

4.0 Analyses of Individual Nonattainment Areas

4.2 Region 2 Nonattainment Areas

4.2.2 New York

Attachment 1

NEW YORK Area Designations For the 24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in New York Metropolitan area that EPA has designated as not attaining the 2006 24-hour fine particle (PM_{2.5}) standard.¹ A county is designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	New York Recommended Nonattainment Counties	New York Recommended Unclassifiable Counties	EPA's Designated Nonattainment Counties
New York-Northern New Jersey-Long Island, NY-NJ-CT area	Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk and Westchester	None	Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk and Westchester
Buffalo-Niagara Falls area	None	Erie and Niagara	None

EPA has designated Erie and Niagara counties, as well as the remaining counties in the state as “attainment/unclassifiable.”

EPA Technical Analysis for New York-Northern New Jersey-Long Island, NY-NJ-CT area

Introduction

¹ EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour PM_{2.5} standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for PM_{2.5} remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those nearby areas that contribute to violations. This technical analysis for New York-Northern New Jersey-Long Island, NY-NJ-CT area (New York City Metropolitan area) identifies the counties with monitors that violate the 24-hour PM_{2.5} standard and evaluates the nearby counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under factor 1 below.)

Figure 1 is a map of the counties in the nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

New York-N. New Jersey-Long Island, NY-NJ-CT 24-hr PM_{2.5} Nonattainment Area

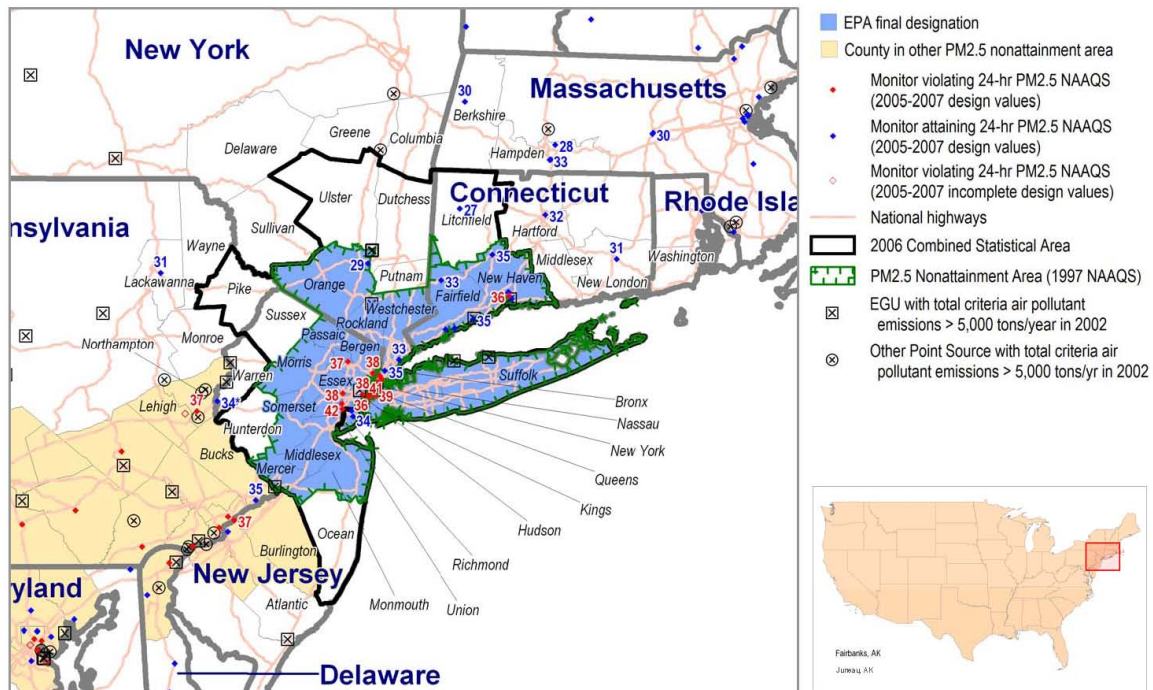


Figure 1. New York-Northern New Jersey-Long Island, NY-NJ-CT area

For this area, EPA previously established PM_{2.5} nonattainment boundaries for the 1997 PM_{2.5} NAAQS that included ten full counties located in New York.

In a letter received on December 18, 2007, New York recommended that Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk and Westchester counties be designated as nonattainment for the 2006 24-hour PM_{2.5} standard based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) monitors located in the state.

In August 2008, EPA notified New York State of its intended designations. In this letter, EPA also requested that if New York State wished to provide comments on EPA's intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

Based on EPA's technical analysis described below, EPA has designated 10 counties in New York State, the same counties as previously designated for PM_{2.5}, nonattainment for the 24-hour PM_{2.5} air-quality standard as part of the New York City Metropolitan nonattainment area, based upon currently available information. These counties are listed in the table below.

New York City Metropolitan area	State-Recommended Nonattainment Counties	EPA-Final Designated Nonattainment Counties
New York-Northern New Jersey-Long Island, NY-NJ-CT area	Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk and Westchester	No change

The following is a summary of the technical analysis for the EPA Region 2 portion of the New York City Metropolitan area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following PM_{2.5} components and precursor pollutants: “PM_{2.5} emissions total,” “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” “SO₂,” and “NO_x” “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other”, primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. .

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive manner for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of PM_{2.5} and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the New York City Metropolitan area. Counties that are part of the New York City Metropolitan nonattainment area for the 1997 PM_{2.5} NAAQS are shown in boldface. Counties are listed in descending order by CES.

County	State Recommended Nonattainment?	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ (tpy)	NO _x (tpy)
Kings, NY	Yes	100	2,230	1,053	1,176	8,274	27,886

New York, NY	Yes	100	3,522	1,864	1,658	13,060	36,742
Hudson, NJ	Yes	100	2,933	671	2,261	27,305	26,889
Suffolk, NY	Yes	100	4,408	1,836	2,572	47,134	54,932
Fairfield, CT	Yes	100	3,056	1,630	1,426	9,533	26,382
Union, NJ	Yes	100	1,092	603	488	3,806	20,040
New Haven, CT	Yes	97	2,871	1,642	1,230	8,250	21,693
Queens, NY	Yes	78	2,976	1,430	1,545	18,460	40,922
Essex, NJ	Yes	77	942	637	304	4,647	22,221
Bronx, NY	Yes	58	1,106	535	571	3,703	14,362
Richmond, NY	Yes	Not Available	790	307	483	2,623	9,466
Bergen, NJ	Yes	48	1,219	886	333	1,691	23,827
Westchester, NY	Yes	43	1,751	947	805	4,770	24,755
Middlesex, NJ	Yes	42	1,549	951	598	3,129	29,172
Nassau, NY	Yes	41	2,149	1,091	1,058	6,203	31,877
Morris, NJ	Yes	24	1,498	953	545	1,177	13,774
Monmouth, NJ	Yes	21	1,506	989	517	1,789	16,771
Rockland, NY	Yes	20	1,296	327	968	12,711	12,777
Orange, NY	Yes	19	2,637	934	1,704	32,973	18,631
Mercer, NJ	Yes	16	1,658	579	1,079	17,891	17,640
Middlesex, CT	No	15	1,173	641	533	2,684	6,941
Somerset, NJ	Yes	15	801	451	349	577	7,886
Hartford, CT	No	14	2,713	1528	1,185	5,301	24,631
Passaic, NJ	Yes	12	755	471	284	733	8,770
Putnam, NY	No	9	636	306	329	1,116	5,367
Litchfield, CT	No	8	1,671	949	721	1,234	4,400

Dutchess, NY	No	7	1,711	783	929	4,637	7,955
Ocean, NJ	No	6	1,540	993	547	1,060	9,578
Hunterdon, NJ	No	6	769	454	316	556	3,882
Sussex, NJ	No	5	1,270	744	526	669	2,726
Warren, NJ	Yes, Partial - Allentown-Bethlehem-Easton PA-NJ	5	1,105	588	517	563	5,088
Ulster, NY	No	3	1,891	903	988	3,167	6,054
Sullivan, NY	No	1	1,096	561	535	922	2,203
Pike, PA	No	1	802	419	384	266	2,353

Table 1. PM_{2.5} Related Emissions and Contributing Emissions Score

Generally, New York and New Jersey Counties that are in the existing 1997 PM_{2.5} NAAQS nonattainment area for the New York City metropolitan area have much higher emissions than the adjacent counties. CES scores were generally low for the adjacent counties as well, which is indicative of low impact on the violating monitors that violate the 2006 PM_{2.5} NAAQS in the area.

In New York State, the counties with relatively high emissions include Suffolk, Queens, Nassau, Kings, New York, Westchester, and Orange Counties. Dutchess, Ulster, the Bronx, Richmond, and Rockland emissions were generally mid-range when compared to the other counties in the New York Metropolitan area. CES values were indicative of emissions levels, with the exception of Dutchess and Ulster Counties. CES scores were 7 and 3 respectively for Dutchess and Ulster, which are indicative of minimal contribution to violating monitors from Dutchess and Ulster emissions. Please see Factor 6, Meteorology, for further discussion on impact of emissions from Dutchess and Ulster County.

Putnam and Sullivan Counties in New York have low emissions in comparison to the other counties in the area. Putnam, NY emissions account for about one percent (i.e. 636 tons) of the total PM_{2.5}, one percent carbon emissions (i.e. 306 tons), less than half a percent of total SO₂ (1,116 tons), and one percent of NO₂ emissions (i.e. 5,367 tons) for the area under consideration. Sullivan County emissions represent about two percent of the total PM_{2.5} (1,096 tons), two percent of the carbon emissions (i.e. 561 tons), less than half a percent each of total SO₂ (922 tons) and NO₂ emissions (i.e. 2,203 tons) for the area under consideration. CES scores were 9 and 1 on a scale of 100 for Putnam and Sullivan, respectively, indicating minimal contribution to counties with violating monitors.

In their December 2007 recommendation to EPA, New York used the 2005 emission inventory from EPA. New York included data for PM_{2.5} direct, NO_x, SO_x, ammonia, organic carbon, elemental carbon, and crustal emissions. New York also showed relatively higher emissions for Suffolk, Queens, Nassau, Kings, New York, Westchester,

and Orange Counties, and lower emissions for Dutchess, the Bronx, Richmond, Rockland, and Putnam. New York did not include emissions data for Ulster or Sullivan Counties.

Putnam and Sullivan Counties have low emissions, and very low CES scores. Based on high emission levels and high CES values, Suffolk, Nassau, Kings, New York, Westchester, Bronx, Richmond, Queens, Orange, Rockland, Dutchess, and Ulster counties were candidates for 24-hour PM_{2.5} nonattainment designation.

In New Jersey, the counties with relatively high emissions include Hudson, Middlesex, Bergen, Essex, Union, and Monmouth. Mercer, Morris, and Ocean were generally mid-range when compared to the other counties in the New York Metropolitan area. Somerset, Passaic, Hunterdon, Warren, and Sussex had low emissions in comparison to the other counties in the area. CES values were generally consistent with these emissions levels, with the exception of Ocean County. The Ocean County CES score was 6 on a scale of 100, which is indicative of minimal contribution to violating monitors from Ocean County emissions. Please see factor 6, Meteorology, for further discussion on impact of emissions from Ocean County.

Hunterdon, NJ emissions account for slightly over one percent (i.e. 769 tons) of the total PM_{2.5} emissions, one and half percent of the carbon emissions (i.e. 454 tons), and less than one percent of the total SO₂ emissions (i.e. 556 tons) and NO_x emissions (i.e. 3,882 tons) for the area. The CES score of 6 was consistent with minimal impact.

Warren County, NJ also has relatively lower emissions than most of the other counties in the area. 2005 total PM_{2.5} and carbon emissions were 1,105 tons and 588 tons, respectively, which represents about two percent of the total and carbon emissions for the area under consideration. SO₂ emissions (i.e. 563 tons) and NO_x emissions (i.e. 5,088 tons) were less than one percent of area emissions. The CES score of 5 was consistent with low contribution.

Sussex County, NJ had low total PM_{2.5} (1,270 tons), carbon (744 tons), SO₂ (669 tons), and NO_x emissions (2,726 tons). The CES score was 5 on a scale of 100 indicating minimal contribution to the county with the violating monitor.

Passaic and Somerset County emissions were also lower than many of the other counties in the area. For Passaic total PM_{2.5} was 755 tons, carbon emissions were 471 tons, SO₂ was 733 tons, and NO_x emissions were 8,770 tons. Somerset emissions were 801 tons for total PM_{2.5}, 451 tons for carbon emissions, 577 tons for SO₂, and 7,886 for NO_x emissions.

In its December 2007 recommendation to EPA, New Jersey used 2002 emissions and projected 2009 emissions from the 2002 MANE-VU Modeling Inventory. New Jersey also showed relatively lower emissions from Hunterdon, Warren, Sussex, Passaic, and Somerset Counties than the other counties in the area.

Based on emission levels and CES values, Hudson, Middlesex, Bergen, Essex, Union, Monmouth, Mercer, Morris, and Ocean counties were candidates for designation as 24-hour PM_{2.5} nonattainment areas. Passaic and Somerset Counties had CES scores of 12 and 15, respectively, and had relatively low emissions as shown in Table 1.

Factor 2: Air quality data

This factor considers the 24-hour PM_{2.5} design values (in µg/m³) for air quality monitors in counties in the New York City Metropolitan based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 24-hour PM_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values is 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the New York City Metropolitan area are shown in Table 2.

County	State Recommended Nonattainment	Design Values 2005-07 (µg/m3)
Bronx, NY	Yes	39
Kings, NY	Yes	36
Nassau, NY	Yes	33
New York, NY	Yes	39
Orange, NY	Yes	29
Queens, NY	Yes	33
Richmond, NY	Yes	34
Rockland, NY	Yes	No monitor
Suffolk, NY	Yes	30
Westchester, NY	Yes	33
Bergen, NJ	Yes	38
Middlesex, NJ	Yes	32
Monmouth, NJ	Yes	No monitor
Essex, NJ	Yes	39
Mercer, NJ	Yes	34
Hudson, NJ	Yes	42

Union, NJ	Yes	42
Morris, NJ	Yes	32
Passaic, NJ	Yes	37
Somerset, NJ	Yes	No monitor
Fairfield, CT	Yes	35
New Haven, CT	Yes	36
Hunterdon, NJ	No	No monitor
Ocean, NJ	No	30
Sussex, NJ	No	No monitor
Warren, NJ	Yes, Partial - Allentown-Bethlehem-Easton PA-NJ	34
Pike, PA	No	No monitor
Litchfield, CT	No	27
Sullivan, NY	No	No monitor
Ulster, NY	No	No monitor
Dutchess, NY	No	No monitor
Putnam, NY	No	No monitor
Hartford, CT	No	32
Middlesex, CT	No	No monitor

Table 2. Air Quality Data

In EPA Region 2, the Bronx, Kings, and New York Counties in New York; and Union, Essex, Hudson, Passaic, and Bergen Counties in New Jersey show a violation of the 24-hour PM_{2.5} standard. Fairfield and New Haven Counties in CT, which are located in Region 1, also violate the 24-hour PM_{2.5} standard. Therefore, these counties are included in the New York City Metropolitan area. However, the absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status. Each county has been evaluated based on the weight of evidence of the nine factors and other relevant information.

Under this factor, we also consider fine particle composition monitoring data. Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations in the New York-Northern New Jersey-Long Island, NY-NJ-CT area occur about 60% in the warm season and 40% in the cool season. In the warm season, the average chemical composition of the highest days is 64% sulfate, 32% carbon, 3% crustal, and 0% nitrate. In the cool

season, the average chemical composition of the highest days is 52% carbon, 28% sulfate, 17% nitrate, and 3% crustal material. These data indicate that sources of SO₂, NO_x, and direct PM_{2.5} emissions contribute to violations in the area.

In their December 2007 letter, New York also submitted PM_{2.5} speciation data, from urban and rural monitoring site in the New York City vicinity. The speciation data was dominated mostly by organic carbon and sulfates - over 50 percent of total mass for both urban and rural monitoring sites. Elemental carbon, organic carbon, sulfates, and nitrates were higher at the urban location, indicating some local source contribution.

Many of the violating monitors are near major transportation routes, which is an indication of a significant mobile source contribution. Counties in the New York Metropolitan area with large populations, and large number of commuters in the New York metropolitan area (see discussion in Factors 3 and 4 below) and limited transportation routes for goods and service delivery are relevant considerations when determining the counties to include in the nonattainment area. Figures 2 and 3 show the New York Metropolitan area, including monitor locations, and major roadways.

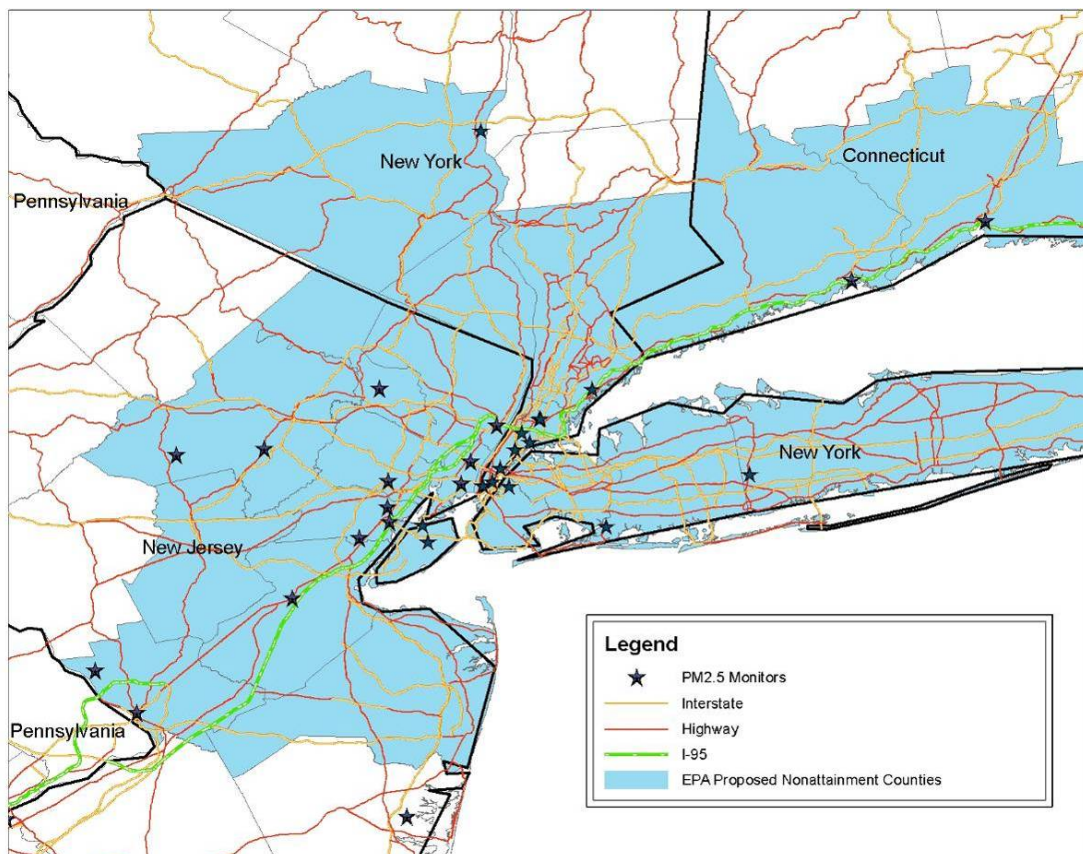


Figure 2. Map of the New York metropolitan area

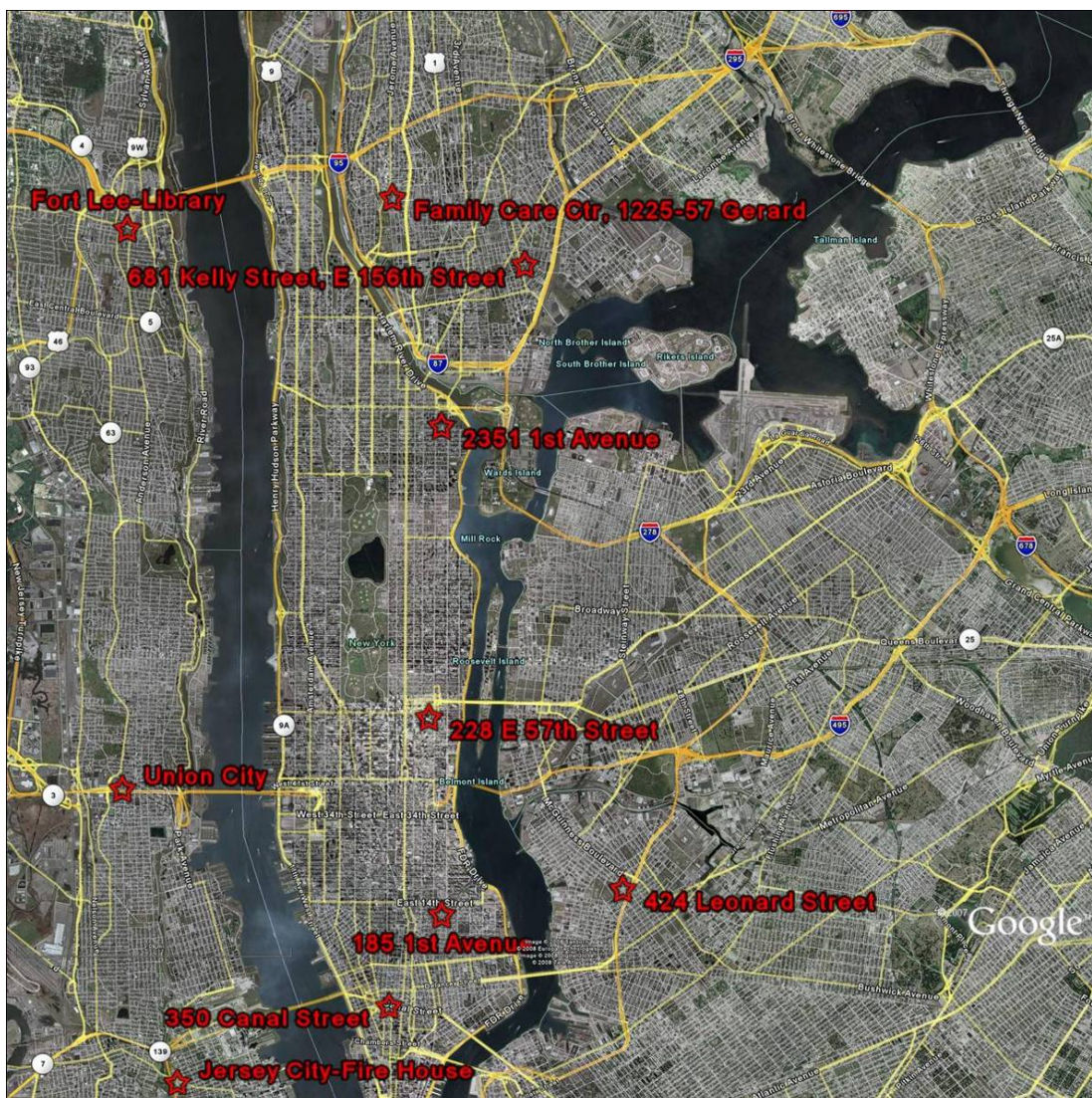


Figure 3. Detailed view of the New York City area. Red stars show the location of PM_{2.5} monitors.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM_{2.5} NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in the New York City Metropolitan area. Population data give an indication of whether it is likely that population-based emissions

might contribute to violations of the 24-hour PM_{2.5} standards. Table 3 is sorted by 2005 population.

Due to their large concentrated population and relative land area size, the counties within New York City (i.e., New York, Bronx, Kings, Queens, and Richmond counties) have high population densities and high population relative to the remainder of the area. Suffolk, Nassau, Westchester, Orange, and Rockland counties in New York; and Middlesex, Essex, Monmouth, Hudson, Ocean, Union, Passaic, Morris, Mercer, and Somerset counties in New Jersey, also scored high in population and/or population density.

Of the counties listed in Table 3, most of the counties designated as nonattainment have a CES score of greater than 10, with the exception of Hartford, CT. These high CES counties have high populations and high population densities indicating possible population-based emissions contribution.

County	State Recommended Nonattainment	2005 Population	2005 Population Density (pop/sq mi)
Kings, NY	Yes	2,511,408	37206
Queens, NY	Yes	2,256,576	20477
New York, NY	Yes	1,606,275	70451
Suffolk, NY	Yes	1,472,086	1369
Bronx, NY	Yes	1,364,566	31882
Nassau, NY	Yes	1,331,620	4289
Westchester, NY	Yes	947,719	1989
Bergen, NJ	Yes	902,308	3718
Fairfield, CT	Yes	901,086	1385
Hartford, CT	No	875,422	1168
New Haven, CT	Yes	844,510	1358
Middlesex, NJ	Yes	789,283	2487
Essex, NJ	Yes	789,166	6099
Monmouth, NJ	Yes	634,841	1308
Hudson, NJ	Yes	602,970	11208
Ocean, NJ	No	558,170	738
Union, NJ	Yes	530,710	5035

Passaic, NJ	Yes	496,985	2525
Morris, NJ	Yes	490,084	1019
Richmond, NY	Yes	475,014	7625
Orange, NY	Yes	372,750	445
Mercer, NJ	Yes	366,070	1601
Somerset, NJ	Yes	319,830	1049
Rockland, NY	Yes	294,636	1479
Dutchess, NY	No	294,509	357
Ulster, NY	No	182,433	157
Sussex, NJ	No	152,726	285
Hunterdon, NJ	No	130,042	297
Warren, NJ	Yes, Partial - Allentown-Bethlehem-Easton PA-NJ	110,317	305
Putnam, NY	No	100,528	409
Sullivan, NY	No	76,155	77

Note: The counties that are in the nonattainment area for the 1997 annual PM_{2.5} NAAQS are shown in boldface.

Table 3. Population

Factor 4: Traffic and commuting patterns

This factor considers the number of commuters in each county who drive to another county within the New York City Metropolitan area, the percent of total commuters in each county who commute to violating counties within the New York City Metropolitan area, as well as the total Vehicle Miles Traveled (VMT) for each County in millions of miles (see Table 4). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

The listing of counties in Table 4 reflects a ranking based on the number of people commuting to any violating county.

County	State Recommended Non-attainment?	2005 VMT (millions of miles)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into statistical area	Percent Commuting into statistical area
Kings, NY	Yes	4,899	861,160	96	895,130	99

Queens, NY	Yes	7,839	833,770	90	925,290	99
New York, NY	Yes	4,378	718,530	95	742,870	99
Bergen, NJ	Yes	9,124	394,140	92	424,530	99
Fairfield, CT	Yes	7,649	387,340	93	413,090	99
Bronx, NY	Yes	4,721	374,820	90	412,900	100
New Haven, CT	Yes	6,948	343,410	89	353,820	91
Essex, NJ	Yes	5,611	281,290	86	325,570	99
Hudson, NJ	Yes	2,543	244,470	93	262,640	99
Nassau, NY	Yes	11,920	201,260	33	616,330	100
Passaic, NJ	Yes	3,302	186,060	89	208,770	99
Union, NJ	Yes	4,704	181,030	76	237,010	100
Westchester, NY	Yes	9,166	141,680	33	421,720	99
Richmond, NY	Yes	2,002	97,040	51	190,220	100
Middlesex, NJ	Yes	8,014	90,710	25	358,740	99
Suffolk, NY	Yes	19,815	81,780	12	667,130	100
Morris, NJ	Yes	5,398	77,050	32	236,040	99
Monmouth, NJ	Yes	6,230	55,040	19	287,550	99
Rockland, NY	Yes	2,731	43,780	33	131,200	99
Somerset, NJ	Yes	2,702	32,080	21	148,750	99
Orange, NY	Yes	4,696	24,190	16	150,080	99
Hartford, CT	No	7,951	20,400	5	24,380	6
Sussex, NJ	No	889	17,000	23	70,640	97
Ocean, NJ	No	3,367	16,910	8	197,230	94
Putnam, NY	No	3,085	11,330	24	47,860	100
Mercer, NJ	Yes	2,668	11,130	7	150,970	93
Dutchess, NY	No	3,180	8,720	7	126,440	99
Hunterdon, NJ	No	929	8,150	13	58,450	94
Warren, NJ	Yes, Partial - Allentown-Bethlehem-	1,342	7,160	14	26,220	52

	Easton PA-NJ					
Ulster, NY	No	2,208	2,770	3	78,640	97
Sullivan, NY	No	784	1,720	6	9,090	31

Note: The counties that are in the nonattainment area for the 1997 annual $PM_{2.5}$ NAAQS are shown in boldface.

Table 4. Traffic and Commuting Patterns

The largest number of commuters to counties with violating monitors in New York and New Jersey are from Kings, Queens, and New York. The New York counties of the Bronx, Nassau, Westchester, Richmond, Suffolk, Rockland, Orange; and the New Jersey counties of Bergen, Essex, Hudson, Passaic, Union, Middlesex, Morris, Monmouth, and Somerset, have about 25,000 commuters into a violating area.

Data provided by New Jersey indicates that only 7,647 commuters from Ocean County go to New York (2,964), Bronx (115), and Union County (4,567), which reduces the impact of this factor for Ocean County on the CSA.

The New York metro area has a large amount of truck traffic. The Federal Highway Administration projection of 2020 shows an increase of annual average daily traffic, which played a role in including counties for designation. Figure 4 shows projected 2020 annual average daily truck traffic.

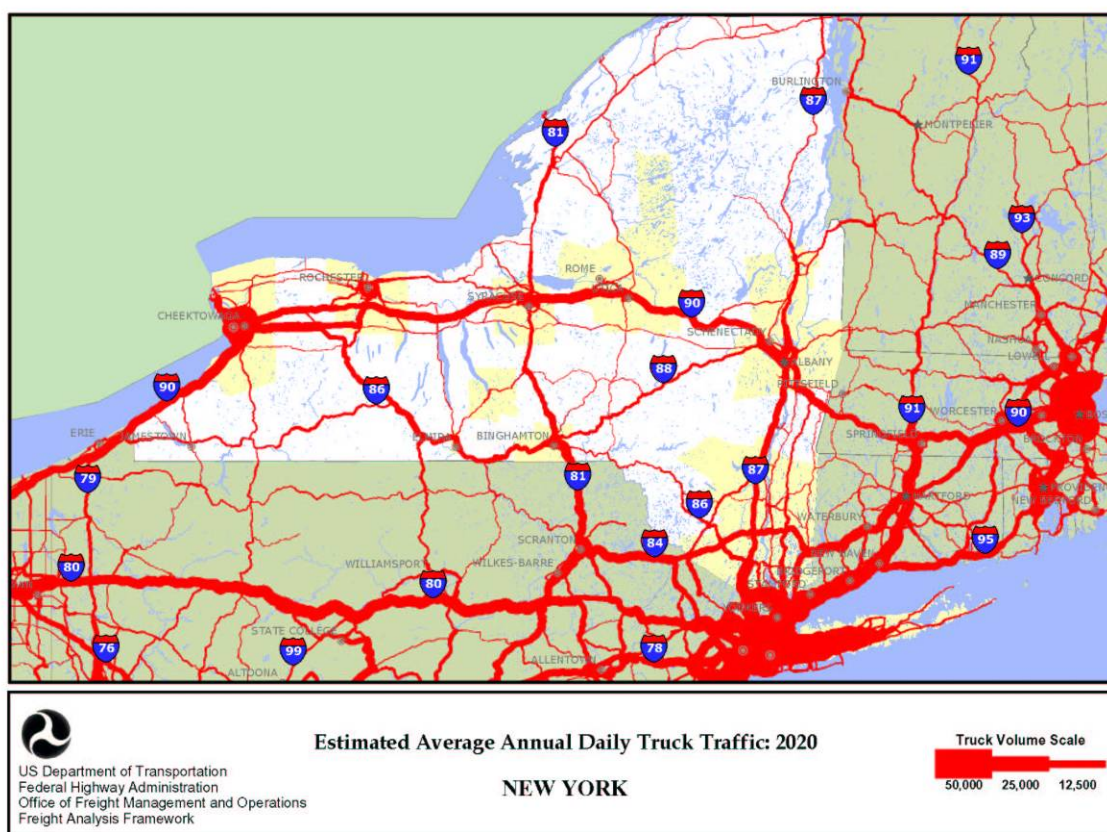


Figure 4. Estimated Average Annual Daily Truck Traffic in 2020

This factor played a role in our decision making process by highlighting the contributing role that counties with high numbers of commuters have toward violating areas.

Note: The 2005 VMT data used for table 4 and 5 of the technical analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:
ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf

Factor 5: Growth rates and patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in the New York metropolitan area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and could be an appropriate county for implementing mobile-source and other emission-control strategies, thus warranting inclusion in the nonattainment area.

Table 5 below shows population, population growth, VMT and VMT growth for counties that are included in the New York metropolitan area. Counties are listed in descending order based on VMT growth between 1996 and 2005.

County	2005 Population	2005 Population Density (people/sq mi)	Percent Population Change (2000-05)	Vehicle Miles Traveled in 2005 (millions annually)	Percent VMT Growth (1996- 2005)
Putnam, NY	100,528	409	4	3,085	347
Suffolk, NY	1,472,086	1369	3	19,815	191
Westchester, NY	947,719	1989	2	9,166	123
Rockland, NY	294,636	1479	2	2,731	111
Nassau, NY	1,331,620	4289		11,920	89
Morris, NJ	490,084	1019	4	5,398	56
Middlesex, NJ	789,283	2487	5	8,014	56
Greene, NY	49,559	75	3	811	53
Bergen, NJ	902,308	3718	2	9,124	52
Somerset, NJ	319,830	1049	7	2,702	39
Orange, NY	372,750	445	9	4,696	39
Monmouth, NJ	634,841	1308	3	6,230	37
Ulster, NY	182,433	157	3	2,208	37
Columbia, NY	63,327	98		848	34
Delaware, NY	47,360	32	(1)	564	33
Sullivan, NY	76,155	77	3	784	33
Union, NJ	530,710	5035	1	4,704	31
New London, CT	264,265	380	2	3,181	21
Dutchess, NY	294,509	357	5	3,180	21
New Haven, CT	844,510	1358	2	6,948	10
Fairfield, CT	901,086	1385	2	7,649	9
Hartford, CT	875,422	1168	2	7,951	8
Richmond, NY	475,014	7625	7	2,002	8
Ocean, NJ	558,170	738	9	3,367	5
Passaic, NJ	496,985	2525	1	3,302	3
Warren, NJ	110,317	305	7	1,342	2
Essex, NJ	789,166	6099		5,611	(1)
Queens, NY	2,256,576	20477	1	7,839	(18)
Bronx, NY	1,364,566	31882	2	4,721	(20)
Mercer, NJ	366,070	1601	4	2,668	(22)
Sussex, NJ	152,726	285	6	889	(22)
Hudson, NJ	602,970	11208	(1)	2,543	(37)
New York, NY	1,606,275	70451	4	4,378	(40)

Hunterdon, NJ	130,042	297	6	929	(42)
Kings, NY	2,511,408	37206	2	4,899	(57)

Note: The counties that are in the nonattainment area for the 1997 annual PM_{2.5} NAAQS are shown in boldface.

Table 5. Population and VMT Growth and Percent Change

In New York, the counties of the Bronx, Kings, New York, Orange, Queens, Richmond, Rockland, Suffolk, Westchester, Dutchess, Putnam, Ulster, and Sullivan all exhibited growth. New York projects that the population in Bronx, Kings, New York, Orange, Queens, Richmond, Rockland, Suffolk, Westchester, Dutchess, and Putnam will continue to grow through 2015. In New Jersey, Middlesex, Monmouth, Hudson, Morris, Warren, Hunterdon, Sussex, and Ocean counties are experiencing growth. Somerset County is experiencing significant growth percentage-wise and in absolute numbers.

The VMT growth for Putnam, Suffolk, Westchester, and Rockland more than doubled from 1996-2005. Other areas in NY that had significant VMT growth were: Orange, Dutchess, Sullivan and Ulster. In NJ, Somerset, Middlesex, Morris, Monmouth, Bergen, and Union had notable VMT growth from 1996-2005.

This factor played a role in our decision process as it showed that in most of the counties in the proposed New York City Metropolitan nonattainment area there is continued growth in both population and VMT.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments and other meteorological monitoring sites in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on “high PM_{2.5} days” for each of two seasons (an October-April “cold” season and a May-September “warm” season). These high days are defined as days where any FRM or FEM air quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values.

For each air quality monitoring site, EPA developed a “pollution rose” to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The figure identifies 24-hour PM_{2.5} values by color; days exceeding 35 ug/m³ are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figures 5, 6, and 7 show pollution roses for the New York Metropolitan Area.

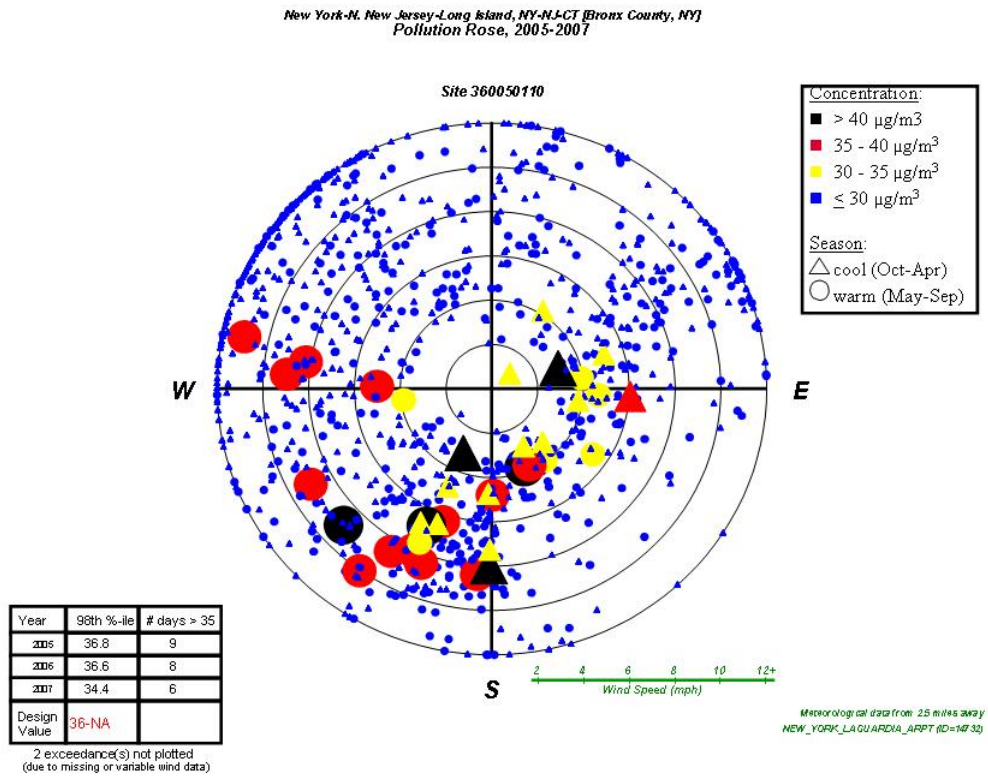


Figure 5. Pollution Rose for Bronx County, NY

New York-N. New Jersey-Long Island, NY-NJ-CT [New Haven County, CT]
Pollution Rose, 2005-2007

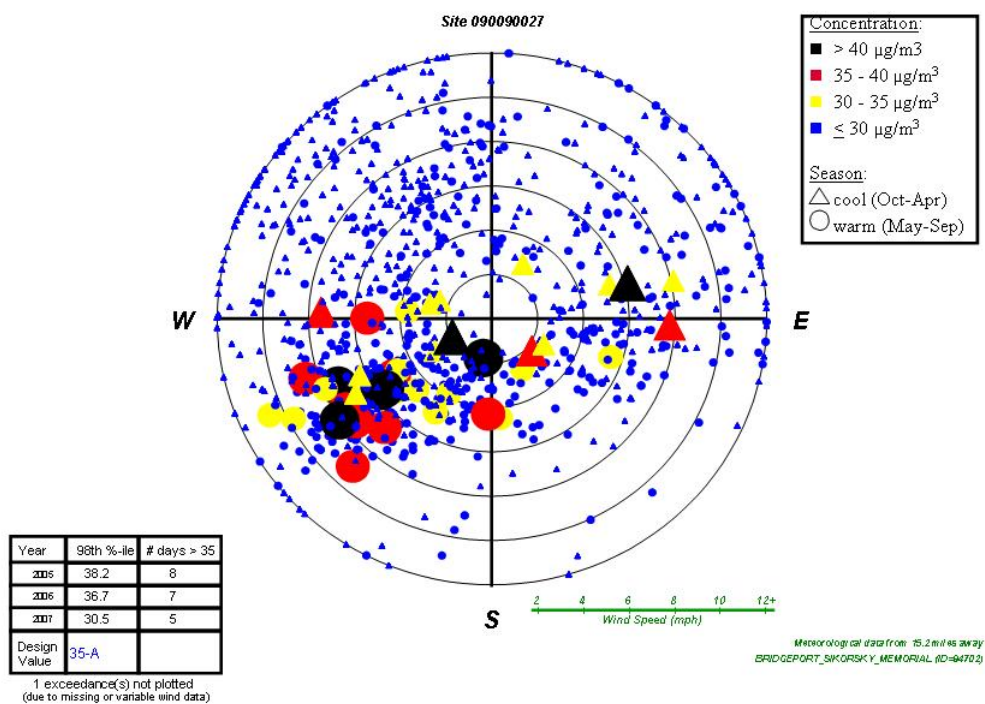


Figure 6. Pollution Rose for New Haven County, CT

New York-New Jersey-Long Island, NY-NJ-CT Union County, NJ
Pollution Rose, 2005-2007

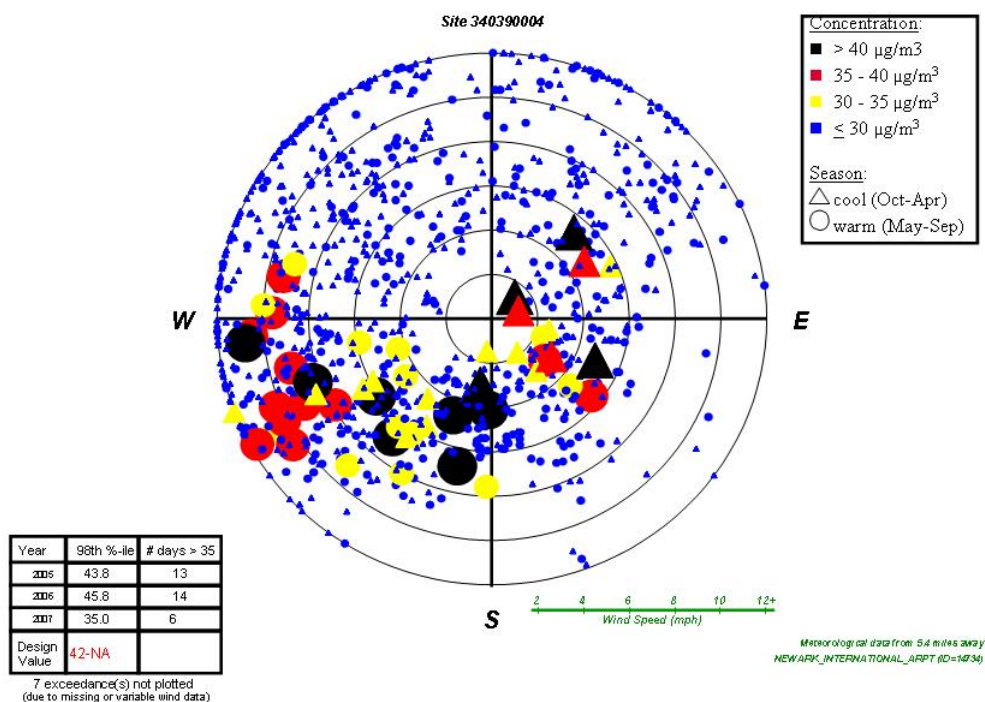


Figure 7. Pollution Rose for Union County, NJ

Generally, the analysis of prevailing wind directions and pollution roses show that the counties that are in the current 1997 PM_{2.5} NAAQS nonattainment area for New York City rank high for this factor. The counties outside the 1997 PM_{2.5} NAAQS nonattainment area generally ranked lower.

Table 6 shows the average prevailing surface wind directions for high PM_{2.5} days by quadrant for representative counties with violating monitors in the New York City Metropolitan area. These data show that 24-hour PM_{2.5} concentrations are influenced by emissions in any direction at various times, but these data also suggest that emissions in some directions relative to the violation are more likely to contribute than emissions in other directions.

County	Prevailing Wind Direction (%)			
	NW	SW	SE	NE
Union County, NJ	8%	70%	13%	9%
Bronx County, NY	8%	53%	25%	14%
New Haven County, CT	11%	60%	18%	11%

Table 6. Prevailing Wind Directions for High PM_{2.5} Days

EPA's analysis of meteorology shows that PM_{2.5} emissions during high PM_{2.5} days in 2005-2007 primarily originated and/or passed through locations from a southerly to a southwesterly direction. This is also evident upon examination of the pollution roses (see Figures 5, 6, and 7) for the New York City Metropolitan area. In addition, the pollution roses also show that some component of elevated PM_{2.5} measured at the nonattainment monitors may originate from a northerly direction. The roses, therefore, show the need to consider the contribution of all surrounding counties to the violating monitors in the New York City Metropolitan area. This ensures that the nonattainment area is sufficiently large enough to include both the areas that violate and the areas that contribute.

In New York State, the counties that ranked high for this factor are Queens, Bronx, Richmond, Nassau, Kings, New York, Rockland, Westchester, and Orange. Suffolk County ranked slightly lower for this factor.

Ulster and Dutchess Counties were not shown to contribute significantly based on the analysis of meteorology. Ulster County is north to northwest of violating monitors in New York, New Jersey and Connecticut. Pollution roses and the prevailing wind direction did not indicate a high impact from this area. The CES score was very low (i.e. 3 on a scale of 100). Dutchess County is northwest of violating monitors in Connecticut, and northeast of violating monitors in New York and New Jersey. Pollution roses and the prevailing wind direction did not indicate a high impact from this area either.

In New Jersey, the counties that rank high for this factor are Union, Bergen, Essex, Hudson, Mercer, Middlesex, Monmouth, Morris, Passaic, and Somerset Counties.

Ocean County is generally south of violating monitors in New Jersey and New York, and southwest of violating monitors in CT. The Ocean County CES score was very low (6), and pollution roses did not indicate a high impact from Ocean County to areas that violate.

Based on our analysis, this factor supported including the Counties of New York, Bronx, Queens, Kings, Richmond, Nassau, Suffolk, Westchester, Orange, and Rockland Counties in New York; and Union, Bergen, Essex, Hudson, Mercer, Middlesex, Monmouth, Morris, Passaic, and Somerset in New Jersey in the New York City metropolitan nonattainment area.

Note: the meteorology factor is also considered in each county's Contributing Emissions Score because the method for deriving this metric included an analysis of trajectories of air masses for high PM_{2.5} days.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM_{2.5} over the New York Metropolitan area.

The New York City Metropolitan area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, this factor did not play a significant role in the decision-making process.

Factor 8: Jurisdictional boundaries (e.g., existing PM areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 24-hour PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, three also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment represent important boundaries for state air quality planning.

In EPA's June 2007 Guidance for Area Designations for the 24-hr PM_{2.5} NAAQS, EPA had indicated that we expected that the boundaries for the existing 1997 PM_{2.5} nonattainment areas would have been appropriate for the boundaries of the new nonattainment areas for the 2006 PM_{2.5} NAAQS. The following counties were included in the EPA Region 2 portion of the 1997 PM_{2.5} NAAQS nonattainment area for the New York City metropolitan area: New York, Bronx, Queens, Kings, Richmond, Nassau, Suffolk, Westchester, Orange, and Rockland Counties in New York; and Union, Bergen, Essex, Hudson, Mercer, Middlesex, Monmouth, Morris, Passaic, and Somerset Counties in New Jersey. Dutchess and Ulster Counties in New York; and Ocean County in New Jersey were not included in the 1997 PM_{2.5} NAAQS nonattainment area for the New York City metropolitan area.

To the degree appropriate, based upon violations and contributions to violations of the ozone and PM_{2.5} NAAQS in a particular area, EPA believes it may be helpful for air planning purposes and for attainment of both NAAQS, for there to be some consistency between ozone and PM_{2.5} nonattainment area boundaries.

The major jurisdictional boundaries in the New York City Metropolitan nonattainment area are the State lines between New York, New Jersey, and Connecticut.

New York has recommended the same boundaries for the 24-hour PM_{2.5} NAAQS that were previously delineated by EPA for the 1997 PM_{2.5} nonattainment area. In their December 2007 letter New York has noted that although they disagreed with those boundaries and chose to litigate the issue, they do not expect the possible change in those boundaries as a result of the litigation to affect their recommendation, given the more local impacts associated with the 24-hour standard, the 24-hour averaging basis for the NAAQS that is the subject of this submittal, the larger number of monitors exceeding the 24-hour standard in the New York City counties, and the values close to the 24-hour standard in the counties surrounding New York City.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the New York City area before 2005 on stationary, mobile, and area sources. Data are presented for PM_{2.5} components that are directly emitted (carbonaceous PM_{2.5} and crustal PM_{2.5}) and for pollutants which react in the atmosphere to form fine particles (e.g. SO₂, NO_x, VOC, and ammonia).

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a State regulation adopted in a State implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in a federally enforceable permit upon termination of the consent decree. In making final decisions, EPA also considered whether a facility would continue to emit pollutants which contribute to PM_{2.5} exceedances even after emission controls are operational.

Since we believe that the emissions listed in Table 1 have not changed significantly since 2005, this factor does not influence heavily in our decision-making.

Conclusion

Bronx, Kings, Nassau, New York, Orange, Queens, Richmond, Rockland, Suffolk and Westchester Counties have been designated by EPA as nonattainment for the 2006 24-hour fine particle (PM_{2.5}) standard.

The Bronx has a monitor that is in violation of the 24-hour PM_{2.5} standard. In addition to violating the standard, the County has mid-range emissions in comparison to the other counties in the New York Metropolitan area; high CES value, total population, population density, and VMT. The population of the Bronx has also exhibited growth. All these factors have lead EPA to designate the Bronx as nonattainment for the 24-hour PM_{2.5} standard.

Kings County has a monitor that is in violation of the 24-hour PM_{2.5} standard. In addition to violating the standard, the County has high emissions, CES value, total population, population density, and VMT. The population of Kings County has also exhibited growth. All these factors have lead EPA to designate Kings County as nonattainment for the 24-hour PM_{2.5} standard.

Nassau County has high emissions, CES value, total population, population density, VMT, commuters into the statistical area, and VMT growth. All these factors have lead EPA to designate Nassau County as nonattainment for the 24-hour PM_{2.5} standard.

New York County has a monitor that is in violation of the 24-hour PM_{2.5} standard. In addition to violating the standard, the County has high emissions, high CES value, total population, population density, and VMT. The population of New York County has also exhibited growth. All these factors have lead EPA to designate the New York County as nonattainment for the 24-hour PM_{2.5} standard.

Orange County has high emissions, VMT, number of commuters into the statistical area, population growth, and VMT growth. All these factors have lead EPA to designate Orange County as nonattainment for the 24-hour PM_{2.5} standard.

Queens County has high emissions, CES value, population, population density, VMT, and number of commuters into the statistical area. Queens County has also exhibited population growth. All these factors have lead EPA to designate Queens County as nonattainment for the 24-hour PM_{2.5} standard.

Richmond County has mid-range emissions in comparison to the other counties in the New York Metropolitan area; high population density, population growth, VMT, and number of commuters into the statistical area. All these factors have lead EPA to designate Richmond County as nonattainment for the 24-hour PM_{2.5} standard.

Rockland County has mid-range emissions in comparison to the other counties in the New York Metropolitan area; high population density, percentage of commuters into the

statistical area, and VMT growth. Rockland County has also exhibited population growth. All these factors have lead EPA to designate Rockland County as nonattainment for the 24-hour PM_{2.5} standard.

Suffolk County has high emissions, total population, population density, VMT, percentage of commuters into the statistical area, and VMT growth. Suffolk County has also exhibited population growth. All these factors have lead EPA to designate Suffolk County as nonattainment for the 24-hour PM_{2.5} standard.

Westchester County has high emissions, CES value, total population, population density, VMT, percentage of commuters into the statistical area, and VMT growth. Westchester County has also exhibited population growth. All these factors have lead EPA to designate Westchester County as nonattainment for the 24-hour PM_{2.5} standard.

Additional information regarding responses to specific State comments can be found in EPA's Response to Comments document at <http://www.epa.gov/pmdesignations/2006standards/tech.htm>

EPA Technical Analysis for Buffalo/Niagara Falls Area (Erie & Niagara Counties)

Introduction

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. EPA would designate an area “attainment” if the area meets the NAAQS and does not contribute to violations.

An area would be designated “unclassifiable” if an area cannot be classified on the basis of available information as meeting or not meeting the NAAQS. EPA would designate a county as “unclassifiable” when it has air quality monitoring data for the 2005-2007 time period that is not complete and cannot be used for determining compliance with the standard.

On December 18, 2007, New York recommended that Erie and Niagara Counties in the Buffalo/ Niagara Falls area be designated as unclassifiable for the 2006 24-hour PM_{2.5} standard based upon air quality data from 2004-2006. These data are from Federal Reference Method (FRM) monitors located in the state data from 2004-2006.

New York’s unclassifiable recommendation for Erie and Niagara counties was based on the insufficient margin between the monitored values and the 24-hour PM_{2.5} standard to support a definitive conclusion that the attainment that was monitored in the 2004-2006 period would persist. New York indicated that the annual 24-hour values were inconsistent, exhibiting no downward trend in the data. New York also noted in their recommendation that the result of the application of the nine factors required by EPA taken together does not weight this recommendation toward a clear conclusion that the area should be either attainment or nonattainment.

On March 28, 2008, EPA informed New York that Erie County may be in violation of the 2006 24-hour PM_{2.5} standard based on data available from the first three quarters of 2007. A complete year of data for 2007 would be necessary to confirm a violation. New York was offered an opportunity to revise their designation recommendation, and submit their new recommendation to EPA in May 2008.

On June 9, 2008, EPA received a letter from New York indicating that the State continued to believe that the Buffalo/ Niagara Falls Metropolitan Statistical area (i.e. Erie and Niagara Counties) should be classified as “unclassifiable”. New York presented data for the 2005-2007 time period that showed that the air monitoring sites monitored attainment of the 24-hour PM_{2.5} standard. Notwithstanding this, New York’s opinion was that assigning a classification of attainment or nonattainment continues to be inappropriate. While the monitored PM_{2.5} design values have not exceeded 24-hour standards, New York has stated that there is insufficient information to determine the

attainment status of this area at this time as there is no clear indication that the monitoring data will continue to be below the 24-hour PM_{2.5} NAAQS.

Based upon currently available information, EPA has designated the Buffalo/ Niagara Falls Metropolitan Statistical area as “attainment/ unclassifiable”. These counties are listed in the table below.

Buffalo/Niagara Falls Area	State-Recommended Nonattainment Counties	EPA-Designated Nonattainment Counties
	None: Erie & Niagara Counties were recommended as unclassifiable	None: Erie & Niagara Counties are recommended as attainment/unclassifiable.

The following is a summary of the air quality data for the Buffalo/Niagara Falls Area.

Air quality data

This factor considers the 24-hour PM_{2.5} design values (in µg/m³) for air quality monitors in counties in the Buffalo/Niagara Falls Area based on data for the 2005-2007 period. A monitor’s design value indicates whether that monitor attains a specified air quality standard. The 24-hour PM_{2.5} standards are met when the 3-year average of a monitor’s 98th percentile values are 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the Buffalo/Niagara Falls Area are shown in Table 7.

County	State Recommended Nonattainment	Design Values 2005-07 (µg/m3)
Erie, NY	No	33
Niagara, NY	No	34

Table 7. Air Quality Data

There are no counties in the Buffalo/Niagara Falls Area that show a violation of the 24-hour PM_{2.5} standard.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors

used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM_{2.5} NAAQS for designation purposes.

Attachment 2

Description of the Contributing Emissions Score

The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

The CES for each county was derived by incorporating the following significant information and variables that impact PM_{2.5} transport:

- Major PM_{2.5} components: total carbon (organic carbon (OC) and elemental carbon (EC)), SO₂, NO_x, and inorganic particles (crustal).
- PM_{2.5} emissions for the highest (generally top 5%) PM_{2.5} emission days (herein called “high days”) for each of two seasons, cold (Oct-Apr) and warm (May-Sept)
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days
- The “urban increment” of a violating monitor, which is the urban PM_{2.5} concentration that is in addition to a regional background PM_{2.5} concentration, determined for each PM_{2.5} component
- Distance from each potentially contributing county to a violating county or counties

A more detailed description of the CES can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.