UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
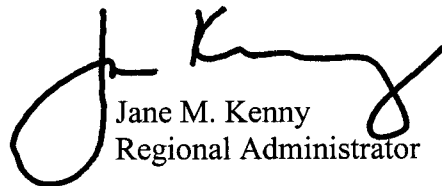290 BROADWAY
NEW YORK, NY 10007-1866

JUL - 1 2004

Ms. Erin M. Crotty
Commissioner
New York State Department of Environmental Conservation
Albany, NY 12233-1010

Dear Commissioner Crotty:

On June 29, 2004 I wrote to Governor Pataki informing him of the Environmental Protection Agency's proposed fine particulate matter designations. For your information, I have enclosed a copy of that letter as well as a copy of the technical analysis that presents the basis for our nonattainment recommendations.

We look forward to a continued dialogue with New York as we work to finalize the designations for the fine particulate standard. If you have any questions, please do not hesitate to contact me at 212-637-5000 or have your staff contact Walter Mugdan, Director of the Division of Environmental Planning and Protection at 212-637-3724.

Sincerely,

Jane M. Kenny
Regional Administrator

Enclosures

cc: Carl Johnson, Assistant Commissioner
    New York State Department of Environmental Conservation

EPA TECHNICAL ANALYSIS FOR PM2.5 DESIGNATIONS - NEW YORK

A.   Modifications to New York's Recommendations

Westchester

New York did not recommend Westchester County as a nonattainment county. EPA is modifying the New York recommendation by designating Westchester County as nonattainment.

Westchester County ranks high for emissions, population, traffic, and commuting patterns. Westchester is also adjacent to a county with a violating monitor. In addition, an analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Westchester County.

Nassau

New York did not recommend Nassau County as a nonattainment county. EPA is modifying the New York recommendation by designating Nassau County as nonattainment.

Nassau County ranks high for emissions, population, traffic, and commuting patterns. In addition, an analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Nassau County.

Suffolk

New York did not recommend Suffolk County as a nonattainment county. EPA is modifying the New York recommendation by designating Suffolk County as nonattainment.

Suffolk County ranks high for urban excess emissions, population, traffic, and commuting patterns. In addition, an analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Suffolk County.

Orange

New York did not recommend Orange County as a nonattainment county. EPA is modifying the New York recommendation by designating Orange County as nonattainment.

Orange County ranks high for emissions. Orange County also has several large point sources.

In addition, an analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Orange County.

Rockland

New York did not recommend Rockland County as a nonattainment county. EPA is modifying the New York recommendation by designating Rockland County as nonattainment. This county is recommended because it is contiguous to both Orange and Westchester Counties, and an analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Rockland County.

B.   An Explanation of EPA's 9-Factor Analysis

Factor 1. Emissions:

*The analysis for factor 1 looks at emissions of carbonaceous particles (carbon), inorganic particles (crustal), SO_2, and NOx. In general, EPA computed a composite emission score for each county by multiplying the county's emissions as a fraction of the metropolitan area emissions for each of these pollutants times a corresponding air quality weighting factor. These scores for the metropolitan area counties add to 100. For metropolitan areas with four or fewer counties, counties' emissions were taken as a fraction of total emissions summed over the metropolitan area plus counties adjacent to either the 1999 or the 2003 metropolitan area. For these areas, scores for the metropolitan area counties plus adjacent counties add to 100. The air quality weighting factors for each area are given below and reflect the percentages of the total estimated "urban excess" value found as carbonaceous particles, miscellaneous inorganic particles (crustal material), ammonium sulfate, and ammonium nitrate. Tables presented under factor 1 provide the carbonaceous particles, inorganic particles, SO_2, and NOx emissions and the composite emission scores for the counties in the corresponding metropolitan area and adjacent counties. Emissions data are derived from the National Emissions Inventory and are for 2001, given in tons per year. Metropolitan area counties are in **bold**. Emissions data indicate the potential for a county to contribute to observed violations, often making the emissions data the most important factor in assessing boundaries of nonattainment areas.*

"Urban excess" values are derived by comparing urban monitored component concentrations against rural monitored component concentrations. Concentrations of the four $PM_{2.5}$ components are obtained from local data if available or, if necessary, from the nearest available urban site, and are compared to available rural concentrations.

Factor 2. Air quality:

The air quality analysis looks at the annual averaged design value for each area based on data for 2001 to 2003.

Factor 3. Population/ Population density:

Tables presented under factor 3 show the 2002 population for each metropolitan area, as well as the population density for each county in that area. Population density is listed in people per square mile. Population data indicate the likelihood of population-based emissions that might contribute to violations.

Factor 4. Traffic and commuting patterns:

A county with numerous commuters is generally an integral part of the area, and would be an appropriate part of the domain of some mobile source strategies, thus warranting inclusion in the nonattainment area. A table summarizes the vehicle miles traveled (VMT) in 2002 and the number of commuters who travel to counties within the metropolitan area with violating monitors are also provided

Factor 5. Growth:

The growth analysis looks at the percent growth for counties in each metropolitan area from 1990 to 2000.

Factor 6. Meteorology:

The meteorology analysis looks at wind data gathered over a ten year period by the National Weather Service. Tables presented under factor 6 list the year round average prevailing wind directions by quadrant for each county in the corresponding metropolitan area. This data shows that annual average $PM_{2.5}$ concentrations are influenced by emissions in any direction at various times, but these data may also suggest that emissions in some directions relative to the violation may be more prone to contribute than emissions in other directions.

The meteorological analysis also included use of the HYSPLIT4 (HYbrid Single-Particle Lagrangian Integrated Trajectory) model to calculate 24-hour back trajectories, and analysis of pollution and wind rose data to further investigate the influence of weather patterns on observed PM 2.5 mass concentrations.

Factor 7. Geography/topography:

The geography/topography analysis looks at physical features of the land that might have an effect on the airshed, and therefore, the distribution of particulate matter over an area.

Factor 8. Jurisdictional boundaries:

The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner.

Factor 9. Level of control of emission sources:

The level of control analysis looks at what controls are currently implemented in each area.

C.   **Analysis of the New York and New Jersey portions of the NY-NJ-CT-PA C/MSA and adjacent counties**

The New York portion of this area includes the counties of Suffolk, Nassau, Queens, New York, Orange, Kings, Westchester, Dutchess, Bronx, Rockland, Richmond, Putnam, Ulster, Sullivan, Greene, Columbia, and Delaware. Violating monitors (based on 2001-2003 data) in New York State are present in New York and the Bronx counties.

The New Jersey portion of the area includes Middlesex, Bergen, Monmouth, Essex, Ocean, Mercer, Hudson, Union, Morris, Somerset, Passaic, Hunterdon, Sussex, Warren, and Burlington. A violating monitor (based on 2001-2003 data) in New Jersey is present in Union County.

A violating monitor (based on 2001-2003 data) is also present in New Haven, Connecticut.

New York State has recommended that the most effective boundary for the New York portion of this nonattainment area would consist of the five counties comprising New York City which includes New York, the Bronx, Kings, Queens, and Richmond Counties.

New Jersey's recommendation includes Hudson, Union, Middlesex, Bergen, Monmouth, Essex, Mercer, Morris, Somerset, and Passaic counties.

Based on EPA's nine factor analysis, EPA is recommending that additional counties should be added to the nonattainment area for the New York portion of the NY-NJ-CT-PA C/MSA and adjacent counties. EPA is not recommending that any additional counties be added to the New Jersey portion of the NY-NJ-CT-PA C/MSA and adjacent counties.

NY-NJ-CT-PA Area	EPA Recommendation	State Recommendation
New York	New York, the Bronx, Kings, Queens, Richmond, Suffolk, Nassau, Orange, Westchester, and Rockland.	New York, the Bronx, Kings, Queens, and Richmond Counties.
New Jersey	Hudson, Union, Middlesex, Bergen, Monmouth, Essex, Mercer, Morris, Somerset, Passaic counties.	Hudson, Union, Middlesex, Bergen, Monmouth, Essex, Mercer, Morris, Somerset, Passaic counties.

The following is a brief summary of the 9 criteria for the New York State and New Jersey portions of the NY-NJ-CT-PA C/MSA including adjacent counties. Counties that are in the

C/MSA are in bold.   Burlington, NJ was not evaluated since it was recommended for nonattainment by us based on our 9 factor analysis for the New Jersey portion of the PA-NJ-MD C/MSA area.

Factor 1: Emissions for New York and New Jersey Counties included in the NY-NJ-CT-PA and for those that are adjacent to the C/MSA

The following table shows total emissions (in tons) and Emission Scores for New York and New Jersey Counties included in the NY-NJ-CT-PA and for those that are adjacent to the C/MSA. (Data source: 2001 National Emissions Inventory (NEI)).

County	direct PM 2.5 (tons)	SOx (tons)	NOx (tons)	Carbon PM 2.5 (tons)	Crustal PM 2.5 (tons)	Emission Score	Cumulative Score
Suffolk, NY	9,834	45,379	42,938	5,894	3,455	10.8	10.8
Nassau, NY	7,289	12,587	30,695	4,665	2,370	7.9	18.7
Queens, NY	5,443	21,315	57,013	3,203	1,539	7.0	25.7
New York, NY	4,531	29,811	45,611	2,701	1,269	6.1	31.8
Orange, NY	4,410	30,875	22,978	2,091	2,058	4.5	36.3
Kings, NY	3,039	14,163	42,392	1,800	973	4.4	40.7
Middlesex, NJ	3,430	5,663	26,425	1,960	1,269	3.9	53.1
Westchester, NY	3,229	9,680	20,815	1,923	1,154	3.7	56.8
Bergen, NJ	2,691	7,945	27,835	1,451	1,726	3.6	60.4
Monmouth, NJ	3,143	3,028	18,971	1,820	1,226	3.4	63.8
Essex, NJ	2,435	8,114	27,325	1,466	808	3.2	67.0
Ocean, NJ	3,291	1,500	13,754	1,802	1,404	3.1	70.1
Mercer, NJ	2,950	16,426	27,098	1,113	1,608	3.0	73.1
Hudson, NJ	2,529	22,745	25,572	1,004	1,241	2.9	76.0
Union, NJ	2,092	5,393	21,149	1,263	688	2.7	78.7
Morris, NJ	2,038	3,753	16,208	1,301	648	2.5	81.2
Dutchess, NY	2,804	4,786	11,471	1,387	1,330	2.5	83.7
Bronx, NY	1,460	6,723	20,299	849	503	2.1	85.8
Rockland, NY	1,762	9,541	10,621	928	625	1.9	87.7
Somerset, NJ	1,523	2,490	9,743	816	610	1.6	89.3
Passaic, NJ	994	4,349	13,645	658	260	1.5	92.3
Richmond, NY	1,776	1,079	8,399	708	1,009	1.4	95.1
Hunterdon, NJ	1,490	1,158	8,494	628	809	1.3	96.4
Sussex, NJ	1,225	872	5,191	612	574	1.1	97.5
Warren, NJ	1,204	975	6,358	600	530	1.1	98.6
Putnam, NY	1,040	548	3,083	505	512	0.9	99.5
Burlington, NJ	2,298	2,330	15,113	1,326	836	2.5	
Ulster, NY	2,328	3,818	8,417	1,025	1,235	1.9	
Sullivan, NY	1,200	612	2,875	625	544	1.0	
Greene, NY	936	3,836	7,511	375	503	0.9	
Columbia, NY	1,018	585	3,497	420	574	0.8	
Delaware, NY	996	879	2,705	496	475	0.8	

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Applied to New York, this process identifies Suffolk, Nassau, Queens, New York, Orange, Kings, Westchester, and Dutchess as having elevated emissions relative to the remainder of the C/MSA.

Applied to New Jersey, the process identifies Middlesex, Bergen, Monmouth, Essex, Ocean, Mercer, Hudson, Union, and Morris as having elevated emissions relative to the remainder of the C/MSA.

Putnam, Sussex, and Ocean Counties do not have any significant point sources.

Factor 2: Air quality

County	PM 2.5 2001- 2003 Design Value (ug/m3)
Suffolk, NY	12.3
Nassau, NY	12.4
Queens, NY	13.6
New York, NY	17.7
Orange, NY	11.6
Kings, NY	14.9
Middlesex, NJ	12.7
Fairfield, CT	13.3
New Haven, CT	16.7
Westchester, NY	12.5
Bergen, NJ	13.8
Monmouth, NJ	No monitor
Essex, NJ	14.5
Ocean, NJ	11.7
Mercer, NJ	14.0
Hudson, NJ	14.8
Union, NJ	15.7
Morris, NJ	12.6
Dutchess, NY	11.0
Bronx, NY	15.8

Rockland, NY	NA
Somerset, NJ	No monitor
Passaic, NJ	13.3
Richmond, NY	12.2
Hunterdon, NJ	No monitor
Sussex, NY	No monitor
Warren, NJ	No monitor
Putnam, NY	No monitor
Ulster, NY	No monitor
Sullivan, NY	No monitor
Greene, NY	No monitor
Columbia, NY	No monitor
Delaware, NY	No monitor

All counties with design values above the standard have been recommended for nonattainment designation by New York and New Jersey. Suffolk, Nassau, Westchester, Queens, Kings, Westchester, and Richmond counties in New York had design values approaching the standard. Middlesex, Bergen, Essex, Mercer, Hudson, Morris, and Passaic had design values approaching the standard in New Jersey.

The following New York counties are adjacent to counties with violating monitors: Westchester, Queens, Kings, and Richmond. The following New Jersey counties are adjacent to counties with violating monitors: Bergen, Essex, Hudson, Middlesex, Somerset, and Morris.

Factor 3: Population/ Population density

County	2002 Population	2002 Population Density (population per sq mi)
Suffolk, NY	1,458,655	1601
Nassau, NY	1,344,892	4686
Queens, NY	2,237,815	20,530
New York, NY	1,546,856	55,245
Orange, NY	356,773	437

Kings, NY	2,488,194	35,045
Middlesex, NJ	775,549	2,494
Westchester, NY	937,279	2165
Bergen, NJ	895,091	3,825
Monmouth, NJ	629,836	1,334
Essex, NJ	798,301	6,336
Ocean, NJ	537,065	844
Mercer, NJ	359,463	1,591
Hudson, NJ	611,439	13,009
Union, NJ	530,763	5,153
Morris, NJ	478,730	1,021
Dutchess, NY	287,752	359
Bronx, NY	1,354,068	32,240
Rockland, NY	291,835	1677
Richmond, NY	457,383	7,752
Somerset, NJ	309,886	1,016
Passaic, NJ	496,646	2,685
Ulster, NY	179,986	160
Hunterdon, NJ	125, 795	293
Sussex, NJ	148,680	285
Warren, NJ	107,537	300
Putnam, NY	98,257	424
Sullivan, NY	74,273	77
Greene, NY	48,538	75
Columbia, NY	63,532	100
Delaware, NY	47,302	33

Due to its large concentrated population and relative land area size, the counties within New York City (i.e. New York, Bronx, Kings, Queens, and Richmond counties) are high for this factor (i.e. high population densities, high population relative to the remainder of the CMSA and adjacent counties). Suffolk, Nassau, and Westchester counties in New York; and Middlesex, Essex, Hudson, and Union in New Jersey also score moderately high for this factor

Factor 4: Traffic and commuting patterns

County	VMT[1] (1000 miles)	#Commuters to New York Co.	#Commuters to Bronx Co.	# Commuters to Union Co.	# Commuters to New Haven, CT
Suffolk, NY	7,414	41,121	2,614	180	113
Nassau, NY	6,875	94,485	6,274	187	90
Queens, NY	10,441	346,268	18,373	780	138
New York, NY	7,961	631,132	20,775	967	178
Orange, NY	3,628	9,610	2,414	147	29
Kings, NY	12,313	341,155	11,365	1,567	112
Middlesex, NJ	5,794	25,765	355	26,653	51
Westchester, NY	4,964	79,643	27,053	327	343
Bergen, NJ	6,732	61,253	5,353	5,124	74
Monmouth, NJ	5,146	22,425	313	8,319	32
Essex, NJ	6,356	28,076	782	24,052	10
Ocean, NJ	3,641	2,964	115	4,567	13
Mercer, NJ	3,869	5,654	147	1,291	15
Hudson, NJ	4,518	58,423	1,214	6,740	23
Union, NJ	4,034	16,305	417	113,263	11
Morris, NJ	3,939	11,516	268	8,755	15
Dutchess, NY	2,905	3,963	1,085	22	199
Bronx, NY	6,440	159,664	168,903	586	56
Rockland, NY	1,413	17,025	6,245	350	56
Somerset, NJ	2,209	6,243	87	11,835	14
Passaic, NJ	3,568	8,402	473	2,943	5
Richmond, NY	2,030	53,249	1,095	1,486	11
Ulster, NY	1,850	1,565	1,565	0	11
Fairfield, CT	7,889	24,831	1,258	56	21,900
New Haven, CT	6,989	1,584	183	23	290,098
Hartford, CT	8,105	460	36	11	16,948

New London, CT	2,958	126	19	9	1,638
Hunterdon, NJ	1,893	1,176	7	3,069	0
Sussex, NJ	1,323	1,449	94	967	13
Warren, NJ	1,473	562	5	991	0
Putnam, NY	781	4,416	2,021	30	181
Sullivan, NY	683	829	110	6	0
Greene, NY	643	305	10	8	0
Columbia, NY	754	610	37	0	4
Delaware, NY	508	248	9	0	4

Note: CT counties shown for comparison purposes

[1] Vehicle Miles Traveled within county in 2002

The largest number of commuters to counties with violating monitors in New York and New Jersey are from the following counties within New York City: New York, Queens, Kings, and the Bronx. A slightly smaller but still significant number of commuters are also traveling into New York, Bronx, and Union counties from Nassau, Westchester, Suffolk, and Richmond Counties in New York; and Middlesex, Bergen, Monmouth, Essex, Hudson, and Union Counties in New Jersey. The remaining counties in New York and New Jersey have a low numbers of commuters to counties in the C/MSA with violating monitors.

Suffolk, Nassau, Queens, New York, Kings, and the Bronx in New York; and Middlesex, Bergen, and Essex in New Jersey score the highest for VMT when compared to the rest of the CMSA and adjacent areas.

Both New York and New Jersey counties have a very low number of commuters to New Haven County, CT.

Factor 5: Expected growth

County	2002 Population	% growth (90-00)	Population Growth (90-00)
Suffolk, NY	1,458,655	7	97,505
Nassau, NY	1,344,892	4	47,196
Queens, NY	2,237,815	14	277,781

New York, NY	1,546,856	3	49,659
Orange, NY	356,773	11	33,720
Kings, NY	2,488,194	7	164,662
Middlesex, NJ	775,549	12	78,382
Westchester, NY	937,279	6	48,593
Bergen, NJ	895,091	7	58,738
Monmouth, NJ	629,836	11	62,177
Essex, NJ	798,301	2	15,427
Ocean, NJ	537,065	18	77,713
Mercer, NJ	359,463	8	24,937
Hudson, NJ	611,439	10	55,876
Union, NJ	530,763	6	28,722
Morris, NJ	478,730	12	48,859
Dutchess, NY	287,752	8	20,688
Bronx, NY	1,354,068	11	128,861
Rockland, NY	291,835	8	21,278
Somerset, NJ	309,886	24	57,211
Passaic, NJ	496,646	8	35,989
Richmond, NY	457,383	17	64,751
Ulster, NY	179,986	8	12,445
Hunterdon, NJ	125,795	13	14,213
Sussex, NJ	148,680	10	13,223
Warren, NJ	107,537	12	10,830
Putnam, NY	98,257	14	11,804
Sullivan, NY	74,273	7	4,689
Greene, NY	48,538	8	3,456
Columbia, NY	63,532	0	112
Delaware, NY	47,302	2	830

Based upon an analysis of this factor, the counties of Queens, Kings, the Bronx, and Somerset counties have been identified as experiencing either significant recent growth on a percentage or absolute basis. Orange, Richmond, Ocean, Suffolk, Middlesex, Monmouth, Hudson, Morris,

Richmond, Hunterdon, Sussex, Warren, and Putnam counties experienced moderate growth. The remainder of the counties have very low growth.

Factor 6: Meteorology

This factor did not play a significant role in the decision making process for Queens, New York, Kings, Bronx, Richmond in New York. Meteorology did not play a significant role in the decision making process for New Jersey Counties with the exception of Ocean County.

County	Prevailing Wind Direction %			
	NW	SW	SE	NE
New York, NY	34	29	11	26
Bronx, NY	33	30	12	25
Union, NJ	31	32	14	23
New Haven, CT	34	30	13	24

The prevailing wind direction to counties with violating monitors is predominately from the northwest, southwest, and northeast.

Analysis of pollution roses and back trajectories to New Haven, CT showed a contribution from Suffolk, Nassau, Orange, Westchester, Dutchess, Rockland, and Ulster Counties.

EPA REMSAD (Regional Modeling System for Aerosols and Deposition) model used during the analysis for the Interstate Air Quality Rule demonstrated that the maximum contribution from New York State to the monitor in New Haven was 0.85 ug/m3, or above the 0.15 ug/m3 threshold for determining whether emissions in a State make a significant contribution to PM 2.5 nonattainment in another state.

Ocean County had a negligible contribution based upon the analysis of pollution roses and back trajectory analysis to New York City. Analysis of back trajectories (HYSPLIT model) calculated and plotted for the thirty-nine high PM days in New York City indicate that emissions from Ocean County have a very low impact on New York City. Back trajectories passed through Ocean County on only two days. Further review of these trajectories indicate the following:

August 28, 2001
Two out of the four trajectories plotted for this day passed through Ocean County. It is not likely that Ocean County was the source of the high PM on this day. The analysis from the Bronx speciation monitor showed that the particulate matter was mostly sulfate. Ocean County is a very

low emitter of sulfur dioxide (i.e. 1,500 released in 2001)

<u>October 6, 2000</u>
One out of four trajectories plotted for this day passed through Ocean County. This trajectory also passed through areas with a heavy concentration of point sources in the Camden/ Philadelphia and northeastern New Jersey areas before entering New York City from the west.

Factor 7: Geography/topography
The area does not have any geographical or topographical boundaries limiting its airshed in the areas.

Factor 8: Jurisdictional boundaries

EPA is striving to achieve consistency with the 8-hour ozone nonattainment areas for purposes of state air quality planning. Although this factor is considered as part of the analysis, this factor is not a dominant factor in the decision making process.

All counties in New Jersey were designated nonattainment for the 8-hour ozone standard on April 15, 2004. All counties within the New York portion of the NY-NJ-CT-PA C/MSA and adjacent counties, with the exception of Ulster, Sullivan, Columbia, and Delaware, were also designated nonattainment for ozone.

Factor 9: Level of control of emission sources

This factor does not play a significant role in the decision making process. The level of control of emission sources is reflected in factor 1.