regulatory requirements. In general, EPA's interpretation of CAAA Sections 182 and 187 provisions for EIPs provides a high degree of flexibility to states

in designing and adopting EIPs to meet their SIP requirements. The proposed rule includes (1) provisions to allow emissions trading across many different sources and source categories, including unregulated sources (thus potentially allowing NO_x emitters to acquire reduction credits from sources whose NO_x emissions are not regulated); (2) provisions to allow excess reductions under other regulatory programs to be credited to the EIP; and (3) relaxation of the traditional EPA restrictions on long-term emissions averaging.

States must define EIPs so that they do not interfere with other Clean Air Act requirements, including such Title I requirements as RACT, best available control technology, new source performance standards, prevention of significant deterioration and NSR offset requirements, and RFP milestones. Sources subject to these statutory requirements may participate in emissions trading under an EIP as long as they continue to meet their statutory requirements. If sources reduce their emissions below levels called for by applicable statutory requirements, the surplus reductions may provide credits for the EIP; however, sources that fall short of meeting the requirements of the applicable statutory provisions may not rely on credits acquired through the EIP to meet these statutory requirements.

An EIP may allow sources subject to RACT requirements to attain RACT-level emissions reductions in the aggregate, and thereby trade among themselves. An EIP may also allow RACT sources to meet their RACT requirements by acquiring emissions reductions from stationary, mobile, and area sources not subject to the RACT requirement, when such trading results in an "exceptional environmental benefit," i.e., a level of reductions significantly greater than RACT-level amounts. The EPA has proposed use of statutory offset ratios for nonattainment areas to determine the amount of emissions reductions required from non-RACT sources generating credits for RACT sources. Statutory offset ratios would not be required if "exceptional environmental benefits" could be otherwise demonstrated, such as through the promotion of increased use of emissions reduction measures by non-RACT sources. A trading ratio of less than 1 to 1 would not be acceptable in any case.

Although Title I stipulates that emissions offsets generally must be obtained by the same source or other existing sources in the same nonattainment area, the law does allow offsets to be obtained in another nonattainment area under certain conditions. The EPA states in the NO_x supplement to the Title I preamble that sources planning to locate or expand in a nonattainment area must obtain offsetting reductions from sources either located in the same nonattainment area or located in an area with a classification not lower than the classification of the area where the source wants to locate. The source must show that emissions from another nonattainment area contribute to violations in the first nonattainment area because of prevailing winds or other transport mechanisms.

The EPA is also developing guidance on mobile source emission reduction credits as a supplement to the EIP guidance. Interim guidance was published on February 23, 1993 (58 FR 111134). Under approved state programs, sources will be able to use mobile source emission reduction credits to (1) satisfy emission reduction requirements beyond the RACT requirements, (2) satisfy RACT requirements for existing sources, and (3) meet new source emissions offset requirements at CAAA-specified offset ratios.

The EPA has still to release important guidance relating to emissions offsets. A Title I provision allows states to substitute NO_x reductions for the 3% per year VOC emission reductions required after 1993 to meet RFP requirements for ozone nonattainment areas classified as serious or worse. The EPA guidance will address the conditions under which NO_x control may be substituted for VOC control or may be combined with VOC control to achieve the greatest reduction in ozone pollution. This guidance was due November 15, 1991.

5 NO_x CONTROLS: STATE ACTIONS

The NO_x control issues addressed by the CAAA are both complex and controversial. Various proposals have been hotly contested by states, public utilities, EPA regulators, and the U.S. Department of Energy since enactment of the CAAA. This complexity led to protracted delays in the issuance of proposed EPA NO_x control rules under Title IV of the CAAA and the critical NO_x SIP guidance to assist states in implementing the Title I requirements. In the absence of clear EPA guidance to help states determine appropriate NO_x control measures for ozone nonattainment areas and OTRs, state regulators in the spring of 1992 announced their own plans to control the pollutant. State initiatives have included NO_x emission limits considerably more stringent than the "presumptive" NO_x limits established by Title IV. State NO_x control proposals for Title I implementation are discussed below.

5.1 NORTHEAST STATES FOR COORDINATED AIR USE MANAGEMENT

In March 1992, eight northeastern states (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont), members of the Northeast States for Coordinated Air Use Management (NESCAUM), announced their support for a performance-based, two-phase program to cut NO_x emissions by more than 50% from electric utilities in their region by the CAAA's mandated compliance date of May 31, 1995 (NESCAUM 1992). In the Northeast, approximately 40% of annual NO_x emissions is from stationary sources and about 60% is from mobile sources. In 1987, NO_x emissions from all sources in the NESCAUM states amounted to about 1.6 million tons, of which about 20% came from electric utility boilers. The *Regional Oxidant Modeling for Northeast Transport (ROMNET)* report (EPA 1991b) illustrated the need for a NO_x emission reduction of more than 55% in conjunction with substantial VOC emission reductions to meet the ozone NAAQS in the Northeast. The ROMNET findings were reinforced in a report that described the NO_x problem nationwide (National Academy of Sciences 1991).

The NESCAUM proposal calls for the use of multifacility emissions averaging to give utilities flexibility in selecting appropriate control technologies for individual boilers. The NESCAUM proposal acknowledges that the 1995 emission reduction requirements could be met by using boiler combustion modifications such as low-NO_x burners and enhanced overfire air systems but calls for a second phase of emission reduction targets that the organization believes will be necessary to achieve the NAAQS for ozone. This second phase would require the use of additional control technologies, such as selective catalytic reduction (SCR) and selective noncatalytic reduction (SNCR), and would have to be in place by May 15, 1999, the attainment deadline for serious ozone nonattainment areas. The second-phase NESCAUM standards will be based on modeling studies due by 1994 on refined urban airshed ozone areas. Utilities that commit to repowering old boilers would be exempt from compliance with the May 1995 emission limits. The NESCAUM strategy is consistent with the utility boiler NO_x memorandum of understanding agreed to earlier in the year by the 12 Ozone Transport Commission (OTC) states (Section 5.3). Although the NESCAUM strategy includes specific

combustion modification emissions performance criteria for the various boiler types and fuels, both agreements include two control phases: phase 1 relies mainly on combustion modifications, whereas phase 2 relies on the use of add-on controls; the compliance schedules are identical.

The recommended phase 1 NO_x emission limits for existing utility boilers are shown in Table 7. The recommended emission limits are similar to the STAPPA/ALAPCO recommendations (Section 5.2). The limits shown in Table 7 reflect recent revisions by NESCAUM; the limits for coal dry-bottom tangentially and wall-fired boilers were originally set at a more stringent 0.33 lb of $NO_x/10^6$ Btu.

The NESCAUM states are also developing motor vehicle emission control strategies to achieve significant NO_x emission reductions.

TABLE 7 Comparison of NO_x RACT Proposals

Fuel and Boiler Type	NO_x Emission Limits (lb $NO_x/10^6$ Btu) by Proposal		
	EPA	NESCAUM	STAPPA/ ALAPCO
Gas only			
Tangentially fired	NA[a]	0.20	0.20
Wall fired	NA	0.20	0.20
Gas or oil			
Tangentially fired	0.20	0.25	0.25
Wall fired	0.30	0.25	0.25
Cyclone	0.55[b]	0.43	0.43
Coal, wet bottom			
Tangentially fired	NA	1.00	1.00
Wall fired	NA	1.00	1.00
Cyclone	NA	0.55	0.55
Coal, dry bottom			
Tangentially fired	0.45	0.38	0.38
Wall fired	0.50	0.43	0.38
Cyclone	0.70[b]	NA	NA
Stokers	0.70[b]	0.30	0.40
Compliance averaging period	30 days	1 hour	Gas/oil: 1 hour Coal: 24 hours

[a] NA = not applicable.

[b] The EPA limits for all others besides tangentially and wall-fired boilers.

5.2 STAPPA/ALAPCO

In April 1992, the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO) voted to adopt, with some modifications, the NESCAUM proposal. The STAPPA/ALAPCO-recommended emission limits are intended to serve as national guidance and are considered by the two organizations to be "reasonably achievable" on a nationwide basis. The STAPPA/ALAPCO-recommended emission limits, which are based on a 1-h averaging period for gas- and oil-fired units and a 24-h rolling average for coal-fired units, are generally based on the application of combustion modifications, including low-NO_x burners, overfire air, and advanced overfire air. The recommended strategy allows for emissions averaging on a facilitywide basis; a state or local agency may allow averaging on a wider basis for units that can make a "clear technical demonstration" that the recommended limits cannot be achieved at the facility level. Phase 1 of the two-phase strategy would affect all utility boilers located in applicable ozone nonattainment areas or transport regions. Phase 2, which would require advanced controls (e.g., SCR and SNCR), is aimed at those areas that require additional NO_x reductions to achieve and maintain the ozone standard. The STAPPA/ALAPCO-recommended emission limits are shown in Table 7.

5.3 OZONE TRANSPORT COMMISSION

The Northeast OTC has developed two approaches to control NO_x emissions. Recent EPA ROMNET modeling runs indicated the need for extensive NO_x reductions in the Northeast OTR. The OTC has adopted its own version of NO_x RACT and is also developing an emissions trading program.

The EPA Office of Air Quality Planning and Standards (OAQPS) has performed a number of ROMNET modeling runs for the OTC that indicate the need for substantially greater NO_x reductions to abate the Northeast's ozone problem. In fact, the OAQPS runs indicate a clear shift in emphasis from VOC controls to NO_x controls. The initial set of sensitivity runs OAQPS performed on the ROMNET model indicated that a 75% reduction in OTR-wide NO_x emissions would eliminate ozone violations throughout the entire region, except in New York City. In contrast, the sensitivity analysis showed very little improvement in ozone levels resulting from VOC controls pursued either independently or in combination with NO_x controls. The OAQPS concluded that (1) ozone levels are more sensitive to NO_x control than they are to VOC control; (2) it is impossible to attain the ozone NAAQS without NO_x control; (3) VOC controls are more effective for reducing ozone in the urban core, while NO_x controls are more effective for reducing ozone regionwide; and (4) a strategy of 75% reduction in regionwide NO_x and 25% reduction in regionwide VOC would bring most areas of the Northeast into compliance with the ozone NAAQS (OTC 1992).

Subsequent OAQPS runs of the ROMNET model have refined the geographical application of NO_x controls that go beyond CAAA requirements; in general, the OAQPS runs evaluated 60% further reductions beyond CAAA requirements. Although reducing NO_x by those levels in attainment areas of the OTR did not affect ozone levels, except in the

Pittsburgh area, applying those levels of NO_x control in nonattainment areas of the OTR produced large reductions in ozone, especially in the urban areas of the Northeast Corridor. Applying additional NO_x control beyond CAAA requirements across the entire OTR in both attainment and nonattainment areas produced only minimal ozone improvement beyond applying the controls in just the nonattainment areas of the OTR, so additional NO_x controls could be limited to only those areas of the OTR. Adding 60% more VOC controls across the entire OTR provided only some benefits in New York City.

At its Spring 1992 meeting, the OTC adopted a memorandum of understanding committing its members to the development of vague NO_x RACT regulations. In contrast to the explicit limits in the NESCAUM and STAPPA/ALAPCO initiatives, the OTC committed to NO_x RACT that would emphasize combustion modifications (e.g., low-NO_x burners, overfire air) by May 1995 and possible additional NO_x controls based on performance standards to be determined in 1994 SIP revisions and implemented by May 1999, if necessary. To that extent, the OTC commitment is not inconsistent with either the NESCAUM or STAPPA/ALAPCO initiative. The OTC member states expect to propose NO_x RACT regulations by summer 1993 at the latest. The OTC member states will employ varying approaches to NO_x RACT, primarily differing on averaging time.

The OTC has considered adopting an emissions trading program. So far, the OTC has ruled out interpollutant (NO_x for VOC) trades but is still deliberating its position on intersource (mobile for stationary) trades. The OTC seems to be emphasizing NO_x-for-NO_x trades, rather than VOC-for-VOC trades, at this time. To date, the OTC has agreed on the following elements of a trading program: (1) certification/documentation of the credit created must be provided; (2) credits are not property rights; (3) shutdown credits are not tradeable but remain with the state of origin, perhaps to support future growth; (4) a baseline must be calculated; and (5) one state can create a credit in a certain way, while another state can use the credit in a different way. How credits might be discounted with time poses the major stumbling block to OTC implementation of a trading program.

6 REFERENCES

Loughe, A.F., et al., 1987, *In Pursuit of Clean Air: A Data Book of Problems and Strategies at the State Level, 1987 Update*, ANL/EES-TM-345, Vols. 1 and 2, Argonne National Laboratory, Argonne, Ill., Dec.

National Academy of Sciences, 1991, *Rethinking the Ozone Problem in Urban and Regional Air Pollution*, Dec.

NESCAUM, 1992, Press Release, Northeast States for Coordinated Air Use Management, April 2.

Novello, D.P., 1992, "New NO_x Requirements under Title I of the Clean Air Act," *Environment Reporter*, pp. 938-941, July 24.

Ozone Transport Commission, 1992, *Memorandum of Understanding on the Need to Reduce Stationary Source NO_x Emissions and Activities to Develop Technical Support for Regulatory Development,* March 10.

Sensitivity of Regional Ozone to Reduction in NO_x and VOC Emissions, 1992, prepared for the Ozone Transport Commission, unpublished material, Oct.

U.S. Environmental Protection Agency, 1985, *Compilation of Air Pollutant Emission Factors,* Fourth Edition, Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency, 1991a, *Implementation Strategy for the Clean Air Act Amendments of 1990*, Office of Air and Radiation, Jan. 15.

U.S. Environmental Protection Agency, 1991b, *Regional Oxidant Modeling for Northeast Transport*, June.

APPENDIX:

STATE-SPECIFIC SUMMARIES OF AIR QUALITY ATTAINMENT BY FEDERAL REGION

TABLE A.I-1 EPA Region I: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	1/15	11	43	0
Number of counties containing nonattainment areas in 1991	2/0	2	12	46	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	15	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	1	0	0
Total number of counties that improved	0	15	1	0	0
Deterioration (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	1	2	2	3	0
Total number of counties that deteriorated	1	2	2	3	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-2 Connecticut: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	4	8	0
Number of counties containing nonattainment areas in 1991	0/0	1	6	8	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	1	2	0	0
Total number of counties that deteriorated	0	1	2	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-3 Maine: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	0/3	0	9	0
Number of counties containing nonattainment areas in 1991	2/0	1	0	12	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	3	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	3	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	1	1	0	3	0
Total number of counties that deteriorated	1	1	0	3	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-4 Massachusetts: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/8	5	14	0
Number of counties containing nonattainment areas in 1991	0/0	0	5	14	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	8	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	8	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-5 New Hampshire: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	1/1	1	7	0
Number of counties containing nonattainment areas in 1991	0/0	0	1	7	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	1	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	2	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-6 Rhode Island: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/1	1	5	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	5	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	1	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	1	0	0
Total number of counties that improved	0	1	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.I-7 Vermont: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/2	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	2	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	2	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.II-1 EPA Region II: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	1/14	21	30	0
Number of counties containing nonattainment areas in 1991	1/2	0	23	43	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	14	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	14	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	1	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	2	13	0
Total number of counties that deteriorated	1	0	2	13	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.II-2 New Jersey: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	0/5	13	21	0
Number of counties containing nonattainment areas in 1991	1/1	0	15	21	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	5	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	5	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	1	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	2	0	0
Total number of counties that deteriorated	1	0	2	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.II-3 New York: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	1/9	8	9	0
Number of counties containing nonattainment areas in 1991	0/1	0[c]	8	22	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	9	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	9[e]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	13	0
Total number of counties that deteriorated	0	0	0	13	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating New York County as a PM-10 nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

[e] One county was designated as exceeding both primary and secondary standards in 1987.

TABLE A.III-1 EPA Region III: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	4/0	11/15	7	55	0
Number of counties containing nonattainment areas in 1991	4/0	2	7	97[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	12	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	9	0	0	0
Total number of counties that improved	0	20	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	42[c]	0
Total number of counties that deteriorated	0	0	0	42[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Nine of these counties were designated nonattainment as a result of the automatic expansion under the CAAA of 1990 of the boundaries of ozone nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.III-2 Delaware: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	0	1	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	3[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	2[c]	0
Total number of counties that deteriorated	0	0	0	2[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] As a result of nonattainment area boundary expansion under the CAAA of 1990, Kent County was added to the Philadelphia-Wilmington-Trenton severe-15 ozone nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.III-3 Maryland: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	1/2[c]	3	7	0
Number of counties containing nonattainment areas in 1991	0/0	0	3	14[d]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	2	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	2[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	0	0	7[d]	0
Total number of counties that deteriorated	0	0	0	7[d]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Baltimore County was designated as exceeding both primary and secondary standards in 1987.

[d] As a result of nonattainment area boundary expansions under the CAAA of 1990, Cecil County was added to the Philadelphia-Wilmington-Trenton severe-15 ozone nonattainment area, and Calvert, Charles, and Frederick counties were added to the Washington serious nonattainment area.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.III-4 Pennsylvania: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	3/0	7/10[c]	2	41	0
Number of counties containing nonattainment areas in 1991	3/0	1	2	45	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	9	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	6	0	0	0
Total number of counties that improved	0	13[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	4	0
Total number of counties that deteriorated	0	0	0	4	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 1, 1987.

[c] Three counties (Allegheny, Beaver, and Laurence) were designated as exceeding both primary and secondary standards in 1987. Of these, Allegheny County is still in nonattainment.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.III-5 Virginia: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	2	6	0
Number of counties containing nonattainment areas in 1991	0/0	0	2[c]	29[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	23[c]	0
Total number of counties that detericrated	0	0	0	23[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Some Virginia cities are in nonattainment but are treated as counties for purposes of tabulation. As a result of the nonattainment area boundary expansions under the CAAA of 1990, Alexandria, Falls Church, Manassas, and Manassas Park were added to the Washington serious ozone nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.III-6 West Virginia: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	3/3	0	0	0
Number of counties containing nonattainment areas in 1991	1/0	1[c]	0	6	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	3	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	5	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	6	0
Total number of counties that deteriorated	0	0	0	6	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating part of Hancock County as a PM-10 nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-1 EPA Region IV: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	6/3	15/7	8	33	0
Number of counties containing nonattainment areas in 1991	4/6	0	5	53[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	8	d	d	d
Number of counties that changed from primary nonattainment to full attainment	2	14	6	3	0
Total number of counties that improved	2	21	6	3	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	3	23[c]	0
Total number of counties that deteriorated	0	0	3	23[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Two of these counties were designated nonattainment areas as a result of the automatic expansion under the CAAA of 1990 of the boundaries of ozone nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-2 Alabama: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/2	2/1[c]	0	1	0
Number of counties containing nonattainment areas in 1991	0/2	0	0	2	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	2	d	d	d
Number of counties that changed from primary nonattainment to full attainment	1	1	0	0	0
Total number of counties that improved	1	2[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	1	0
Total number of counties that deteriorated	0	0	0	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Jefferson County was designated as a nonattainment area of both primary and secondary standards in 1987.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-3 Florida: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	0/2	0	6	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	6[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	2	d	d	d
Number of counties that changed from primary nonattainment to full attainment	1	0	0	0	0
Total number of counties that improved	1	2	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated as a transitional ozone nonattainment area in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-4 Georgia: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	3	11	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	13[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full Attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	3	0	—
Total number of counties that improved	0	0	3	0	—
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	2[c]	0
Total number of counties that deteriorated	0	0	0	2[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] As a result of the expansion of boundaries under the CAAA of 1990, Cherokee and Forsyth counties were added to the Atlanta serious ozone nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-5 Kentucky: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/1	13/1	1	5	0
Number of counties containing nonattainment areas in 1991	1/1	0	0	15	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	1	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	13	1	0	0
Total number of counties that improved	0	14	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	10	0
Total number of counties that deteriorated	0	0	0	10	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-6 Mississippi: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-7 North Carolina: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	1	1	0
Number of counties containing nonattainment areas in 1991	0/0	0	4	9	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	3	8	0
Total number of counties that deteriorated	0	0	3	8	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-8 South Carolina: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/1	1	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	1	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	1	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	1	0	0
Total number of counties that improved	0	1	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	1	0
Total number of counties that deteriorated	0	0	0	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IV-9 Tennessee: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	3/0	0/2	2	9	0
Number of counties containing nonattainment areas in 1991	3/3[c]	0	1	7	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	2	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	1	3	0
Total number of counties that improved	0	2	1	3	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	1	0
Total number of counties that deteriorated	0	0	0	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Benton, Humphreys, and Polk counties were designated as nonattainment areas of both primary and secondary sulfur dioxide (SO_2) standards in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.V-1 EPA Region V: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	28/4	34/83	12	81	0
Number of counties containing nonattainment areas in 1991	27/6	10	15	96[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	76	d	d	d
Number of counties that changed from primary nonattainment to full attainment	2	0	5	1	0
Total number of counties that improved	2	76	5	1	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	3	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	2	8	16[c]	0
Total number of counties that deteriorated	1[e]	5	8	16[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Five of these counties were designated nonattainment as a result of the automatic expansion under the CAAA of 1990 of the boundaries of ozone nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

[e] See Table A.V-2.

TABLE A.V-2 Illinois: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	2/0	8/19[c]	1	8	0
Number of counties containing nonattainment areas in 1991	2/1[d]	3	0	12[e]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	f	f	f	f
Number of counties that changed from secondary nonattainment to full attainment	0	17	f	f	f
Number of counties that changed from primary nonattainment to full attainment	0	5	1	1	0
Total number of counties that improved	0	22	1	1	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	2	f	f	f
Number of counties that changed from full attainment to secondary nonattainment	0	f	f	f	f
Number of counties that changed from full attainment to primary nonattainment	0	0	0	5[e]	0
Total number of counties that deteriorated	1[d]	2	0	5[e]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Four counties were in nonattainment of both primary and secondary standards.

[d] Peoria County, formerly designated as a nonattainment area of the primary standard, was designated as being in nonattainment of both the primary and secondary standards in 1991. The EPA has proposed designating parts of two counties, Madison and St. Clair, as SO_2 nonattainment areas.

[f] No secondary standard exists for PM-10, CO, O_3, or NO_x.

[e] As a result of the expansion of boundaries under the CAAA of 1990, Grundy, Kendall, McHenry, and Will counties were added to the Chicago-Gary-Lake County severe-17 ozone nonattainment area.

TABLE A.V-3 Indiana: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	5/0	2/6	2	7	0
Number of counties containing nonattainment areas in 1991	5/0	2	2	8	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	6	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	7	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	1	0	1	0
Total number of counties that deteriorated	0	1	0	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.V-4 Michigan: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	2/11[c]	3	37	0
Number of counties containing nonattainment areas in 1991	0/0	1	3	37[d]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	10	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	11	0	0[d]	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated in 1987 as in nonattainment of both primary and secondary standards.

[d] The Lansing-East Lansing nonattainment area, containing three counties, was designated as a transitional area in 1991.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.V-5 Minnesota: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	8/0	3/8	2	0	0
Number of counties containing nonattainment areas in 1991	8/0	2	9	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	7	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	2	1	0	0
Total number of counties that improved	0	7	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	1	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	1	8	0	0
Total number of counties that deteriorated	0	2	8	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.V-6 Ohio: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	7/3	19/27	3	23	0
Number of counties containing nonattainment areas in 1991	6/3	2	1	28[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	24	d	d	d
Number of counties that changed from primary nonattainment to full attainment	1	17	2	0	0
Total number of counties that improved	1	29[e]	2	0[c]	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	5	0
Total number of counties that deteriorated	0	0	0	5[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Three counties were designated as transitional nonattainment areas in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

[e] Ten counties were designated as primary and secondary nonattainment areas in 1987.

TABLE A.V-7 Wisconsin: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	6/1	0/12	1	6	0
Number of counties containing nonattainment areas in 1991	5/2	0	0	11[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	12	d	d	d
Number of counties that changed from primary nonattainment to full attainment	1	0	1	0	0
Total number of counties that improved	1	12	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	5[c]	0
Total number of counties that deteriorated	0	0	0	5[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] As a result of expansion of boundaries under the CAAA of 1990, Washington County was added to Milwaukee-Racine severe-17 ozone nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-1 EPA Region VI: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	8/1	2	30	0
Number of counties containing nonattainment areas in 1991	1/0	2	2	34[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	1	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	7	0	5	0
Total number of counties that improved	0	7	0	5	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	1	0	9[c]	0
Total number of counties that deteriorated	0	1	0	9[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Seven of these counties were designated nonattainment as a result of the automatic expansion under the CAAA of 1990 of the boundaries of ozone nonattainment areas classified as serious or worse to include the entire MSA or CMSA.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-2 Arkansas: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-3 Louisiana: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	0	19	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	17[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	0	3	0
Total number of counties that improved	0	0	0	3	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	1[c]	0
Total number of counties that deteriorated	0	0	0	1[c]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] As a result of boundary expansion under the CAAA of 1990, Livingston Parish was added to the Baton Rouge serious ozone nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-4 New Mexico: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	1/0	2/0	1	0	0
Number of counties containing nonattainment areas in 1991	1/0	1[c]	1	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full Attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	2	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	1	0	0	0
Total number of counties that deteriorated	0	1	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating Bernalillo County as a PM-10 nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-5 Oklahoma: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	2/0	0	1	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	2	0	1	0
Total number of counties that improved	0	2	0	1	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VI-6 Texas: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	4/1[c]	1	10	0
Number of counties containing nonattainment areas in 1991	0/0	1	1	17[d]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	1	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	3	0	1	0
Total number of counties that improved	0	3[c]	0	1	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	0	0	8[d]	0
Total number of counties that deteriorated	0	0	0	8[d]	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Harris County was designated as primary and secondary nonattainment areas in 1987.

[d] As a result of boundary expansions under the CAAA of 1990, Hardin County was added to the Beaumont-Port Arthur serious ozone nonattainment area, and Fort Bend, Liberty, Montgomery, Waller, and Chambers counties were added to the Houston-Galveston-Brazoria severe-17 ozone nonattainment area.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VII-1 EPA Region VII: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	5/17	4	9	0
Number of counties containing nonattainment areas in 1991	0/0	0	1	9	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	18	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	3	0	0
Total number of counties that improved	0	0	3	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VII-2 Iowa: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	2/11	1	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	11	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	2	1	0	0
Total number of counties that improved	0	11[d]	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

[d] Two counties were designated as primary and secondary nonattainment areas in 1987.

TABLE A.VII-3 Kansas: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/1	1	2	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	2[c]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	1	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	1	0	0
Total number of counties that improved	0	1	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Classified as submarginal in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VII-4 Missouri: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	2/3[c]	1	7	0
Number of counties containing nonattainment areas in 1991	0/0	0	1	7[d]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	3	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	3[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Two counties were designated as primary and secondary nonattainment areas in 1987.

[d] Three counties (Kansas City area) were classified as submarginal in 1991.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VII-5 Nebraska: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	1/3[c]	1	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	3	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	1	1	0	0
Total number of counties that improved	0	3[c]	1	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated as primary and secondary nonattainment in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-1 EPA Region VIII: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	4/0	11/0	14	8	0
Number of counties containing nonattainment areas in 1991	4/3[c]	20	16	8	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	6	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	3	0	0	0
Total number of counties that improved	0	9	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	2	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	9	2	0	0
Total number of counties that deteriorated	0	10	2	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] See Tables A.VIII-3 and A.VIII-6.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-2 Colorado: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	6/3	8	6	0
Number of counties containing nonattainment areas in 1991	0/0	11[c]	10	6[d]	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	2	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	4	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	1	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	6	2	0	0
Total number of counties that deteriorated	0	6	2	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating part of an additional county, Routt, as a PM-10 nonattainment area.

[d] These counties are in a transitional area.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-3 Montana: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	2/0	3/5[c]	3	0	0
Number of counties containing nonattainment areas in 1991	2/1[d]	6[e]	3	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	f	f	f	f
Number of counties that changed from secondary nonattainment to full attainment	0	3	f	f	f
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	3	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	1	f	f	f
Number of counties that changed from full attainment to secondary nonattainment	0	f	f	f	f
Number of counties that changed from full attainment to primary nonattainment	0	2	0	0	0
Total number of counties that deteriorated	0	3	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated as primary and secondary nonattainment in 1987.

[d] Lewis and Clark counties were designated as primary and secondary nonattainment for SO_2 in 1991.

[e] The EPA has proposed designating part of an additional county, Sanders, as a PM-10 nonattainment area.

[f] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A-VIII-4 North Dakota: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/0	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-5 South Dakota: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/1	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	0	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	0	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	1	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secon ary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-6 Utah: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	2/0	2/0	3	2	0
Number of counties containing nonattainment areas in 1991	2/2[c]	2	3	2	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	0	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	0	0	0
Total number of counties that deteriorated	0	0	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Two counties were designated as nonattainment of both primary and secondary SO_2 standards in 1991.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.VIII-7 Wyoming: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	0/1	0	0	0
Number of counties containing nonattainment areas in 1991	0/0	1	0	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	1	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	1	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	1	0	0	0
Total number of counties that deteriorated	0	1	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IX-1 EPA Region IX: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	7/0	29/5	27	35	4
Number of counties containing nonattainment areas in 1991	6/0	23	29	37	4
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	5	c	c	c
Number of counties that changed from primary nonattainment to full attainment	1	11	0	0	0
Total number of counties that improved	1	15	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	5	2	2	0
Total number of counties that deteriorated	0	5	2	2	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IX-2 Arizona: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	5/0	7/0	2	1	0
Number of counties containing nonattainment areas in 1991	5/0	7/0[c]	2	1	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	0	d	d	d
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	2	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	2	0	0	0
Total number of counties that deteriorated	0	2	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating part of an additional county, Mohave, as a PM-10 nonattainment area.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IX-3 California: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	15/2	22	34	4
Number of counties containing nonattainment areas in 1991	0/0	14[c]	23	35[d]	4
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	2	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	4	0	0	0
Total number of counties that improved	0	6	0	0[c]	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	3	1	1	0
Total number of counties that deteriorated	0	3	1	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] The EPA has proposed designating an additional county, Sacramento, as PM-10 nonattainment.

[d] Four counties are in transitional ozone areas.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.IX-4 Nevada: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	2/0	7/3[c]	3	0	0
Number of counties containing nonattainment areas in 1991	1/0	2	4	1	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	d	d	d	d
Number of counties that changed from secondary nonattainment to full attainment	0	3	d	d	d
Number of counties that changed from primary nonattainment to full attainment	1	5	0	0	0
Total number of counties that improved	1	7[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	d	d	d
Number of counties that changed from full attainment to secondary nonattainment	0	d	d	d	d
Number of counties that changed from full attainment to primary nonattainment	0	0	1	1	0
Total number of counties that deteriorated	0	0	1	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated as primary and secondary nonattainment in 1987.

[d] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.X-1 EPA Region X: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	7/10	12	5	0
Number of counties containing nonattainment areas in 1991	0/0	16	16	9	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	6	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	2	0	0	0
Total number of counties that improved	0	8	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	1	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	10	4	4	0
Total number of counties that deteriorated	0	11	4	4	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.X-2 Idaho: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	2/3[c]	1	0	0
Number of counties containing nonattainment areas in 1991	0/0	5[d]	1	0	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	1	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	2[c]	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	4	0	0	0
Total number of counties that deteriorated	0	4	0	0	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] Three counties were designated as primary and secondary TSP nonattainment in 1987.

[d] The EPA has proposed designating part of an additional county, Kootenai, as a PM-10 nonattainment area.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.X-3 Oregon: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	1/4	7	4	0
Number of counties containing nonattainment areas in 1991	0/0	5	9	5	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	c	c	c	c
Number of counties that changed from secondary nonattainment to full attainment	0	3	c	c	c
Number of counties that changed from primary nonattainment to full attainment	0	0	0	0	0
Total number of counties that improved	0	3	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	1	c	c	c
Number of counties that changed from full attainment to secondary nonattainment	0	c	c	c	c
Number of counties that changed from full attainment to primary nonattainment	0	3	2	1	0
Total number of counties that deteriorated	0	4	2	1	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] No secondary standard exists for PM-10, CO, O_3, or NO_x.

TABLE A.X-4 Washington: Summary of Air Quality Attainment

Air Quality Status	Pollutant				
	SO_2[a]	PM-10[a,b]	CO	O_3	NO_x
Attainment					
Number of counties containing nonattainment areas in 1987	0/0	4/3[c]	4	1	0
Number of counties containing nonattainment areas in 1991	0/0	6[d]	6	4	0
Improvement (1987 to 1991)					
Number of counties that changed from primary to secondary nonattainment	0	e	e	e	e
Number of counties that changed from secondary nonattainment to full attainment	0	2	e	e	e
Number of counties that changed from primary nonattainment to full attainment	0	1	0	0	0
Total number of counties that improved	0	3	0	0	0
Deterioriation (1987 to 1991)					
Number of counties that changed from secondary to primary nonattainment	0	0	e	e	e
Number of counties that changed from full attainment to secondary nonattainment	0	e	e	e	e
Number of counties that changed from full attainment to primary nonattainment	0	3	2	3	0
Total number of counties that deteriorated	0	3	2	3	0

[a] When two values are given: primary nonattainment/secondary nonattainment.

[b] TSP primary and secondary standards were replaced by the fine particulate (PM-10) standard on July 31, 1987.

[c] One county was designated as primary and secondary TSP nonattainment in 1987.

[d] The EPA has proposed designating parts of two additional counties as PM-10 nonattainment areas.

[e] No secondary standard exists for PM-10, CO, O_3, or NO_x.

END

DATE
FILMED
9/20/93