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DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
ALBANY, NEW YORK, 12233-1010

OCT - 1 2004

Honorable Jane M. Kenny  
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United States Environmental Protection Agency  
290 Broadway, 26<sup>th</sup> Floor  
New York, New York 10007-1866

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DEPT. OF ENVIRONMENTAL PROTECTION  
OFFICE OF DEPUTY COMMISSIONER

Dear Regional Administrator Kenny:

On June 29, 2004, you wrote to Governor Pataki regarding the United States Environmental Protection Agency's (EPA) proposed modifications to New York State's recommendations for designations of nonattainment under the fine particle (PM<sub>2.5</sub>) National Ambient Air Quality Standard (NAAQS). That letter indicated that any supplemental information must be submitted for EPA's consideration by September 1, 2004. As noted in my correspondence dated August 25 and September 1, 2004, the New York State Department of Environmental Conservation (Department) disagrees with the proposed modifications to New York's February 13, 2004 recommendations and the abbreviated period of time for the Department to respond. The Department continued to receive technical information from EPA regarding the proposed modifications through the month of August and even into September. Having completed the necessary review of the information received, and consistent with my September 1, 2004 letter, I am enclosing the Department's technical response to the proposed modifications.

I would also like to express my concerns regarding this designation process. Throughout this process EPA has not followed its own guidance. For example, states were informed that the implementation guidance that drives this program would be released prior to making recommendations, though it has yet to be issued. Guidance which was to be issued regarding the time frame of the designation process and which was consistent with the Act has been superseded by transmittal letters, methods of analysis that are being employed have been put forth without input from the affected parties, and EPA has failed to give consideration to its own published research and science.

The intent of establishing nonattainment areas is to create an area in which implementation of controls will be effective in expediting achievement of the NAAQS. Establishing the boundary of such an area should be logically based on the nature of the particular pollutant for which the standard is being violated, and analysis of where the enactment of controls will expedite attainment.

EPA has proposed adding the counties of Suffolk, Nassau, Westchester, Rockland and Orange to the proposed PM<sub>2.5</sub> nonattainment area in New York. This expansion is based, in part, on data collected at a single monitor in Connecticut which recorded a violation of the annual PM<sub>2.5</sub> NAAQS.

Based on the results from the single monitor in New Haven, Connecticut, EPA staff conducted an analysis that reviewed, among other things, emissions, population, traffic and commuting patterns, and pollution roses to determine that the additional five counties in New York are significant contributors to the nonattainment levels recorded at the Stiles Street monitor in New Haven.

This analysis appears to be in contradiction to a source characterization study that EPA performed by speciating the collected PM<sub>2.5</sub> data from eight cities around the country. Included in that analysis was data from the Bronx Botanical Gardens located in New York City. This study found that 58 percent of the total PM<sub>2.5</sub> mass was consistent with regional and transported sources of this pollutant. The results of this study would seem to indicate that contributions from the five additional counties in New York are not significant at the Stiles Street monitor, and in proposing to designate these counties as nonattainment, EPA will be placing a burden on areas in New York State that do not contribute significantly to nonattainment, and cannot contribute to achieving attainment.

New York continues to implement requirements to control the precursors to PM<sub>2.5</sub>. Additional controls on stationary source emissions of sulfur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>) have been enacted. The Metropolitan Transportation Authority (MTA) bus fleet now utilizes low-sulfur diesel fuel and its diesel bus fleet has been retrofitted with controls. The State has also been very supportive of EPA's efforts to control both diesel engines and fuel in all source categories.

Given our current understanding of PM<sub>2.5</sub> source characterization, New York believes EPA's recommendation to expand the New York PM<sub>2.5</sub> nonattainment boundaries is inappropriate and will not provide the basis to adequately address PM<sub>2.5</sub> in New York or Connecticut.

Should you have any questions regarding these comments, please do not hesitate to contact me at (518) 402-8540. Should your staff have questions, please have them contact David J. Shaw, Director of the Department's Division of Air Resources at (518) 402-8452.

Sincerely,

Erin M. Crotty

Enclosure

cc: Honorable Robert Varney, Regional Administrator, USEPA Region 1  
Honorable Arthur Rocque, Commissioner, CTDEP ✓  
Honorable Bradley Campbell, Commissioner, NJDEP

## Enclosure 1 – Review and Rebuttal of EPA’s Technical Analysis

### Overview

The United States Environmental Protection Agency (EPA) identified nine factors as the basis for its modification of New York’s recommendation of a five-county nonattainment region for the National Ambient Air Quality Standard (NAAQS) for fine particles (PM<sub>2.5</sub>) (July 1, 2004 letter from Regional Administrator Kenny to Commissioner Crotty). The modifications proposed by EPA expands New York State’s February 13, 2004 recommended PM<sub>2.5</sub> nonattainment area to include Westchester, Rockland, Orange, Nassau, and Suffolk Counties (supplemental counties). The New York State Department of Environmental Conservation (Department) does not support the proposed modification.

In proposing these modifications, EPA has not identified how each of the nine factors were weighted in reaching the conclusion that a specific county should be included in the nonattainment area. In completing this supplemental analysis, the Department reviewed EPA’s assessment of the nine factors and conclusions. The Department disagrees with some of the information presented by EPA in addressing the nine factors and has developed this assessment. Generally, the Department has the following comments.

The Department notes that EPA uses a meteorology analysis method with regard to the Stiles Street monitor in New Haven, Connecticut, that is similar to the method employed by the Department in its February 13, 2004 demonstration. That demonstration showed that emissions from the supplemental counties do not contribute to the nonattainment readings in New York and Bronx Counties. As EPA did not discuss meteorology with regard to the monitors in New York and Bronx Counties, it is apparent that EPA concurs that the supplemental counties do not contribute to the nonattainment readings at the New York and Bronx County monitors.

To designate the supplemental counties, which are clearly in attainment, as contributing to a problem at the Stiles Street monitor, when that monitor meets the definition of a microscale monitor, is an error. The similarity of the attainment readings throughout the supplemental counties and the counties of Connecticut, does not support a contention that New York’s counties are contributing significantly to the nonattainment readings at the Stiles Street monitor. Rather, these data only emphasize the fact that the monitors recording nonattainment of the PM<sub>2.5</sub> NAAQS in New York and Connecticut are influenced by very localized sources which are unrelated to each other.

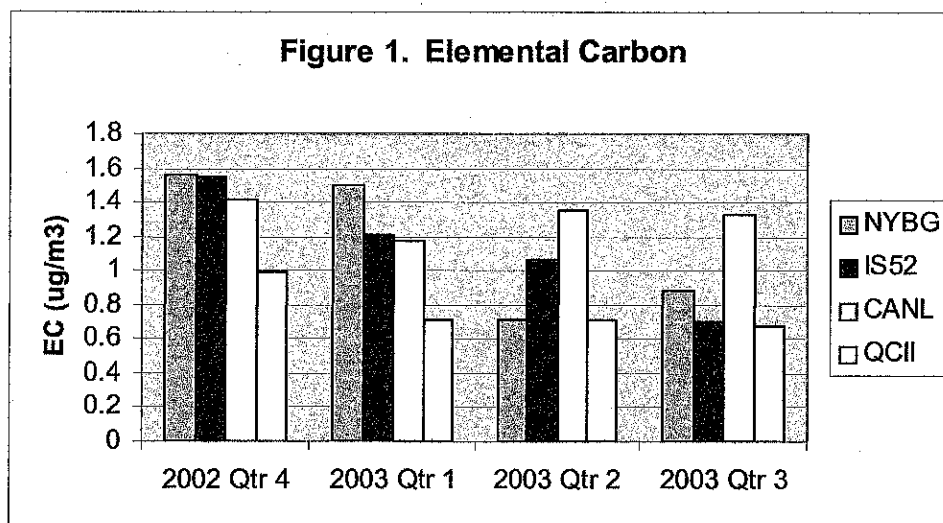
The Department is concerned that EPA is ignoring existing research and analysis regarding the nature of PM<sub>2.5</sub>, and the unique behaviors of direct and secondary emissions over distance. EPA needs to take into consideration not only factors that can serve as indicators of relative emission volumes such as Vehicle Mile Traveled (VMT) and populations, but also how far the PM<sub>2.5</sub> impact from those sources reach.

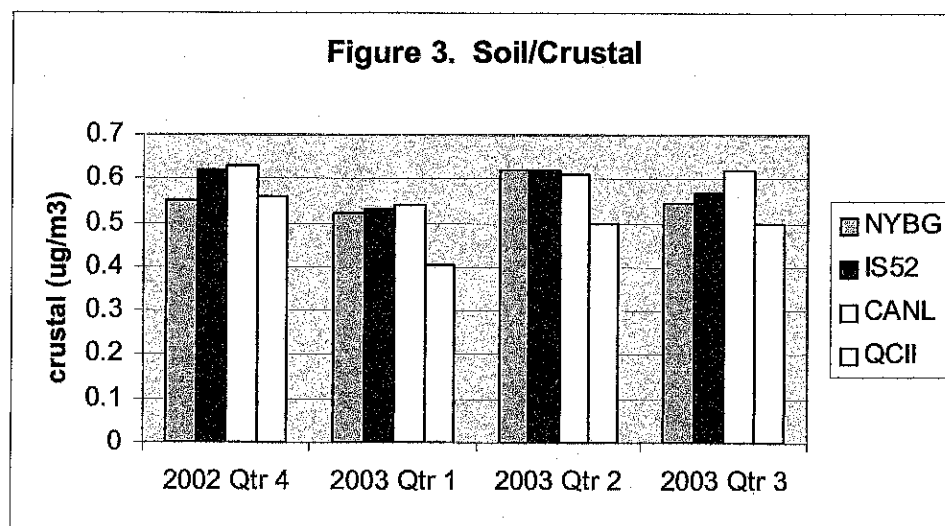
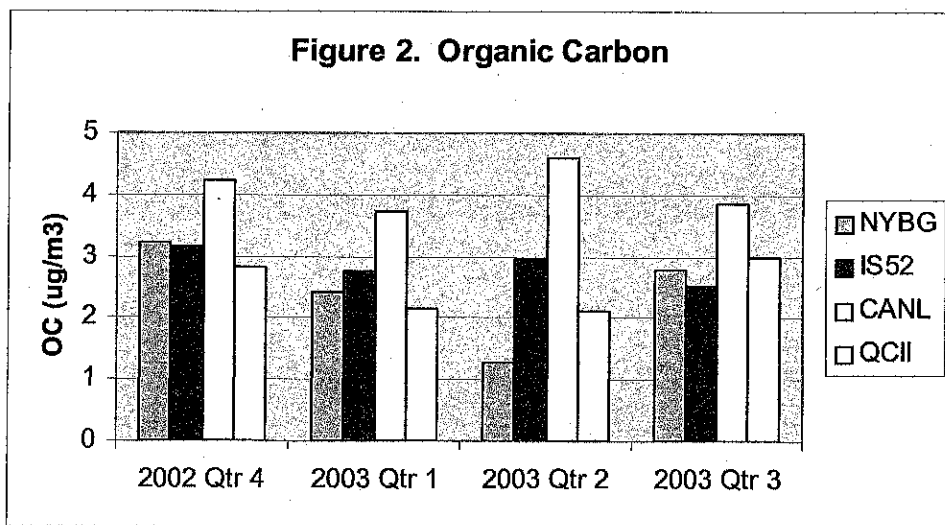
EPA recognizes the following species as being the major contributors to PM<sub>2.5</sub> mass load: sulfate, nitrate, organic carbon, elemental carbon, and soil/crustal material. Sulfate and nitrate are generally associated with ammonium, and soil/crustal material is assumed to consist of oxides of aluminum, calcium, iron, silicon, and titanium. It is known that the observed concentrations of these major PM<sub>2.5</sub> species are associated with both regional and local source

types. In order to better understand the behavior of  $PM_{2.5}$ , EPA recently conducted a comprehensive source apportionment study using  $PM_{2.5}$  speciation data from monitors in eight cities across the United States, including the Bronx Botanical Gardens site.<sup>1</sup>

The study identified seven source categories as contributors to the measured  $PM_{2.5}$  concentration levels at the Bronx site. Two of them are “coal combustion” and “ammonium nitrate.” The coal combustion source is high in ammonium, organics, and sulfate, while the ammonium nitrate source is high in potassium, nitrate, and ammonium. Both are consistent with regional/transported source signature, and combined they account for about 58 percent of the total  $PM_{2.5}$  mass. This implies that the area of influence for these regional emission sources impacting the New York City sites reaches well beyond the New York Consolidated Metropolitan Statistical Area (NYCMSA), perhaps as far as the Ohio River Valley/Industrial Midwest.

The remaining source categories: oil combustion, marine/industrial salts, mobile sources/tire wear, industrial, and crustal, account for about 42 percent of the mass. These are the local sources that contribute to  $PM_{2.5}$ . Crustal material and carbon species play important roles in each of these five remaining categories. Figures 1 through 3 show the quarterly average elemental carbon, organic carbon, and soil/crustal concentrations at four sites across New York City: Bronx Botanical Gardens (NYBG), Bronx Intermediate School 52 (IS52), Canal Street (CANL), and Queens College (QCII); from the fourth quarter 2002 through third quarter 2003. Note that there are gradients in these species across the metropolitan area, even within one county (Bronx), and that the seasonal variations are not always consistent from site to site. These intra-city variations are a reflection of the impact of localized sources over short distances. A recent study dealing with the spatial and temporal aspects of carbon in the Boston metropolitan area shows similar results, concluding that the impact of such local sources is limited to approximately ten miles from the urban core.<sup>2</sup> Therefore, expanding the nonattainment area boundary to include the supplemental counties based upon local emission sources is inappropriate.





Again, it is an error to designate counties in New York State that are clearly in attainment as nonattainment for “contributing” to a localized problem in Connecticut. It is evident from the above information, the distances between the supplemental counties in New York State and the New Haven monitor, and the similarity of the attainment readings at the monitors throughout the corridor from Westchester to the Stiles Street monitor in Connecticut, that designating these additional counties as nonattainment areas will not contribute toward the attainment of the PM<sub>2.5</sub> NAAQS.

EPA has also tried to distinguish between the local and regional sources of the major species of PM<sub>2.5</sub> by using an “urban excess” demonstration. “Urban excess” is the difference in

PM<sub>2.5</sub> concentrations at an urban location (for NYC, EPA uses a Bronx monitor) and at a rural location (for NYC, EPA uses a Brigantine, NJ monitor). For this designation process, EPA has arbitrarily created a relationship between urban excess in a region and the emissions from the counties near that urban area. EPA has not justified this concept and the Department believes that a pure evaluation of urban excess actually provides support for the original proposal for a five county nonattainment area.

In its evaluation of urban excess, EPA compared average concentration levels of SO<sub>4</sub>, NO<sub>3</sub>, total carbon (elemental and organic), and soil/crustal material between an individual rural and an individual urban location. In this comparison, EPA assumed that the observed concentrations at the rural site were due to regional sources, so EPA attributed the difference to the local/urban sources. One limitation of this approach is that the rural monitors are generally IMPROVE (Interagency Monitoring of PROtected Visual Environment) sites and the urban monitors are generally STN (EPA Speciation Trends Network) sites, with the two networks having different sampling and analysis methodologies. Another shortcoming is that in the case when the average concentration of a pollutant such as SO<sub>4</sub> at a rural site is higher than the corresponding value at the urban site, the urban excess is set to zero. More importantly, this methodology does not account for prevailing meteorology, even though there is a high degree of variability in the urban excess from season to season. These assumptions combine into a flawed analysis of the nature of PM<sub>2.5</sub>.

### **Factor 1. Emissions**

EPA has used the National Emission Trend (NET) 1999, version 3, emissions inventory that was grown to 2001 and identified as NET2001. While the Department had submitted 1999 annual and ozone season day emissions to the EPA, which were part of NET1999, version 2, the Department had not reviewed the NET1999, version 3 data, as these data were posted on the EPA web site in December 2003 and the accompanying documentation was posted in February 2004. In the case of particulate emissions, the Department had provided only primary PM and primary PM<sub>10</sub> emissions as part of its submission to EPA; however, EPA apparently used those data to estimate PM<sub>2.5</sub> emissions and further estimated speciated components of interest, crustal and carbon. EPA notes in the technical analysis that "emissions data are the most important factor in assessing boundaries of nonattainment areas," yet EPA's analysis is based upon extrapolated data. Given the importance of this data in the assessment of the nonattainment area boundary, the Department is concerned that these inventories were not readily available prior to August 19, 2004 for our review.

EPA's linkage of emissions to ambient air quality without accounting for meteorological processes that are quite critical in the transformation and transport of some of the components of particulate matter is novel. To understand this analysis, the Department requested estimates of concentrations attributed to each one of these counties, as attributed to the monitor that is in nonattainment. EPA has indicated that it does not have such information, yet the EPA's technical analysis states, "in addition, an analysis of pollution roses and back trajectories to New Haven, Connecticut showed a contribution from..." each one of the supplemental counties. If EPA does not have these data, its conclusion cannot be justified.

In particular, we would like to note that the estimation of "urban excess" is based upon comparison of data collected under different protocols (STN vs. IMPROVE). This subject is currently being researched in reference to nitrate and carbon fractions, with no definitive answer available at this time. While it is recognized that urban areas have higher concentration levels and emissions density compared to rural or remote areas, quantifying this difference as due to only urban emissions with no information on meteorology is not valid.

Given that EPA has not provided the data which shows concentration contributions from each of the supplemental counties at the nonattainment monitor, and that no relationship has been established between the urban excess for New York City and the Stiles Street monitor, the Department questions the validity of this factor in the development of nonattainment boundaries.

The only information that may be pertinent to this issue is included under Factor 6, Meteorology:

EPA REMSAD (Regional Modeling System for Aerosols and Deposition) model used during the analysis of Interstate Air Quality Rule (IAQR) demonstrated that the maximum contribution from New York State to the monitor in New Haven was  $0.85\mu\text{g}/\text{m}^3$ , or above the  $0.15\mu\text{g}/\text{m}^3$  threshold for determining whether emissions in a State make a significant contribution to  $\text{PM}_{2.5}$  nonattainment in another state.

It should be noted that the REMSAD model was run using a horizontal grid resolution of 36 km. An examination of Appendix H from the proposed IAQR indicates that besides New York State, other contributing states above the threshold limit are Illinois, Indiana, Massachusetts, Maryland/DC, Michigan, New Jersey, Ohio, and Pennsylvania.<sup>3</sup> At a minimum, EPA should have included the list of other states as also being contributors to nonattainment in New Haven, Connecticut.

### **Carbon Component**

In a recent study dealing with the spatial and temporal aspects of carbon in the Boston metropolitan area, it was shown unequivocally that high concentrations are confined to the urban core area, are highly localized, and are not transported into the suburban areas.<sup>2</sup> Therefore, the urban excess fraction of 67 percent for all carbon used in EPA's technical analysis should be limited to the urban or local area. This is borne out by the estimates of the carbon fractions of 41 percent, 59 percent, and 73 percent for the STN monitors located in Queens, Bronx, and New York Counties, respectively. The highest levels are associated with New York County and the levels fall off for the nearby counties, again indicating the contribution of this pollutant is highly localized.

### **Crustal Component**

Table 1 lists the average crustal concentrations along with the sample size for the locations listed. While the crustal concentrations from Bronx, New York and Queens Counties are between  $0.5$  and  $0.6\mu\text{g}/\text{m}^3$ , the concentrations from Suffolk and Orange County monitors are

0.28 and 0.30  $\mu\text{g}/\text{m}^3$ , demonstrating that this pollutant contribution is highly localized. In this analysis, the definition of crustal component is the same as that used by EPA in its technical analysis. This is further evidence that the “urban excess”  $\text{PM}_{2.5}$  in New York City is a highly localized pollutant.

<i>County</i>	<i>Location</i>	<i>Crustal Conc.</i>	<i>Sample size</i>
Bronx	IS52	0.599	60
Bronx	NYBG	0.576	57
Queens	Queens College	0.509	53
New York	Canal St	0.599	55
Orange	Newburgh	0.301	58
Suffolk	Babylon	0.279	59

### **Factor 2. Air Quality**

Orange, Nassau, Suffolk and Westchester Counties of New York have reported ambient design value concentrations of 11.5, 12.1, 12.4, and 12.4  $\mu\text{g}/\text{m}^3$ , respectively, for the 2000-2002 time period. For the 2001-2003 period the values were 11.5, 12.2, 12.1 and 12.3  $\mu\text{g}/\text{m}^3$ . All of these design values are well below the NAAQS level of 15.0  $\mu\text{g}/\text{m}^3$ .

Review of the  $\text{PM}_{2.5}$  monitoring data between the New York State/Connecticut border and the Stiles Street monitor located in New Haven, Connecticut shows that the entire area is also demonstrating attainment at similar levels (approximately 13  $\mu\text{g}/\text{m}^3$ ) indicating similarity of regional emission contributions. Therefore, Orange, Nassau, Suffolk and Westchester Counties are not significantly contributing to the high levels at the Stiles Street location, and this factor does not justify the expansion of the recommended nonattainment area boundaries.

### **Factor 3. Population**

Higher population is often associated with higher pollutant emissions. Four of the five counties of New York City (Bronx, Kings, Queens, and New York Counties) have high population densities. The supplemental counties have lower population densities and lower pollutant emissions.

Although cited as a determining factor in EPA’s summary, the information provided in the EPA technical analysis does not provide any quantitative information as to how this factor influences the modification of the nonattainment boundary. EPA states that “population data indicates the likelihood of population based emissions that might contribute to violations,” and that “Suffolk, Nassau, and Westchester Counties...score moderately high for this factor.” If this factor were significant for these counties, the impact would be clearly indicated by monitoring



results. However, the air quality in each of these counties and in Connecticut is well below the NAAQS, with the sole exception of the Stiles Street monitor. Therefore, it is apparent that for these counties, the population density does not indicate a significant contribution to nonattainment in any other county.

**Factor 4. VMT/Commuter Ratios**

The Department finds that the Vehicle Miles Traveled (VMT) presented in the Factor 4 table is incompletely and incorrectly labeled. Furthermore, EPA county-wide VMT is distorted by procedures used by EPA to allocate the statewide levels of VMT to each county in the State.

In its analysis, EPA took the statewide VMT and apportioned the VMT to counties using population as the sole factor. This is a completely inadequate method when applied to metropolitan New York. This distorts VMT in highly populated urban areas, especially where mass transit options are available. The five counties of New York City are perhaps the most extreme case in point in the entire nation. For instance, the Department's estimates of VMT for 2002 are only 67 percent of EPA's in Bronx County, 37 percent of EPA's in Kings County, and 50 percent in New York County. Use of the Department's VMT estimates at the county level would not only improve accuracy but ultimately provide a better comparison. The Department recommends that EPA use Department estimates (Table 2), which have consensus among the Department, New York State Department of Transportation and Federal Highway Administration (New York Division) technical staffs.

<b>TABLE 2</b>	
<b>TOTAL DAILY VMT ESTIMATE</b>	
<b>COUNTY</b>	<b>2002 Total Daily VMT Estimate</b>
Bronx	13,138,000
Kings	13,659,000
New York	12,132,000
Queens	21,723,000
Richmond	5,551,000
Nassau	33,027,000
Suffolk	56,631,000
Dutchess	8,869,000
Orange	13,183,000
Putnam	8,562,000
Rockland	7,527,000
Westchester	25,158,000
<b>Total VMT in NYMA</b>	<b>219,161,000</b>

## Commuting VMT

In the discussion for Factor 4, EPA cites Nassau, Suffolk and Westchester Counties as having a significant number of commuters to New York and Bronx County. These are also counties which make significant use of mass transit to those destinations.

Although cited as a determining factor in EPA's summary, the information provided in the technical analysis does not provide any quantitative information as to how this factor influences the modification of the nonattainment boundary. EPA states that Suffolk, Nassau, and Westchester Counties "score highest for VMT when compared to the rest of the CMSA and adjacent areas." However, if this factor were significant for this region, the impact would be clearly noted by recorded exceedances in these counties.

EPA also states that Nassau, Westchester and Suffolk Counties have a "significant number of commuters" traveling into the counties monitoring nonattainment, but it can be seen by comparing total VMT for the region (Table 2) to total commuter VMT (Table 3), that the latter is far outweighed by local traffic. For example, of the 12.1 million vehicle miles traveled in New York County, only 4.3 million miles are from Nassau, Suffolk and Westchester commuters. As these counties all show attainment of the NAAQS, it is not possible to conclude that this fraction of all PM<sub>2.5</sub> sources is creating the nonattainment problem at monitors that exceed the standard.

<i>Destination</i>	<i>Nassau</i>	<i>Suffolk</i>	<i>Westchester</i>
Bronx	103,748	85,963	409,725
Kings	353,383	293,975	107,241
New York	1,374,929	1,262,142	1,654,237
Queens	686,898	661,898	130,617
Richmond	24,799	18,346	12,281
Nassau	2,379,210	1,329,023	51,567
Suffolk	658,311	7,188,621	18,501
Westchester	78,236	54,590	2,427,907
Rockland	6,489	2,803	48,660
Orange	3,473	5,415	29,879
Putnam	2,744	3,601	45,181
Dutchess	3,896	1,849	39,014
Connecticut	39,052	32,915	456,054
<b>TOTAL</b>	<b>5,715,167</b>	<b>10,941,141</b>	<b>5,430,863</b>

Finally, review of the 2001 IAQR inventory indicates that EPA believes that on-road mobile sources only contribute approximately 5 percent of total PM<sub>2.5</sub> emissions. Therefore, this factor does not justify the expansion of the nonattainment area boundaries.

#### **Factor 5. Expected Growth**

Information presented in EPA's technical analysis lists the percent and absolute growth in population from 1990 to 2000. However, it is unclear if EPA expects that population would continue to grow at these rates. Also, no information is provided as to how this factor contributes to the modification of the nonattainment boundary for PM<sub>2.5</sub>.

#### **Factor 6. Meteorology**

EPA states that "Analysis of pollution roses and back trajectories to New Haven, Connecticut showed a contribution from Suffolk, Nassau, Orange, and Westchester ... Counties." As discussed above, New York and Connecticut experience similar regional impacts. Any significant contribution would be demonstrated through other exceedances at monitoring sites both in these counties and in Connecticut.

The reasons for this include: the consistency of the monitoring data showing attainment throughout the region, the demonstrated drop of monitored levels in these counties when compared to the nonattainment area in New York City, and research that demonstrates the significant but localized (within 10 miles) impact of local sources. It is clear that emissions in these counties are not significantly contributing to the exceedances at the Stiles Street monitor.

#### **Factor 7. Geography/Topography**

EPA notes that Westchester borders a nonattaining county. Westchester County narrows considerably southward to meet the Bronx. The resulting shared border is insignificant in proportion to the size of the counties.

EPA also notes that Rockland is contiguous to Westchester and Orange County. Since neither of those counties is monitoring nonattainment, this statement is irrelevant and is not sufficient to support a proposal of nonattainment for Rockland County.

#### **Factor 8. Jurisdictional Boundaries**

The five counties of New York City represent a distinct jurisdictional boundary compared to EPA's proposed nonattainment areas in New York.

#### **Factor 9. Level of Control**

The Department requested a list of control measures which EPA has evaluated for the NYCMSA under this factor, but EPA has provided no response. The Department is including the following information, which was not included in the emissions table for Factor 1, for EPA's consideration.

On August 17, 2004 the Department adopted the Acid Deposition Reduction Program (ADRP). The ADRP established the reduction requirements announced by the Governor in October of 1999 and will reduce emissions of Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Oxides (NO<sub>x</sub>) from fossil fuel-fired electric generators statewide. The NO<sub>x</sub> program, promulgated as 6 NYCRR Part 237, "Acid Deposition Reduction NO<sub>x</sub> Budget Trading Program," affects fossil fuel-fired electric generators 25 MW and larger. The SO<sub>2</sub> program, promulgated as 6 NYCRR Part 238, "Acid Deposition Reduction SO<sub>2</sub> Budget Trading Program," affects all electric generators subject to the federal Title IV program. The NO<sub>x</sub> program begins on October 1, 2004 and the SO<sub>2</sub> program is slated to begin on January 1, 2005. The Department estimates that these programs will result in 20,000 tons of annual NO<sub>x</sub> reductions and over 130,000 tons of annual SO<sub>2</sub> reductions statewide. This is approximately a 50 percent reduction below the Title IV levels of SO<sub>2</sub> and a 75 percent reduction below annual NO<sub>x</sub> State Implementation Plan (SIP) call levels of these sources.

## **CONCLUSION**

EPA bases its proposed expanded nonattainment area boundaries for Nassau, Orange, Suffolk and Westchester chiefly on four factors: emissions, population, traffic/commuting, and meteorology. Based on the discussions above and the monitoring of attainment throughout these counties, there is no technical merit to designating these counties as nonattainment. None of these counties contribute to nonattainment at the Stiles Street monitor, which is clearly recording local impacts.

For Rockland County, EPA's only justification for a nonattainment area designation is its proximity to Westchester and Orange Counties. Both of these counties should be designated as attaining the National Ambient Air Quality Standard, as should Rockland.

Based upon the documentation contained in this rebuttal, and EPA's lack of supporting documentation, EPA's proposed addition of the supplemental counties is without merit.

## References

1. Coutant, B. W., Holloman, C. H., Swinton, K. E., and Hafner, H. R., 2003. Final report: Eight-site source apportionment of PM<sub>2.5</sub> speciation trends data. Prepared for the US EPA/OAQPS, EPA Contract No. 68-D-02-061, Work assignment I-05.
2. Allen, G., and P. Johnson, "Spatial and temporal aspects of black carbon concentrations over the Boston metro area: an update of work in progress" presented at the 22<sup>nd</sup> Annual Conference of the American Association of Aerosol Research, Anaheim, CA, October 2003.
3. See Appendix H at <http://www.epa.gov/interstateairquality/technical.html>