

TSD- 3b

Analysis of Ambient PM_{2.5} Mass:

**CT and NJ portions of the New York City Metropolitan Non-
attainment Area through 2006**

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Introduction

In this report we provide ambient data analysis for those monitors in Connecticut (two counties) and New Jersey (10 counties) that are part of the New York City non-attainment area (NYC NAA) for PM_{2.5}. The analysis presented here supplements TSD-3a (2007), which examined PM_{2.5} air quality for the FRM monitors in New York only.

Database

The analysis is based upon the Federal Reference Method (FRM) data covering the period of 1999 to 2006, which were extracted from the EPA Air Quality System (AQS) data on December 26, 2007. To be consistent with the analysis reported in TSD-3a (2007), we excluded the data from July 6-9, 2002 that was associated with large-scale Canadian forest fires.

Connecticut

The Connecticut portion of the NYC NAA had 14 sites at various times during this period; five of these sites have collocated duplicate monitors and two of the sites had every day sampling for at least a portion of the time. It should be noted that the New Haven/Stiles St. monitor was designated as a “special purpose” monitor, and as such cannot be used to make an attainment or non-attainment designation. The stations are listed in Table 1 along with their operational dates.

New Jersey

The New Jersey portion of the NYC NAA had 15 monitoring sites at various times during this period; three of these sites have collocated duplicate monitors and two of the sites had every day sampling for at least a portion of the time. Information on these monitors is listed in Table 1.

Analysis

A very cursory analysis was performed on these data, similar to what was done for the NY sites in TSD-3a (2007). The annual average estimates are listed in Table 2. Only those monitors with at least 75% valid samples in a given year are shown in Table 2, and blank cells indicate that either the sampler was not in operation or it did not meet the 75% criteria. In general the CT monitors are below the level of the annual PM_{2.5} National Ambient Air Quality Standard (NAAQS) of 15 µg m⁻³, with the exception of the New Haven/Stile Street special purpose monitoring site. In the case of NJ, there is obvious year-to-year variation at some of the sites, and a few of the monitors are above the level of the annual PM_{2.5} NAAQS. However, this estimated annual average should not be confused with that based on the regulatory process that requires estimation of the annual average based upon individual quarterly data.

Table 3 lists the 98th percentile of the PM_{2.5} concentration at each of these monitors, and again, only those years that had 75% valid samples are shown. The 24-hour NAAQS for PM_{2.5} is 65µg m⁻³, and only once did a site exceed 50µg m⁻³ – Elizabeth Lab in 2001.

Trends

We also used these data to estimate the annual trends at the longest-running sites. For this analysis we computed quarterly averages at these sites, and considered quarters to be complete if there were at least 10 valid samples. Table 4 lists the estimated linear trends on an annual basis. All monitors except for the New Haven/Stiles Street special purpose monitor show a downward trend, varying between 0.05µg m⁻³ and 0.49µg m⁻³, indicating general improvement in PM_{2.5} air quality over the region and consistent with what was reported in TSD-3a (2007) for the NY monitors.

Reference

TSD-3a, 2007. Analysis of Ambient PM_{2.5} Mass and Speciation: New York portion of the New York Metropolitan Nonattainment Area through 2006

Table 1. Listing of FRM sites, 1999-2006. Some locations have primary (“P”) and duplicate (“D”) samplers. Dates with an asterix denote daily sampling for at least part of the period. The New Haven/Stiles St. monitor was designated as “special purpose,” and is included here for completeness only (*in italics*).

State	AQS ID	Site Name	County	Dates
CT	090010010	Bridgeport/Roosevelt School	Fairfield CT	P: 1/1999 – 12/2006 D: 1/1999 – 1/2003
	090010113	Bridgeport/Edison School	Fairfield CT	9/2000 – 12/2003
	090011123	Danbury WCSU	Fairfield CT	1/1999 – 12/2006
	090012124	Stamford H.S.	Fairfield CT	1/1999 – 12/2004
	090013005	Norwalk Health Dept.	Fairfield CT	3/2000 – 12/2006
	090019003	Westport/Sherwood Island	Fairfield CT	1/1999 – 12/2006
	<i>090090018</i>	<i>New Haven/Stiles St.</i>	<i>New Haven CT</i>	<i>P: 1/1999 – 9/2005*</i> <i>D: 1/1999 – 1/2003</i>
	090090026	New Haven/Woodward Firehouse	New Haven CT	4/2003 – 12/2006
	090090027	New Haven/Criscuolo Park	New Haven CT	P: 1/2004 – 12/2006* D: 2/2005 – 12/2006
	090091123	New Haven/State St.	New Haven CT	P: 1/1999 – 12/2006 D: 1/1999 – 2/2005
	090092008	New Haven/Ag. Center	New Haven CT	4/2003 – 12/2006
	090092123	Waterbury/Bank St.	New Haven CT	P: 1/1999 – 12/2006 D: 1/1999 – 12/2006
	090098003	West Haven Toll	New Haven CT	4/2003 – 12/2004
	090099005	Hamden Mill Basins	New Haven CT	7/1999 – 12/2003
NJ	340030003	Fort Lee Library	Bergen NJ	1/1999 – 12/2006
	340130011	Newark/St. Charles	Essex NJ	1/1999 – 12/1999
	340130015	Newark/Willis Center	Essex NJ	4/1999 – 12/2006
	340130016	Newark Lab	Essex NJ	P: 8/2001 – 5/2003 D: 8/2001 – 5/2003
	340171003	Jersey City Firehouse	Hudson NJ	P: 1/1999 – 12/2006 D: 12/1999 – 12/2006
	340172002	Union City	Hudson NJ	1/1999 – 3/2002, 7/2005 – 12/2006
	340210008	Trenton	Mercer NJ	1/1999 – 12/2006
	340218001	Washington Crossing	Mercer NJ	1/1999 – 12/2006
	340230006	New Brunswick	Middlesex NJ	1/1999 – 12/2006
	340270004	Morristown Ambulance Squad	Morris NJ	5/1999 – 12/2006
	340273001	Chester	Morris NJ	1/1999 – 12/2006
	340310005	Paterson	Passaic NJ	1/1999 – 12/2006
	340390004	Elizabeth Lab	Union NJ	P: 1/1999 – 12/2006* D: 1/1999 – 12/2006
	340390006	Elizabeth/Mitchell Bldg.	Union NJ	1/1999 – 12/2006
	340392003	Rahway	Union NJ	12/1999 – 12/2006*

Table 2. Annual average PM_{2.5} levels for sites with at least 75% valid samples in a given year, 2000-2006. Incomplete years are left blank.

Site Name	2000	2001	2002	2003	2004	2005	2006
Bridgeport/Roosevelt School (P)	13.88	13.71	12.72	12.98	12.92	14.32	12.51
Bridgeport/Roosevelt School (D)	15.63	13.49	11.82				
Bridgeport/Edison School		12.77	12.88	12.27			
Danbury WCSU	12.70	13.22	12.51	13.37	11.25	13.44	12.17
Stamford H.S.	12.90	13.01	12.81	13.51	11.78		
Norwalk Health Dept.	12.86	13.41	12.58	12.96	12.23	13.32	11.77
Westport/Sherwood Island	13.03	12.15	11.49	11.63	11.06	12.18	10.69
<i>New Haven/Stiles St. (P)</i>	<i>15.94</i>	<i>16.88</i>	<i>16.00</i>	<i>16.91</i>	<i>15.40</i>		
<i>New Haven/Stiles St. (D)</i>	<i>18.78</i>	<i>18.60</i>	<i>16.19</i>				
New Haven/Woodward Firehouse					11.56	13.05	11.72
New Haven/Crisuolo Park (P)					12.21	13.62	12.21
New Haven/Crisuolo Park (D)						14.01	12.81
New Haven/State St. (P)	14.07	14.32	13.03	13.59	12.66	13.88	12.63
New Haven/State St. (D)		14.58	12.38	15.49	12.39		
New Haven/Ag. Center					11.14	11.73	10.76
Waterbury/Bank St. (P)	13.61	13.98	13.23	12.64	12.04	14.00	11.98
Waterbury/Bank St. (D)	14.82	14.21	12.75	14.09	11.97	14.14	12.26
West Haven Toll					12.91		
Hamden Mill Basins	11.49	11.88	11.09	12.29			
Fort Lee Library	14.57	13.85	12.99	13.34	12.05	14.65	11.82
Newark/Willis Center	15.60	13.06	13.16	13.84	13.17	14.35	12.12
Newark Lab (P)			14.12				
Newark Lab (D)			14.05				
Jersey City Firehouse (P)	16.78	14.01	14.34	14.81	13.66	15.10	13.35
Jersey City Firehouse (D)			13.99	16.26	12.93	16.07	14.67
Union City	17.08	15.54					13.83
Trenton	14.71	14.46	12.94	13.41	12.48	12.90	12.19
Washington Crossing	12.05		11.35	12.18	10.96	12.27	10.06
New Brunswick	13.00	12.72	11.12	12.91	11.11	13.33	10.77
Morristown Ambulance Squad	12.88		11.48	12.16	11.27	12.33	10.12
Chester	11.09		10.46	10.77	9.99	10.77	9.01
Paterson	13.56		12.90	13.26	12.60	13.44	11.88
Elizabeth Lab (P)		15.53	14.56	15.96	15.08	15.24	14.16
Elizabeth Lab (D)	18.49	15.42	14.78	16.97	14.19	16.65	14.72
Elizabeth/Mitchell Bldg.	15.20	12.88	13.11	13.97	12.68	14.33	12.36
Rahway	14.10	12.77	12.04	13.24	12.53	13.91	11.92

Table 3. The 98th percentile of PM_{2.5} levels for sites with at least 75% valid samples in a given year, 2000-2006. Incomplete years are left blank.

Site Name	2000	2001	2002	2003	2004	2005	2006
Bridgeport/Roosevelt School (P)	41.5	40.1	32.9	39.6	34.2	38.3	36.7
Bridgeport/Roosevelt School (D)	42.8	40.6	34.0				
Bridgeport/Edison School		32.1	33.2	40.4			
Danbury WCSU	32.9	35.2	30.7	37.3	27.5	33.4	33.8
Stamford H.S.	36.3	37.4	34.5	41.5	32.2		
Norwalk Health Dept.	35.3	35.7	34.3	42.9	35.2	34.9	35.9
Westport/Sherwood Island	33.4	34.5	30.8	44.0	30.9	35.2	31.3
New Haven/Stiles St. (P)	39.5	40.6	40.4	44.0	34.9		
New Haven/Stiles St. (D)	44.8	43.0	34.5				
New Haven/Woodward Firehouse					31.5	36.4	36.5
New Haven/Criscuolo Park (P)					33.2	38.2	36.7
New Haven/Criscuolo Park (D)						39.1	31.6
New Haven/State St. (P)	37.2	39.5	32.4	40.6	36.2	40.8	38.1
New Haven/State St. (D)		40.6	32.3	38.9	29.9		
New Haven/Ag. Center					32.1	32.8	33.9
Waterbury/Bank St. (P)	34.4	35.4	32.6	37.7	30.4	34.1	35.6
Waterbury/Bank St. (D)	36.0	34.9	33.5	32.8	26.1	35.9	35.2
West Haven Toll					30.8		
Hamden Mill Basins	34.7	32.1	29.4	44.0			
Fort Lee Library	36.4	34.4	33.0	38.9	31.0	40.5	38.2
Newark/Willis Center	41.6	32.1	32.3	39.8	34.9	40.4	39.9
Newark Lab (P)			34.6				
Newark Lab (D)			39.9				
Jersey City Firehouse (P)	39.5	34.1	34.3	46.4	37.4	37.9	41.0
Jersey City Firehouse (D)			36.8	41.1	29.1	38.3	38.9
Union City	39.3	39.5					
Trenton	43.1	35.4	35.4	40.5	33.3	33.6	36.2
Washington Crossing	31.5		32.2	34.9	28.0	33.0	29.5
New Brunswick	34.5	34.1	26.0	45.0	35.5	33.8	32.8
Morristown Ambulance Squad	30.2		29.7	36.8	31.1	32.9	30.4
Chester	29.4		30.0	35.7	29.8	33.4	28.3
Paterson	35.4		34.9	39.8	31.0	40.5	33.4
Elizabeth Lab (P)		39.7	41.7	37.0	40.5	42.5	39.8
Elizabeth Lab (D)	46.6	50.3	39.3	41.2	36.5	39.8	41.9
Elizabeth/Mitchell Bldg.	36.0	33.8	30.0	40.9	33.1	38.6	38.7
Rahway	38.0	30.4	31.1	35.2	36.6	38.2	37.5

Table 4. Trends in PM_{2.5} mass at the longest running FRM monitors, based on quarterly averages from 1999-2006, in $\mu\text{g m}^{-3} \text{ yr}^{-1}$. Only those quarters with at least 10 valid samples are included in this trend estimate.

Site Name	Trend ($\mu\text{g m}^{-3} \text{ yr}^{-1}$)
Bridgeport/Roosevelt School (P)	-0.07
Danbury WCSU	-0.05
Norwalk Health Dept.	-0.18
Westport/Sherwood Island	-0.19
<i>New Haven/Stiles St. (P)</i>	<i>+0.02</i>
New Haven/State St. (P)	-0.19
New Haven/State St. (D)	-0.32
Waterbury/Bank St. (P)	-0.16
Waterbury/Bank St. (D)	-0.13
Fort Lee Library	-0.25
Newark/Willis Center	-0.37
Jersey City Firehouse (P)	-0.34
Jersey City Firehouse (D)	-0.25
Trenton	-0.27
Washington Crossing	-0.14
New Brunswick	-0.11
Morristown Ambulance Squad	-0.49
Chester	-0.21
Paterson	-0.06
Elizabeth Lab (P)	-0.27
Elizabeth Lab (D)	-0.43
Elizabeth/Mitchell Bldg.	-0.30
Rahway	-0.15