Proposed
Revision to Connecticut's
State Implementation Plan

Meeting the Interstate Air Pollution Transport Requirements of Clean Air Act Section 110(a)(2)(D)(i)

Connecticut Department of Environmental Protection
December 22, 2006

Table of Contents

List of Tables

List of Figures

EXECUTIVE SUMMARY

This revision to Connecticut's State Implementation Plan (SIP) addresses requirements of the Clean Air Act (CAA) to reduce interstate transport of air pollution. CAA Section 110(a)(2)(D)(i) requires each state to adopt a SIP within three years after promulgation of a national ambient air quality standard (NAAQS) containing adequate provisions:

> *prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will*
> *(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or*
> *(II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility.*

EPA promulgated new NAAQS for ozone and $PM_{2.5}$ in 1997, but litigation resulted in significant delays in implementation of the standards and associated planning efforts by EPA and the states. As required by a subsequent consent decree reached with Environmental Defense and the American Lung Association, EPA published a finding that states had failed to submit SIPs to satisfy CAA section 110(a)(2)(D)(i). That requires EPA to issue a Federal Implementation Plan (FIP) that would apply unless a state has an approved SIP meeting the section 110(a)(2)(D)(i) requirements in place prior to May 25, 2007.

This SIP revision demonstrates that Connecticut has met its obligations under the transport provisions of CAA section 110(a)(2)(D)(i) to ensure that emissions from Connecticut do not contribute significantly to other states' nonattainment or interfere with maintenance of the 8-hour ozone or $PM_{2.5}$ NAAQS, or otherwise interfere with visibility protection or other states' efforts to prevent significant deterioration of air quality.

Evidence is also provided in this SIP revision demonstrating that ozone levels in Connecticut are uniquely and overwhelmingly influenced by transport from upwind areas. EPA's remedy to the ozone transport problem, the Clean Air Interstate Rule (CAIR), provides inconsequential relief to Connecticut. EPA's CAIR modeling indicates that post-CAIR levels of transport in 2010, the required attainment date, continue to cause ozone violations in Connecticut regardless of the level of control assumed for Connecticut sources. EPA's CAIR analysis also indicates that cost-effective controls, beyond CAIR, are available. Adoption of such controls by upwind states will reduce transported emissions to Connecticut as required by section 110(a)(2)(D)(i), making it possible for Connecticut to achieve timely attainment of the 8-hour ozone NAAQS.

Connecticut's Compliance with Section 110(a)(2)(D)(i)

8-Hour Ozone NAAQS

EPA's CAIR modeling identified Connecticut as a significant contributor to downwind 8-hour ozone nonattainment in Kent County, Rhode Island and Suffolk County, New York. CTDEP has concluded that Connecticut will meet its section 110(a)(2)(D)(i) obligations to these downwind areas based on the following:

1) Connecticut is in the process of adopting regulations to implement CAIR (with this rule the seasonal NOx budget in Connecticut is reduced from 4477 tons to 2691 tons) and

several ozone precursor control measures that would provide additional emission reductions not considered in EPA's CAIR modeling.

2) Preliminary ozone modeling conducted by the Ozone Transport Commission (OTC), which includes several of the new control programs, projects attainment throughout all of Rhode Island by the mandated 2010 attainment date.

3) As part of the New York City multi-state nonattainment area, CTDEP is working with New York and New Jersey to develop an attainment demonstration (due to EPA in June 2007) providing for ozone NAAQS compliance in Suffolk County and the rest of the area. Note, that since Connecticut is downwind of Suffolk County on high ozone days, CTDEP feels that EPA's conclusion that Connecticut contributes significantly to this county may be an artifact of the modeling and grid specifications.

4) Recent improvements in measured ozone levels appear to be occurring at a much greater rate than suggested by EPA's CAIR modeling and OTC's preliminary modeling. If upcoming emission reductions are accompanied by favorable meteorology, there is a plausible chance that design values in Suffolk County will comply with the ozone NAAQS by the 2010 deadline. Prospects for attainment in both New York and Rhode Island would increase with additional transport reductions beyond CAIR.

$PM_{2.5}$ NAAQS

As a result of the CAIR modeling, EPA concluded that Connecticut's emissions of SO_2 and NO_x do not significantly contribute to downwind $PM_{2.5}$ nonattainment in any other state. Modeling conducted by CTDEP concluded that primary emissions of $PM_{2.5}$ also do not significantly contribute to downwind $PM_{2.5}$ nonattainment. Nonetheless, as part of the New York City multi-state nonattainment area, Connecticut is working with the air quality agencies in New York and New Jersey to prepare a $PM_{2.5}$ attainment plan (due to EPA in April 2008) that includes appropriate control strategies to provide for projected compliance with the annual $PM_{2.5}$ NAAQS by the April 2010 statutory deadline and continued maintenance into the future.

Visibility and Prevention of Significant Deterioration of Air Quality

Connecticut's new source review (NSR) program requires the owners of new major stationary sources and major modifications in attainment areas to demonstrate their emissions will prevent significant deterioration of air quality in all areas and protect visibility in federal Class I areas. New major stationary sources and major modifications in nonattainment areas are required to obtain offsetting emission reductions or emission reduction credits. The offsetting requirement has the effect of producing a net air quality benefit, including improved visibility in downwind areas.

Connecticut has also adopted multi-pollutant reduction programs that reduce visibility and air quality degrading pollution in downwind states by requiring strict nitrogen oxides (NOx) and sulfur dioxide (SO_2) emission limits for all electrical generating units (EGUs) and other large point sources.

Connecticut is currently participating with the Mid-Atlantic/Northeast Visibility Union (MANE-VU), to develop a regional haze SIP designed to reduce regional haze at national parks and more

widely across the Eastern United States. The SIP, due to EPA in December 2007, will establish, for each Class I area, an emission reduction/visibility improvement goal that provides for reasonable progress towards achieving natural visibility by 2064.

Section 110(a)(2)(D)(i) Compliance by States Upwind of Connecticut

CAIR Does Not Adequately Address Upwind States' Significant Impacts On Connecticut's 8-hour Ozone NAAQS Nonattainment

EPA's modeling analysis for CAIR identified eight states as contributing significantly to 8-hour ozone NAAQS nonattainment in Connecticut (i.e., NY, PA, NJ, OH, VA, MD/DC, WV, MA). EPA's analysis concluded that transport from upwind states contributes, on average, 95% of projected 2010 ozone levels in New Haven County and 93% in Middlesex County. Connecticut is the only state subject to transport exceeding 90% of projected 2010 ozone levels.

Improvements due to CAIR are inconsequential in Connecticut when compared to the overwhelming levels of transport that cannot be addressed by in-state controls. EPA's modeling shows that CAIR results in no more than a 0.4 ppb improvement in Connecticut's ozone levels in 2010 (0.8 ppb in 2015), amounting to well less than one percent of transport affecting the state.

Conclusion: EPA's modeling indicates the levels of transport after CAIR remain large enough that attainment may not be achievable in Connecticut even if all in-state emissions were to be eliminated. Clearly, additional upwind reductions are necessary to provide Connecticut citizens with healthy levels of air quality.

Additional Regional NOx Reductions Beyond CAIR Are Cost Effective

In CAIR, EPA made the policy decision that significantly impacting states should only be required to control emissions to a level determined by EPA to be "highly cost effective" and that such controls would be adequate to address CAA section 110(a)(2)(D)(i). EPA's use of the "highly cost effective" standard, while appropriate in concept, does not yield acceptable results for Connecticut and therefore fails to comport with the CAA. The CAA requires that state SIPs "contain adequate provisions … prohibiting emissions in amounts which will … contribute significantly to nonattainment in any other state." EPA's modeling shows transport impacts alone violate the ozone NAAQS, thus preventing Connecticut from attaining regardless of the level or cost of additional in-state controls.

EPA's data indicate significant additional regional NOx reductions beyond CAIR can be achieved with cost effective controls. EPA's reference list of recently undertaken or planned NOx controls cites average annual costs ranging from about $200 to $2800 (per ton of NOx reduced, in 1999$). EPA decided to set the "highly cost effective" CAIR ozone season control level at $900 in 2009 (and $1800 in 2015), at the low end of the reference range and significantly less than the $2500 level used by EPA in the NOx SIP Call. Similarly, the incremental marginal costs for the selected level of CAIR ozone season NOx controls ($2400 in 2009 and $3000 in 2015) are at the low end of EPA's reference range of marginal costs ($2000 to $19,600). In fact, EPA's analysis of marginal cost curves indicates that an ozone season EGU NOx cap in the range of 0.32 to 0.42 million tons appears to be cost effective (i.e., at $3000 to $4000 per ton), compared to the adopted CAIR caps of 0.6 and 0.5 million tons in 2009 and 2015, respectively.

Conclusion: It is clear that significant additional regional ozone season NOx reductions beyond CAIR are achievable at a reasonable cost. Given the overwhelming level of transport affecting Connecticut, and minimal relief provided by CAIR, additional upwind reductions are essential for Connecticut to attain the 8-hour ozone NAAQS.

EPA Should Ensure States Contributing Significantly to Ozone Nonattainment in Connecticut Comply with CAA Section 110(a)(2)(D)(i) Requirements

EPA's CAIR preamble provides a mechanism to address unique cases of interstate transport that remain after CAIR, such as is experienced by Connecticut:

> *In adopting this approach for determining whether a future broad, multi-state SIP call is appropriate, we note that other CAA mechanisms, such as SIP disapproval authority and State petitions under section 126, are available to address more isolated instances of the interstate transport of pollutants. (70FR25179)*

Given the level of overwhelming transport projected to remain in Connecticut in 2010 after EPA's CAIR remedy is implemented, and the availability of cost effective controls that go beyond CAIR, CTDEP requests that EPA address Connecticut's circumstances under the "isolated instance" SIP review mechanism, as outlined below.

1) EPA should promptly review all ozone-related SIP revisions (e.g., section 110(a)(2)(D) SIPs, ozone attainment demonstrations, CAIR SIPs) that are submitted by states identified as contributing significantly to ozone nonattainment in Connecticut. Should any of these SIP revisions fail to contain sufficient emissions reductions beyond-CAIR to enable Connecticut to achieve timely attainment in 2010, with a reasonable level of in-state control, we encourage EPA to work with CTDEP, other members of the Ozone Transport Commission (OTC) and other states to identify and implement strategies that will achieve the necessary reductions.

2) Although it may be appropriate to consider the cost of controls, in order to satisfy the explicit language of CAA section 110(a)(2)(D)(i), the level of projected ozone improvement needed to reduce transport should be the primary consideration dictating the level of control necessary in each contributing state. At a minimum, required control levels should correspond to the upper end of the cost range of controls cited by EPA in CAIR. Certainly, sources in Connecticut have already adopted such levels of control.

3) Additional EGU reductions should be considered, especially those targeting peak summer demand periods when high emitting units are dispatched during ozone episodes. Controls from all other source categories should also be evaluated. For example, in CAIR EPA elected not to pursue control of non-EGU boilers and turbines. EPA estimates that this group of sources contributes 16% of pre-CAIR NOx emissions in the region, versus 25% from the EGU sector. Both the on-road and non-road mobile source sectors, for which states have only a limited authority to regulate, also comprise a significant portion of NOx emissions and warrant further federal consideration for control.

1.0 Introduction

In July 1997, the U.S. Environmental Protection Agency (EPA) promulgated new National Ambient Air Quality Standards (NAAQS) for 8-hour ozone and fine particulate matter ($PM_{2.5}$). Promulgation of the new NAAQS triggered a number of planning requirements at the federal and state levels, as specified by the Clean Air Act (CAA). CAA section 110(a) requires each state to submit a state implementation plan (SIP) within 3 years following promulgation of any NAAQS to implement, maintain, and enforce the NAAQS.

More specifically for this SIP submission, CAA section 110(a)(2)(D)(i) requires that each state's SIP include adequate provisions:

> *prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will*
> *(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or*
> *(II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility.*

Significant delays in implementation of the standards by EPA and the states ensued subsequent to promulgation of the 1997 ozone and $PM_{2.5}$ NAAQS. These delays were caused by a combination of litigation pursued by various parties and states' efforts to establish $PM_{2.5}$ monitoring networks. Attainment/nonattainment designations were not finalized by EPA until June 2004 for the ozone NAAQS and April 2005 for the $PM_{2.5}$ NAAQS. As a result, states were not able to submit timely section 110(a)(2)(D)(i) SIPs, missing the statutory submission date of July 2000, three years after the NAAQS were promulgated.

On March 16, 2004, Environmental Defense and the American Lung Association (ED/ALA) provided notice of intent to commence a civil action against the EPA Administrator for failing to make a determination as to whether each state had submitted SIPs required by CAA section 110(a) for the 8-hour ozone and $PM_{2.5}$ NAAQS. On March 10, 2005, a proposed consent decree between ED/ALA and EPA was filed with the United States District Court for the District of Columbia, as announced in the Federal Register (70FR15623; March 28, 2005). In partial fulfillment of the consent decree, EPA made a finding that states had failed to submit SIPs to satisfy CAA section 110(a)(2)(D)(i), related to interstate transport of pollution, for the 8-hour ozone and $PM_{2.5}$ NAAQS (70FR21147; April 25, 2005). The finding started a two-year clock for the promulgation of a Federal Implementation Plan (FIP) by EPA. That FIP will be imposed upon states as of May 25, 2007 unless EPA approves state SIPs meeting the section 110(a)(2)(D)(i) requirements.

Crucial to understanding EPA's approach to reviewing Section 110(a)(2)(D)(i) SIP submissions is the Clean Air Interstate Rule (CAIR), in which EPA determined that emissions of nitrogen oxides (NOx) in each of 25 states and the District of Columbia contribute significantly to nonattainment and interfere with maintenance of the 8-hour ozone NAAQS in other downwind states (70FR25162; May 12, 2005). EPA also determined that sulfur dioxide (SO_2) and NOx emissions from sources in 25 states and the District of Columbia contribute significantly to nonattainment and interfere with maintenance of the annual $PM_{2.5}$ standard in other downwind states. The CAIR established seasonal NOx budgets for each state identified as significantly contributing to downwind 8-hour ozone nonattainment and annual NOx and SO_2 budgets (i.e.,

$PM_{2.5}$ precursors) for states identified as significantly contributing to downwind $PM_{2.5}$ nonattainment. Connecticut was included by EPA in the list of states significantly contributing to a downwind state's nonattainment for the 8-hour ozone NAAQS, but not for the $PM_{2.5}$ NAAQS.

EPA issued guidance[1] to the states on August 15, 2006 providing the agency's recommended approach for developing SIPs to address the section 110(a)(2)(D)(i) requirements. According to the guidance, states subject to CAIR would meet their CAA section 110(a)(2)(D)(i) obligations to address their "significant contribution" and "interference with maintenance" impacts on downwind states by complying with the CAIR requirements. Accordingly, EPA indicates that any state subject to CAIR satisfies its 110(a)(2)(D)(i) obligation with a CAIR SIP submission, and any state not subject to CAIR for a particular pollutant need only submit a negative declaration. On the contrary, CTDEP concludes that CAIR does not reduce interstate air pollution transport to Connecticut sufficiently to satisfy the 110(a)(2)(D)(i) obligations of states to which CAIR applies.

Connecticut is a CAIR state for 8-hour ozone but not for $PM_{2.5}$. Based on EPA's guidance, Connecticut is only required to submit a section 110(a)(2)(D)(i) SIP revision for $PM_{2.5,}$ assuming the state's upcoming submission of its ozone CAIR SIP[2] receives EPA approval. However, given our disagreement on the efficacy of CAIR in eliminating significant interstate transport (as discussed further in Section 3 of this document), CTDEP elects to address both 8-hour ozone and $PM_{2.5}$ in this SIP revision.

Section 2 of this document describes how Connecticut is in compliance with section 110(a)(2)(D)(i) of the CAA, with separate discussions regarding Connecticut's ozone, $PM_{2.5}$, and visibility impacts on other states, as well as how CTDEP's regulations affect other states' efforts to prevent significant deterioration (PSD) of air quality.

Section 3 expresses CTDEP's concerns regarding the adequacy of the CAIR program at reducing upwind states' contributions to Connecticut's ozone nonattainment. Evidence is provided from EPA's CAIR analysis showing:

- The level of ozone transport affecting Connecticut exceeds that of any other state;
- CAIR provides inconsequential improvements to ozone transport in Connecticut;
- Connecticut cannot attain by the 2010 deadline without additional relief from transport; and
- Additional transport reductions, beyond CAIR, can be achieved at a reasonable cost.

As a result, CTDEP recommends that EPA address Connecticut's unique situation with regard to transported ozone through the CAA section 110(a)(2)(D)(i) process.

---

[1] "Guidance for State Implementation Plan (SIP) Submissions to Meet Current Outstanding Obligations Under Section 110(a)(2)(D)(i) for the 8-Hour Ozone and $PM_{2.5}$ National Ambient Air Quality Standards"; Memorandum from William T. Harnett, EPA OAQPS to EPA Regional Air Division Directors; August 15, 2006.

[2] CTDEP held a public hearing on its proposed CAIR regulation on October 19, 2006 and expects to submit an abbreviated CAIR SIP to EPA in early 2007.

2.0 Connecticut's Compliance with Section 110(a)(2)(D)(i)

CAA section 110(a)(2)(D)(i) requires that each state's SIP contain adequate provisions prohibiting air pollutant emissions within the state from significantly contributing to nonattainment, or interfering with the maintenance, of any NAAQS in any other state. Each state's SIP must also contain adequate provisions to prohibit emissions of air pollutants within the state that interfere with measures required to prevent significant deterioration of air quality or to protect visibility in any other state. The remainder of this section describes how Connecticut's SIP currently complies or will soon comply with each of these requirements.

2.1 Connecticut's Influence on Downwind States' 8-Hour Ozone Levels

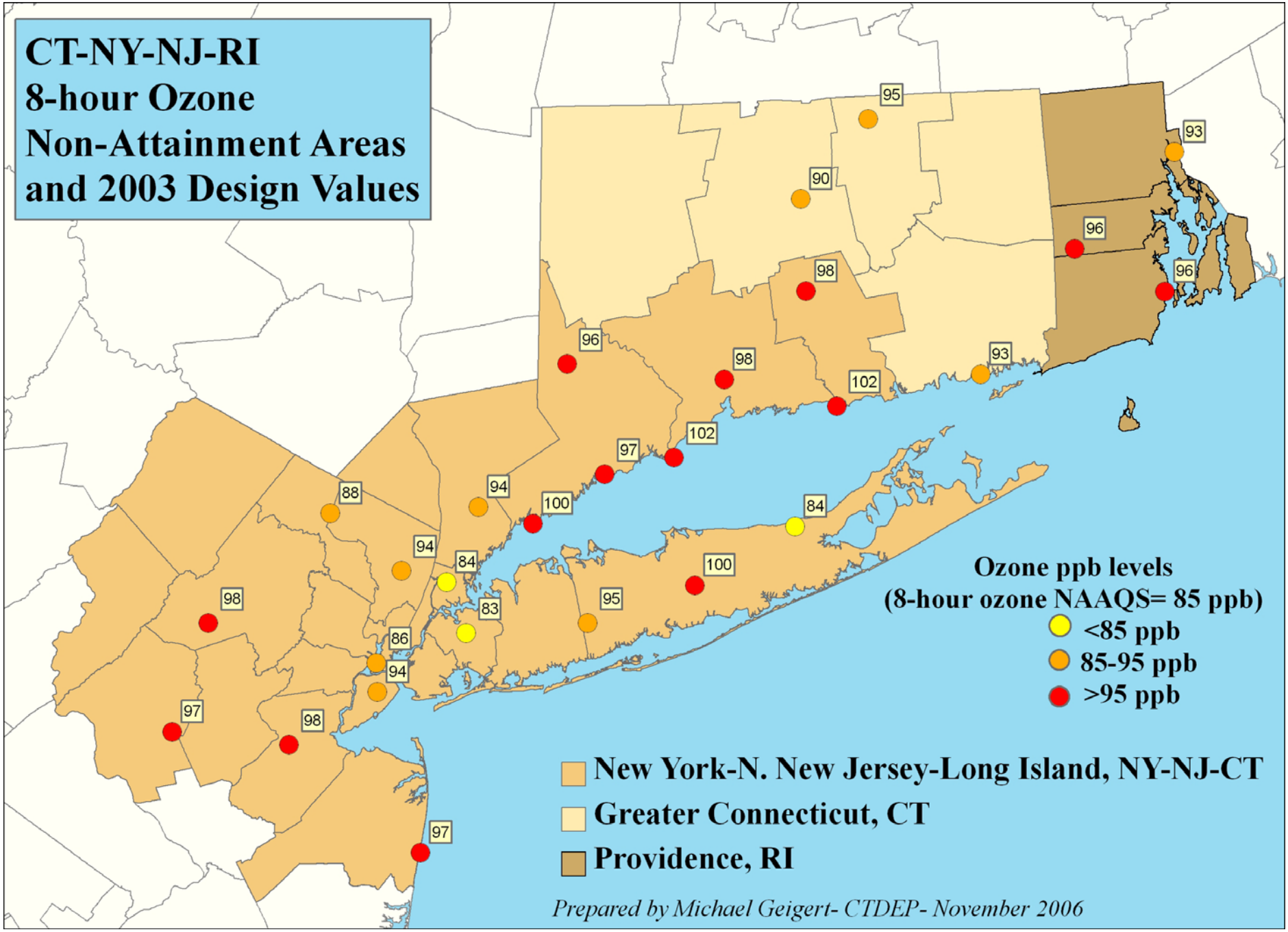
EPA promulgated designations for the 1997 8-hour ozone NAAQS in 2004 (69FR23858; April 30, 2004). As shown in Figure 2-1, Connecticut, along with much of the Northeast and other areas of the country, was designated as nonattainment by EPA based on measured 8-hour ozone values from the 2001-2003 period. Portions of Connecticut were included in two nonattainment areas: Fairfield, New Haven, and Middlesex Counties were included as part of a moderate nonattainment area, with the New York and New Jersey counties that make up the metropolitan New York Consolidated Statistical Area; and the remaining five counties in Connecticut were grouped as a separate moderate nonattainment area, known as the Greater Connecticut nonattainment area. EPA's nonattainment designations triggered a number of planning requirements for affected states, including the need to address significant downwind impacts, as mandated by CAA section 110(a)(2)(D)(i).

2.1.1 EPA CAIR Modeling Results for 8-Hour Ozone

When developing the CAIR, EPA used version 3.10 of the Comprehensive Air Quality Model with Extensions (CAMx) to quantify the contribution of emissions from "upwind" states to 8-hour ozone nonattainment in "downwind" states.[3] EPA's CAMx modeling included state-specific "zero-out" and source apportionment runs to quantify each state's downwind contributions in 2010. This 2010 "base case" run accounted for emission reductions from adopted national and regional control programs, but not projected reductions due to the CAIR program. In general, upwind states' contributions were judged to contribute significantly to a downwind state's nonattainment problem if specified statistical screening criteria were met regarding the following metrics:[4]

[3] "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling"; US EPA OAQPS; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.
[4] See Section VI of EPA's modeling technical support document cited in Footnote #3 for a full description of the metrics used.

Figure 2-1


CT-NY-NJ-RI
8-hour Ozone
Non-Attainment Areas
and 2003 Design Values
95
93
90
96
96
98
96
98
93
102
102
97
94
88
100
84
94
84
100
98
83
95
86
94
97
98
97
Ozone ppb levels
(8-hour ozone NAAQS= 85 ppb)
<85 ppb
85-95 ppb
>95 ppb
New York-N. New Jersey-Long Island, NY-NJ-CT
Greater Connecticut, CT
Providence, RI
Prepared by Michael Geigert- CTDEP- November 2006

- Magnitude Metrics: An upwind state's influence was considered large enough to be significant if the contribution was ≥ 3 ppb;
- Frequency Metrics: An upwind state's influence was considered frequent enough to be significant if there was a 3 ppb or more contribution to at least 3 percent of the exceedances and, for linkages in which the maximum contribution was in the range of ≥ 2 to < 3 ppb, there had to be contributions in this range to at least two exceedances in the downwind area; and
- Relative Amount Metrics: An upwind state's influence was considered large enough to be significant if the total contribution relative to the total amount of nonattainment was ≥ 3 percent.

It is important to note that these screening procedures were the first of a two-step process EPA used for determining significant contribution, in which the second step involved EPA's identification of "highly cost effective controls" to determine the amount of upwind emissions that should be reduced. Although CTDEP agrees that the use of EPA's CAMx modeling exercise is a reasonable way to identify states with significant contributions, we strongly disagree with EPA's subsequent policy decisions to only require "highly cost effective controls" and to judge such controls to be fully sufficient to meet upwind states' Section 110(a)(2)(D)(i) requirements. More discussion of the policy determinations behind the "highly cost effective" standard is presented in Section 3 of this document.

EPA's 2010 base case CAMx modeling analysis indicated that pre-CAIR emissions from Connecticut contribute to 8-hour ozone nonattainment in two downwind counties: Kent County, Rhode Island and Suffolk County, New York. Results of the various metrics used by EPA in its screening analysis are listed in Tables 2-1 and 2-2 for Kent County and Suffolk County, respectively.

EPA's screening analysis found that Connecticut's emissions contributed at least 2 ppb of ozone to 93% of the 8-hour exceedance grid-hours modeled for Kent County, Rhode Island. On average, for the three simulated episodes, the source apportionment modeling indicated Connecticut contributed about 10% of the ozone during exceedance periods, the fourth highest contributing state to Kent County after New York, Pennsylvania, and New Jersey.

For Suffolk County, New York, EPA's analysis indicated that emissions from Connecticut contributed at least 2 ppb of ozone during 28% (using zero-out modeling) to 36% (using source apportionment modeling) of the modeled exceedance grid-periods. On average, for the three simulated episodes, source apportionment modeling found that Connecticut contributed about 4% of the ozone during exceedance periods, the fourth highest contributing state after New Jersey, Pennsylvania, and Maryland. Since Connecticut is downwind of Suffolk County on high ozone days, CTDEP feels that EPA's conclusion may be an artifact of the modeling and grid specifications.

EPA's 2010 base case CAMx modeling projects a 2010 8-hour ozone design value of 86.4 ppb for Kent County, Rhode Island. With the addition of CAIR, the projected 2010 design value is 86.2 ppb, slightly greater than the 85 ppb monitoring compliance level for the 8-hour ozone NAAQS. Other monitors in Rhode Island are projected by EPA to comply with the NAAQS by 2010, with a maximum value of 84.2 ppb. EPA modeled projections for 2015 indicate all Rhode

Table 2-1: EPA's 2010 Base-Case (pre-CAIR) Contribution Analysis for Kent County, Rhode Island

Downwind Nonattainment Receptor	CAMX Source Apportionment Modeling Base Case: Total Number of Exceedances (grid-hours) = 134							CAMX State Zero-Out Modeling Base Case: Total Number of Exceedances (grids-days) = 18				
Kent RI	**Upwind State**	Average 3-episode % contribution	Highest daily average (ppb)	Highest daily average (%)	# reduced >= 2 ppb	% reduced >= 2 ppb	max 8-hr ppb contribution	% total ppb reduced	% pop-wgt total ppb reduced	# reduced >= 2 ppb	% reduced >= 2 ppb	max 8-hr ppb contribution
Contributions exceed screening criteria	**MA**	1	26	30	3	2	27	1	1	1	6	26.3
	NY	26	22	23	134	100	29	77	77	17	94	20.3
	PA	17	22	25	131	98	22	39	37	17	94	12.2
	NJ	16	14	17	131	98	18	45	41	17	94	9.8
	CT	10	8	9	125	93	15	29	35	17	94	9.7
	OH	6	7	7	75	56	9	9	12	7	39	3.6
	VA	4	5	5	75	56	6	6	5	3	17	2.9
Contributions do not exceed screening criteria	**MD**	4	5	5	113	84	5	7	5	0	0	1.6
	WV	2	2	2	50	37	3	4	4	0	0	1.4
	NH	0	3	3	3	2	3	1	0	0	0	1.3
	MI	1	2	2	28	21	3	3	4	0	0	1.2
	IN	2	2	2	22	16	2	3	4	0	0	0.8
	DE	2	3	3	27	20	3	3	2	0	0	0.7
	NC	2	3	3	42	31	3	1	1	0	0	0.7
	IL	2	2	2	8	6	2	2	3	0	0	0.5
	KY	1	2	2	0	0	2	1	1	0	0	0.3
	ME	0	1	1	0	0	1	0	0	0	0	0.3
	MO	1	1	1	0	0	1	1	1	0	0	0.2
	VT	0	0	0	0	0	0	0	0	0	0	0.2
	AR	0	0	0	0	0	0	0	0	0	0	0.1
	IA	1	1	1	0	0	1	0	1	0	0	0.1
	TN	0	0	0	0	0	0	0	0	0	0	0.1
	WI	1	0	1	0	0	1	1	1	0	0	0.1
	AL	0	0	0	0	0	0	0	0	0	0	0.0
	FL	0	0	0	0	0	0	0	0	0	0	0.0
	GA	0	0	0	0	0	0	0	0	0	0	0.0
	LA	0	0	0	0	0	0	0	0	0	0	0.0
	MN	0	0	0	0	0	0	0	0	0	0	0.0
	MS	0	0	0	0	0	0	0	0	0	0	0.0
	SC	0	0	0	0	0	0	0	0	0	0	0.0

From Appendix G of EPA's "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Analyses"; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

Table 2-2: EPA's 2010 Base-Case (pre-CAIR) Contribution Analysis for Suffolk County, New York

Downwind Nonattainment Receptor	CAMX Source Apportionment Modeling Base Case: Total Number of Exceedances (grid-hours) = 1088							CAMX State Zero-Out Modeling Base Case: Total Number of Exceedances (grids-days) = 153				
Suffolk NY	**Upwind State**	Average 3-episode % contribution	Highest daily average (ppb)	Highest daily average (%)	# reduced >= 2 ppb	% reduced >= 2 ppb	max 8-hr ppb contribution	% total ppb reduced	% pop-wgt total ppb reduced	# reduced >= 2 ppb	% reduced >= 2 ppb	max 8-hr ppb contribution
Contributions exceed screening criteria	**NJ**	22	19	21	1088	100	39	64	64	151	99	36.7
	PA	18	25	27	1050	97	34	42	42	136	89	22.2
	CT	4	9	8	395	36	26	13	7	42	28	16.1
	VA	3	8	8	355	33	11	9	8	35	23	8.4
	MD	6	10	12	790	73	15	13	12	80	52	6.5
	DE	3	5	5	528	49	6	7	7	26	17	4.6
	OH	3	5	5	310	29	7	5	5	12	8	3.3
	NC	1	4	4	282	26	6	3	2	11	7	3.2
	WV	1	2	3	235	22	3	4	4	16	11	2.8
	MA	1	3	3	93	9	7	1	1	1	1	2.2
	MI	2	3	3	220	20	5	4	5	2	1	2.1
Contributions do not exceed screening criteria	**WI**	1	1	1	0	0	2	2	2	0	0	1.0
	IA	1	1	2	4	0	2	1	1	0	0	0.7
	IN	1	1	1	0	0	2	2	2	0	0	0.7
	IL	1	2	2	125	12	3	2	2	0	0	0.5
	MN	0	0	0	0	0	1	1	1	0	0	0.5
	KY	1	1	1	1	0	2	1	1	0	0	0.4
	RI	0	1	1	3	0	2	0	0	0	0	0.3
	MO	1	1	1	0	0	1	0	0	0	0	0.2
	AR	0	0	0	0	0	0	0	0	0	0	0.1
	FL	0	1	1	0	0	1	0	0	0	0	0.1
	ME	0	0	0	0	0	1	0	0	0	0	0.1
	NH	0	0	0	0	0	1	0	0	0	0	0.1
	SC	0	0	0	0	0	1	0	0	0	0	0.1
	TN	0	0	0	0	0	0	0	0	0	0	0.1
	VT	0	0	0	0	0	0	0	0	0	0	0.1
	AL	0	0	0	0	0	0	0	0	0	0	0.0
	GA	0	0	0	0	0	1	0	0	0	0	0.0
	LA	0	0	0	0	0	0	0	0	0	0	0.0
	MS	0	0	0	0	0	0	0	0	0	0	0.0

From Appendix G of EPA's "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Analyses"; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

Island monitors will attain, with a maximum design value of 83.2 ppb at the Kent County monitor. For Suffolk County, New York, EPA's CAMx 2010 base case modeling projects a 2010 8-hour ozone design value of 91.1 ppb, with a value of 90.8 ppb when CAIR reductions are included.

These EPA modeling results, which include reductions from the CAIR program and other previously adopted national control programs, predict that emissions from Connecticut will contribute significantly to 8-hour ozone nonattainment in Kent County, Rhode Island and Suffolk County, New York through at least 2010. However, as discussed below, Connecticut is in the process of adopting or pursuing adoption of additional control measures that are projected to further reduce its contribution to any remaining downwind nonattainment. In addition, significant recent improvements in measured design values in both Kent County and Suffolk County suggest that ozone levels are improving at a greater rate than projected by EPA's CAIR modeling. When these factors are considered together with Connecticut's continuing efforts with New York and New Jersey to achieve attainment in the New York City nonattainment area, Connecticut expects to fully meet its CAA section 110(a)(2)(D)(i) obligations for the 8-hour ozone NAAQS.

2.1.2 Additional Ozone Precursor Control Measures

CTDEP has been evaluating candidate control measures to be considered for inclusion in Connecticut's 8-hour ozone attainment demonstration, scheduled to be submitted to EPA by June 2007. Although this evaluation process is not complete, CTDEP has already adopted or proposed adoption of several control measures that would provide additional emission reductions not considered in EPA's CAIR modeling. These measures are listed in Table 2-3. When considered together with previously adopted federal and state emission control programs, the combined emission reductions from Connecticut sources are expected to reduce to a significant degree the state's impact on measured ozone levels both in-state and downwind by the mandated 2010 attainment date.

2.1.3 Preliminary OTC Modeling Results

Preliminary ozone modeling has also been conducted by the Ozone Transport Commission (OTC). In addition to federal and state measures already in place, this regional modeling includes several of the control programs listed in Table 2-3. OTC's preliminary results project that emission reductions achieved will be sufficient to bring all monitors in Rhode Island into attainment by the end of 2009, with predicted design values in Kent County improving from 93 ppb in the 2002 base year to 81 ppb in 2009. CTDEP expects that the final versions of OTC's modeling and documentation, to be included with the June 2007 ozone attainment demonstration, will confirm these preliminary findings projecting attainment for Kent County and all of Rhode Island. With continued emission reductions projected from Connecticut sources beyond 2009 (see Tables 2-4a and 2-4b), Connecticut will meet the CAA section 110(a)(2)(D)(i)(I) requirements not to contribute significantly to nonattainment, or interfere with maintenance, of the 8-hour NAAQS in Kent County.

Table 2-3
Additional Ozone Precursor Control Strategies
Adopted or Proposed in Connecticut[1]
(Not Included in EPA's CAIR Modeling)

Control Measure	CT Regulation	Regulation Status	Effective Date	Pollutant
Automotive Refinishing	22a-174-3b	Adopted: March 2002	March 2002	VOC
Municipal Waste Combustors	22a-174-38	Adopted: October 2000	Phase 2 limits: May 1, 2003	NOx
Gasoline Stations Pressure-Vent Valves	22a-174-30	Adopted: May 2004	May 2004	VOC
Portable Fuel Containers Phase 1	22a-174-43	Adopted: May 2004	May 2004	VOC
Portable Fuel Containers Phase 2	Proposed Amendment 22a-174-43	Hearing Held: June 2006	July 2007	VOC
Metal Cleaning	Proposed Amendment 22a-174-20(l)	Hearing Held: June 2006	May 2008	VOC
Consumer Products	Proposed Amendment 22a-174-40	Hearing Held: June 2006	May 2008	VOC
Architectural and Industrial Maintenance Coatings	Proposed Amendment 22a-174-41	Hearing Held: June 2006	May 2008	VOC
Stationary Sources of Nitrogen Oxides	Proposed Amendment 22a-174-22	Hearing Held: October 2006	May 2009	NOx
Asphalt Paving	Proposed Amendment 22a-174-20(k)	Under Development	May 2009	VOC
Adhesives and Sealants	Proposed New Rule 22a-174-44	Under Development	May 2009	VOC

[1] CTDEP is actively pursuing adoption of the proposed regulations noted in the table, although there is no guarantee at this point that the proposals will be approved by the legislative oversight committee. CTDEP is also evaluating several other measures for possible inclusion in Connecticut's 8-hour ozone attainment demonstration.

Table 2-4a
Projected Anthropogenic VOC Emissions in Connecticut

(Preliminary MANE-VU Annual Estimates compiled by MARAMA, 9/29/2006 & 12/6/2006)

Source Sector	2002 (tons)	2009 OTB/OTW* (tons)	2012 OTB/OTW* (tons)
Point	4,975	4,317	4,433
Area	87,302	75,693	71,274
Nonroad	33,880	24,910	20,694
Onroad	31,818	26,136	22,159
TOTAL	**157,975**	**131,056**	**118,560**

Table 2-4b
Projected Anthropogenic NOx Emissions in Connecticut

(Preliminary MANE-VU Annual Estimates compiled by MARAMA, 9/29/2006 & 12/6/2006)

Source Sector	2002 (tons)	2009 OTB/OTW* (tons)	2012 OTB/OTW* (tons)
Point	13,270	11,048	11,017
Area	12,689	13,173	13,342
Nonroad	25,460	21,512	19,316
Onroad	69,421	56,198	47,107
TOTAL	**120,840**	**101,931**	**90,782**

* Preliminary MARAMA emission projections including measures in-place ("on the books", OTB) or likely to be adopted soon (on-the-way, OTW), but not additional measures being considered by the OTC and/or Connecticut.

Suffolk County, along with the southwestern portion of Connecticut, is part of the multi-state New York City 8-hour ozone nonattainment area. Preliminary OTC modeling predicts that peak design values in Suffolk County, New York will improve from 97 ppb in 2002 to 90 ppb in 2009. As part of the multi-state nonattainment area, CTDEP is currently working with the air quality agencies of New York and New Jersey with a goal of developing an attainment demonstration that will include appropriate additional regional and state-level controls to provide for compliance with the ozone NAAQS by the mandated 2010 attainment date in Suffolk County and the rest of the New York City nonattainment area. When that goal is accomplished, the continued emission reductions projected from Connecticut sources beyond 2009 (see Tables 2-4a and 2-4b) will ensure that Connecticut will meet the CAA section 110(a)(2)(D)(i)(I) requirements not to contribute significantly to nonattainment, or interfere with maintenance, of the 8-hour NAAQS in Suffolk County.

2.1.4 Additional Empirical Evidence of Connecticut's Influence on Downwind Ozone

Recent monitoring data indicate that measured ozone levels in Connecticut and elsewhere in the Northeast have improved dramatically over the last three years and may be improving at a greater rate than suggested by either EPA's CAIR modeling or OTC's preliminary modeling. Ozone design values for 2006, developed using data measured from 2004 through 2006, are displayed in Figure 2-2 for the area including northern New Jersey, downstate New York, Connecticut and Rhode Island. In most cases, design values have improved by ten percent or more between 2003 (see Figure 2-1) and 2006. Improvements in ozone levels can be attributed to a combination of decreases in emission levels (e.g., mobile source sector fleet turnover, NOx budget program for electric generating units) and maximum daily summertime temperatures in the 2004 to 2006 period that were closer to average conditions than the extreme temperature conditions experienced during the 2001 to 2003 period (see Figure 2-3)[5] used by EPA to establish 8-hour ozone nonattainment areas.

In Table 2-5, improvements in measured design values for Kent County, Rhode Island and Suffolk County, New York are compared to peak modeled values projected to occur in 2009/2010 by EPA's CAIR modeling and OTC's preliminary modeling.

In Kent County, peak measured design values have improved from 96 ppb in 2003 to 83 ppb in 2006, essentially reaching compliance with the 8-hour ozone NAAQS. The 2006 measured design value of 83 ppb is already less than the 86 ppb value predicted by EPA's CAIR modeling for 2010 and approaching the preliminary OTC modeled design value of 81 ppb in 2009. When considered together, current monitoring levels and available modeling projections provide a higher level of confidence that Kent County, Rhode Island will comply with the 8-hour ozone NAAQS by the 2010 deadline.

[5] Over the past 30 years, there have been an average of 17 days with measured maximum temperatures at Bradley International Airport (Windsor Locks, CT) reaching 90 °F or higher ("hot days"). The 2001 to 2003 period averaged 22 "hot days" per year, the highest number over any 3-year period during the last 30 years. The 2004 to 2006 period averaged 17 "hot days", the same as the 30-year average.

Figure 2-2

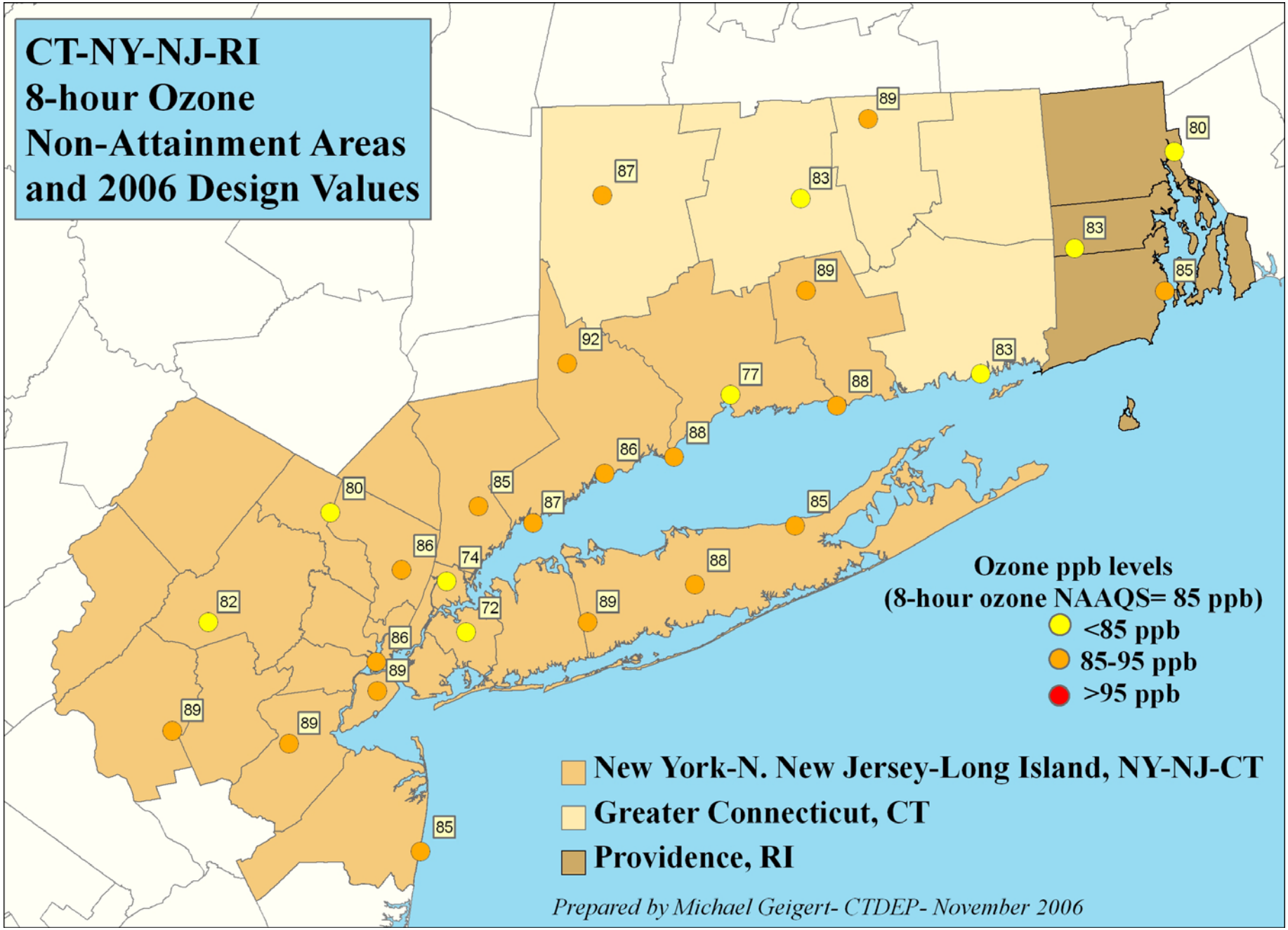

CT-NY-NJ-RI
8-hour Ozone
Non-Attainment Areas
and 2006 Design Values
89
87
83
80
83
89
85
92
83
77
88
88
86
85
87
85
80
86
74
88
82
72
89
86
89
89
89
85
Ozone ppb levels
(8-hour ozone NAAQS= 85 ppb)
<85 ppb
85-95 ppb
>95 ppb
New York-N. New Jersey-Long Island, NY-NJ-CT
Greater Connecticut, CT
Providence, RI
Prepared by Michael Geigert- CTDEP- November 2006

Figure 2-3
Number of Days with Maximum Temperature ≥ 90°F
(3-Year Running Average at BDL)

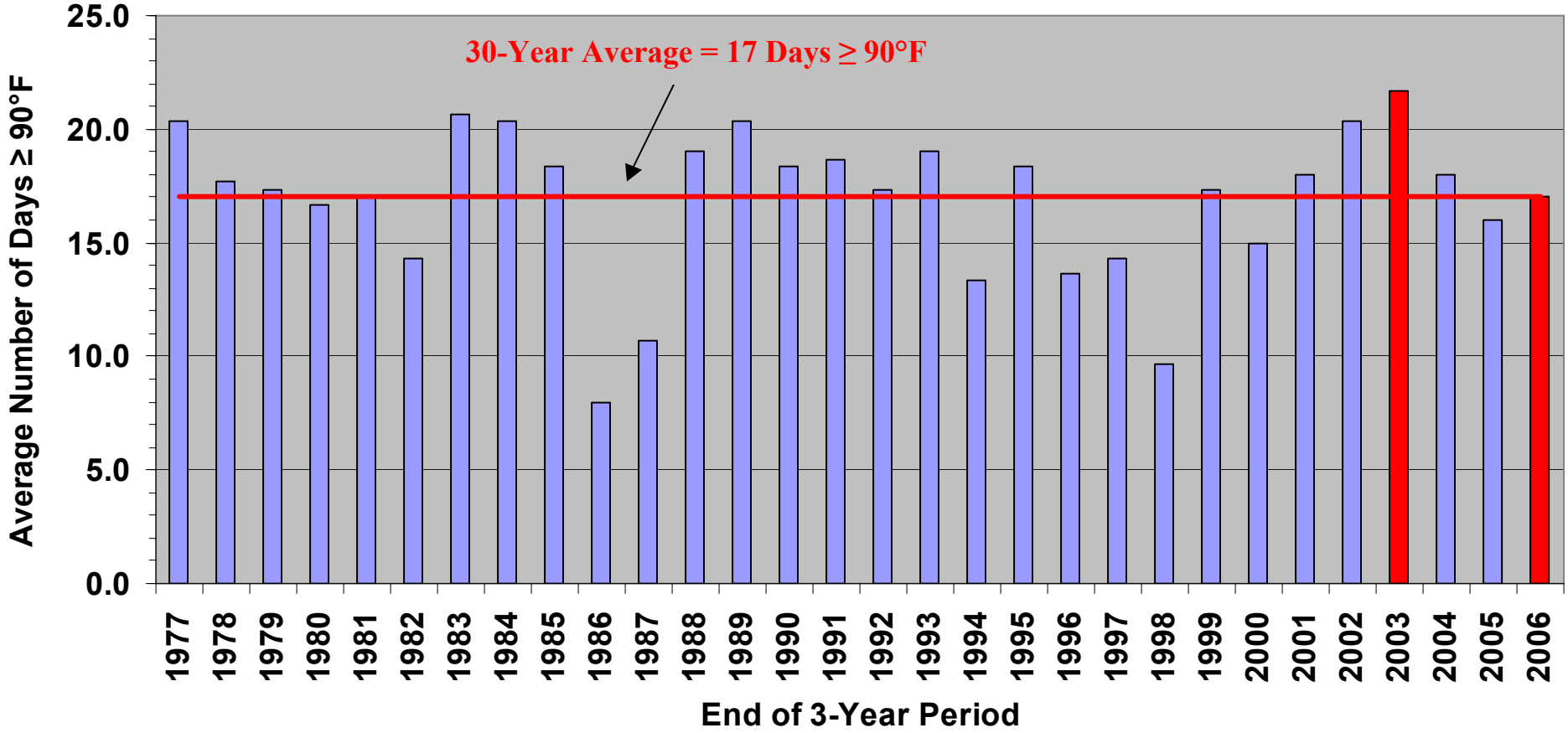


Table 2-5
Comparison of Measured 8-Hour Ozone Design Values to Future Peak Modeled Design Values For Counties Downwind of Connecticut

Downwind Monitor	2003 Measured Design Value (ppb)	2006 Measured Design Value (ppb)	EPA CAIR Modeling Peak 2010 Design Value (ppb)	Preliminary OTC Modeling Peak 2009 DesignValue (ppb)
Kent County, RI	96	83	86	81
Suffolk County, NY	100	89	91	90

Note: Measured 8-hour ozone design values are determined by calculating the average of the 4th-highest value measured each year for the most recent three-year period. For example, the 2003 measured design value represents the average of the 4th-highest 8-hour concentration measured in each of 2001, 2002, and 2003.

In Suffolk County, peak measured design values have improved from 100 ppb in 2003 to 89 ppb in 2006, an improvement of 11 ppb over the most recent 3-year period. The measured 2006 design value of 89 ppb is already less than predicted by both EPA's CAIR modeling for 2010 (i.e., 91 ppb without considering additional local control strategies) and the preliminary OTC modeling (which predicts 90 ppb in 2009). If continued emission reductions and favorable meteorology result in improvements in peak ozone levels over the upcoming 3-year period (from 2007 to 2009), there is a plausible chance that ozone design values in Suffolk County may comply with the 8-hour ozone NAAQS by the 2010 deadline. If so, Connecticut will have met the Section 110(a)(2)(D)(i) obligation not to contribute significantly to nonattainment in another state. In addition, projected decreases in Connecticut's emissions beyond 2010 (see Tables 2-4a and 2-4b) will ensure that Connecticut does not interfere with efforts of downwind states to maintain compliance with the NAAQS after attainment is achieved. In any case, CTDEP is continuing to work with New York and New Jersey to develop an attainment demonstration to provide for compliance with the ozone NAAQS throughout the New York City multi-state nonattainment area by the mandated 2010 attainment date. Prospects for attainment would increase with additional transport reductions beyond CAIR.

2.2 Connecticut's Influence on Downwind States' $PM_{2.5}$ Levels

Connecticut operates a network of federal reference method (FRM) $PM_{2.5}$ monitors, all of which measure compliance with both the annual and 24-hour 1997 $PM_{2.5}$ NAAQS. Consistent with the monitored levels of $PM_{2.5}$, EPA classified Litchfield, Hartford, Middlesex, Windham, and New London Counties as being in attainment with the NAAQS.[6] However, despite monitored attainment in Connecticut, EPA included Fairfield and New Haven Counties with counties in northern New Jersey and southern New York as a multi-state New York City nonattainment area.

Violations of the 1997 $PM_{2.5}$ annual NAAQS (15 $\mu g/m^3$) exist in both the New York and New Jersey portions of the nonattainment area, but not in the Connecticut portion. Figure 2-4 shows the geographic boundaries of the nonattainment area and the 2003 design values used by EPA to establish the nonattainment designations. Peak annual design values of 17.6 $\mu g/m^3$ in New York, 15.6 $\mu g/m^3$ in northern New Jersey, and 13.9 $\mu g/m^3$ in southwestern Connecticut were recorded in 2003. Peak current (i.e., 2005) design values, depicted in Figure 2-5, were measured as 17.0 $\mu g/m^3$ in New York City, 15.5 $\mu g/m^3$ in northern New Jersey, and 13.5 $\mu g/m^3$ in southwestern Connecticut.

Similar to the ozone standard, EPA's $PM_{2.5}$ nonattainment designations triggered a number of planning requirements for affected states, including the need to address significant downwind impacts. In its guidance for preparing section 110(a)(2)(D)(i) SIPs, EPA indicates that any state subject to CAIR satisfies its 110(a)(2)(D)(i) obligation with a CAIR SIP submission, and any state not subject to CAIR for a particular pollutant need only submit a negative declaration.

[6] 70FR944; January 5, 2005.

Figure 2-4

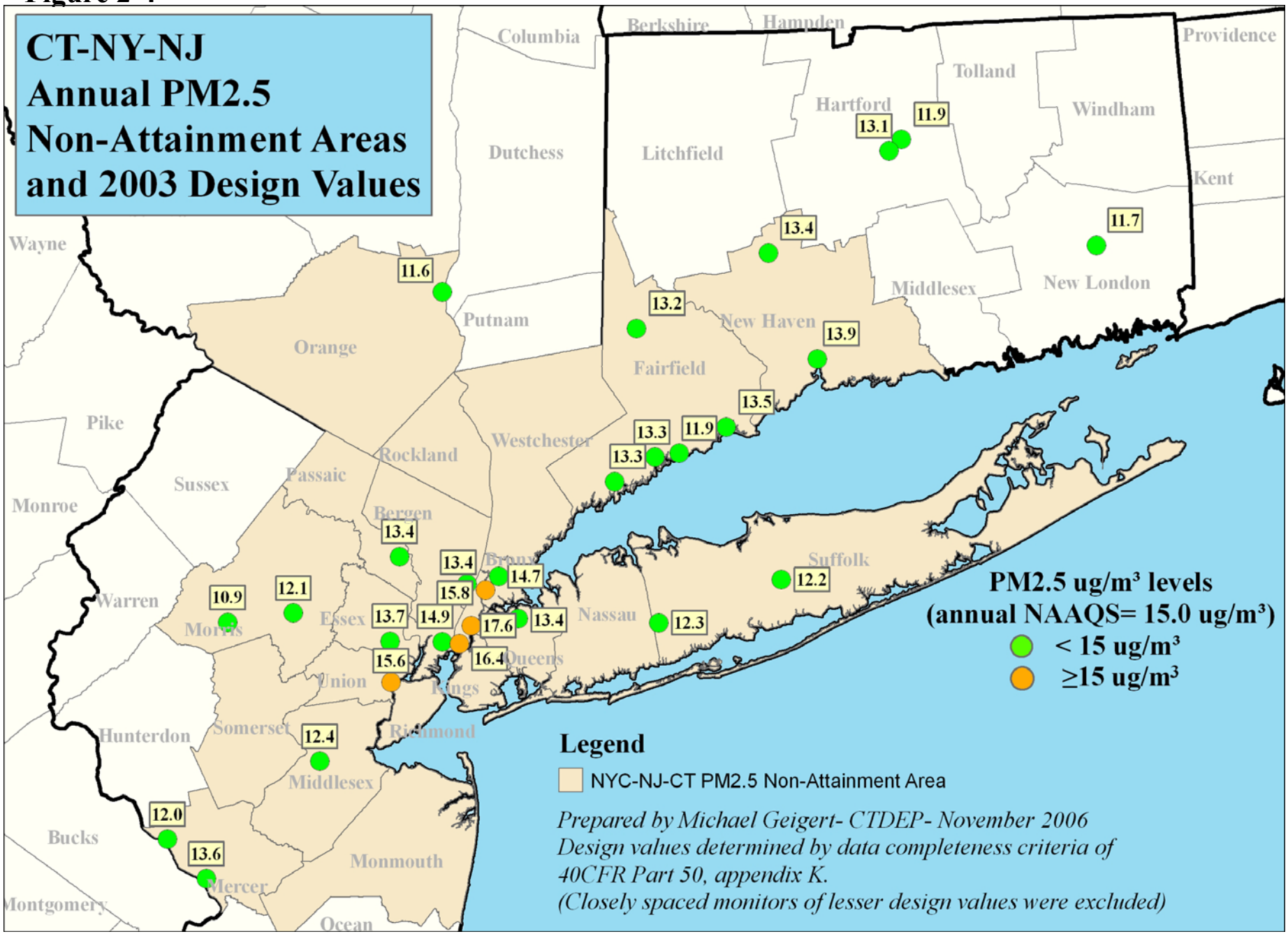
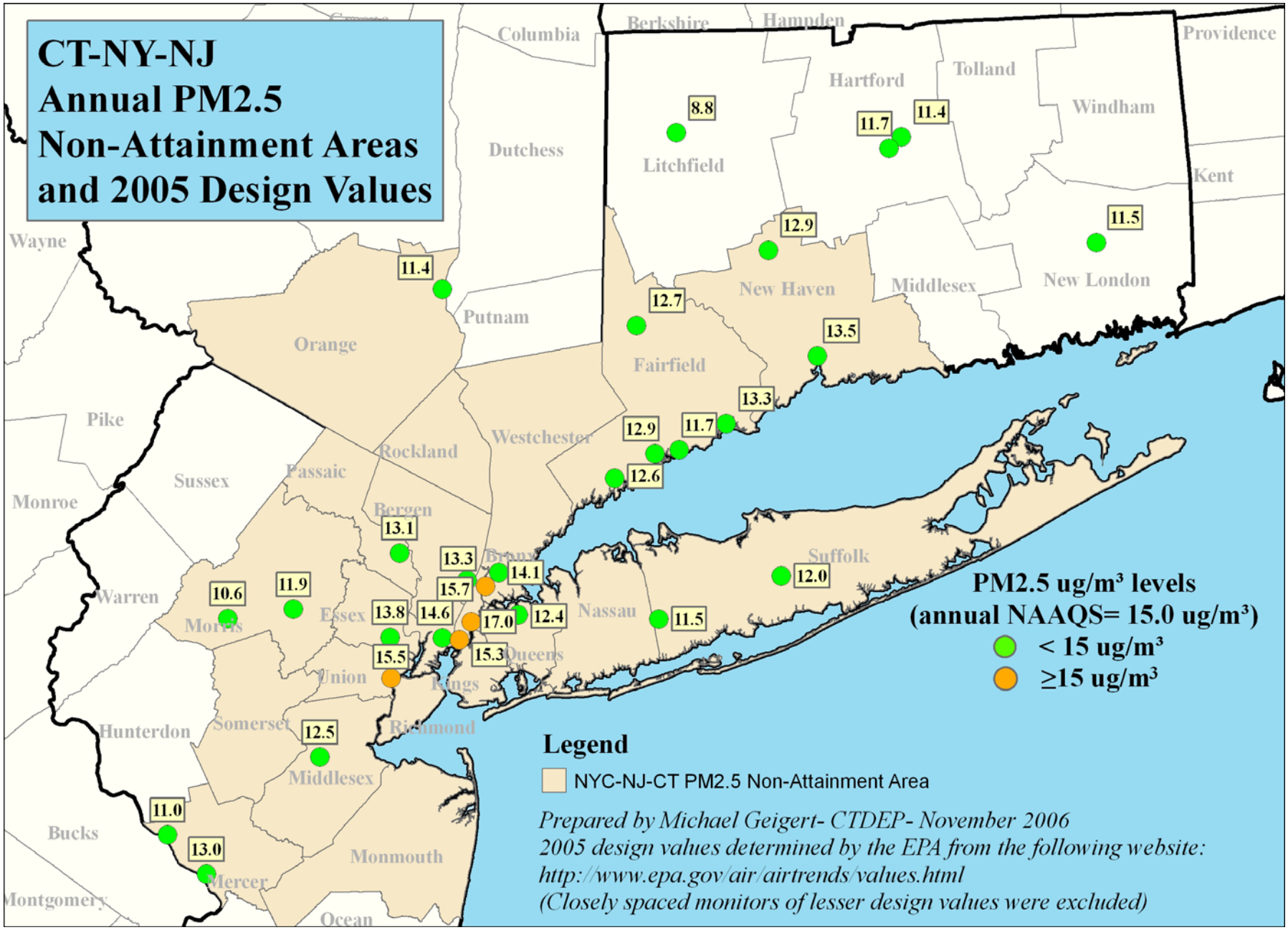

CT-NY-NJ
Annual PM2.5
Non-Attainment Areas
and 2003 Design Values
Columbia
Berkshire
Hampden
Providence
Tolland
Windham
Hartford
Litchfield
Dutchess
Kent
Wayne
Middlesex
New London
Putnam
New Haven
Orange
Fairfield
Pike
Westchester
Rockland
Passaic
Sussex
Monroe
Bergen
Suffolk
Warren
Morris
Essex
Nassau
Union
Queens
Kings
Somerset
Hunterdon
Richmond
Middlesex
Bucks
Monmouth
Mercer
Montgomery
Ocean
11.6
13.4
11.9
13.1
11.7
13.2
13.9
13.5
13.3
11.9
13.3
13.4
13.4
14.7
15.8
12.2
10.9
12.1
13.7
14.9
17.6
13.4
12.3
15.6
16.4
12.4
12.0
13.6
PM2.5 ug/m³ levels
(annual NAAQS= 15.0 ug/m³)
< 15 ug/m³
≥15 ug/m³
Legend
NYC-NJ-CT PM2.5 Non-Attainment Area
Prepared by Michael Geigert- CTDEP- November 2006
Design values determined by data completeness criteria of
40CFR Part 50, appendix K.
(Closely spaced monitors of lesser design values were excluded)

Figure 2-5


CT-NY-NJ
Annual PM2.5
Non-Attainment Areas
and 2005 Design Values
Columbia
Berkshire
Hampden
Providence
Hartford
Tolland
Windham
Litchfield
Dutchess
Kent
Wayne
Putnam
New Haven
Middlesex
New London
Orange
Fairfield
Pike
Rockland
Westchester
Sussex
Passaic
Monroe
Bergen
Suffolk
Warren
Morris
Essex
Nassau
Union
Queens
Kings
Richmond
Somerset
Hunterdon
Middlesex
Bucks
Monmouth
Mercer
Montgomery
Ocean
8.8
11.7
11.4
11.5
12.9
11.4
12.7
13.5
13.3
12.9
11.7
12.6
13.1
13.3
14.1
15.7
12.0
10.6
11.9
13.8
14.6
17.0
12.4
11.5
15.5
15.3
12.5
11.0
13.0
PM2.5 ug/m³ levels
(annual NAAQS= 15.0 ug/m³)
< 15 ug/m³
≥15 ug/m³
Legend
NYC-NJ-CT PM2.5 Non-Attainment Area
Prepared by Michael Geigert- CTDEP- November 2006
2005 design values determined by the EPA from the following website:
http://www.epa.gov/air/airtrends/values.html
(Closely spaced monitors of lesser design values were excluded)

As EPA did not include Connecticut in CAIR for $PM_{2.5}$, Connecticut's obligation to satisfy Section 110(a)(2)(d)(i) would arguably be met with a simple negative declaration. However, given our disagreement on the efficacy of CAIR in eliminating significant interstate transport, CTDEP offers the following information to clarify Connecticut's lack of significant contribution to any other states' nonattainment or maintenance of $PM_{2.5}$. Separate discussions are provided for Connecticut's attainment counties and for the counties included in the New York City nonattainment area.

2.2.1 Connecticut's $PM_{2.5}$ Attainment Region: Litchfield, Hartford, Middlesex, New London, Tolland, and Windham Counties

The Connecticut counties of Litchfield, Hartford, Middlesex, New London, Tolland, and Windham do not significantly contribute to nonattainment or interfere with maintenance of the $PM_{2.5}$ NAAQS in another state. Both EPA's CAIR modeling analyses (70FR25162; May 12, 2005) and CTDEP's modeling conducted in support of Connecticut's "Recommendation for $PM_{2.5}$ Designation Technical Support Document" (CT TSD[7]; February 2004) provide evidence in support of this conclusion.

EPA's CAIR Modeling for $PM_{2.5}$

EPA's CAIR modeling procedures for $PM_{2.5}$ are described in the "Technical Support Document for the Final Clean Air Interstate Rule," (CAIR TSD; March 2005). EPA calculated annual interstate $PM_{2.5}$ contributions using the state-by-state zero-out modeling technique, applying CMAQ for each of 37 states individually. The EPA used a threshold of 0.2 $\mu g/m^3$ for determining whether SO_2 and NO_x emissions in a state significantly contribute to annual $PM_{2.5}$ nonattainment in another state. Table 2-6, reproduced from EPA's CAIR Rule preamble (70FR25247; May 12, 2005), presents the interstate contributions from sulfur dioxide (SO_2) and nitrogen oxides (NOx) emissions in upwind states to $PM_{2.5}$ nonattainment in downwind states. The maximum modeled contribution from Connecticut to any other state was determined by EPA to be less than 0.05 $\mu g/m^3$. Therefore, EPA deemed that emissions from Connecticut do not contribute significantly to downwind states, according to the CAIR significance criteria.

CTDEP's ISC Modeling for $PM_{2.5}$ Designations

Supplemental modeling conducted by the CTDEP, using EPA's Industrial Source Complex (ISC) model, and fully documented in the CT TSD, resulted in a similar conclusion. The modeling technique is briefly described below.

- Modeling was designed to focus on primary emissions of $PM_{2.5}$ on a county-size scale, with no consideration to secondary formation or micro-scale effects.

- Annual emissions were extracted from EPA's 1999 National Emissions Inventory (Version 3). Two versions of the inventory were employed in the modeling, one unadjusted and one adjusted. The adjusted inventory included the following alterations: 1) fugitive dust emission categories were reduced by 90% to better reflect measured ambient $PM_{2.5}$ data; 2) residential wood combustion emissions were removed, due to faulty urban area emission factors at the time of the analysis; and 3) open burning

[7] See http://www.dep.state.ct.us/air2/pm25/technicalsupport.pdf and http://www.dep.state.ct.us/air2/pm25/figures.pdf.

Table 2-6
Maximum Modeled Downwind Annual $PM_{2.5}$ Contribution for Each of the 37 Upwind States (from EPA's CAIR TSD)

Upwind State	Maximum Downwind Contribution (µg/m3)	Upwind State	Maximum Downwind Contribution (µg/m3)
Alabama	0.98	Nebraska	0.07
Arkansas	0.19	New Hampshire	<0.05
Connecticut	**<0.05**	New Jersey	0.13
Delaware	0.14	New York	0.34
Florida	0.45	North Carolina	0.31
Georgia	1.27	North Dakota	0.11
Illinois	1.02	Ohio	1.67
Indiana	0.91	Oklahoma	0.12
Iowa	0.28	Pennsylvania	0.89
Kansas	0.11	Rhode Island	<0.05
Kentucky	0.90	South Carolina	0.40
Louisiana	0.25	South Dakota	<0.05
Maine	<0.05	Tennessee	0.65
Maryland/DC	0.69	Texas	0.29
Massachusetts	0.07	Vermont	<0.05
Michigan	0.62	Virginia	0.44
Minnesota	0.21	West Virginia	0.84
Mississippi	0.23	Wisconsin	0.56
Missouri	1.07		

emissions were replaced with corresponding estimates from a January 2003 MANE-VU report (prepared by EH Pechan and Associates) entitled "Open Burning in Residential Areas, Emissions Inventory Development Report".

- In processing the emissions, the point, non-road, and mobile source emissions were combined with the area source emissions from each county, to obtain total area source emissions for input into the ISC model. Each county was converted into an appropriately sized and shaped rectangular source area and located on a mapped grid of the New York City metropolitan region, as depicted in Figure 2-6.

The ISC results with the adjusted inventory are summarized in Table 2-7. (As discussed in the CT TSD the unadjusted inventory resulted in unrealistically high PM levels at all monitors). Results for the New York City receptor show that Connecticut source contributions range from 1.7% (using LaGuardia surface meteorological data) to 2.1% (using Bridgeport surface meteorological data) of the total modeled impact for direct $PM_{2.5}$. Results for the Union City, New Jersey receptor show that Connecticut source contributions range from 2.9% (LaGuardia data) to 2.3% (Bridgeport data) of the total. When viewed on a mass loading basis, contributions from the entire State of Connecticut range from 0.18 to 0.21 $\mu g/m^3$ at the New York City and New Jersey receptors, depending on the surface meteorological data used. Accordingly, it is concluded that primary $PM_{2.5}$ emissions from Connecticut do not contributing significantly to nonattainment in New York or New Jersey.

Based on the results of both of these modeling studies, Connecticut is making a "**negative declaration**" for the $PM_{2.5}$ attainment counties of the state, as such counties do not significantly contribute to nonattainment or interfere with maintenance of the $PM_{2.5}$ standards in another state.

2.2.2 Connecticut's $PM_{2.5}$ Nonattainment Region: Fairfield and New Haven Counties

In a letter to the CTDEP Commissioner on December 5, 2005, EPA Administrator, Stephen Johnson, denied Connecticut's request to reconsider EPA's designation of Fairfield and New Haven counties as part of the New York-Northern New Jersey-Long Island, CT-NJ-NY $PM_{2.5}$ nonattainment area. This was based on EPA's nine factor analysis for Connecticut which concluded that the counties of New Haven and Fairfield contribute to elevated levels of $PM_{2.5}$ throughout the NYC metropolitan area based on the magnitude of current emissions and traffic patterns in these counties. In particular, EPA stated that these counties are a conduit for a large percentage of the diesel truck traffic that flows out of New England into New York.

CTDEP continues to disagree with the basis for EPA's nonattainment designation for Fairfield and New Haven under the 1997 $PM_{2.5}$ standards. The EPA CAIR and CTDEP modeling discussed in the previous section show Connecticut does not significantly contribute precursors to $PM_{2.5}$ (i.e., NO_x, SO_2) or primary $PM_{2.5}$ to violating monitors in New York or New Jersey. As documented in CTDEP's response package[8] to EPA's nine factor analysis, the volume of light and heavy-duty vehicle traffic from Connecticut to New York and New Jersey is less than 1% of the total traffic volume in those areas. Nonetheless, Connecticut is working with New York and New Jersey, as part of the New York City multi-state nonattainment area, to prepare a $PM_{2.5}$

[8] CTDEP, August 26, 2004. Connecticut's Response to the EPA 9-Factor Analysis for PM2.5 Designations.

Figure 2-6: County-Based Area Sources Included in ISC Primary $PM_{2.5}$ Modeling

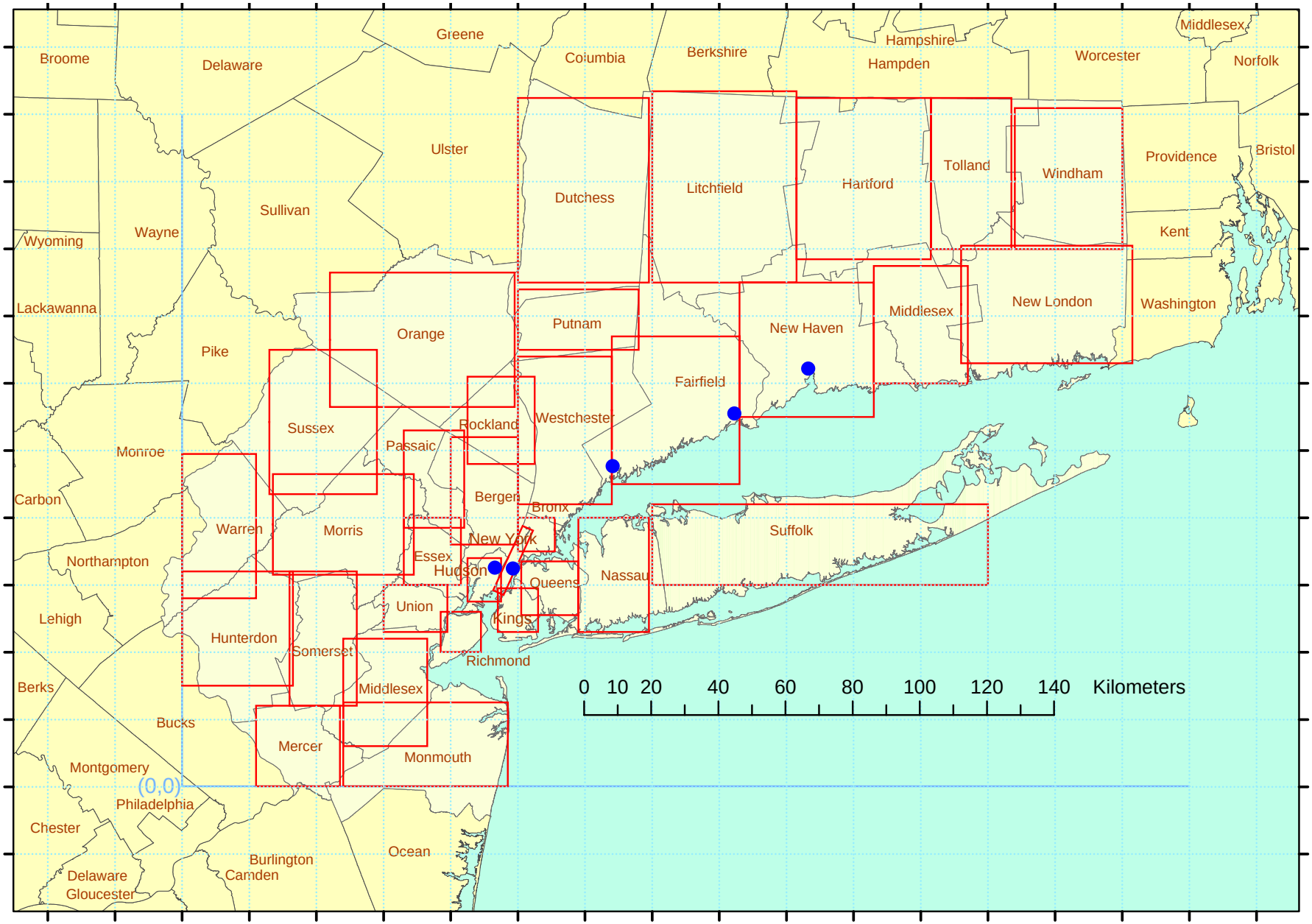


Table 2-7: ISC Results for Direct $PM_{2.5}$ Annual Average Concentration

		NYC (Manhattan)		Bridgeport CT		New Haven CT		Greenwich CT		Union City NJ	
Source County	STATE	**Adjusted Annual Average µg/m³ Contribution** LaGuardia/ Atlc City 1994 Met Data	**Adjusted Annual Average µg/m³ Contribution** Sikorsky/ Kennedy 1974 Met Data	**Adjusted Annual Average µg/m³ Contribution** LaGuardia/ Atlc City 1994 Met Data	**Adjusted Annual Average µg/m³ Contribution** Sikorsky/ Kennedy 1974 Met Data	**Adjusted Annual Average µg/m³ Contribution** LaGuardia/ Atlc City 1994 Met Data	**Adjusted Annual Average µg/m³ Contribution** Sikorsky/ Kennedy 1974 Met Data	**Adjusted Annual Average µg/m³ Contribution** LaGuardia/ Atlc City 1994 Met Data	**Adjusted Annual Average µg/m³ Contribution** Sikorsky/ Kennedy 1974 Met Data	**Adjusted Annual Average µg/m³ Contribution** LaGuardia/ Atlc City 1994 Met Data	**Adjusted Annual Average µg/m³ Contribution** Sikorsky/ Kennedy 1974 Met Data
New Haven	CT	0.051	0.043	0.192	0.214	0.578	0.686	0.068	0.068	0.046	0.042
Litchfield	CT	0.008	0.007	0.012	0.016	0.015	0.019	0.010	0.010	0.009	0.007
Fairfield	CT	0.085	0.067	0.488	0.585	0.079	0.159	0.265	0.301	0.078	0.067
Hartford	CT	0.033	0.025	0.046	0.040	0.051	0.056	0.045	0.033	0.033	0.024
Middlesex	CT	0.008	0.009	0.016	0.018	0.026	0.030	0.008	0.011	0.007	0.009
New London	CT	0.015	0.022	0.023	0.031	0.028	0.041	0.017	0.022	0.014	0.022
Tolland	CT	0.006	0.004	0.011	0.008	0.014	0.010	0.007	0.006	0.006	0.004
Windham	NY	0.004	0.003	0.007	0.006	0.009	0.008	0.005	0.005	0.004	0.003
Dutchess	NY	0.010	0.013	0.021	0.019	0.029	0.017	0.015	0.020	0.009	0.012
Putnam	NY	0.004	0.006	0.015	0.009	0.006	0.007	0.008	0.012	0.004	0.005
Westchester	NY	0.069	0.088	0.040	0.085	0.022	0.062	0.343	0.426	0.073	0.069
Bronx	NY	0.254	0.308	0.018	0.045	0.012	0.032	0.071	0.104	0.210	0.204
New York	NY	9.753	5.445	0.062	0.144	0.042	0.107	0.197	0.261	1.453	1.467
Queens	NY	0.258	0.192	0.077	0.099	0.053	0.083	0.154	0.156	0.102	0.237
Kings	NY	0.516	0.163	0.047	0.063	0.035	0.055	0.084	0.101	0.259	0.168
Nassau	NY	0.043	0.065	0.055	0.067	0.038	0.050	0.147	0.081	0.032	0.068
Suffolk	NY	0.017	0.041	0.080	0.062	0.081	0.062	0.025	0.050	0.015	0.039
Richmond	NY	0.081	0.068	0.014	0.022	0.010	0.018	0.025	0.028	0.100	0.091
Orange	NY	0.020	0.029	0.020	0.021	0.015	0.019	0.045	0.028	0.021	0.028
Rockland	NJ	0.026	0.044	0.015	0.031	0.009	0.026	0.057	0.047	0.026	0.036
Sussex	NJ	0.017	0.011	0.004	0.009	0.003	0.008	0.008	0.010	0.018	0.011
Passaic	NJ	0.066	0.064	0.009	0.031	0.006	0.024	0.022	0.048	0.061	0.061
Bergen	NJ	0.203	0.465	0.025	0.095	0.018	0.066	0.077	0.179	0.200	0.280
Hudson	NJ	0.605	0.678	0.027	0.063	0.019	0.048	0.072	0.103	3.497	3.968
Essex	NJ	0.194	0.288	0.017	0.060	0.014	0.048	0.033	0.104	0.270	0.306
Union	NJ	0.048	0.129	0.012	0.030	0.009	0.024	0.025	0.049	0.068	0.175
Morris	NJ	0.054	0.064	0.008	0.032	0.007	0.025	0.015	0.050	0.065	0.060
Warren	NJ	0.012	0.018	0.003	0.013	0.002	0.011	0.006	0.016	0.013	0.016
Hunterdon	NJ	0.007	0.022	0.003	0.010	0.002	0.009	0.004	0.013	0.007	0.022
Somerset	NJ	0.019	0.053	0.007	0.020	0.006	0.017	0.011	0.029	0.021	0.059
Middlesex	NJ	0.068	0.089	0.023	0.039	0.018	0.034	0.038	0.049	0.077	0.105
Mercer	NJ	0.032	0.047	0.014	0.026	0.012	0.023	0.022	0.032	0.036	0.053
Monmouth	NJ	0.050	0.042	0.019	0.024	0.016	0.020	0.025	0.030	0.054	0.047
TOTAL	**(µg/m3)**	**12.64**	**8.61**	**1.43**	**2.04**	**1.29**	**1.90**	**1.95**	**2.48**	**6.89**	**7.76**
CT Total	**(µg/m3)**	**0.21**	**0.18**	**0.79**	**0.92**	**0.80**	**1.01**	**0.43**	**0.46**	**0.20**	**0.18**
NY Total	**(µg/m3)**	**11.05**	**6.46**	**0.46**	**0.67**	**0.35**	**0.54**	**1.17**	**1.31**	**2.30**	**2.42**
NJ Total	**(µg/m3)**	**1.37**	**1.97**	**0.17**	**0.45**	**0.13**	**0.36**	**0.36**	**0.71**	**4.39**	**5.16**
%	**CT**	**1.7**	**2.1**	**55.6**	**45.1**	**62.2**	**53.0**	**21.8**	**18.4**	**2.9**	**2.3**
%	**NY**	**87.5**	**75.0**	**32.4**	**32.8**	**27.5**	**28.3**	**59.9**	**52.9**	**33.4**	**31.2**
%	**NJ**	**10.9**	**22.9**	**12.0**	**22.2**	**10.3**	**18.7**	**18.3**	**28.7**	**63.7**	**66.5**

attainment plan that includes appropriate control strategies to provide for compliance with the annual $PM_{2.5}$ NAAQS by the April 2010 statutory deadline. In addition, Connecticut is working with its regional partners, through the OTC and NESCAUM, to develop multi-pollutant strategies to reduce emissions region wide.

2.2.3 Recent Connecticut Programs to Reduce $PM_{2.5}$

Several programs are now in place to reduce emissions of pollutants that contribute to the emission and formation of $PM_{2.5}$ in the atmosphere. These include national programs requiring cleaner fuels and technology improvements on new cars and trucks; regional and state programs requiring reductions from power plants and industrial boilers; and state programs implementing cleaner fuels and retrofits on diesel school buses and construction equipment. The combined effects of these programs are expected to continue to result in significant improvements in measured $PM_{2.5}$ levels over the next several years, enabling Connecticut to continue to meet its section 110(a)(2)(D)(i) obligations regarding downwind impacts.

2.3 Connecticut's Programs to Prevent Significant Deterioration of Air Quality and to Protect Visibility in Downwind States

As described below, Connecticut has implemented a number of programs to ensure emissions from the state do not significantly deteriorate air quality in downwind states nor interfere with other states' ability to protect visibility. These programs include the CTDEP new source review (NSR) regulations, CTDEP's multi-pollutant emission reduction strategy and a new program being developed to meet regional haze goals.

2.3.1 CTDEP's New Source Review Regulations Address Air Quality and Visibility in Downwind States

Section 22a-174-3a[9] of the Regulations of Connecticut State Agencies (RCSA) governs new source review permitting in Connecticut. Subsection (k) of that regulation addresses prevention of significant deterioration (PSD) requirements and subsection (*l*) addresses nonattainment.

Prevention of Significant Deterioration

CTDEP's PSD regulations require the owner of any proposed new major source or major modification to demonstrate that any increased emissions from a proposed facility or expansion would not significantly deteriorate air quality. This provision is irrespective of the state to where the pollutant plume may travel. Therefore, any proposed facility subject to CTDEP's PSD pre-construction permitting requirements must assess PSD increment consumption in Connecticut as well as in adjacent states.

The federal visibility regulations promulgated in December 1980 require consideration of the effects of new sources on the visibility values of Federal Class I areas. RCSA section 22a-174-3a(k)(8)(A)(i) requires owners of all new major stationary sources or major modifications to

[9] All of Connecticut's air quality regulations are available at the following link: http://www.dep.state.ct.us/air2/regs/mainregs.htm

perform an additional impact analysis to assess impacts on visibility in federal Class I areas. In practice, this provision requires a modeling demonstration that may consist of a Level I or Level II visibility screening analysis, or a more refined visibility modeling review that would involve the use of a tool such as the CALPUFF model. These analyses require a source owner to demonstrate that operation of the source will have an insignificant visibility impact on the applicable Class I area. The CTDEP works closely with the appropriate federal land manager when reviewing these analyses. This provision of Connecticut's NSR regulations essentially prohibits the permitting of a major stationary source or major modification that may significantly degrade visibility in a federal Class I area.

Non-Attainment Permit Requirements

Section 22a-174-3a(*l*) of the RCSA addresses pre-construction permitting of new major stationary sources and major modifications in non-attainment areas. Connecticut is designated non-attainment statewide for ozone and designated non-attainment for $PM_{2.5}$ in Fairfield and New Haven Counties. As such, subsection (*l*)(4) of the regulations requires the owner of any proposed source or modification to obtain emission reductions or emission reduction credits to offset emissions increases at a ratio of at least 1 to 1 for ozone and particulate matter precursors in nonattainment areas. This offsetting requirement has the effect of producing a net air quality benefit, including improved visibility in downwind areas.

Recent NOx and SO_2 Emission Reductions Also Improve Visibility in Downwind States

Connecticut's recently adopted programs to reduce SO_2 and NOx emissions from large electric generating units (EGUs) and other major stationary sources can reasonably be expected to reduce visibility impairment on nearby Class I areas. The programs are codified in RCSA sections 22a-174-19a for control of SO_2, 22a-174-22 for control of NOx, 22a-174-22b for the NOx Budget Program and 22a-174-22c for the CAIR program[10]. Notably, the first phase of the SO_2 regulation, with an effective date of January 1, 2002, limited sulfur emissions to an equivalent of 0.55 lbSO_2/MMbtu of heat input from each and every source subject to the rule. The second phase of SO_2 reductions, beginning January 2003, required an SO_2 emission limit of 0.33 lb/MMbtu, which may be met directly or using emission trading.

2.3.2 Regional Haze Planning Efforts

Pursuant to the Regional Haze regulation (64FR35714; July 1, 1999), EPA is requiring states to submit SIPs that contain measures to address regional haze, including a rate of progress strategy to address visibility impairment for each Class I area affected by emissions from each state. EPA is requiring states to submit these SIPs in December 2007. Connecticut is currently involved in the task of developing this SIP in coordination with MANE-VU, which is the regional planning organization for the Northeast states. This SIP will establish reasonable progress goals and emission limits for sources subject to the CAA's Best Available Retrofit requirements.

Reasonable Progress Goals

[10] Section 22a-174-22c is currently in the process of adoption.

The regional haze SIP will attempt to establish, for each Class I area, emission reduction/visibility improvement goals that provide for reasonable progress towards achieving natural visibility by 2064. The reasonable progress goals for the first ten year planning period will ensure improvement in visibility for the 20 percent most impaired days each year, and also ensure no degradation in visibility for the 20 percent least impaired days each year. The long term strategy developed under the regional haze rule will include enforceable emission limitations, compliance schedules and other measures necessary to achieve the reasonable progress goals established by the states in which the Class I areas are located. Connecticut's emission reduction obligations will be developed based on an analysis of monitoring and modeling data through a consultative process with the Class I states, MANE-VU and other regional planning organizations.

Best Available Retrofit Technology (BART)

One element of the regional haze SIP will involve developing a list of BART eligible sources in Connecticut, and determining their impact on visibility at all federal Class I areas in the region. Connecticut has compiled a list of these sources and has submitted this information to our regional partner NESCAUM, the Clean Air Association of the Northeast States. NESCAUM is performing visibility modeling to quantify visibility impacts from all BART sources in the MANE-VU states. The BART analyses will determine the potential for emission reductions from these BART-eligible sources based on a five-factor analysis. The factors include the cost of compliance, the energy and non-air quality environmental impacts of compliance, any existing pollution control technology in use at the source, the remaining useful life of the source and the degree of improvement in visibility that may reasonably be expected to result from the use of such technology.

The regional haze SIP, although under development, is at too early a stage to draw any conclusions regarding the magnitude and type of emission reductions that will be required to meet reasonable progress goals or BART requirements. As the SIP development process moves forward, Connecticut will adopt appropriate revisions to its regulations to ensure that the requirements of CAA section 110(a)(2)(D)(i)(II) are met in a timely manner.

3.0 Section 110(a)(2)(D)(i) Compliance by States Upwind of Connecticut

Ozone levels in Connecticut are overwhelmingly influenced by transport from upwind areas. In this section, CTDEP uses EPA's analyses in support of the CAIR program along with more recent analyses to uphold the following statements:

- Post-CAIR emissions from a number of states upwind from Connecticut will continue to contribute significantly to ozone nonattainment in Connecticut beyond the attainment deadline of June 2010.
- EPA has the ability and obligation to significantly reduce transported emissions through the adoption of reasonably available control measures that are cost effective and can be adopted expeditiously.
- EPA has the opportunity through the 110(a)(2)(D) SIP submittal process to address Connecticut's unique situation with regard to transported emissions.

In the preamble to EPA's CAIR rulemaking, EPA concluded that states within the CAIR region can satisfy CAA section 110(a)(2)(D)(i) obligations to address their "significant contribution" and "interference with maintenance" impacts on downwind states by complying with the CAIR requirements. This approach is not adequate to sufficiently limit upwind states' emissions impacts on Connecticut's ozone levels.

EPA used two criteria to determine which states CAIR would apply to and the level of emissions reductions necessary in each state to limit interstate transport: air quality and cost of controls. In the discussion below, CTDEP generally agrees with the air quality factor approach used by EPA to identify significantly contributing upwind states. However, for a variety of reasons, including some unique to Connecticut, CTDEP believes that the cost factors applied by EPA to develop the CAIR program result in ozone season NOx reductions that are grossly inadequate to address the overwhelming amount of ozone transported into Connecticut from upwind states. EPA has acknowledged that it may need to address such "isolated instances" of interstate transport[11] with means beyond CAIR. To this end, CTDEP recommends that EPA closely review all CAA section 110(a)(2)(D)(i) SIPs and ozone attainment SIPs submitted by various states over the next several months. EPA should ensure that all states significantly impacting ozone nonattainment in Connecticut include sufficient emission reductions in their SIPs to limit transport to a level where it is possible for Connecticut to attain the 8-hour ozone NAAQS, concurrent with the adoption of reasonable in-state controls.

3.1 CAIR Does Not Adequately Address Upwind States' Significant Impacts on Connecticut's Ozone Nonattainment

In developing CAIR, EPA used the CAMx model to quantify each state's contribution to 8-hour ozone nonattainment in other states. EPA considered contributions to be significant if several air quality factors, or metrics, exceeded defined threshold levels. In general, EPA considered emissions from an upwind state to contribute significantly to nonattainment in a downwind state if the following metrics were met:

- the maximum modeled contribution was at least 2 parts per billion,
- the average contribution was greater than one percent, and
- certain other metrics were met regarding magnitude of contribution, frequency of contribution, and relative percentage of nonattainment attributed to the upwind state.[12]

[11] 70FR25179.

[12] See Section 2.1.1 of this document for further information. Full details regarding EPA's air quality factors can be found in Section VI of "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling"; US EPA OAQPS; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

Based on this procedure, EPA identified the eight states listed in Table 3-1 as contributing significantly to nonattainment in 2010 in one or more Connecticut counties, before considering the impacts of the CAIR program. The largest transport impacts to Connecticut are caused by emissions from New York, Pennsylvania, and New Jersey, with significant impacts also caused by emissions from Ohio, Virginia, Maryland/Washington, D.C., West Virginia, and Massachusetts. EPA's modeling further shows the CAIR program provides minimal relief from upwind state transport to Connecticut, with maximum ozone reductions of 0.4 ppb in 2010 and 0.8 ppb in 2015. These ozone reductions attributed to the CAIR program represent less than a 1% improvement in Connecticut's ozone levels.

When all states are considered (23 of the 30 states modeled by EPA have some impact on Connecticut), EPA's analysis shows that transport from upwind states during ozone exceedance periods contributes, on average, 95% of projected 2010 ozone levels in New Haven County, 93% in Middlesex County and 80% in Fairfield County. Connecticut is the only state shown by EPA to be subjected to transport exceeding 90% of projected 2010 ozone levels. With the exception of Kent County, RI (88% transport), no other eastern state experiences transport exceeding 65% of 2010 ozone levels.

The level of ozone transport into Connecticut from upwind states is so large that EPA's CAMx source apportionment modeling indicates that it is inconceivable to expect Connecticut to achieve attainment by the 2010 NAAQS deadline unless additional reductions, beyond CAIR, are provided by upwind states. As summarized in Table 3-2, examination of available data from EPA's CAIR modeling TSD[13] shows that the combination of post-CAIR transport of anthropogenic impacts from upwind states and regional biogenic emissions impacts results in predicted 2010 impacts exceeding the 8-hour NAAQS in Middlesex (i.e., 85.4 ppb) and New Haven (i.e., 87.5 ppb) Counties, even before considering any additional impacts from Connecticut's own emissions. As a result, emissions that are outside of Connecticut's control are likely to prevent attainment by 2010 without further upwind reductions that go beyond the CAIR program. Furthermore, the CAIR modeling did not adequately account for the increased emissions from upwind states that occur on high electric demand days, which are the very days when the highest ozone levels occur.

Connecticut's situation is unique, given both the overwhelming fraction of ozone transport (up to 95%) and the modeling projections that indicate emissions beyond Connecticut's control (i.e., transport and biogenic) will prevent Connecticut from reaching attainment by the 2010 NAAQS deadline, even if Connecticut eliminates all in-state emissions. To provide Connecticut citizens with the health protections required by the CAA, EPA must mandate additional upwind reductions.

[13] For further explanation see the notes section of Table 3-2 and Section VI .B. of "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling"; US EPA OAQPS; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

Table 3-1
States Contributing to Ozone Nonattainment in Connecticut Counties in 2010[1]
Based on EPA's CAIR Modeling

	Fairfield County	Middlesex County	New Haven County
2010 Base Case Modeled 8-Hour Ozone (ppb)	92.6	90.9	91.6
Average Modeled 3-Episode % Contribution[2]			
New York	19 %	26 %	25 %
Pennsylvania	24 %	20 %	21 %
New Jersey	21 %	18 %	19 %
Ohio	9 %	6 %	7 %
Virginia	5 %	4 %	4 %
Maryland/D.C.	4 %	Insignificant	4 %
West Virginia	3 %	Insignificant	2 %
Massachusetts	Insignificant	1 %	Insignificant
Total Percent of 8-Hour Ozone Due to Transport[3]	80 %	93 %	95 %

Notes: [1] The listed states significantly contribute to nonattainment in Connecticut in the 2010 base case, as identified by EPA in the CAIR. EPA's 2010 base case CAMx modeling analysis includes emission reductions from adopted national control programs, but not projected reductions due to the CAIR program. Data in the table are excerpted from Tables VI-5, V-1, VI-2, and Appendix G of "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling"; US EPA OAQPS; March 2005; see http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

[2] The "average modeled 3-episode percent contribution" is one of eight modeled air quality metrics used by EPA to assess whether an upwind state significantly contributes to 8-hour nonattainment in any other state(s). This source-apportionment metric provides an indication of upwind states' average percent contribution to Connecticut ozone levels during 8-hour ozone exceedance periods. See Section VI and Appendix G, respectively, of EPA's CAIR modeling technical support document (link provided above) for more details on the metrics used by EPA and the results for each metric.

[3] Connecticut is the only nonattainment state identified by EPA with counties subjected to transport from upwind states that exceeds 90% of total projected ozone in the 2010 base case. In fact, of 40 nonattainment counties projected by EPA to be significantly impacted by upwind emissions in the 2010 base case, only Kent County, RI (88%), Ozaukee County, WI (81%), and Sheboygan County, WI (74%) also experience transport exceeding 65% of total projected values. All other counties identified by EPA as being significantly impacted experience transport ranging from 24% to 65% of total values.

Table 3-2
2010 Post-CAIR Impacts in Connecticut
Based on EPA's CAIR CAMx Modeling

				2010 Post-CAIR Source Apportionment[4]			
	2010 Base w/o CAIR[1] (ppb)	2010 Impact of CAIR[2] (ppb)	2010 w/CAIR[3] (ppb)	Due to CT Emissions[5] (ppb)	Anthropogenic Transport Into CT[5] (ppb)	Biogenic[4] (ppb)	Total Not Controllable by CT[6] (ppb)
Fairfield County	92.6	-0.4	92.2	15.2	60.6	16.4	**77.0**
Middlesex County	90.9	-0.3	90.6	5.2	69.2	16.2	**85.4**
New Haven County	91.6	-0.3	91.3	3.8	71.1	16.4	**87.5**

Values in the table are taken/developed from CAMx modeling results documented in EPA's "Technical Support Document for the Final Clean Air Interstate Rule: Air Quality Modeling"; US EPA OAQPS; March 2005; http://www.epa.gov/cleanairinterstaterule/pdfs/finaltech02.pdf.

Notes: [1] EPA projected 2010 8-hour ozone design values, without the effects of the CAIR program. Excerpted from Table VIII-4 of the document cited above.

[2] EPA projected 2010 impact of CAIR program (negative value is an ozone reduction). Excerpted from Table VIII-4 of the document cited above.

[3] EPA projected 2010 8-hour ozone design values, including the effects of the CAIR program. Excerpted from Table VIII-4 of the document cited above.

[4] EPA's source apportionment modeling with the CAMx model provides ozone impact estimates attributable to various source categories (e.g., anthropogenic, biogenic) and source regions (e.g., Connecticut, states upwind of Connecticut). On page 30 of EPA's CAIR modeling TSD (cited above), EPA uses Fairfield County as an example for CAMx source apportionment results. EPA indicates that, of the 6,527 ppb of total ozone in Fairfield County over the 65 exceedances in the 2010 base case run, 5,362 ppb is due to anthropogenic sources. Thus, anthropogenic emissions account for 82.2% (or 76.1 ppb) of the 2010 base (w/o CAIR) ozone level of 92.6 ppb in Fairfield County, with biogenic emissions accounting for the other 16.5 ppb. EPA's TSD does not provide specific breakdowns for the other counties, so CTDEP assumed that the Fairfield anthropogenic fraction (i.e., 82.2%) can reasonably be applied to Middlesex and New Haven Counties. Similar source apportionment calculations can be applied to total 2010 impacts (with CAIR). For example, in Fairfield County 82.2% (or 75.8 ppb) of the 92.2 ppb post-CAIR total can be attributed to anthropogenic emissions and 16.4 ppb to biogenic emissions.

[5] As discussed earlier, Table VI-2 and pages 30-31 of EPA's TSD (cited above) describe EPA's estimate of the "percent of 8-hour ozone due to transport" for each nonattainment county in 2010 (i.e., 80% for Fairfield County, 93% for Middlesex County, and 95% for New Haven County). Applying the 80% transport factor for Fairfield to the 2010 post-CAIR anthropogenic contribution (75.8 ppb) described in the previous footnote, results in an estimated 60.6 ppb of ozone due to anthropogenic transport from upwind states and 15.2 ppb due to Connecticut emissions. The same procedures were used to determine source apportionments for the other two Connecticut counties.

[6] **Adding the contributions due to transport from upwind states to contributions caused by biogenic emissions provides an estimate of the level of ozone predicted in 2010 by EPA's modeling (including CAIR) that cannot be controlled by Connecticut. Results exceeding 85 ppb indicate that Connecticut may not be able to attain the 8-hour ozone NAAQS in 2010 without additional upwind emission reductions, even if all of Connecticut's emissions are eliminated.**

3.2 Additional Regional NOx Reductions Beyond CAIR Are Cost Effective

After using the air quality factors described above to determine which states significantly contribute to ozone nonattainment in downwind areas, EPA determined the level of emission reductions it deemed as sufficient to address the requirements of CAA section 110(a)(2)(D)(i). EPA predicated the determination on a level of reductions it termed "highly cost effective" in relation to a reference list of costs associated with recently adopted control programs. EPA's use of the "highly cost effective" standard, while appropriate in concept, does not yield acceptable results for Connecticut and therefore fails to comport with the CAA.

In the CAIR preamble, EPA presents its rationale for including the costs of controls in determining the appropriate level of reduction to be required from significantly contributing upwind states:

> *We are striving in this proposal to set up a reasonable balance of regional and local controls to provide a cost effective and equitable governmental approach to attainment with the NAAQS for fine particles and ozone. (70FR25175)*

Although it is appropriate to achieve necessary emission reductions in the most cost effective manner, the sole statutory consideration guiding determinations under CAA Section 110(a)(2)(D)(i) is that state implementation plans "contain adequate provisions … prohibiting emissions in amounts which will … contribute significantly to nonattainment in any other state." EPA's remedy for states' section 110(a)(2)(D)(i) obligations, the CAIR program, asserts that upwind states' significant contributions to summer season ozone levels will be sufficiently addressed through what EPA has concluded are "highly cost effective" controls. The resulting CAIR program provides for minimal improvements to the overwhelming level of transport to Connecticut and will unacceptably extend nonattainment conditions into the future despite Connecticut's good faith efforts to adopt local controls. EPA and upwind states should consider other cost effective controls, beyond those considered highly cost effective, in order to reduce the level of transported pollution to Connecticut.

EPA's decision to limit upwind states' emission reduction obligations to what it defines as highly cost effective controls presumes that the downwind nonattainment state is able to achieve additional necessary reductions for attainment, without consideration of whether such additional reductions are available at any cost. This presumption does not hold true for Connecticut. As discussed earlier, EPA's modeling shows transport impacts alone violate the ozone NAAQS, thus making it impossible for Connecticut to attain regardless of the level or cost of additional in-state controls.

When determining highly cost effective controls for CAIR, EPA examined both the average and marginal cost effectiveness[14] of other regulatory actions, using a ''reference list'' of NOx emissions controls judged to be available and of comparable cost to other recently undertaken or

[14] EPA defines marginal cost effectiveness as the incremental cost required to achieve the next ton of reduction after the defined control level. This metric can help to identify whether a more stringent control option imposes much higher costs relative to the average cost per ton for further control.

planned NOx measures (see Table 3-3; replicated from Table IV-6 of 70FR25208). Average control costs for the annual NOx measures on the reference list range from approximately $200 to $2,800 per ton of NOx reduced (in 1999$ per ton). Previously, in the NOx SIP Call, EPA had identified ozone season average costs of $2500 per ton of NOx reduced (1999$/ton) as highly cost effective. As reflected in Table 3-4, limited available data indicate marginal NOx control costs for annual state NOx requirements range from $2,000 to $19,600 per ton of NOx reduced (in 1999$/ton).

EPA's final CAIR ozone season control levels were based on EGU NOx caps of 0.6 million tons in 2009 and 0.5 million tons in 2015 within the CAIR ozone season NOx control region (compared to base case emission levels of 0.7 million tons). As shown in Table 3-5, EPA's estimated average cost per ton effectiveness to implement the caps is $900 in 2009 and $1800 in 2015 (in 1999$/ton), significantly lower than the seasonal NOx SIP Call's average cost of $2500 per ton of NOx reduced and at the low end of the annual CAIR program's reference range of $200 to $2,800. Similarly, EPA's estimated marginal costs for CAIR's ozone season NOx controls of $2,400 per ton of NOx reduced in 2009 and $3,000 per ton in 2015 (in 1999$/ton) fall into the lower end of EPA's reference range of marginal costs ($2,000 to $19,600 per ton of NOx reduced in 1999$/ton).

EPA also considered the cost effectiveness of alternative stringency levels for CAIR NOx reductions for ozone purposes by examining changes in the marginal cost curve at varying levels of emissions reductions. Figure 3-1 shows that the ''knee'' in the 2010 cost effectiveness curve developed by EPA for ozone season NOx reductions from EGUs (i.e., the point where the cost of controlling an ozone season ton of NOx begins to increase at a noticeably higher rate) occurs somewhere between $3,000 and $4,000 per ton of NOx reduced. EPA's 2015 results are similar. This cost range corresponds to a summer EGU NOx cap of between about 0.32 and 0.42 million tons, which is 30-47% less than EPA's adopted CAIR cap of 0.6 million tons in 2009 and 16-36% less than EPA's adopted CAIR cap of 0.5 million tons in 2015.

In the CAIR preamble, EPA indicates that CAIR control costs are even lower than described above:

> *For purposes of estimating costs of ozone season control under CAIR, EPA set up this modeling case with CAIR ozone season NOx requirements but without the annual NOx requirements. The Agency believes that the cost of the ozone season CAIR requirements will actually be lower than the costs presented here because interactions will occur between the CAIR annual and ozone season NOx control requirements. In addition, for States in both programs, the same controls achieving annual reductions for PM purposes will achieve ozone season reductions for ozone purposes; this is not reflected in our cost-per-ton estimates.* (70FR25212) [emphasis added]

Based on EPA's estimates of average and marginal costs described above, significant additional regional ozone season NOx reductions beyond CAIR may be achieved at a reasonable cost. Given the overwhelming level of transport uniquely affecting Connecticut, such reductions are essential to address Connecticut's "isolated instance" of overwhelming transport and to allow for local measures to succeed.

Table 3-3
EPA's Reference List of Average Costs per Ton of Annual NOx Controls[6]
(1999 $/ton)

NOx control action	Average cost per ton
Marine Compression Ignition Engines	Up to $200 [2]
Off-highway Diesel Engine	$400–$700 [2]
Nonroad Diesel Engines and Fuel	$600 [1]
Marine Spark Ignition Engines	$1,200–$1,800 [2]
Tier 2 Vehicle Gasoline Sulfur	$1,300–$2,300 [2]
Revision of New Source Performance Standards for NOx Emissions-EGUs	$1,700 [3]
2007 Highway Heavy Duty Diesel Standards	$1,600–$2,100 [2]
National Low Emission Vehicle	$1,900 [2]
Tier 1 Vehicle Standards	$2,100–$2,800 [2]
Revision of New Source Performance Standards for NOx Emissions-Industrial Units	$2,200 [3]
On-board Diagnostics	$2,300 [2]
Texas NOx Emission Reduction Grants FY 2002–2003	$300–$12,700 [4]
Best Available Retrofit Technology (BART) for Electric Power Sector	$800 [5]

1 Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel; Final Rule (69 FR 39131; June 29, 2004). The value in this table represents the long-term cost per ton of emissions reduced from the total fuel and engine program (cost per ton of emissions reduced in the year 2030). This value includes the cost for NOx plus NMHC reductions. 1999$ per ton.

2 Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements; Final Rule (66 FR 5102; January 18, 2001). The values shown for 2007 Highway HD Diesel Stds are discounted costs. Costs shown in this table include a VOC component. 1999$ per ton.

3 Proposed Revision of Standards of Performance for Nitrogen Oxide Emissions From New Fossil-Fuel Fired Steam Generating Units; Proposed Revision to Reporting Requirements for Standards of Performance for New Fossil-Fuel Fired Steam Generating Units; Proposed Rule (62 FR 36953; July 9, 1997), Table 4 (the Agency's estimate of average control costs was unchanged for the NSPS revisions final rule, published September 5, 1998). In the CAIR NPR, we included a value from the range of NOx controls for coal-fired EGUs from Table 2 in the proposed NSPS proposed rule (62 FR 36951). 1999$ per ton.

4 Costs shown in this table are the range of project costs reported for projects that were FY 2002–2003 recipients of the TERP Emission Reductions Incentive Grants Program. These costs may not be in 1999 dollars. *(www.tnrcc.state.tx.us/oprd/sips/grants.html)*

5 The EPA IPM modeling 2004 of the proposed BART for the electric power sector (69 FR 25184, May 5, 2004), available in the docket. The EPA modeled the Regional Haze Requirements as a source specific 0.2 lb/mmBtu NOx emission rate limit. Estimated average costs based on this modeling are $800 per ton in 2015 and 2020. 1999$ per ton.

6 The table and above notes are from the CAIR final rulemaking (Table IV-6 at 70FR25208).

Table 3-4
EPA's Marginal Control Costs for Recent Annual NOx Rules[2]
(1999 $/ton)

NOX control action	Marginal cost per ton
Texas Rules	$2,000–$19,600 [1]

1The EPA IPM base case modeling August 2004, available in the docket. 1999$ per ton. We modeled Senate Bill 7 and Ch. 117, which impose varying NOx control requirements in different areas of the State; the range of marginal costs shown here reflects the range of

2 The table and above note are from the CAIR final rulemaking (Table IV-7 at 70FR25209).

Table 3-5
EPA's Estimated Costs for CAIR Ozone Season NOx Controls[1]
(1999 $/ton)

Type of cost effectiveness	2009	2015
Average Cost	$900	$1,800
Marginal Cost	2,400	3,000

1 From the CAIR final rulemaking (Table IV-11 at 70FR25212).

Figure 3-1

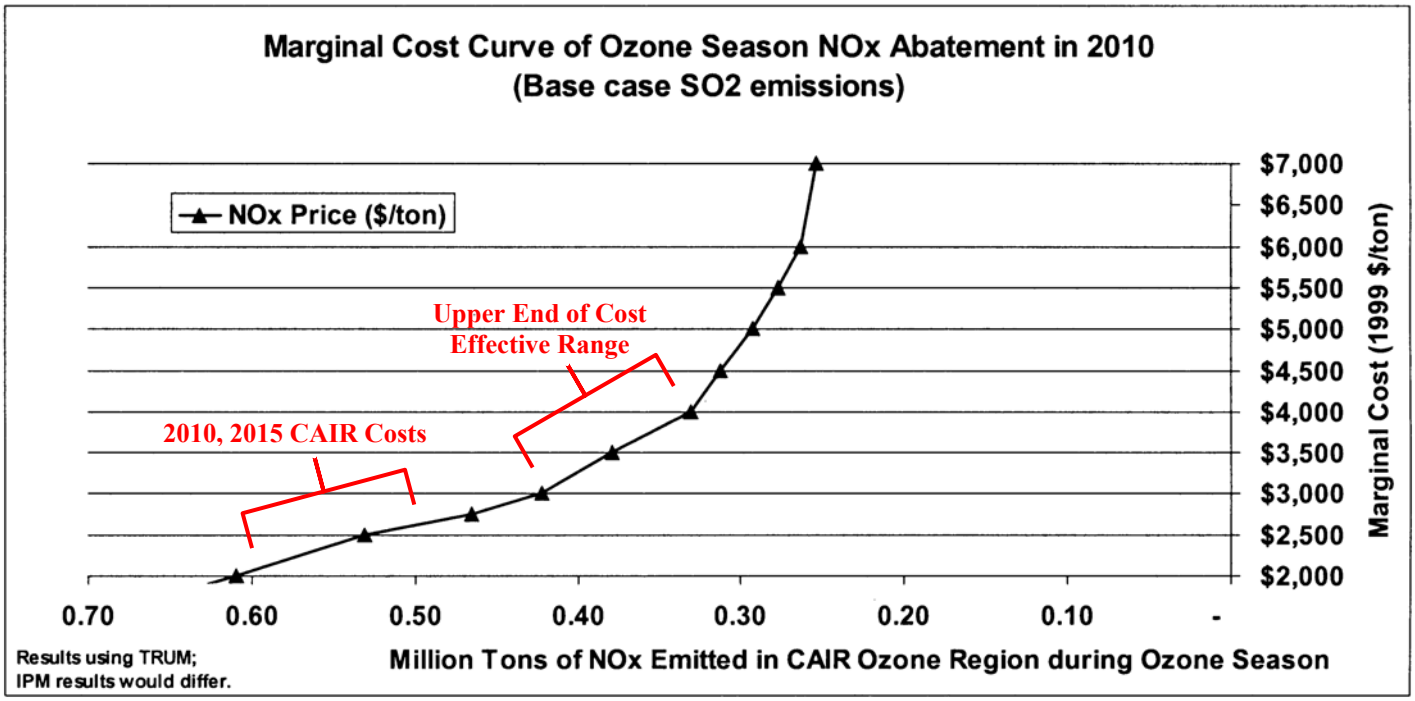


Figure excerpted from the CAIR final rulemaking (Figure IV-5 at 70FR25213), except bracketed annotations added by CTDEP.

3.3 EPA CAIR Preamble Provides a Mechanism to Require Additional Transport Reductions

EPA considers the emission reductions and air quality improvements provided by CAIR to be sufficient to meet state obligations under CAA section 110(a)(2)(D)(i), even though Connecticut receives minimal relief from what amounts to overwhelming ozone transport. In the CAIR preamble, EPA states the conditions under which any future large-scale transport rulemakings might occur:

> *Therefore, we intend to undertake any future broad, multi-state rulemakings under section 110(a)(2)(D) regarding transported emissions only when, as here, they produce substantial air quality benefits across a broad area and have beneficial air quality impacts on a significant number of downwind nonattainment areas, including bringing many areas into attainment. We do not at this time anticipate the need for any such rulemakings in the future. (70FR25178)*

EPA's CAIR preamble also indicates that EPA recognized circumstances such as that of Connecticut may remain after CAIR and provided a mechanism to address unique cases of interstate transport:

> *In adopting this approach for determining whether a future broad, multi-state SIP call is appropriate, we note that other CAA mechanisms, such as SIP disapproval authority and State petitions under section 126, are available to address more isolated instances of the interstate transport of pollutants. (70FR25179)*

Given the level of overwhelming transport projected to remain in Connecticut in 2010 after EPA's CAIR remedy is implemented, and the availability of cost effective controls that go beyond CAIR, CTDEP requests that EPA make use of the "isolated instance" SIP review mechanism to ensure that transport affecting Connecticut is adequately addressed.

3.4 Observations and Recommendations Regarding Upwind States' Transport to Connecticut

<u>Observations Regarding EPA's Transport Remedy</u>

Based on the above discussions, the following observations are made:

1) CAA section 110(a)(2)(D)(i) requires states to prohibit emissions that contribute significantly to nonattainment in any other state. Although it is desirable to balance control costs and emission reductions for both the significantly contributing and affected states, the plain language of this section is quite clear in its focus on reducing emissions that contribute significantly to downwind nonattainment. EPA's choice of control level for CAIR is weighted so heavily towards minimizing costs that it fails to provide adequate improvements in ozone season transport, particularly to Connecticut where maximum ozone reductions from CAIR are inconsequential (i.e., 0.4 ppb in 2009 and 0.8 ppb in 2015), reducing transport into Connecticut by less than one percent.

2) Connecticut is subject to levels of ozone transport that are significantly greater than any other state. EPA's 2010 CAIR source apportionment modeling estimates that 95% of 8-hour ozone nonattainment in New Haven County, Connecticut is due to transport from upwind states, meaning less than 5 ppb of the 91 ppb projected 2010 ozone design value – about 5% – can be attributed to Connecticut emission sources. The inescapable conclusion from this modeling is that nonattainment would persist in Connecticut in 2010 (with CAIR reductions) even if all Connecticut emission sources were to be eliminated.

3) Examination of EPA's CAIR cost analysis reveals that significantly more emission reductions can be achieved at a reasonable cost. The "highly cost effective" control level determined by EPA for CAIR corresponds to the lower end of the cost range from an EPA reference list of adopted NOx control programs. EPA's analysis of both average and marginal control costs indicates that additional cost effective NOx reductions are available.

Recommendations to EPA

Given the level of overwhelming transport projected to remain in Connecticut in 2010 after EPA's CAIR remedy is implemented, CTDEP requests that EPA follow through on the SIP review mechanism, outlined below.

1) EPA should carefully review all ozone-related SIP revisions (e.g., section 110(a)(2)(D) SIPs, ozone attainment demonstrations, CAIR SIPs) that are submitted by states identified as contributing significantly to ozone nonattainment in Connecticut. EPA should only approve SIPs from these states if such SIP revisions include sufficient emission reductions to meet the section 110(a)(2)(D)(i) requirement. Emission reductions from these states must go beyond those provided by CAIR, given the overwhelming levels of transport that the modeling shows will remain in Connecticut after CAIR implementation. EPA's review of these SIPs should ensure that, collectively, ozone transport is reduced adequately to enable Connecticut to achieve attainment with a reasonable level of in-state controls by the 2010 CAA deadline.

2) Although it may be appropriate to consider the cost of controls, in order to satisfy the explicit language of CAA section 110(a)(2)(D)(i), the level of projected ozone improvement needed to reduce transport should be the primary consideration dictating the level of control necessary in each contributing state. At a minimum, required control levels should correspond to the upper end of the cost range of controls cited by EPA in CAIR.

3) Additional EGU reductions should be considered, especially those targeting peak summer demand periods when high emitting units are dispatched during ozone episodes. Controls from all other source categories should also be evaluated. For example, in CAIR EPA elected not to pursue control of non-EGU boilers and turbines. EPA estimates that this group of sources contributes 16% of pre-CAIR NOx emissions in the region, versus 25% from the EGU sector. Both the on-road and non-road mobile source sectors, for which states have only a limited authority to regulate, also comprise a significant portion of NOx emissions and warrant further federal consideration for control.

4.0 Conclusions

In this document, CTDEP demonstrates that Connecticut has met its obligations under the transport provisions of CAA Section 110(a)(2)(D) to ensure that the state does not contribute significantly to other states' nonattainment or interfere with maintenance of the 8-hour ozone or $PM_{2.5}$ NAAQS or otherwise interfere with visibility protection or other states' efforts to prevent significant deterioration of air quality:

- Emissions from Connecticut are declining and will continue to decline into the future as federal, regional and state programs to reduce emissions from mobile and stationary sources become fully effective.
- Emissions from Connecticut are not significantly transported to nor significantly affecting $PM_{2.5}$ nonattainment in New York City or New Jersey.
- Modeling and recent ozone air quality trends indicate that the two counties (Kent County, Rhode Island and Suffolk County, New York) where Connecticut's emissions may have had significant impacts on ozone nonattainment in the past have a plausible chance to attain the ozone standard by the regulatory deadline of 2010. Prospects for attainment in those counties would increase with additional transport reductions beyond CAIR.
- The combination of Connecticut's NSR permitting program, its multi-pollutant reduction program and development of a regional haze SIP with other states in the region provide adequate provisions to prevent Connecticut from interfering with visibility protection or PSD efforts in other states.

CTDEP has made the following conclusions with respect to the importance of transported emissions on Connecticut's ability to attain the 8-hour ozone NAAQS:

- Connecticut does not have the ability to attain the 8-hour ozone NAAQS based on in-state emissions reductions alone, since up to 95% of the peak ozone levels measured in Connecticut are transported from out of state.
- The effect of CAIR on reducing the transport of ozone and its precursors to Connecticut is negligible, reducing anthropogenic transport into Connecticut from upwind states by less than one percent.
- Transport from states upwind of Connecticut are contributing and will continue to contribute significantly to 8-hour ozone NAAQS nonattainment in Connecticut after the regulatory attainment deadline of 2010 unless emissions are reduced beyond CAIR.
- As a consequence of limiting the CAIR remedy to reductions considered "highly cost effective" regardless of the level of resulting downwind air quality improvements, EPA is missing out on multiple opportunities to achieve cost effective emission reductions that could help upwind states meet their CAA Section 110(a)(2)(D) obligations.
- EPA must meet its remaining obligations under the transport provisions of CAA Section 110(a)(2)(D) to ensure that the upwind states' emissions leading to ozone nonattainment in Connecticut are reduced adequately to provide for 8-hour ozone attainment in Connecticut in an expeditious and cost-effective manner.