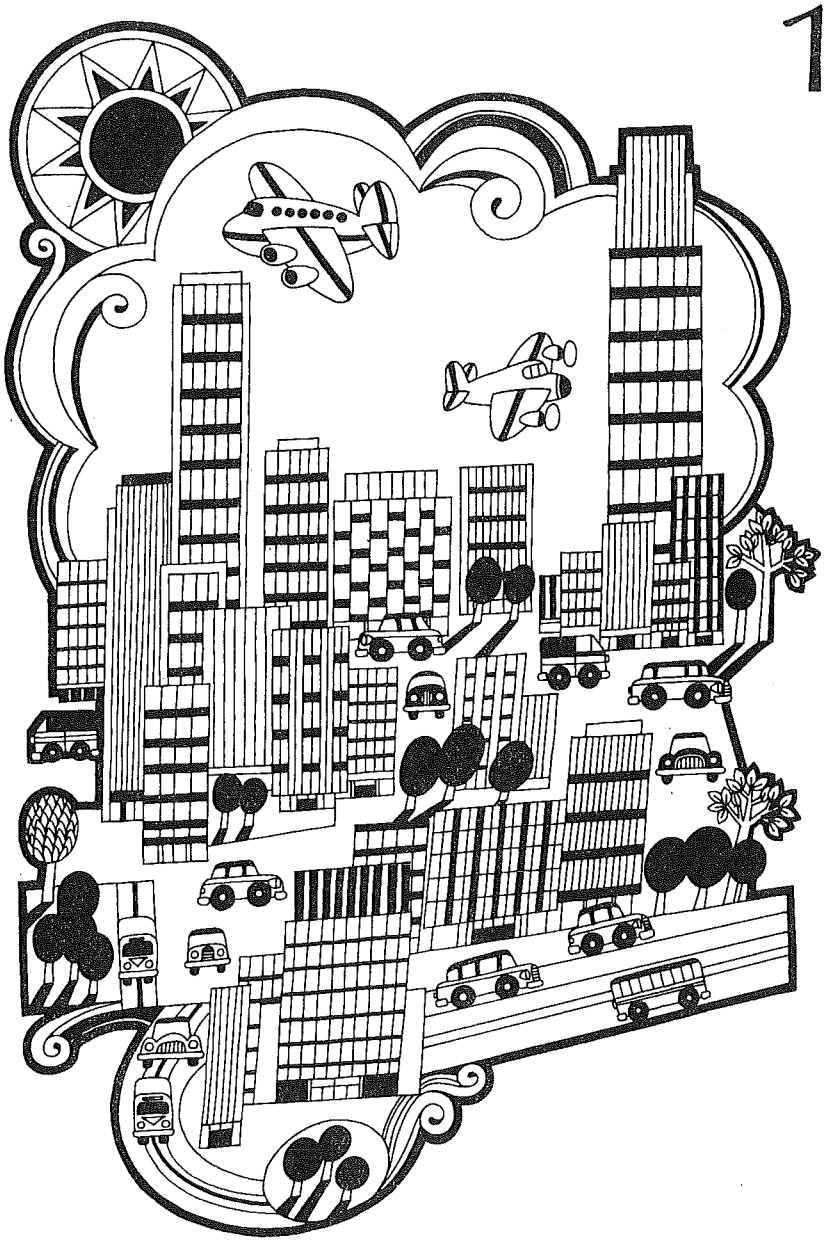
CONNECTICUT 1977 AIR QUALITY SUMMARY



Department of Environmental Protection

Stanley J. Pac, Commissioner

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CONNECTICUT AIR QUALITY SUMMARY - 1977
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I. INTRODUCTION

This summary of 1977 ambient air quality levels in Connecticut is a compilation of all air pollutant measurements made at permanent Department of Environmental Protection (DEP) monitoring sites in the State.

A. Total Suspended Particulate Matter and Sulfur Dioxide Trends

In order to reach some statistically valid conclusions concerning the trend in Total Suspended Particulate levels in Connecticut, we applied the Wilcoxon Matched Pairs, Signed Rank Statistical Test to the 1970-1977 data. The Wilcoxon Test is a non-parametric test of high power and efficiency which enables us to ascertain if there was a statistically significant change (increase or decrease) in the annual average TSP concentrations at all the TSP monitoring sites in Connecticut. This test enables us to overcome the trend analyses problems which arise due to the changes in the number and locations of TSP monitoring sites from year to year and the problems associated with making equitable comparisons among sites. The annual mean TSP levels for consecutive years are compared at each site; there is no inter-site comparison. Data for two consecutive years are required and the size of the change (increase or decrease) is noted. For example, if a high proportion of sites experienced an increase and/or if the magnitude of an increase at several sites is of much greater importance than the magnitude of a decrease at other sites, the test will show if the increase was statistically significant for those two years. A 95% confidence interval is used in the analyses.

Applying the Wilcoxon Test indicates that between 1970 and 1974 TSP levels in Connecticut exhibited a general decreasing trend. However, between 1974 and 1975 this decreasing trend reversed itself and TSP levels demonstrated a significant increase. Since 1975 TSP concentrations have remained relatively constant.

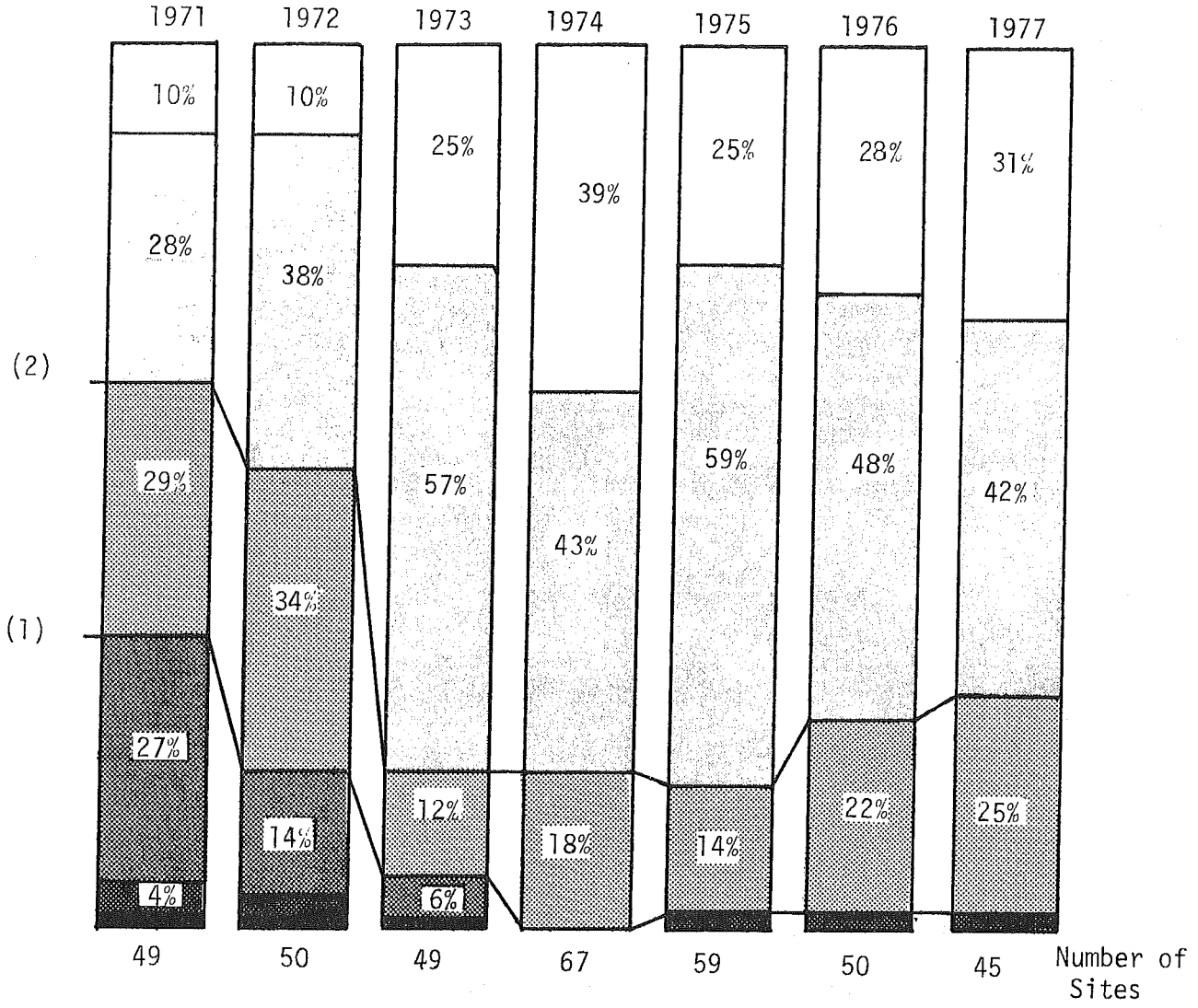
Figure 1 shows the long-term trend of TSP concentrations in Connecticut in a more graphical form. The trend chart is based on data obtained from both high volume and low volume sampling devices. High volume sampler data is included only if there were a sufficient number of samples taken in each year to compute valid geometric means. Low volume sampler data is included for those sites where low volume samplers replaced high volume samplers in 1976.

Figure 2 shows a similar trend chart for sulfur dioxide (SO_2). It can be seen that there has been a general improvement in sulfur dioxide levels since 1971. Although only 3 sites had valid annual averages in 1977 (see detailed discussion in Section III), estimated annual averages at all remaining SO_2 sites were less than 40 ug/m^3 in 1977.

The continuous instruments used to measure SO_2 from 1975 to 1977 were more accurate than those used from 1971 to 1974. Therefore, while SO_2 levels have in general decreased since 1971, no precise quantification of this improvement can be obtained from the SO_2 trend chart.

FIGURE 1

TOTAL SUSPENDED PARTICULATE MATTER TREND



LEGEND

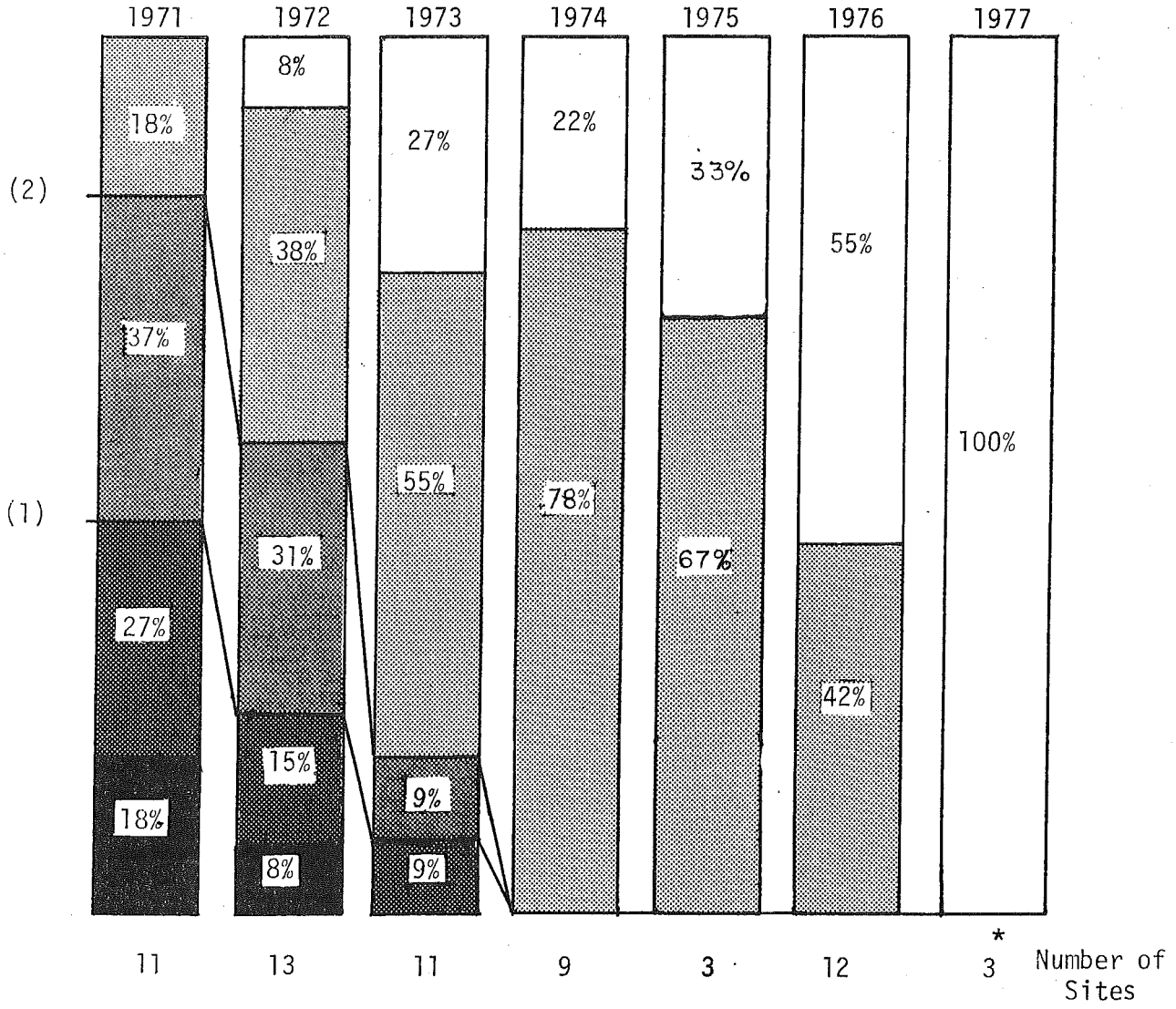
Annual Geometric Mean ($\mu g/m^3$)

- 0 - 45
- 45 - 60
- 60 - 75
- 75 - 100
- 100 - 125
- 125+

(1) Primary Annual Standard 75 $\mu g/m^3$
(2) Secondary Annual Standard 60 $\mu g/m^3$

FIGURE 2

SULFUR DIOXIDE TREND



LEGEND

Annual Arithmetic Mean ($\mu g/m^3$)

0 - 40

40 - 60

60 - 80

80 - 100

100+

(1) Primary Annual Standard 80 $\mu g/m^3$
(2) Secondary Annual Standard 60 $\mu g/m^3$

* Note that the estimated annual averages at the 12 SO_2 sites with partial data in 1977 were less than 40 $\mu g/m^3$ also.

B. Air Monitoring Network

A computerized Air Monitoring network consisting of an IBM System 7 computer and 12 telemetered monitoring sites was put into full operation in 1975. Presently, up to 12 measurement parameters from each site are transmitted via telephone lines to the System 7 unit located in the DEP Hartford office. The data are then compiled into 24-hour summaries twice daily. The telemetered sites are located in the towns of Bridgeport, Danbury, Derby, Enfield, Greenwich, Groton, Hartford, Middletown, New Britain, New Haven, Stamford, and Waterbury.

Measured parameters include the pollutants sulfur dioxide, particulates, (COHS), carbon monoxide, ozone, and meteorological data consisting of wind speed and wind direction, wind horizontal sigma, temperature, dew point, precipitation, barometric pressure and solar radiation.

The real-time capabilities of the System 7 telemetry network have enabled the Air Monitoring Unit to report the Pollutant Standards Index for 12 towns on a daily basis while keeping a close watch for high pollution levels which may occur during adverse weather conditions throughout the year.

The complete monitoring network used in 1977 consists of:

43 Total Suspended Particulate (Hi-Vol) sites
8 Total Suspended Particulate (Lo-Vol) sites
15 Sulfur Dioxide sites (Continuous Monitors)
12 Ozone sites
24 Nitrogen Dioxide sites (Bubblers)
9 Carbon Monoxide sites

A complete description of all permanent air monitoring sites in Connecticut operated by DEP in 1977 is available from the Department of Environmental Protection, Air Compliance, State Office Building, Hartford, Connecticut, 06115.

C. Air Quality Standards

Table 1 lists analysis methods and National Ambient Air Quality Standards (NAAQS) for each pollutant. The NAAQS were established by the U.S. Environmental Protection Agency (EPA) and are divided into two categories: primary, established to protect the public health; and secondary, established to protect plants and animals and to prevent economic damage.

Each standard specifies a concentration and an exposure time developed from studies of the effect of various levels of the different pollutants.

TABLE 1
ASSESSMENT OF AMBIENT AIR QUALITY

POLLUTANT	METHOD OF ANALYSIS: SAMPLING PERIOD	METHOD OF ANALYSIS: DATA REDUCTION	NATIONAL AMBIENT AIR STANDARDS: STATISTICAL BASE	PRIMARY STANDARD		SECONDARY STANDARD	
				µg/m³	ppm	µg/m³	ppm
Total Suspended Particulates	24-Hours Every Sixth Day	24-Hour Average	Annual Geometric Mean	75		60*	
			24-Hour Concentration[2]	260		150	
Sulfur Oxides (Measured as Sulfur Dioxide)	Continuous[1]	1-Hour Average	Annual Arithmetic Mean	80	.03	60†	.02
			24-Hour Average Concentration[2]	365	.14	260†	.10
			3-Hour Average Concentration[2]			1300	.5
Nitrogen Dioxide	24-Hours Every Sixth Day	24-Hour Average	Annual Arithmetic Mean	100	.05	Same as Primary	
Photochemical Oxidants (Ozone)	Continuous[1]	1-Hour Average	1-Hour Average[2]	160	.08	Same as Primary	
Hydrocarbons	Continuous[1]	1-Hour Average	3-Hour Average[2] (6-9 AM)	160**	.24	Same as Primary	
				mg/m³	ppm	mg/m³	ppm
Carbon Monoxide	Continuous[1]	1-Hour Average	8-Hour Average[2]	10	9	Same as Primary	
			1-Hour Average[2]	40	35	Same as Primary	

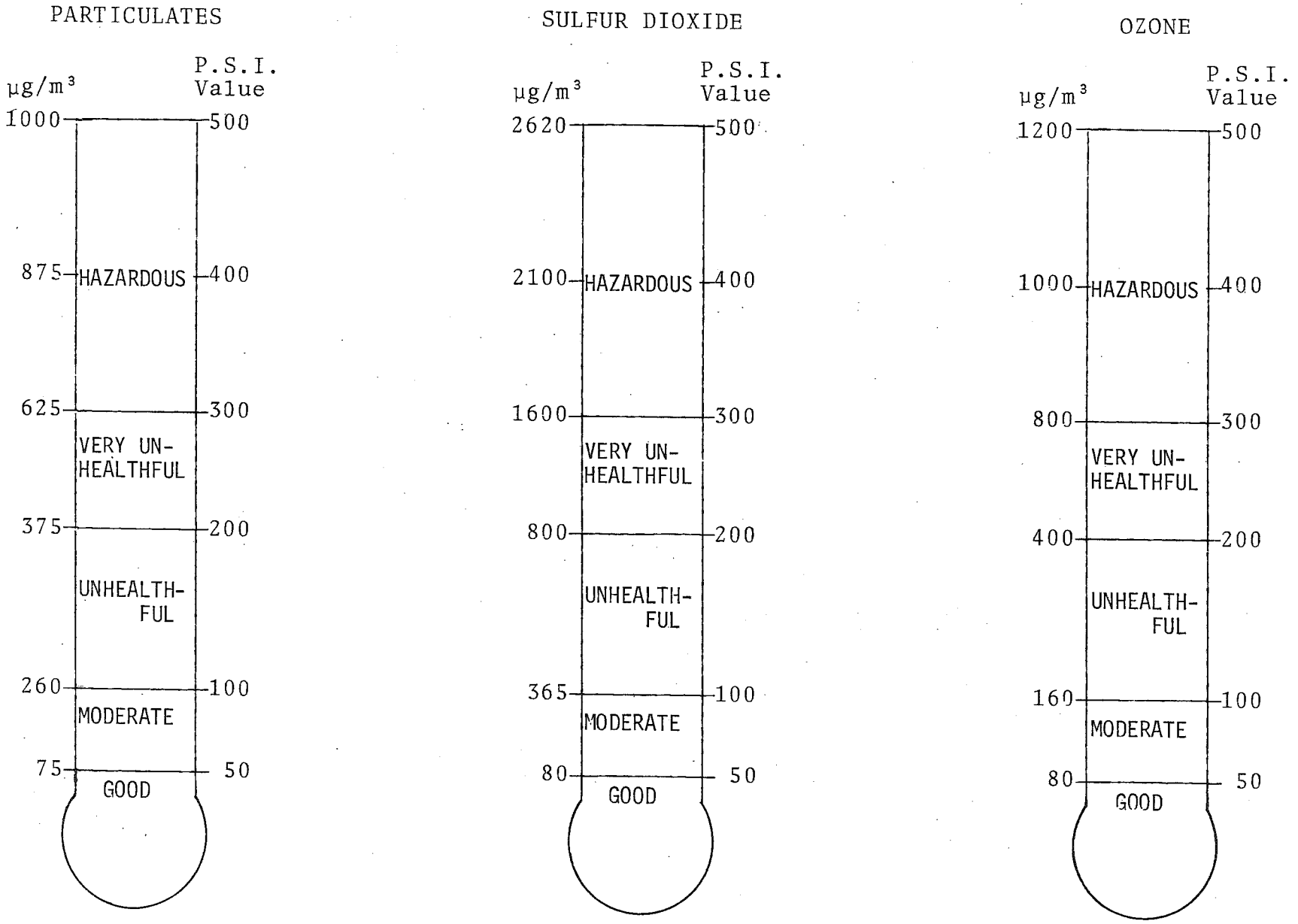
[1]EPA assessment criteria requires 75% of possible data to compute valid averages.
[2]Not to be exceeded more than once per year.
*A guide to be used in assessing implementation plans to achieve the 24-hour standard.
**For use as a guide in devising implementation plans to achieve oxidant standards.
†Secondary Standard applies to State of Connecticut only.
Units: µg/m³ = Micrograms per cubic meter; mg/m³ = Milligrams per cubic meter; ppm = Parts per million

D. Pollutant Standards Index

The Pollutant Standards Index (PSI) is a daily air quality index recommended for common use in state and local agencies by the U.S. Environmental Protection Agency. Connecticut switched to reporting the PSI on a 7-day a week basis on November 15, 1976. The PSI incorporates five pollutants - carbon monoxide, sulfur dioxide, total suspended particulates, photochemical oxidants and nitrogen dioxide. The index converts each air pollutant concentration into a normalized number where the National Ambient Air Quality Standard for each pollutant corresponds to PSI = 100 and the Significant Harm Level corresponds to PSI = 500. Figure 3 shows the breakdown of index values for the commonly reported pollutants in Connecticut. Each day the pollutant with the highest PSI value of all the pollutants being monitored is reported, along with the dimensionless PSI number, and a descriptor word to characterize the daily air quality.

A telephone recording of the PSI is taped each afternoon at 3 PM, seven days a week and can be heard by dialing 566-3449. For residents outside of the Hartford telephone exchange, the PSI is now available toll-free from the DEP representative at the Governor's State Information Bureau. The number is 1-800-842-2220. This information is also available to the public weekday afternoons from the Connecticut Lung Association in East Hartford.

FIGURE 3
POLLUTANT STANDARDS INDEX



E. Quality Assurance

A vigorous and comprehensive Quality Assurance Program for air quality data encompasses a multitude of tasks:

* Personnel training
* Site selection, evaluation and review
* Equipment evaluation, selection and modification when applicable
* Purchasing and inventory control of consumable supplies
* Instrument preventive maintenance, operation and calibration
* Calibration and traceability of working standards
* Sample collection and analysis
* Data recording, documentation, reduction, validation and reporting
* Interagency cross-checks
* Interlaboratory and instrument audits

With the advancement of instrument technology, personnel experience and improved quality control and quality assurance procedures for the operation, maintenance and calibration of monitoring equipment, the quality of data should improve from year to year until these advancements are balanced by other factors such as instrument degradation due to aging, reduction in resources, and personnel turnover (this balance has not yet been reached).

1. DEP Data Handling Procedures

The table below briefly summarizes some of the data acceptability criteria used by the DEP on data produced by our continuous monitors. Data points are either unadjusted, corrected, or rejected depending upon the % of deviation from a calibrated value:

POLLUTANT	UNADJUSTED DATA	CORRECTED DATA	DISCARDED DATA
Ozone	$< \pm$ 10%	$\pm$ 10% to $\pm$ 20%	$> \pm$ 20%
Carbon Monoxide	$< \pm$ 5%	$\pm$ 5% to $\pm$ 15%	$> \pm$ 15%
Sulfur Dioxide	$< \pm$ 10%	$\pm$ 10% to $\pm$ 25%	$> \pm$ 25%

Additional accept/reject criteria apply to deviations due to instrument zero drift. As a result of these checks and corrections the data accepted for presentation in this summary are probably better than indicated by the EPA audits which follow.

2. EPA Audits

It is essential that data quality be assessed by an impartial source (EPA) who periodically performs quantitative audits on monitoring instruments, calibration systems and laboratory functions. The

results of Connecticut DEP's performance are summarized here in an effort to quantify the degree of data accuracy. The following discussion describes the results for the individual pollutants.

a. Integrating Instruments (24-Hour Sample Every 6 Days)

1) Particulates:

a) Sample Weights

The EPA procedure of auditing the weighing of samples is no longer being performed because of a negative bias which exists at each subsequent weighing due to the loss of particulate matter during the sample shipping process. However, weights used to daily calibrate the laboratory balance were checked and found to be in tolerance (1 gm wgt = 0.99994 $\pm$ 0.00001 gms; 3 gm wgt = 2.99975 $\pm$ 0.00001 gms).

b) Flow Rates

The second parameter required to determine particulate concentrations is the sampling flow rate. Connecticut participated in the audits of 9 samplers, each of which contained 5 different flow rates for a total of 45 data points.

There were 4 data points (2 samplers) which were outside the acceptable range defined by EPA, all of which were reported high. However, the unacceptable points were below the normal operating range of the hi-vols and therefore did not affect reported data. All audited values in the range of instrument operation were acceptable.

2) Nitrogen Dioxide

a) Bubblers

Ten EPA reagent samples were analyzed at the Environmental Chemistry Laboratory of the Connecticut Health Department to determine the accuracy of the analytical procedures. All values were within EPA's acceptable "Target Range" of $\pm$ 10%.

b. Continuous Instruments

The table below is a summary of the data distribution of all EPA audits performed during 1977 on our continuous monitoring network of Ozone, Carbon Monoxide, and Sulfur Dioxide:

POLLUTANT	TOTAL # DATA POINTS	% DATA POINTS < 10% DEVIATION	% DATA POINTS < 15% DEVIATION	% DATA POINTS < 20% DEVIATION
O_3	45	100%	---	---
CO	59	70%	88%	95%
SO_2	72	74%	82%	89%

II. TOTAL SUSPENDED PARTICULATES

Conclusion:

In general, measured total suspended particulates (TSP) levels in Connecticut showed no significant change in air quality in 1977 as compared to 1976.

Sample Collection and Analysis:

Hi-Volume Sampler (Hi-Vol):

"Hi-Vols" resemble vacuum cleaners in their operation, with an 8" x 10" piece of fiberglass filter paper replacing the vacuum bag. The samplers operate every sixth day at most sites and every third day at certain urban stations from midnight to midnight.

The matter collected on the filters is analyzed for weight and chemical composition. The flow through the filter is measured before and after sampling and the volume of air which has passed through the filter in 24 hours is calculated. The weight in micrograms (μg) divided by the volume of air in cubic meters (m^3) yields the pollutant concentration for the day, in micrograms per cubic meter. The chemical composition of the suspended particulate matter is determined as follows. A standardized strip of every other hi-vol filter collected in each quarter year is cut-out and composited into one sample. This procedure is repeated three times so that for each site, three quarterly composited samples are made. One of the composited filter samples is digested in benzene. The organic materials in the sample dissolve and are extracted into the benzene. The benzene is evaporated and the organic residue is weighed. The weight of this residue represents the organic material in the sample and the result is reported as the benzene soluble fraction of the TSP, in $\mu g/m^3$. Another sample is dissolved in water, re-fluxed and the resulting solution is analyzed to determine the water soluble fraction of the TSP using wet chemistry techniques. Results are reported for each individual constituent of the water soluble fraction in $\mu g/m^3$. The last composited sample is digested in acid and the resulting solution is analyzed for the different metals in the TSP using an atomic absorption spectrophotometer. Results are reported for each individual metal in $\mu g/m^3$.

Lo-Volume Sampler:

The low-volume (i.e., Lo-vol) sampler is a 30-day continuous sampler. It is enclosed in a shelter similar to a hi-vol, uses the same glass fiber filter paper, but operates at an air sampling flow rate approximately one-tenth that used by a standard hi-vol (i.e., 4 cfm as opposed to 40-60 cfm). The air flow through the lo-vol is measured by a temperature compensating dry gas meter. The lo-vol measurement is essentially an arithmetic average for the 30-day sampling interval.

Discussion of Data:

In 1977 both hi-vol and lo-vol particulate samplers were operated in Connecticut. Because the Federal EPA does not recognize the lo-vol instrument as an equivalent to the reference (hi-vol) method of sampling for TSP, only

hi-vol data are analyzed for compliance with NAAQS.

In 1977, of the sites that had valid annual geometric means, 17 hi-vol sites showed lower annual geometric means than in 1976, with 7 of these decreases being greater than 5 $\mu g/m^3$. In 1977, 21 hi-vol sites showed higher geometric means than 1976, with 5 of these increases being greater than 5 $\mu g/m^3$. When determining compliance with either the primary or secondary annual NAAQS for TSP, the Federal EPA recommends at least 5 observations in each quarter of the year be evaluated. Using this criterion, the primary annual standard was exceeded in Waterbury at site 123, while the secondary annual standard was exceeded at 12 sites.

Table 2 is the product of a computer program listing all monitoring sites used by DEP. The data for each site includes the number of samples taken (generally, a maximum of 61 samples per year), the geometric mean, 95% confidence limits about the mean, the standard geometric deviation and a statistical prediction of the number of days in each year the 24-hour primary and secondary NAAQS would have been exceeded if sampling had been conducted every day. This analysis, as were the ambient standards, is based on the assumption that the particulate data are log-normally distributed.

Because manpower and economic limitations dictate that sampling of particulate matter at most sites occur once every sixth day, a degree of uncertainty as to whether the air quality at a site has either met or exceeded the national standards is introduced. This uncertainty for the annual standard can be quantified by determining 95% confidence limits about each of the annual geometric means. For example (see Table 2), in Bristol at site 004 in 1977, 61 samples were taken and a geometric mean of 56 $\mu g/m^3$ was calculated. However, the columns labeled "95-PCT-LIMITS" show the lower and upper limits for a 95% confidence interval of 52 and 61 $\mu g/m^3$, respectively. This means that if a larger (i.e., greater than 61 samples) sample set were collected in 1977 at this site there is a 95% chance that the geometric mean would fall between these limits. Since the national secondary standard for particulates is within this interval, one cannot be 95% confident that the secondary standard was met here in 1977.

In Table 3, the 1977 monitoring sites are examined for compliance with standards, using the state's hi-vol confidence limit criteria. The table shows that Waterbury 123 exceeded the primary annual standard with 95% confidence. It is uncertain whether the primary standard was either achieved or exceeded at 2 other sites (i.e., Bridgeport, site 123 and Waterbury, site 02). The table also shows that the secondary standard was exceeded at 4 sites (i.e., Waterbury, sites 123 and 02; Bridgeport, site 123; and Hartford, site 03). Whether the secondary standard was exceeded is uncertain at 20 other sites. Comparing this to the results using the actual measured levels in the discussion above, the 95% confidence method includes the same number of sites exceeding the primary standard and 8 less sites exceeding the secondary standard.

Table 4 presents 1st and 2nd high 24-hour concentrations recorded at each site. There was no violation of the primary 24-hour standard recorded in 1977. Measured values exceeding the secondary 24-hour standard were recorded at 8 sites in 1977, 4 less than in 1976.

Lo-vols, which operate continuously for 30 day periods, measure the particulate concentration at 3 remote sites and 5 rural sites. The rural lo-vol sites help give us an indication of the State's annual average background particulate levels. Table 5 shows the lo-vol concentration for each month during 1977 and the equivalent geometric mean for the year.

Annual averages of seventeen components or characteristics of the particulate matter collected at each hi-vol sampling location have been computed for the years 1971 through 1977 and are tabulated in Table 6. In early 1976 hi-vol monitors at 8 sites were replaced by lo-vol samplers. The chemical composition of the particulate matter collected at these sites is not yet available. In the 1976 Annual Summary some erroneous values were published for 1971-1975 chemical composition data (Table 15, 1976). These have since been corrected. Only data presented in this 1977 Air Quality Summary should be considered valid for those years. The abbreviations used in the table are defined below. All values shown are annual arithmetic means, in micrograms per cubic meter, except for pH.

#S - Number of Samples
AL - Aluminum
BE - Berylium
CD - Cadmium
CR - Chromium
CU - Copper
FE - Iron
PB - Lead
MN - Manganese
NI - Nickel
ZN - Zinc
V - Vanadium
NO3 - Total Nitrates
SO4 - Total Sulfates
NH4 - Ammonium
NA - Sodium
pH - Acidity
BENZ - Total Benzene Solubles
TSP - Total Suspended Particulates

TABLE 2

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION PAGE 1 AIR COMPLIANCE MONITORING

POLLUTANT--PARTICULATES DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	UPPER	STD GEOM DEV	PREDICTED DAYS OVER 150 UG/M3	PREDICTED DAYS OVER 260 UG/M3
ANSONIA	03	1977	58	63.1 62.5 1975	57	70	1.542	8	
BRIDGEPORT	01	1977	60	57.1 49.8	52	62	1.448	2	
BRIDGEPORT	123	1977	119	70.9 65.9	67	75	1.510	13	
BRISTOL	01	1977	58	51.5 47.2	46	57	1.531	2	
BRISTOL	04	1977	61	56.1	52	61	1.405	1	
DANBURY	123	1977	58	57.4 50.8	52	64	1.571	7	
DERBY	123	1977	60	53.9	50	58	1.410		
EAST HARTFORD	02	1977	60	47.1 49.8	42	53	1.596	2	
ENFIELD	123	1977	54	40.4 41.6	37	45	1.487		
GREENWICH	01	1977	47	60.7	54	68	1.509	5	
GREENWICH	03	1977	59	59.2	54	65	1.444	2	
GREENWICH	04	1977	58	42.3 35.5	38	47	1.589	1	
GREENWICH	08	1977	60	61.2 52.2	55	68	1.547	7	
GROTON	123	1977	61	42.7 40.7	39	47	1.542	1	
HADDAM	02	1977	59	34.5 35.4	31	38	1.548		
HARTFORD	02	1977	59	50.6	46	55	1.472	1	
HARTFORD	03	1977	105	66.2 64.6	62	71	1.568	13	

POLLUTANT--PARTICULATES DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	STD GEOM DEV	PREDICTED DAYS OVER 150 UG/M3	PREDICTED DAYS OVER 260 UG/M3
HARTFORD	123	1977	60	65.7 67.1	59	73	1.542	10	
MANCHESTER	01	1977	60	43.5 41.5	39	48	1.567	1	
MERIDEN	02	1977	60	52.5 50.9	47	58	1.550	3	
MERIDEN	05	1977	59	61.5 54.2	54	69	1.671	16	1
MIDDLETOWN	03	1977	60	53.2 62.2	48	59	1.548	3	
MILFORD	01	1977	55	45.6	41	51	1.556	1	
MILFORD	02	1977	58	57.3 53.9	53	62	1.424	1	
NAUGATUCK	01	1977	60	57.7 50.8	52	64	1.530	5	
NEW BRITAIN	03	1977	31	84.7	70	102	1.692	50	7
NEW BRITAIN	123	1977	120	57.9 60.1	55	61	1.444	2	
NEW HAVEN	01	1977	35	63.2	55	73	1.526	8	
NEW HAVEN	02	1977	58	55.2 59.1	49	62	1.618	7	
NEW HAVEN	123	1977	46	63.2 73.9	58	69	1.403	2	
NORTH CANAAN	01	1977	41	40.8	36	47	1.574	1	
NORWALK	05	1977	60	60.8 59.0	55	67	1.471	4	
NORWICH	01	1977	61	47.7 45.1	44	52	1.474		
OLD SAYBROOK	01	1977	61	59.9 55.0	54	66	1.535	7	
STAMFORD	07	1977	53	59.8 58.3	54	66	1.498	4	

POLLUTANT--PARTICULATES

DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	UPPER	STD GEOM DEV	PREDICTED DAYS OVER 150 UG/M3	PREDICTED DAYS OVER 260 UG/M3
STAMFORD	123	1977	61	62.6 53.1	57	69	1.486	5	
STRATFORD	01	1977	42	41.1	36	47	1.641	2	
STRATFORD	05	1977	59	57.9 53.5	52	65	1.584	7	
TORRINGTON	123	1977	61	62.7 60.1	56	71	1.653	16	1
WALLINGFORD	01	1977	53	57.1 57.0	51	64	1.601	7	
WATERBURY	02	1977	60	70.0 62.8	64	77	1.505	10	
WATERBURY	123	1977	118	81.3 80.1	75	88	1.651	42	4
WATERFORD	01	1977	61	32.2 33.0	29	36	1.669		

TABLE 3

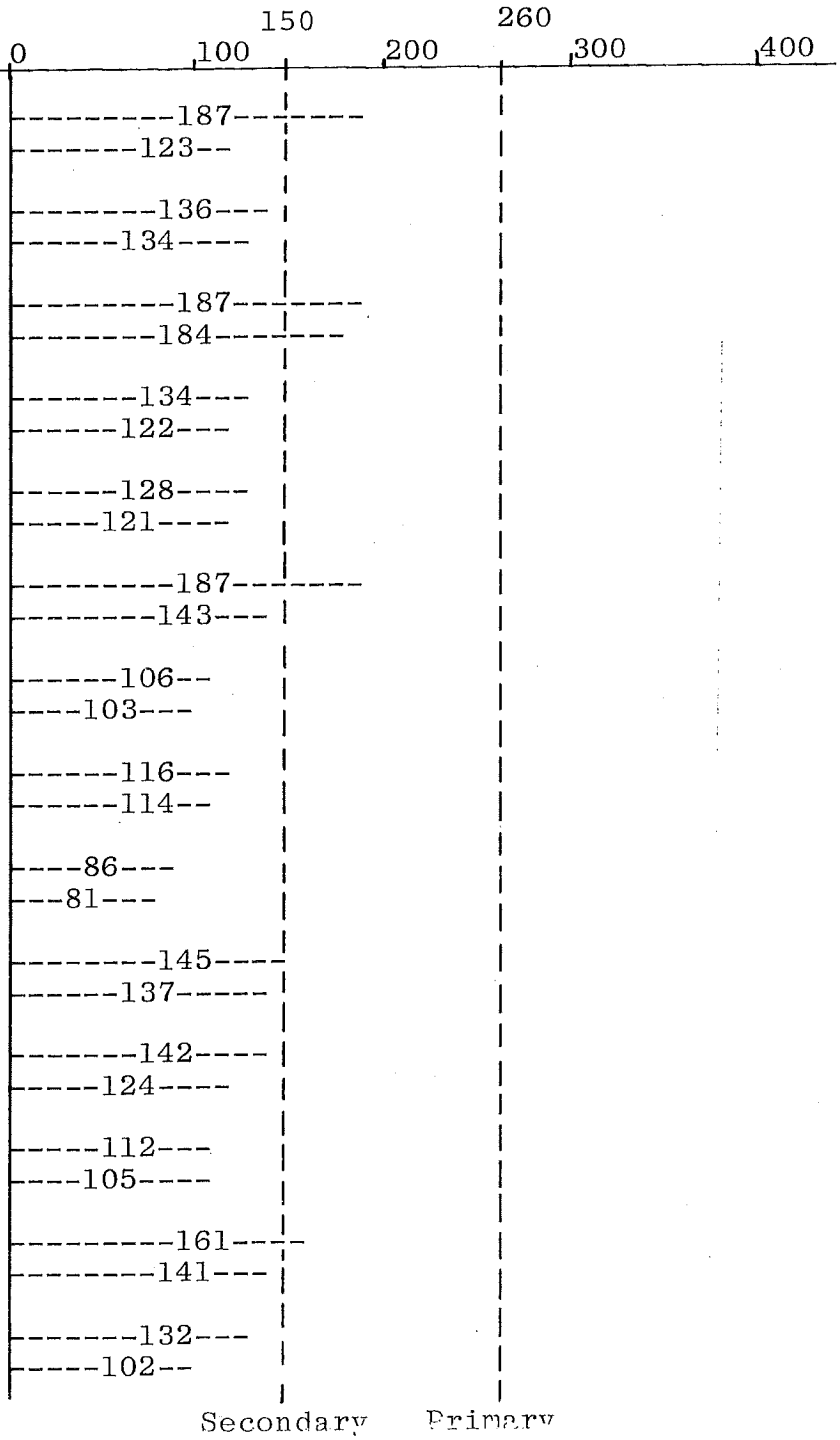
CONFIDENCE OF TSP ANNUAL GEOMETRIC MEANS

PRIMARY STANDARD		SECONDARY STANDARD	
95% CONFIDENT STANDARD HAS BEEN EXCEEDED (>75)	UNCERTAIN WHETHER STANDARD HAS BEEN ACHIEVED OR EXCEEDED	95% CONFIDENT STANDARD HAS BEEN EXCEEDED (>60)	UNCERTAIN WHETHER STANDARD HAS BEEN ACHIEVED OR EXCEEDED
Waterbury 123	Bridgeport 123	Bridgeport 123	Ansonia 003
	Waterbury 002	Hartford 003	Bridgeport 001
		Waterbury 002	Bristol 004
		Waterbury 123	Derby 123
			Greenwich 001
			Greenwich 003
			Greenwich 008
			Hartford 123
			Meriden 005
			Milford 002
			Naugatuck 001
			N. Britain 123
			New Haven 002
			Norwalk 005
			O. Saybrook 001
			Stamford 123
			Stamford 007
			Torrington 123
			Wallingford 001
			Waterbury 002

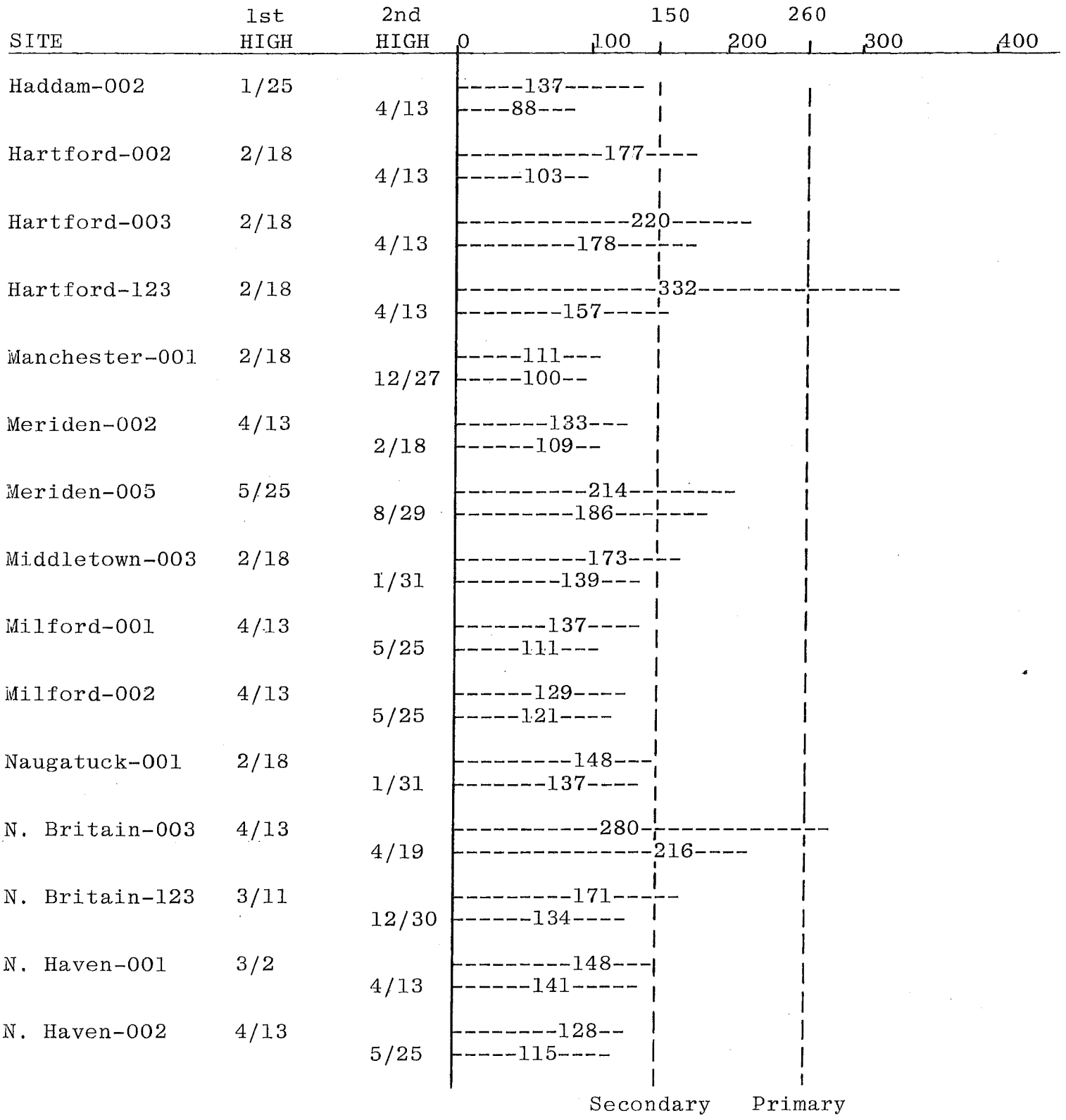
TABLE 4
TOTAL SUSPENDED PARTICULATES

1977 CONNECTICUT
24-HOUR CONCENTRATION *

SITE	1st HIGH	2nd HIGH
Ansonia-003	2/18	187
		12/30 123
Bridgeport-001	3/9	136
		4/13 134
Bridgeport-123	4/22	187
		3/11 184
Bristol-001	4/13	134
		5/25 122
Bristol-004	1/13	128
		4/13 121
Danbury-123	3/8	187
		4/13 143
Derby-123	4/13	106
		8/5 103
E. Hartford-002	6/24	116
		3/2 114
Enfield-123	4/13	86
		7/24 81
Greenwich-001	2/24	145
		5/1 137
Greenwich-003	1/13	142
		9/28 124
Greenwich-004	4/19	112
		5/13 105
Greenwich-008	7/24	161
		4/13 141
Groton-123	4/13	132
		5/25 102



*units in $\mu g/m^3$


SITE
1st HIGH
2nd HIGH
0
100
150
200
260
300
400
Haddam-002 1/25 4/13 137 88
Hartford-002 2/18 4/13 177 103
Hartford-003 2/18 4/13 220 178
Hartford-123 2/18 4/13 332 157
Manchester-001 2/18 12/27 111 100
Meriden-002 4/13 2/18 133 109
Meriden-005 5/25 8/29 214 186
Middletown-003 2/18 1/31 173 139
Milford-001 4/13 5/25 137 111
Milford-002 4/13 5/25 129 121
Naugatuck-001 2/18 1/31 148 137
N. Britain-003 4/13 4/19 280 216
N. Britain-123 3/11 12/30 171 134
N. Haven-001 3/2 4/13 148 141
N. Haven-002 4/13 5/25 128 115
Secondary
Primary

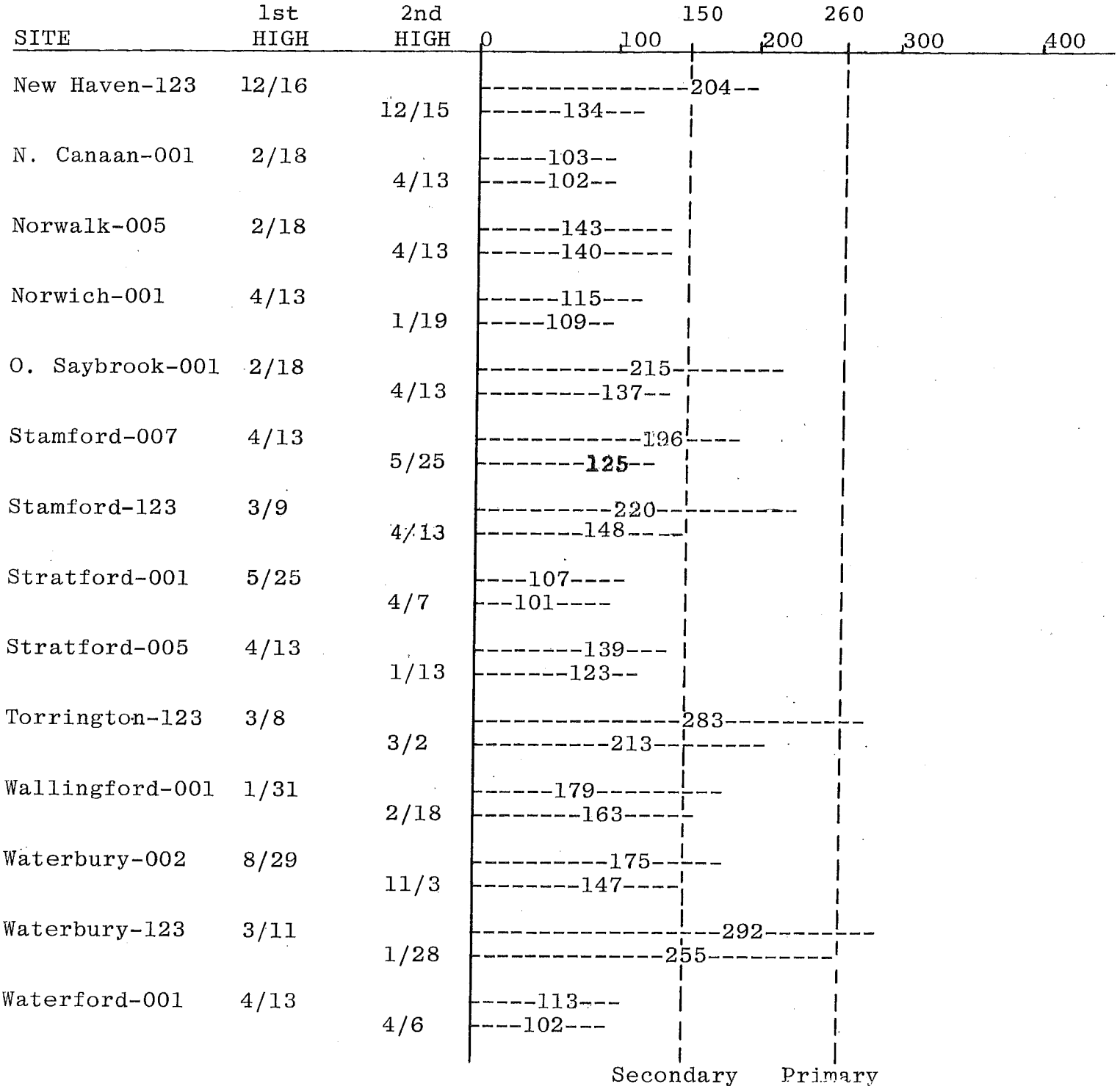

SITE
1st HIGH
2nd HIGH
0
100
150
200
260
300
400
New Haven-123
12/16
12/15
204
134
N. Canaan-001
2/18
4/13
103
102
Norwalk-005
2/18
4/13
143
140
Norwich-001
4/13
1/19
115
109
O. Saybrook-001
2/18
4/13
215
137
Stamford-007
4/13
5/25
196
125
Stamford-123
3/9
4/13
220
148
Stratford-001
5/25
4/7
107
101
Stratford-005
4/13
1/13
139
123
Torrington-123
3/8
3/2
283
213
Wallingford-001
1/31
2/18
179
163
Waterbury-002
8/29
11/3
175
147
Waterbury-123
3/11
1/28
292
255
Waterford-001
4/13
4/6
113
102
Secondary
Primary

TABLE 5

1977 LO-VOL TSP MEASUREMENTS, $\mu g/m^3$

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	GEOMETRIC AVERAGE
Berlin	36	38	34	36	43	35	34	35	21	21	21	24	31
Burlington	24	26	25	29	28	26	26	33	23	19	22	18	25
Kent	15	49	30	16	30	x	x	38	18	19	16	16	23
Morris	25	28	27	28	45	40	32	34	20	18	16	20	26
Mansfield	47	53	60	52	60	36	40	43	29	27	23	31	40
Putnam	45	71	73	46	55	38	34	51	26	25	28	58	43
Voluntown	20	23	20	27	52	47	35	29	20	16	19	15	25
Willimantic	44	63	61	43	37	x	53	41	28	31	27	40	41

TABLE 6

CHEMICAL CHARACTERIZATION OF TSP, CORRECTED VERSION, 1971-1977

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
ANSONIA	001	70	25			0.0366	0.009	0.12	3.30	1.57	0.109	0.080	4.45		1.94	19.67			6.36	7.72	143
BRIDGEPORT	001	70	26			0.0110	0.003	0.44	1.96	1.63	0.066	0.050	2.13		1.27	10.78			6.35	4.87	71
DANBURY	001	70	19			0.0029	0.003	0.02	1.92	1.59	0.074	0.030	0.71		1.37	11.15			6.39	6.39	99
ENFIELD	001	70	22			0.0023	0.004	0.04	2.30	1.62	0.184	0.064	0.75		1.12	11.25			6.42	5.40	88
FAIRFIELD	002	70	24			0.0042	0.002	1.57	1.37	1.29	0.041	0.070	1.04		0.56	7.86			5.55	2.95	52
GREENWICH	001	70	25			0.0029	0.003	0.05	2.02	1.04	0.043	0,049	0.84		1.13	11.24			6.24	4.63	62
GREENWICH	002	70	24			0.0034	0.004	0.05	1.40	1.43	0.035	0.032	0.54		1.06	9.53			5.50	4.70	59
GREENWICH	003	70	26			0.0041	0.002	0.04	1.54	1.58	0.038	0.035	0.96		1.06	10.31			5.36	4.35	61
GREENWICH	007	70	26			0.0038	0.004	0.04	1.58	0.99	0.024	0.055	0.61		0.95	11.37			6.42	4.64	55
GROTON	001	70	25			0.0019	0.010	0.14	3.12	1.24	0.113	0.089	0.91		2.00	20.27			6.37	5.78	108
HARTFORD	003	70	19			0.0027	0.006	0.11	1.74	1.44	0.058	0.050	1.30		0.76	15.39			6.25	7.49	117
LTCH CTY(MORRI	001	70	18			0.0021	0.006	0.11	1.00	0.60	0.038	0.031	0.81		0.75	9.36			6.28	2.59	52
MANSFIELD	001	70	20			0.0010	0.003	0.05	1.85	0.64	0.027	0.024	0.58		1.40	6.88			6.53	2.37	50
MERIDEN	002	70	6			0.0070	0.007	0.06	0.68	1.07	0.130	0.082	18.55		0.90	23.50			6.10	5.83	136
MERIDEN	003	70	14			0.0036	0.002	0.03	0.36	0.68	0.072	0.056	2.44		1.37	18.05			5.96	6.43	109
MIDDLETOWN	001	70	21			0.0014	0.014	0.02	0.73	0.29	0.027	0.038	0.26		0.92	8.79			6.43	2.87	52
MIDDLETOWN	003	70	24			0.0061	0.004	0.06	1.54	1.11	0.048	0.040	0.46		0.97	10.70			6.40	4.83	71
MILFORD	001	70	16			0.0033	0.007	0.03	1.43	1.60	0.037	0.068	1.47		0.93	10.28			6.45	3.90	65
MILFORD	002	70	16			0.0023	0.007	0.07	1.27	0.98	0.044	0.078	0.50		1.08	13.10			6.32	5.04	82
MILFORD	006	70	4			0.0024	0.011	0.09	1.08	0.40	0.053	0.033	0.29		1.10	14.15			6.30	3.88	71
NAUGATUCK	001	70	23			0.0048	0.014	0.03	1.75	0.87	0.029	0.055	1.09		2.67	18.46			5.62	7.14	103
NEW BRITAIN	001	70	26			0.0028	0.002	0.04	2.56	1.88	0.057	0.124	2.45		1.12	12.08			5.42	7.52	85
NEW BRITAIN	002	70	26			0.0121	0.052	0.06	1.65	2.24	0.058	0.035	2.15		1.00	13.38			6.37	6.76	97
NEW BRITAIN	003	70	26			0.0121	0.008	0.04	1.47	1.58	0.053	0.052	0.70		1.02	10.14			5.67	6.53	103
NEW BRITAIN	004	70	26			0.0052	0.016	0.04	2.19	1.36	0.039	0.070	1.30		0.79	10.83			5.32	3.96	60
NEW BRITAIN	005	70	26			0.0069	0.005	0.03	2.16	1.36	0.040	0.057	0.38		0.65	9.20			5.09	3.19	49
NEW HAVEN	002	70	21			0.0096	0.005	0.05	3.67	2.63	0.400	0.144	1.74		1.33	15.60			4.41	9.06	120
NORWALK	001	70	25			0.0044	0.005	0.04	1.61	2.68	0.061	0.056	2.25		1.09	9.96			5.50	5.34	70
NORWALK	005	70	26			0.0035	0.004	0.03	3.89	3.18	0.054	0.054	3.47		1.31	9.65			5.92	5.50	73
NORWICH	001	70	24			0.0068	0.005	0.04	2.05	1.16	0.039	0.048	1.26		1.08	10.08			6.47	4.23	65
ORANGE	003	70	12			0.0032	0.007	0.03	1.86	0.84	0.055	0.018	0.83		1.34	12.56			6.32	3.54	67
PUTNAM	002	70	18			0.0002	0.015	0.06	1.04	1.13	0.048	0.140	0.18		1.68	14.84			6.44	7.08	93
STRATFORD	001	70	18			0.0042	0.011	0.55	0.88	1.50	0.080	0.111	1.18		0.74	11.55			6.41	4.25	65
STRATFORD	002	70	15			0.0060	0.010	0.44	2.20	2.40	0.077	0.066	1.80		1.03	13.00			6.37	5.77	87
THOMASTON	003	70	24			0.0031	0.008	0.05	0.90	0.96	0.063	0.059	3.09		0.86	12.01			6.35	4.25	82
TORRINGTON	001	70	24			0.0020	0.005	0.03	1.26	0.66	0.061	0.068	3.25		0.98	12.78			6.54	5.88	89
WATERBURY	001	70	25			0.0386	0.006	0.13	0.99	1.59	0.054	0.073	5.36		1.72	15.00			6.63	6.47	107
WINCHESTER	001	70	25			0.0014	0.003	0.09	0.83	0.48	0.042	0.026	0.43		0.81	8.86			6.54	3.92	59
ANSONIA	001	71	6			0.0406	0.003	0.90	1.83	1.84	0.047	0.066	1.94		1.40	12.10			6.65	7.63	158
ANSONIA	003	71	18			0.0707	0.011	0.45	1.53	1.68	0.029	0.029	2.67	0.24	2.42	11.53			7.35	5.70	120
BRIDGEPORT	001	71	22			0.0057	0.008	0.59	0.58	1.31	0.018	0.033	1.07	0.25	3.22	8.37			6.52	3.74	59
BRISTOL	001	71	22			0.0026	0.007	0.22	0.70	0.78	0.025	0.014	0.35	0.13	1.21	5.77			6.32	3.02	58
DANBURY	001	71	0												2.82	8.10			6.50		
ENFIELD	001	71	20			0.0030	0.008	0.11	0.83	1.76	0.027	0.027	0.43	0.13	2.20	10.78			7.06	5.16	90
FAIRFIELD	002	71	19			0.0047	0.013	12.48	0.52	0.31	0.018	0.049	2.59	0.07	1.81	5.00			6.87	3.77	75
GREENWICH	001	71	24			0.0024	0.006	0.16	0.71	1.06	0.018	0.021	0.36	0.12	1.74	8.54			6.63	3.68	60
GREENWICH	002	71	25			0.0033	0.015	0.31	0.77	1.51	0.019	0.014	0.28	0.07	1.66	9.07			6.64	3.97	62
GREENWICH	003	71	24			0.0028	0.007	0.24	0.61	1.27	0.016	0.013	0.26	0.09	1.24	6.59			6.87	4.01	60
GREENWICH	007	71	25			0.0028	0.009	0.18	0.44	0.84	0.014	0.016	0.23	0.12	1.41	10.10			6.94	3.76	47

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
GREENWICH	008	71	23			0.0029	0.011	0.17	0.98	1.71	0.022	0.018	0.43	0.10	1.73	8.36			6.85	4.40	79
GROTON	001	71	22			0.0035	0.021	0.77	1.30	2.13	0.036	0.056	0.59	0.39	1.44	16.06			6.47	4.95	101
HARTFORD	003	71	23			0.0031	0.014	0.14	1.36	1.95	0.028	0.047	0.47	0.30	1.33	9.79			6.63	8.24	98
HARTFORD	005	71	9			0.0045	0.031	0.46	1.67	2.13	0.045	0.060	0.50	0.43	1.03	16.37			6.48	9.92	159
LTCH CTY(MORRI	001	71	21			0.0013	0.007	0.40	0.34	0.37	0.011	0.005	0.23	0.05	0.91	4.68			7.11	2.05	40
MANCHESTER	001	71	10			0.0021	0.018	0.19	0.59	0.65	0.021	0.019	0.39	0.16	0.68	11.82			6.40	3.54	89
MANSFIELD	001	71	16			0.0011	0.006	0.13	0.41	0.33	0.010	0.013	0.20	0.08	0.77	9.19			6.47	3.07	59
MERIDEN	001	71	23			0.0029	0.011	1.54	0.38	1.00	0.012	0.014	0.50	0.05	0.99	3.09			7.69	3.52	44
MERIDEN	002	71	26			0.0038	0.017	0.73	1.15	1.71	0.036	0.107	1.55	0.24	1.56	11.17			6.96	5.62	107
MERIDEN	003	71	24			0.0034	0.019	0.07	0.81	1.32	0.034	0.034	0.80	0.23	1.61	9.96			7.37	4.67	91
MERIDEN	005	71	26			0.0248	0.023	0.56	1.25	1.84	0.069	0.068	85.42	0.25	3.87	12.77			6.83	5.67	194
MERIDEN	006	71	24			0.0068	0.018	0.69	0.73	0.90	0.024	0.021	0.40	0.12	1.60	10.01			7.38	4.09	81
MIDDLETOWN	00:	71	23			0.0041	0.007	0.24	0.30	0.39	0.013	0.013	0.52	0.07	0.91	5.47			6.58	2.16	35
MIDDLETOWN	003	71	25			0.0033	0.011	0.60	0.85	1.59	0.031	0.033	0.51	0.14	0.77	9.48			6.52	4.41	77
MILFORD	001	71	22			0.0040	0.010	0.24	0.72	1.10	0.022	0.027	0.43	0.12	1.39	8.99			6.94	3.72	56
MILFORD	002	71	24			0.0041	0.008	0.14	0.81	1.29	0.020	0.033	0.37	0.18	1.13	8.93			6.79	3.35	69
MILFORD	006	71	21			0.0028	0.011	0.08	0.46	0.60	0.017	0.020	0.29	0.10	0.84	7.48			7.02	2.13	45
NAUGATUCK	001	71	23			0.0048	0.015	0.11	0.91	1.50	0.024	0.026	0.40	0.21	1.82	10.61			7.07	5.06	94
NEW BRITAIN	001	71	23			0.0041	0.015	0.13	1.29	1.47	0.030	0.034	0.47	0.21	0.85	9.65			6.80	6.56	87
NEW BRITAIN	002	71	25			0.0044	0.014	0.21	1.30	2.18	0.031	0.037	0.77	0.26	1.12	14.23			6.65	7.61	112
NEW BRITAIN	003	71	25			0.0029	0.010	0.25	1.53	1.98	0.031	0.019	0.43	0.12	0.83	8.80			6.91	7.28	104
NEW BRITAIN	004	71	25			0.0020	0.007	0.20	0.53	1.07	0.016	0.022	0.38	0.12	0.76	6.47			6.99	3.00	55
NEW BRITAIN	005	71	25			0.0029	0.007	0.14	0.55	1.20	0.017	0.018	0.42	0.12	0.74	8.79			6.71	3.63	53
NEW HAVEN	001	71	11			0.0021	0.002	0.05	0.43	1.15	0.009	0.022	0.14	0.16	2.83	7.84			9.67	2.84	114
NEW HAVEN	002	71	24			0.0038	0.011	0.21	0.92	1.29	0.025	0.039	0.36	0.16	1.44	9.68			7.82	5.97	83
NEW HAVEN	003	71	13			0.0053	0.004	0.27	3.77	1.07	0.011	0.024	0.15	0.13	2.39	7.59			9.52	3.10	56
NEW HAVEN	005	71	6			0.0098	0.004	0.35	1.08	2.61	0.018	0.030	0.34	0.23	3.83	10.00			9.30	6.87	73
NEW HAVEN	009	71	5			0.0034	0.001	0.21	0.96	2.90	0.016	0.030	0.19	0.26	3.30	10.00			9.50	6.43	76
NORWALK	001	71	25			0.0027	0.006	0.09	0.61	1.09	0.018	0.011	0.36	0.10	1.47	8.68			7.76	4.14	63
NORWALK	005	71	26			0.0020	0.012	0.10	0.90	1.32	0.024	0.015	0.36	0.08	1.40	7.12			7.77	4.66	73
NORWICH	001	71	26			0.0015	0.011	0.26	0.77	0.92	0.017	0.026	0.31	0.16	0.93	7.92			6.69	4.67	71
ORANGE	003	71	21			0.0028	0.007	0.15	0.36	0.38	0.014	0.015	0.23	0.08	0.64	5.30			6.66	1.99	40
PUTNAM	002	71	22			0.0035	0.013	0.13	0.96	0.89	0.038	0.047	0.62	0.21	1.19	17.22			6.39	8.09	123
STAMFORD	001	71	21			0.0028	0.007	0.18	0.90	1.35	0.025	0.045	0.48	0.13	2.75	7.82			7.97	4.52	84
STAMFORD	003	71	17			0.0079	0.017	0.11	1.04	1.87	0.026	0.022	0.46	0.17	3.61	15.34			8.23	6.26	127
STAMFORD	004	71	18			0.0028	0.009	1.96	0.77	0.89	0.014	0.015	0.31	0.10	2.03	5.66			7.83	3.53	67
STAMFORD	010	71	6			0.0047	0.005	0.06	1.13	1.85	0.044	0.015	0.61	0.15	3.57	11.30			7.47	5.34	113
STRATFORD	001	71	21			0.0041	0.008	1.70	0.50	0.77	0.020	0.037	0.66	0.22	2.02	9.30			7.27	3.16	61
STRATFORD	002	71	16			0.0035	0.012	0.15	0.48	0.96	0.015	0.075	0.50	0.27	1.66	10.50			7.21	3.62	79
THOMASTON	003	71	22			0.0038	0.012	0.17	0.81	0.83	0.023	0.034	2.17	0.18	1.76	8.42			7.17	4.67	83
TORRINGTON	001	71	22			0.0031	0.010	0.31	0.89	1.23	0.037	0.027	0.21	0.15	0.96	9.69			6.72	6.31	92
VERNON	001	71	2			0.0005	0.001	0.09	0.42	0.81	0.015	0.010	1.02	0.10	2.64	5.40			6.40	3.49	45
WATERBURY	001	71	25			0.0526	0.020	0.33	0.94	1.21	0.029	0.052	1.85	0.37	1.22	10.96			6.30	6.85	108
WINCHESTER	001	71	25			0.0014	0.011	0.32	0.59	0.75	0.016	0.009	0.07	0.05	1.32	4.87			8.04	3.88	67
ANSONIA	003	72	29		0.0000	0.0137	0.015	0.31	1.10	1.67	0.021	0.030	2.03	0.18	3.68	13.23			8.69	4.78	87
BRIDGEPORT	001	72	30		0.0000	0.0078	0.008	0.58	0.57	1.47	0.016	0.033	0.61	0.15	3.02	12.69			8.33	3.50	63
BRIDGEPORT	002	72	4		0.0002	0.0651	0.009	0.56	1.37	3.33	0.030	0.028	0.54	0.18	4.80	23.98			7.85	2.26	130
BRISTOL	001	72	28		0.0000	0.0203	0.005	0.26	0.50	1.13	0.012	0.015	0.27	0.17	1.76	12.40			8.35	2.92	54
DANBURY	001	72	4		0.0000	0.0025	0.008	0.19	1.13	1.03	0.017	0.016	0.56	0.13	0.77	9.20			6.80	4.22	80

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
ENFIELD	001	72	14		0.0000	0.0064	0.004	0.10	0.89	1.43	0.014	0.020	0.14	0.17	2.12	10.49			8.35	4.00	92
ENFIELD	002	72	5		0.0000	0.0043	0.000	0.08	0.08	0.71	0.004	0.051	0.19	0.09	1.62	9.20			9.40	1.75	
FAIRFIELD	002	72	26		0.0000	0.0038	0.003	5.46	0.18	0.50	0.013	0.011	0.14	0.06	2.84	6.96			8.03	1.86	51
GREENWICH	001	72	28		0.0000	0.0039	0.006	0.10	0.79	1.50	0.014	0.015	0.28	0.11	3.09	11.46			7.96	3.15	68
GREENWICH	002	72	29		0.0002	0.0040	0.008	0.26	0.78	1.84	0.015	0.016	0.34	0.09	3.07	13.17			7.75	4.04	79
GREENWICH	003	72	30		0.0000	0.0038	0.008	0.19	0.85	1.71	0.016	0.013	0.32	0.09	3.00	9.84			7.98	4.15	66
GREENWICH	007	72	29		0.0000	0.0037	0.005	0.19	0.40	0.83	0.014	0.018	0.28	0.10	1.91	9.24			8.18	1.87	51
GREENWICH	008	72	28		0.0001	0.0033	0.008	0.26	1.10	1.46	0.017	0.016	0.27	0.08	2.71	7.72			7.81	4.34	77
GROTON	001	72	30		0.0000	0.0022	0.004	0.62	0.44	0.81	0.012	0.019	0.08	0.10	3.57	11.64			8.72	1.84	54
HARTFORD	003	72	25		0.0000	0.0036	0.007	0.37	1.05	1.88	0.018	0.026	0.21	0.28	2.76	11.72			8.22	5.09	83
HARTFORD	004	72	19		0.0000	0.0034	0.005	0.63	0.80	1.43	0.013	0.014	0.14	0.10	1.86	8.57			7.94	4.06	59
LTCH CTY(MORRI	001	72	27		0.0000	0.0035	0.114	0.19	0.47	0.57	0.010	0.032	0.06	0.03	2.47	8.17			8.40	1.66	39
MANCHESTER	001	72	6		0.0000	0.0065	0.006	0.37	0.54	1.58	0.015	0.031	0.28	0.14	6.87	9.22			8.80		54
MANSFIELD	001	72	12		0.0001	0.0032	0.006	0.19	0.72	0.86	0.016	0.024	0.15	0.17	2.85	8.73			8.67	1.33	66
MERIDEN	001	72	27		0.0000	0.0036	0.004	0.88	0.83	1.91	0.019	0.018	0.61	0.10	3.40	9.45			7.93	3.03	77
MERIDEN	002	72	30		0.0002	0.0046	0.005	0.71	1.12	1.62	0.023	0.037	1.51	0.21	4.73	11.81			8.74	3.23	91
MERIDEN	003	72	26		0.0000	0.0041	0.004	0.26	1.09	1.54	0.038	0.021	0.33	0.17	3.32	11.87			8.28	3.32	68
MERIDEN	005	72	30		0.0005	0.0136	0.004	0.34	0.70	1.11	0.036	0.049	45.21	0.15	3.85	12.30			7.20	3.14	129
MERIDEN	006	72	18		0.0000	0.0050	0.010	0.70	0.75	1.36	0.026	0.028	0.45	0.22	3.76	15.35			7.12	3.79	103
MIDDLETOWN	001	72	30		0.0000	0.0048	0.012	0.39	0.55	0.81	0.019	0.023	0.86	0.13	0.86	8.06			6.06	2.74	54
MIDDLETOWN	003	72	29		0.0000	0.0043	0.008	0.63	0.91	1.69	0.020	0.024	0.65	0.22	1.20	8.10			6.37	3.99	66
MIDDLETOWN	004	72	7		0.0000	0.0017	0.000	0.49	0.15	0.47	0.009	0.007	0.52	0.00	0.53	1.66			7.00	2.21	18
MILFORD	001	72	26		0.0000	0.0036	0.001	0.10	0.53	0.93	0.011	0.021	0.24	0.12	2.56	10.79			7.82	2.72	58
MILFORD	002	72	27		0.0000	0.0045	0.007	0.07	0.86	1.26	0.016	0.032	0.23	0.18	2.48	10.17			7.52	3.12	63
MILFORD	006	72	28		0.0000	0.0047	0.004	0.09	0.47	0.84	0.012	0.020	0.13	0.11	2.01	9.17			7.62	1.97	52
NAUGATUCK	001	72	30		0.0000	0.0068	0.009	0.16	1.25	1.88	0.027	0.030	0.64	0.28	3.92	12.45			8.07	5.51	88
NEW BRITAIN	001	72	17		0.0000	0.0033	0.008	0.04	1.09	1.57	0.022	0.030	0.21	0.31	2.96	11.30			8.32	5.55	88
NEW BRITAIN	002	72	30		0.0000	0.0047	0.007	0.23	1.20	1.83	0.021	0.033	0.20	0.31	3.17	12.35			8.54	5.80	104
NEW BRITAIN	003	72	28		0.0000	0.0038	0.006	0.14	1.36	2.14	0.022	0.014	0.19	0.09	2.84	9.74			8.17	4.51	83
NEW BRITAIN	004	72	29		0.0001	0.0039	0.009	0.42	0.56	1.01	0.015	0.018	0.19	0.13	2.60	9.83			7.58	3.03	62
NEW BRITAIN	005	72	29		0.0001	0.0036	0.003	0.20	0.47	1.06	0.012	0.015	0.11	0.09	2.24	9.64			8.08	2.91	51
NEW HAVEN	001	72	22		0.0000	0.0032	0.007	0.26	0.60	0.98	0.013	0.032	0.76	0.26	2.82	8.02			9.58	4.63	60
NEW HAVEN	002	72	28		0.0000	0.0050	0.009	0.25	1.22	1.64	0.023	0.047	0.76	0.42	3.08	9.98			9.31	4.72	90
NEW HAVEN	003	72	28		0.0000	0.0057	0.005	0.20	0.53	0.85	0.014	0.016	0.48	0.12	2.88	6.75			9.47	2.88	56
NEW HAVEN	005	72	28		0.0000	0.0052	0.007	0.22	0.79	1.26	0.016	0.034	0.67	0.26	2.77	9.36			9.05	3.82	61
NEW HAVEN	009	72	25		0.0001	0.0038	0.005	0.28	0.54	1.06	0.014	0.037	0.53	0.39	1.91	8.60			9.39	1.62	62
NORWALK	001	72	29		0.0001	0.0035	0.007	0.12	0.66	1.41	0.013	0.017	0.14	0.09	3.24	9.96			8.50	3.24	66
NORWALK	005	72	30		0.0000	0.0043	0.009	0.15	0.94	1.58	0.018	0.016	0.17	0.10	2.84	7.47			8.30	3.23	69
NORWICH	001	72	29		0.0000	0.0021	0.005	0.19	0.67	1.08	0.011	0.023	0.05	0.14	3.09	9.99			8.83	3.24	65
ORANGE	003	72	22		0.0000	0.0036	0.006	0.04	0.70	0.91	0.016	0.021	0.29	0.11	3.28	8.75			8.33	2.82	58
PUTNAM	002	72	28		0.0000	0.0018	0.004	0.17	0.62	0.78	0.015	0.016	0.07	0.09	2.87	10.98			8.62	2.65	64
STAMFORD	001	72	20		0.0000	0.0053	0.012	0.19	1.88	2.53	0.034	0.044	0.26	0.28	6.63	17.81			8.58	12.47	157
STAMFORD	003	72	15		0.0003	0.0072	0.012	0.07	1.33	2.18	0.026	0.048	0.26	0.40	5.83	16.97			8.14	7.34	133
STAMFORD	004	72	20		0.0000	0.0053	0.008	0.90	0.76	1.81	0.019	0.026	0.30	0.13	3.33	19.99			8.54	4.46	91
STAMFORD	010	72	13		0.0000	0.0057	0.013	0.24	0.75	1.78	0.024	0.024	0.20	0.09	5.05	13.28			9.20	3.66	102
STRATFORD	001	72	21		0.0001	0.0036	0.004	0.53	0.44	0.83	0.013	0.017	0.20	0.08	2.66	9.08			9.57	2.29	52
STRATFORD	002	72	7		0.0000	0.0045	0.009	0.34	0.95	1.45	0.020	0.047	0.43	0.38	3.87	10.61			9.27	5.71	93
THOMASTON	003	72	23		0.0000	0.0049	0.004	0.24	0.68	1.16	0.016	0.021	0.96	0.16	2.41	11.22			8.42	4.10	73
TORRINGTON	001	72	28		0.0000	0.0030	0.007	0.35	0.77	1.62	0.023	0.020	0.13	0.15	2.52	10.99			8.04	4.11	75
WATERBURY	001	72	30		0.0000	0.0212	0.012	0.25	1.03	1.75	0.018	0.030	1.56	0.26	3.26	8.54			8.43	5.18	91
WINCHESTER	001	72	25		0.0000	0.0020	0.004	0.57	0.51	0.94	0.012	0.014	0.08	0.05	2.51	6.29			8.74	2.68	59

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
ANSONIA	003	73	30		0.0000	0.0086	0.006	0.33	1.05	1.35	0.016	0.022	0.95	0.07	2.66	8.82			7.82	3.28	67
BERLIN	001	73	28		0.0000	0.0017	0.005	0.37	0.25	0.57	0.008	0.007	0.29	0.02	1.24	7.44			6.89	1.82	38
BRIDGEPORT	001	73	22		0.0001	0.0058	0.009	0.68	0.54	1.02	0.011	0.015	0.28	0.07	3.11	8.59			7.63	2.78	51
BRIDGEPORT	002	73	30		0.0001	0.0244	0.010	0.28	0.66	1.45	0.082	0.019	0.26	0.04	2.10	9.40			6.73	4.07	60
BRISTOL	001	73	29		0.0001	0.0337	0.009	0.40	0.48	1.03	0.012	0.010	0.39	0.05	2.48	8.55			7.69	2.19	55
BRISTOL	002	73	10		0.0000	0.0224	0.009	0.78	0.26	0.50	0.011	0.006	2.34	0.00	0.48	5.67			6.40	2.43	33
BRISTOL	003	73	9		0.0000	0.0095	0.015	0.84	0.54	0.94	0.016	0.012	0.78	0.04	0.38	8.41			6.42	3.83	48
BRISTOL	004	73	9		0.0000	0.0270	0.014	0.50	0.70	2.54	0.016	0.011	1.15	0.03	0.90	4.40			6.33	6.11	53
BURLINGTON	001	73	12		0.0000	0.0024	0.006	0.48	0.24	0.44	0.006	0.010	0.34	0.01	0.21	7.57			6.57	1.86	35
DANBURY	001	73	19		0.0000	0.0029	0.007	0.11	0.92	1.05	0.018	0.010	0.40	0.03	1.73	7.44			6.87	3.56	68
ENFIELD	001	73	23		0.0000	0.0024	0.005	0.19	0.82	1.08	0.018	0.013	0.45	0.06	0.92	8.23			6.58	3.32	66
ENFIELD	003	73	1		0.0000	0.0010	0.000	0.93	0.40	0.36	0.042			0.30	4.42	11.68			9.00		57
FAIRFIELD	002	73	21		0.0001	0.0029	0.003	7.33	0.18	0.50	0.005	0.008	0.18	0.04	3.44	5.20			9.53	2.43	45
GREENWICH	001	73	29		0.0001	0.0032	0.006	0.26	0.60	1.03	0.012	0.010	1.39	0.03	1.53	7.13			6.69	2.04	49
GREENWICH	002	73	30		0.0001	0.0036	0.005	0.14	0.70	1.45	0.013	0.014	1.53	0.04	1.99	9.59			6.67	4.03	65
GREENWICH	003	73	29		0.0001	0.0044	0.005	0.14	0.69	1.38	0.013	0.014	1.47	0.06	2.39	7.16			6.47	3.34	58
GREENWICH	004	73	23		0.0001	0.0033	0.005	0.49	0.39	0.49	0.011	0.009	1.83	0.03	3.04	7.33			6.79	2.03	46
GREENWICH	007	73	28		0.0001	0.0043	0.004	0.12	0.25	0.65	0.008	0.011	1.67	0.06	1.35	9.03			6.65	2.02	41
GREENWICH	008	73	29		0.0001	0.0031	0.006	0.33	1.10	1.42	0.014	0.013	1.56	0.05	1.65	9.07			6.36	3.61	67
GROTON	001	73	26		0.0002	0.0016	0.007	0.26	0.49	0.79	0.012	0.018	0.26	0.05	1.06	4.19			7.01	2.31	37
HARTFORD	003	73	14		0.0000	0.0024	0.005	0.80	1.02	1.24	0.018	0.018	0.11	0.09	4.09	7.17			8.72	5.15	86
HARTFORD	004	73	23		0.0000	0.0040	0.004	0.26	0.73	1.11	0.020	0.017	1.64	0.05	2.63	8.23			8.73	3.24	56
KENT	001	73	13		0.0000	0.0019	0.005	0.26	0.49	0.34	0.012	0.009	0.16	0.02	0.31	7.00			7.21	2.77	44
LTCH CTY(MORRI	001	73	28		0.0000	0.0018	0.003	0.33	0.20	0.51	0.007	0.008	0.11	0.02	1.61	7.27			8.15	2.40	39
MANCHESTER	001	73	17		0.0000	0.0022	0.002	0.25	0.43	0.82	0.012	0.010	0.11	0.06	2.47	9.85			8.27	2.70	59
MANSFIELD	001	73	4		0.0005	0.0044	0.003	0.12	0.24	0.29	0.010	0.012	8.26	0.04	5.13	11.02			6.60	2.22	25
MERIDEN	001	73	16		0.0000	0.0051	0.005	0.94	0.82	2.09	0.018	0.019	0.42	0.06	1.61	4.95			6.89	3.76	68
MERIDEN	002	73	25		0.0000	0.0043	0.004	1.05	0.73	1.36	0.020	0.028	0.84	0.12	1.68	9.44			7.31	2.23	71
MERIDEN	003	73	23		0.0000	0.0025	0.004	0.10	1.06	1.36	0.029	0.017	0.41	0.09	1.47	7.97			7.49	2.97	62
MERIDEN	005	73	22		0.0000	0.0049	0.006	0.35	0.85	1.30	0.026	0.049	2.36	0.09	1.89	7.66			7.47	2.68	73
MERIDEN	006	73	22		0.0000	0.0034	0.010	1.11	0.78	0.96	0.018	0.025	0.27	0.05	1.05	4.60			7.44	2.80	64
MIDDLETOWN	001	73	28		0.0000	0.0033	0.005	0.39	0.38	0.83	0.014	0.014	0.28	0.04	3.96	9.03			7.96	1.70	60
MIDDLETOWN	003	73	29		0.0000	0.0027	0.002	0.71	0.61	1.23	0.017	0.013	0.24	0.07	2.58	7.36			7.91	2.36	57
MIDDLETOWN	004	73	25		0.0000	0.0009	0.004	1.70	0.37	0.39	0.007	0.013	0.09	0.01	4.90	13.86			8.74	2.11	62
MILFORD	001	73	24		0.0001	0.0026	0.004	0.18	0.36	0.98	0.008	0.019	0.11	0.03	3.49	7.47			9.06	2.50	46
MILFORD	002	73	26		0.0000	0.0033	0.003	0.18	0.66	1.06	0.013	0.024	0.10	0.06	3.20	8.85			8.82	2.89	52
MILFORD	006	73	29		0.0000	0.0033	0.002	0.03	0.32	0.71	0.009	0.013	0.11	0.03	3.24	8.12			8.85	2.28	44
NAUGATUCK	001	73	30		0.0000	0.0029	0.006	0.18	1.07	1.42	0.018	0.016	0.47	0.07	4.84	11.61			8.26	3.77	79
NEW BRITAIN	001	73	14		0.0000	0.0028	0.008	0.10	0.90	1.50	0.018	0.016	0.30	0.05	2.64	2.21			8.17	2.47	52
NEW BRITAIN	002	73	28		0.0000	0.0034	0.005	0.23	1.01	1.58	0.023	0.022	0.22	0.09	4.14	8.85			7.95	4.69	84
NEW BRITAIN	003	73	28		0.0000	0.0031	0.003	0.26	1.36	1.73	0.023	0.014	0.16	0.07	3.59	8.35			7.59	4.72	78
NEW BRITAIN	004	73	30		0.0001	0.0036	0.004	0.48	0.52	1.15	0.014	0.020	0.18	0.06	3.32	7.53			7.08	3.58	57
NEW BRITAIN	005	73	29		0.0000	0.0025	0.003	0.31	0.45	1.08	0.011	0.011	0.15	0.06	2.50	7.62			8.08	3.11	49
NEW HAVEN	002	73	26		0.0000	0.0017	0.008	0.09	0.74	1.40	0.012	0.017	0.26	0.09	2.52	6.84			8.87	3.09	66
NEW HAVEN	003	73	31		0.0001	0.0025	0.003	0.07	0.45	0.85	0.009	0.020	0.26	0.04	2.28	7.44			8.31	3.71	45
NEW HAVEN	005	73	29		0.0000	0.0033	0.005	0.10	0.81	1.07	0.015	0.017	0.37	0.08	2.21	4.68			8.21	4.97	63
NEW HAVEN	009	73	30		0.0000	0.0019	0.002	0.07	0.45	0.96	0.010	0.015	0.25	0.08	1.81	7.11			8.07	2.87	50
NORWALK	001	73	27		0.0000	0.0027	0.005	0.25	0.77	1.40	0.013	0.016	0.82	0.06	2.10	5.42			7.39	4.15	67
NORWALK	005	73	30		0.0000	0.0028	0.006	0.17	0.70	1.30	0.013	0.011	0.26	0.04	1.60	5.48			7.31	2.79	70
NORWICH	001	73	25		0.0001	0.0018	0.007	0.26	0.71	1.08	0.012	0.017	0.24	0.10	1.17	7.56			6.78	3.40	59
OLD SAYBROOK	001	73	12		0.0000	0.0015	0.009	0.32	0.97	2.29	0.015	0.021	0.28	0.04	0.99	2.61			8.48	5.47	68

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	P3	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
OLD SAYBROOK	002	73	3		0.0000	0.0012	0.016	0.91	0.34	0.63	0.009	0.008	0.28	0.04	0.94	0.98			6.60	1.29	48
ORANGE	003	73	28		0.0000	0.0028	0.005	0.04	0.69	0.30	0.016	0.012	0.21	0.05	2.18	5.70			7.46	2.82	54
PUTNAM	002	73	25		0.0000	0.0019	0.006	0.19	0.51	0.67	0.009	0.012	0.14	0.05	1.23	5.79			7.05	3.51	50
STAMFORD	001	73	9		0.0000	0.0039	0.014	0.49	1.36	2.09	0.023	0.023	0.27	0.05	1.61	7.45			6.37	5.82	99
STAMFORD	004	73	16		0.0000	0.0054	0.013	0.53	0.90	1.96	0.019	0.021	0.47	0.06	0.71	16.68			6.31	6.84	105
STAMFORD	010	73	19		0.0000	0.0032	0.012	0.16	0.71	1.32	0.013	0.016	0.40	0.04	1.26	9.42			6.37	3.73	63
STRATFORD	001	73	5		0.0000	0.0033	0.009	3.26	3.72	0.65	0.016	0.015	0.33	0.02	3.31	8.23			6.57	0.00	54
STRATFORD	005	73	9		0.0000	0.0022	0.003	0.62	0.26	0.82	0.004	0.008	0.15	0.01	2.53	5.73			8.72	2.68	58
THOMASTON	003	73	29		0.0000	0.0025	0.004	0.32	0.35	0.71	0.008	0.009	0.61	0.03	1.11	4.03			7.16	4.38	41
TORRINGTON	001	73	29		0.0000	0.0021	0.009	0.25	0.60	1.07	0.016	0.012	0.22	0.07	1.83	5.22			7.60	3.81	53
VOLUNTOWN	001	73	24		0.0000	0.0008	0.005	0.40	0.29	0.21	0.004	0.006	0.18	0.01	0.55	2.48			6.94	1.44	33
WATERBURY	001	73	5		0.0000	0.0046	0.020	0.54	0.80	1.63	0.014	0.027	0.45	0.09	1.48	17.46			8.10		89
WILLIMANTIC	00:	73	14		0.0000	0.0005	0.007	0.33	0.39	0.86	0.010	0.008	0.19	0.05	0.73	3.24			6.55	2.97	46
WINCHESTER	001	73	30		0.0000	0.0010	0.007	0.49	0.44	0.74	0.009	0.010	0.18	0.04	0.83	4.94			6.89	2.83	48
ANSONIA	003	74	26		0.0001	0.0149	0.009	0.33	0.94	1.27	0.020	0.024	0.90	0.05	0.70	6.76	0.34	3.42	5.68	4.67	60
BERLIN	001	74	28		0.0000	0.0027	0.005	0.26	0.34	0.59	0.011	0.012	0.31	0.02	0.60	10.13	0.26	5.88	6.21	2.50	39
BRIDGEPORT	002	74	30		0.0001	0.0123	0.010	0.21	0.82	0.86	0.014	0.016	0.37	0.03	1.16	8.21	0.25	3.91	6.08	4.15	47
BRISTOL	001	74	28		0.0000	0.0370	0.003	0.62	0.44	0.55	0.011	0.013	0.49	0.03	0.62	8.91	0.27	3.91	6.06	3.14	45
BRISTOL	002	74	30		0.0001	0.0241	0.003	0.69	0.27	0.50	0.009	0.008	0.49	0.02	0.25	8.24	0.31	2.65	5.92	1.98	31
BRISTOL	003	74	30		0.0001	0.0076	0.003	0.57	0.39	0.89	0.010	0.013	0.46	0.03	0.81	11.99	0.29	3.01	5.70	3.29	40
BRISTOL	004	74	29		0.0000	0.0454	0.004	1.01	0.51	0.90	0.012	0.011	1.17	0.03	0.64	9.99	0.28	3.79	5.96	4.15	53
BURLINGTON	001	74	25		0.0000	0.0021	0.002	0.23	0.28	0.66	0.008	0.005	0.36	0.02	0.22	7.95	0.18	3.85	6.19	2.45	32
DANBURY	001	74	23		0.0001	0.0035	0.005	0.72	0.83	0.71	0.018	0.016	0.47	0.04	0.67	10.46	0.40	3.55	6.15	3.92	55
EAST HAMPTON	002	74	7		0.0000	0.0022	0.002	0.13	0.41	0.69	0.027	0.010	0.23	0.03	0.09	13.12	0.25	5.10	6.60	4.74	
EAST HARTFORD	001	74	20		0.0000	0.0020	0.003	0.18	0.31	0.76	0.013	0.009	0.14	0.03	0.27	8.73	0.36	2.38	5.55	2.76	44
EAST HARTFORD	002	74	19		0.0000	0.0025	0.001	0.32	0.68	1.65	0.011	0.008	0.40	0.04	0.41	14.19	0.57	2.65	5.85	5.42	44
ENFIELD	001	74	30		0.0000	0.0011	0.002	0.26	0.56	0.75	0.011	0.012	0.21	0.03	0.71	7.63	0.26	3.05	6.06	3.53	54
FAIRFIELD	002	74	19		0.0000	0.0030	0.001	2.72	0.34	0.46	0.009	0.011	0.27	0.03	3.98	9.69	0.14	19.52	9.67	1.40	44
GREENWICH	001	74	30		0.0001	0.0028	0.002	0.24	0.64	1.49	0.011	0.008	0.61	0.02	1.64	7.94	0.27	2.37	6.10	3.58	55
GREENWICH	002	74	30		0.0001	0.0025	0.002	0.20	0.79	0.98	0.011	0.010	0.59	0.03	0.92	8.78	0.29	3.33	5.85	4.94	58
GREENWICH	003	74	28		0.0001	0.0027	0.004	0.16	0.81	1.18	0.012	0.011	0.23	0.02	1.66	10.37	0.23	2.95	6.05	4.47	51
GREENWICH	004	74	29		0.0001	0.0027	0.004	0.40	0.54	0.83	0.010	0.011	0.23	0.03	0.88	7.35	0.31	2.52	6.31	1.83	49
GREENWICH	007	74	29		0.0001	0.0022	0.004	0.15	0.67	0.60	0.013	0.011	0.21	0.02	1.07	8.74	0.25	1.80	5.74	2.91	53
GREENWICH	008	74	30		0.0001	0.0021	0.003	0.25	0.98	0.81	0.013	0.010	0.22	0.03	1.39	9.63	0.22	2.35	6.15	2.89	72
GREENWICH	014	74	29		0.0001	0.0033	0.007	0.22	0.78	0.98	0.022	0.019	1.08	0.03	1.80	13.03	0.56	3.71	6.89	4.48	68
GROTON	001	74	30		0.0001	0.0012	0.012	0.16	0.67	0.97	0.022	0.028	0.27	0.05	1.24	10.16	0.28	3.90	6.08	2.42	36
HADDAM	002	74	21		0.0000	0.0016	0.002	0.34	0.28	0.91	0.012	0.006	0.21	0.04	0.05	10.42	0.27	3.47	6.25	3.02	35
HARTFORD	003	74	27		0.0001	0.0028	0.006	0.16	1.34	1.07	0.023	0.033	0.39	0.04	3.31	9.91	0.21	5.74	6.00	6.24	67
HARTFORD	004	74	22		0.0000	0.0018	0.003	0.22	0.62	0.76	0.013	0.010	0.21	0.05	0.58	7.66	0.32	3.16	5.95	3.36	54
HARTFORD	005	74	23		0.0000	0.0031	0.002	0.12	0.55	0.88	0.013	0.011	0.20	0.05	1.39	9.27	0.38	2.64	5.83	1.50	48
KENT	001	74	28		0.0000	0.0018	0.004	0.27	0.51	0.91	0.010	0.009	0.29	0.03	0.76	6.70	0.29	7.90	5.91	1.58	39
LTCH CTY(MORRI	001	74	28		0.0000	0.0010	0.003	0.28	0.23	0.88	0.007	0.007	0.19	0.03	1.07	7.51	0.36	4.05	6.50	1.61	32
MANCHESTER	001	74	20		0.0000	0.0016	0.002	0.18	0.23	1.06	0.020	0.081	0.54	0.03	1.12	9.89	0.38	6.42	6.98	2.58	47
MANSFIELD	001	74	24		0.0006	0.0028	0.002	0.30	0.49	0.46	0.012	0.008	6.93	0.03	2.25	12.37	0.25	6.22	5.77	2.13	37
MERIDEN	001	74	26		0.0000	0.0020	0.004	0.26	0.62	1.02	0.013	0.017	0.35	0.03	1.38	8.42	0.20	3.87	6.18	3.26	50
MERIDEN	002	74	20		0.0000	0.0035	0.005	0.21	0.85	0.99	0.024	0.025	0.61	0.04	1.36	8.37	0.39	4.01	6.36	2.75	52
MERIDEN	003	74	24		0.0000	0.0029	0.003	0.07	0.65	0.90	0.021	0.013	0.59	0.02	1.89	8.97	0.28	4.27	5.68	3.87	50
MERIDEN	005	74	27		0.0000	0.0142	0.005	0.33	1.33	1.00	0.032	0.054	4.52	0.03	1.36	7.35	0.20	3.47	6.22	3.58	71
MERIDEN	006	74	25		0.0000	0.0024	0.008	0.45	0.96	0.61	0.020	0.016	0.28	0.04	1.89	8.77	0.25	4.41	5.42	2.83	65

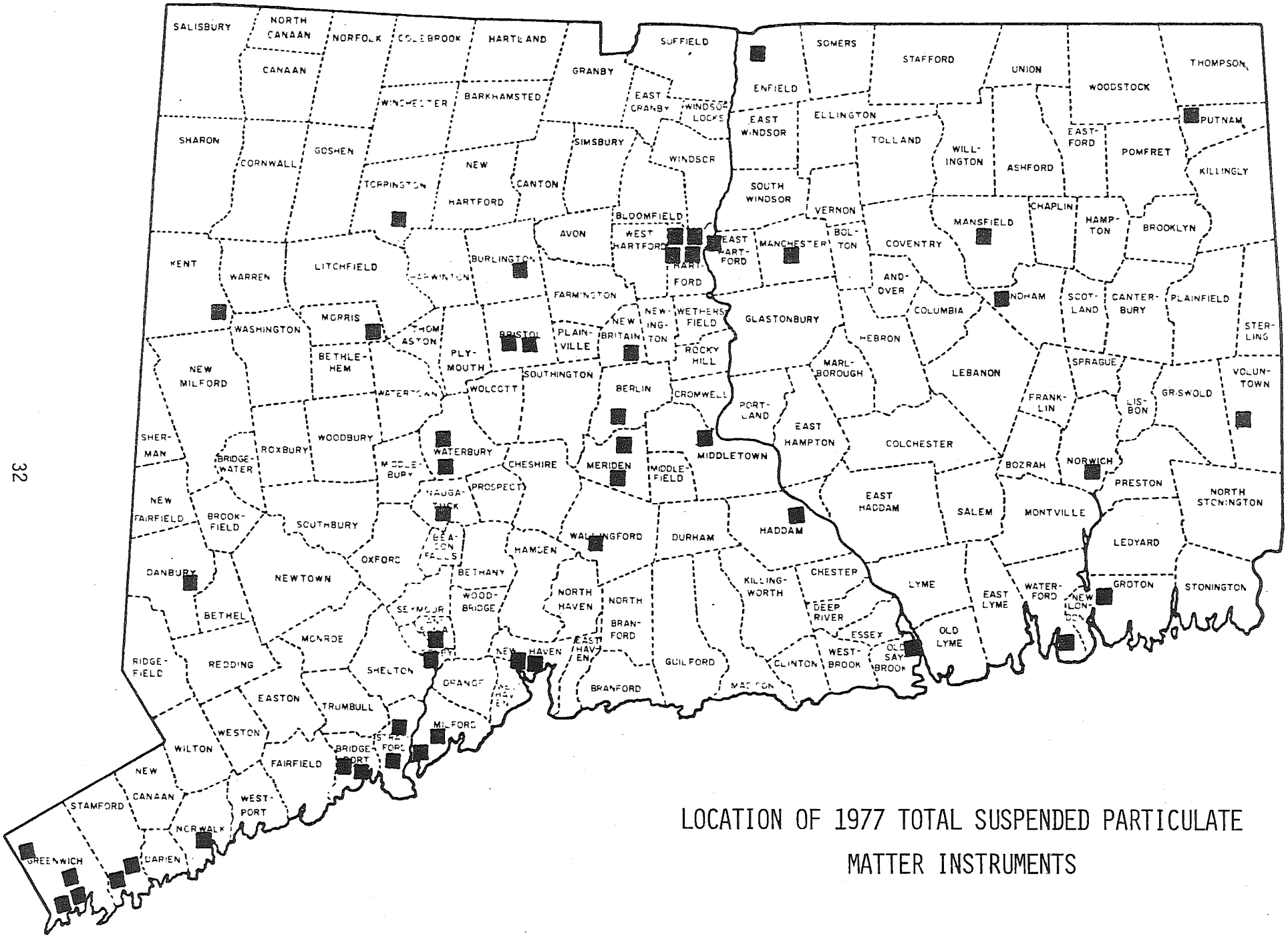
TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
MIDDLETOWN	001	74	29		0.0000	0.0019	0.004	0.08	0.44	0.50	0.013	0.012	0.30	0.04	1.67	12.15	0.21	5.36	5.93	2.41	37
MIDDLETOWN	003	74	30		0.0001	0.0024	0.004	0.61	0.71	0.85	0.016	0.013	0.33	0.04	1.43	8.50	0.20	4.93	6.14	3.72	56
MIDDLETOWN	005	74	5		0.0001	0.0019	0.003	0.14	0.32	0.23	0.017	0.013	0.38	0.03	0.50	12.27	0.13	5.87	7.30	4.15	
MILFORD	001	74	29		0.0000	0.0034	0.002	0.14	0.65	1.16	0.013	0.019	0.41	0.04	2.14	10.13	0.24	6.87	6.23	2.81	47
MILFORD	002	74	26		0.0001	0.0028	0.005	0.17	0.85	1.16	0.012	0.024	0.39	0.05	1.83	8.61	0.29	6.38	6.46	3.68	51
MILFORD	006	74	29		0.0000	0.0030	0.002	0.05	0.49	0.58	0.010	0.018	0.34	0.04	1.80	8.76	0.25	6.10	6.62	3.23	41
NAUGATUCK	001	74	30		0.0000	0.0046	0.004	0.17	1.42	1.32	0.018	0.014	0.49	0.04	1.57	7.48	0.44	2.96	6.27	3.81	66
NEW BRITAIN	001	74	30		0.0000	0.0027	0.002	0.06	0.75	0.92	0.017	0.011	0.15	0.03	1.90	7.44	0.30	2.76	6.28	3.39	57
NEW BRITAIN	002	74	30		0.0000	0.0031	0.004	0.16	1.22	1.02	0.029	0.013	0.15	0.04	1.53	6.42	0.21	2.60	6.71	4.67	75
NEW BRITAIN	003	74	29		0.0000	0.0053	0.002	0.16	1.24	1.45	0.024	0.011	0.19	0.04	1.60	6.52	0.33	3.40	6.04	4.62	71
NEW BRITAIN	004	74	29		0.0001	0.0051	0.004	0.25	0.70	0.90	0.019	0.016	0.21	0.03	1.96	8.21	0.28	3.30	5.87	4.04	41
NEW BRITAIN	005	74	30		0.0000	0.0023	0.002	0.19	0.44	0.80	0.013	0.010	0.14	0.04	1.51	9.73	0.20	3.22	6.32	3.20	42
NEW HAVEN	002	74	28		0.0000	0.0023	0.009	0.15	1.06	1.18	0.028	0.026	0.25	0.06	0.77	7.95	0.45	2.73	6.19	4.05	56
NEW HAVEN	003	74	30		0.0000	0.0031	0.001	0.07	0.72	0.71	0.019	0.017	0.33	0.05	0.81	10.25	0.35	5.13	5.76	3.15	45
NEW HAVEN	005	74	29		0.0000	0.0029	0.005	0.08	0.95	0.93	0.017	0.018	0.25	0.06	0.98	10.47	0.29	4.22	5.97	3.01	47
NEW HAVEN	009	74	29		0.0001	0.0021	0.003	0.12	0.68	1.15	0.014	0.023	0.24	0.08	2.31	7.91	0.20	3.78	5.94	3.04	50
NORTH CANAAN	001	74	29		0.0000	0.0010	0.004	0.17	0.50	0.27	0.013	0.005	0.18	0.03	1.28	7.35	0.26	3.84	6.19	3.73	45
NORWALK	001	74	28		0.0002	0.0039	0.006	0.22	0.91	1.06	0.017	0.015	3.87	0.06	1.59	13.18	0.35	5.66	6.09	4.93	61
NORWALK	005	74	28		0.0002	0.0035	0.004	0.17	1.31	1.40	0.024	0.012	3.13	0.04	2.72	11.28	0.25	5.50	5.89	5.96	79
NORWICH	001	74	29		0.0000	0.0008	0.003	0.21	0.67	0.79	0.015	0.013	0.11	0.04	1.27	10.83	0.30	5.61	6.34	4.05	49
OLD SAYBROOK	001	74	30		0.0000	0.0015	0.006	0.28	1.16	1.48	0.017	0.012	0.29	0.04	1.07	9.79	0.30	5.32	6.16	6.05	74
ORANGE	003	74	18		0.0000	0.0024	0.003	0.04	1.12	0.53	0.022	0.013	0.23	0.03	1.10	7.73	0.17	3.24	6.33	3.23	55
PORTLAND	001	74	5		0.0000	0.0030	0.001	1.11	0.20	0.23	0.011	0.008	0.28	0.03	0.00	11.95	0.20	4.77	6.90	3.73	
PUTNAM	002	74	27		0.0000	0.0008	0.003	0.15	0.47	0.45	0.010	0.009	0.11	0.03	0.70	9.76	0.27	3.52	5.71	2.31	43
STAMFORD	001	74	20		0.0001	0.0026	0.005	0.41	1.20	1.01	0.021	0.012	0.26	0.05	1.79	12.53	0.31	3.07	6.05	3.78	69
STAMFORD	003	74	24		0.0001	0.0053	0.005	0.12	0.65	1.00	0.012	0.009	0.25	0.05	2.65	8.89	0.26	4.68	5.92	3.73	56
STAMFORD	004	74	29		0.0001	0.0058	0.004	0.36	0.53	0.78	0.011	0.012	0.19	0.03	2.10	7.42	0.30	4.48	6.07	3.36	47
STAMFORD	007	74	23		0.0001	0.0049	0.010	0.28	3.55	1.02	0.049	0.022	0.44	0.06	3.02	10.41	0.30	3.60	6.14	3.25	87
STAMFORD	010	74	1		0.0000	0.0048	0.011	0.37	2.51	1.68	0.048	0.051	0.43	0.02	4.06	14.55	0.17	4.35	6.50		15
STRATFORD	001	74	19		0.0000	0.0048	0.004	0.39	0.58	0.70	0.016	0.016	0.33	0.04	1.70	9.01	0.17	5.45	6.75	3.49	49
STRATFORD	005	74	20		0.0000	0.0037	0.006	0.41	0.97	1.11	0.018	0.027	0.30	0.07	1.41	10.89	0.23	5.80	6.79	2.72	65
THOMASTON	003	74	29		0.0000	0.0025	0.007	0.46	0.67	0.78	0.012	0.015	0.59	0.05	0.91	8.18	0.24	3.84	6.38	3.13	45
TORRINGTON	001	74	30		0.0001	0.0014	0.006	0.19	0.81	1.43	0.018	0.017	0.36	0.05	1.11	9.86	0.32	5.73	6.40	3.94	53
VOLUNTOWN	001	74	25		0.0000	0.0009	0.004	0.16	0.40	0.18	0.018	0.008	0.27	0.02	0.87	4.78	0.23	4.96	6.50	1.94	30
WATERBURY	002	74	9		0.0000	0.0658	0.010	0.26	1.20	1.40	0.017	0.020	0.60	0.05	1.03	11.86	0.59	1.67	5.84	4.26	63
WATERFORD	001	74	23		0.0000	0.0012	0.003	0.57	0.50	0.34	0.019	0.005	0.25	0.03	0.48	6.39	0.36	4.81	6.10	2.28	36
WILLIMANTIC	001	74	30		0.0000	0.0009	0.003	0.22	0.50	0.65	0.010	0.008	0.24	0.03	0.47	4.68	0.28	5.67	6.44	2.66	43
WINCHESTER	001	74	30		0.0000	0.0011	0.003	0.40	0.63	0.90	0.015	0.008	0.21	0.03	0.74	9.24	0.30	4.29	6.36	3.28	47
ANSONIA	003	75	28		0.0000	0.0159	0.006	0.26	0.89	1.32	0.014	0.019	0.72	0.03	3.38	9.16	0.22	8.15	7.87	4.55	62
BERLIN	001	75	27		0.0000	0.0020	0.005	0.14	0.31	0.45	0.008	0.008	0.18	0.02	2.82	8.94	0.34	6.62	7.94	1.47	39
BRIDGEPORT	002	75	8		0.0000	0.0056	0.013	0.19	0.74	1.25	0.023	0.021	0.28	0.04	0.80	9.30	0.52	3.85	6.70	5.38	58
BRIDGEPORT	123	75	21		0.0000	0.0042	0.004	0.09	0.96	1.35	0.014	0.018	0.30	0.03	6.02	12.06	0.11	11.66	8.30	3.66	66
BRISTOL	001	75	27		0.0000	0.0527	0.006	0.09	0.86	0.85	0.015	0.011	0.34	0.03	1.64	10.21	0.51	4.77	6.18	5.59	55
BRISTOL	002	75	3		0.0000	0.0041	0.004	0.95	0.45	0.40	0.008	0.005	0.19	0.03	0.52	4.84	0.41	1.14	6.60	2.43	36
BRISTOL	003	75	3		0.0000	0.0047	0.009	0.74	0.89	0.55	0.019	0.003	0.15	0.03	0.63	9.06	0.56	4.42	6.40	4.57	50
BRISTOL	004	75	20		0.0000	0.0690	0.005	0.29	0.77	1.68	0.013	0.010	0.98	0.03	1.30	8.41	0.48	4.19	6.16	4.24	63
BURLINGTON	001	75	20		0.0000	0.0013	0.001	0.11	0.23	0.28	0.005	0.003	0.20	0.02	1.43	8.73	0.24	11.05	6.90	2.03	33
DANBURY	001	75	7		0.0000	0.0008	0.003	0.25	1.09	1.42	0.013	0.012	0.14	0.03	1.53	8.66	0.65	3.08	6.50	3.23	64
DANBURY	123	75	20		0.0000	0.0020	0.001	0.18	0.72	1.16	0.011	0.007	0.12	0.02	2.23	11.10	0.29	7.92	7.66	2.91	56

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
DERBY	123	75	5		0.0000	0.0029	0.002	0.15	1.12	1.30	0.014	0.010	0.18	0.01	3.13	10.12	0.24	11.84	9.30	3.92	65
EAST HARTFORD	001	75	29		0.0000	0.0023	0.005	0.15	0.65	1.15	0.011	0.010	0.19	0.02	3.02	8.62	0.31	5.38	7.43	2.90	57
EAST HARTFORD	002	75	27		0.0000	0.0027	0.003	0.15	0.63	1.17	0.011	0.015	0.25	0.02	2.95	10.16	0.42	7.20	7.39	3.11	53
EAST WINDSOR	001	75	19		0.0000	0.0026	0.003	0.29	0.59	1.16	0.011	0.012	0.16	0.02	2.28	10.00	0.22	7.01	8.38	1.62	57
ENFIELD	001	75	8		0.0000	0.0016	0.002	0.18	0.88	1.23	0.018	0.015	0.46	0.06	1.76	5.78	0.59	5.84	6.50	4.81	79
ENFIELD	123	75	19		0.0000	0.0023	0.003	0.25	0.46	0.88	0.009	0.009	0.18	0.02	4.17	9.52	0.29	4.56	7.79	2.16	43
FAIRFIELD	002	75	14		0.0000	0.0042	0.003	0.30	0.61	0.57	0.012	0.013	0.50	0.03	3.67	9.29	0.32	8.46	7.70	2.14	51
GREENWICH	001	75	12		0.0000	0.0033	0.004	0.13	0.54	1.05	0.010	0.011	0.25	0.02	3.48	9.63	0.28	6.42	8.39	1.76	59
GREENWICH	002	75	29		0.0000	0.0030	0.003	0.11	0.67	1.16	0.012	0.010	0.30	0.03	4.56	12.25	0.29	7.85	7.66	3.34	57
GREENWICH	003	75	29		0.0000	0.0028	0.003	0.14	0.72	1.21	0.012	0.009	0.32	0.02	3.48	12.34	0.25	8.44	7.62	3.14	54
GREENWICH	004	75	28		0.0000	0.0028	0.003	0.23	0.58	0.76	0.012	0.009	0.28	0.02	4.08	12.30	0.29	6.98	7.54	2.60	44
GREENWICH	007	75	4		0.0000	0.0047	0.002	0.09	0.72	0.70	0.014	0.012	0.28	0.03	1.70	1.26	0.36	0.00	7.20	3.34	50
GREENWICH	008	75	30		0.0000	0.0028	0.004	0.18	0.92	1.11	0.015	0.010	0.30	0.02	3.90	12.16	0.34	9.17	7.66	3.45	67
GREENWICH	014	75	14		0.0000	0.0035	0.002	0.15	0.77	1.11	0.015	0.011	0.45	0.03	4.04	9.93	0.45	4.17	7.35	5.38	64
GROTON	001	75	8		0.0000	0.0018	0.006	0.05	0.61	0.81	0.010	0.016	2.82	0.04	1.19	8.50	0.53	5.96	7.40	3.70	44
GROTON	123	75	22		0.0000	0.0024	0.006	0.18	0.53	0.61	0.015	0.019	0.25	0.02	5.85	10.83	0.16	6.35	9.12	3.27	44
HADDAM	002	75	29		0.0000	0.0023	0.003	0.16	0.49	0.44	0.010	0.009	0.73	0.02	3.47	6.82	0.17	6.04	8.61	2.53	37
HARTFORD	002	75	7		0.0000	0.0015	0.004	0.25	0.65	0.58	0.010	0.018	0.12	0.03	5.33	10.26	0.22	6.27	7.50	3.00	55
HARTFORD	003	75	30		0.0000	0.0027	0.006	0.29	1.40	1.90	0.016	0.015	0.25	0.04	3.34	9.97	0.34	8.39	8.56	4.17	77
HARTFORD	004	75	28		0.0000	0.0023	0.003	0.17	0.74	1.21	0.012	0.009	0.19	0.02	4.54	8.75	0.29	5.43	8.45	2.07	51
HARTFORD	005	75	29		0.0000	0.0024	0.004	0.09	0.75	1.21	0.012	0.013	0.21	0.03	4.36	8.13	0.27	7.58	8.57	4.22	57
KENT	001	75	21		0.0000	0.0013	0.003	0.47	0.43	0.23	0.009	0.003	0.17	0.01	2.18	7.04	0.32	6.50	8.55	1.15	41
LTCH CTY(MORRI	001	75	30		0.0000	0.0019	0.003	0.14	0.39	0.36	0.008	0.007	0.09	0.02	0.27	6.62	0.31	0.20	6.99	2.59	33
MANCHESTER	001	75	27		0.0000	0.0015	0.002	0.21	0.57	0.83	0.012	0.008	0.16	0.02	1.98	9.68	0.41	6.20	8.30	2.73	53
MANSFIELD	001	75	30		0.0000	0.0016	0.002	0.13	0.44	0.37	0.007	0.005	0.71	0.02	3.70	11.75	0.27	7.40	8.93	0.91	41
MERIDEN	001	75	19		0.0002	0.0026	0.004	0.47	1.12	1.50	0.018	0.011	0.26	0.03	2.40	8.96	0.51	3.44	6.84	3.63	75
MERIDEN	002	75	27		0.0002	0.0043	0.006	0.26	1.03	1.23	0.016	0.023	0.53	0.03	3.42	10.18	0.35	2.93	7.83	3.51	60
MERIDEN	003	75	14		0.0001	0.0033	0.007	0.16	1.60	1.36	0.030	0.015	0.45	0.04	3.53	11.03	0.49	2.90	6.61	7.26	86
MERIDEN	005	75	27		0.0001	0.0841	0.007	0.29	1.09	1.06	0.022	0.033	7.62	0.03	3.50	8.68	0.26	5.93	7.33	3.81	77
MERIDEN	006	75	30		0.0001	0.0025	0.012	0.48	1.40	0.84	0.023	0.015	0.26	0.03	4.92	9.59	0.40	4.10	7.58	4.21	84
MIDDLETOWN	001	75	2		0.0000	0.0008	0.007	0.07	0.92	0.34	0.023	0.009	0.33	0.03	0.18	1.96	0.28	1.24	6.80	0.00	33
MIDDLETOWN	003	75	28		0.0000	0.0023	0.005	0.14	0.73	0.99	0.015	0.010	0.18	0.02	3.55	5.19	0.28	6.68	7.75	3.59	58
MILFORD	001	75	28		0.0000	0.0030	0.006	0.11	0.64	0.84	0.011	0.015	0.25	0.02	3.20	7.66	0.28	7.27	8.59	4.12	50
MILFORD	002	75	28		0.0000	0.0033	0.007	0.21	1.06	1.15	0.016	0.021	0.35	0.03	2.09	9.20	0.24	8.02	8.50	3.74	68
MILFORD	006	75	27		0.0000	0.0027	0.006	0.10	0.61	0.69	0.010	0.013	0.23	0.03	2.41	8.37	0.28	7.77	8.49	1.95	58
NAUGATUCK	001	75	30		0.0000	0.0100	0.007	0.09	1.45	1.23	0.020	0.013	0.39	0.02	2.09	7.67	0.39	7.93	8.57	4.28	66
NEW BRITAIN	001	75	4		0.0000	0.0018	0.004	0.06	1.69	1.54	0.028	0.019	0.15	0.08	1.37	5.42	0.34	4.42	6.70	8.89	128
NEW BRITAIN	002	75	29		0.0000	0.0021	0.003	0.05	1.32	1.05	0.020	0.013	0.21	0.02	2.26	9.07	0.19	7.24	8.63	4.72	91
NEW BRITAIN	003	75	29		0.0000	0.0021	0.004	0.20	1.43	1.56	0.019	0.009	0.17	0.02	1.05	10.44	0.17	6.75	8.62	3.32	83
NEW BRITAIN	004	75	30		0.0000	0.0024	0.003	0.12	0.57	0.86	0.012	0.011	0.17	0.02	1.51	10.34	0.20	7.33	8.51	3.69	49
NEW BRITAIN	005	75	4		0.0000	0.0018	0.006	0.17	0.70	1.12	0.012	0.012	0.20	0.04	0.99	4.66	0.43	2.87	7.00	4.10	99
NEW BRITAIN	123	75	6		0.0000	0.0023	0.008	0.12	0.84	1.24	0.017	0.009	0.16	0.01	1.84	11.51	0.22	8.86	9.10	3.47	74
NEW HAVEN	002	75	16		0.0000	0.0030	0.005	0.21	1.21	1.19	0.016	0.016	0.17	0.03	2.53	13.44	0.13	9.42	9.19	3.53	72
NEW HAVEN	003	75	28		0.0000	0.0029	0.004	0.09	0.75	0.75	0.014	0.010	0.21	0.02	2.44	12.52	0.20	6.05	8.60	4.26	59
NEW HAVEN	005	75	28		0.0000	0.0026	0.002	0.23	0.73	0.86	0.011	0.013	0.16	0.03	1.89	8.23	0.30	5.65	8.55	3.30	57
NEW HAVEN	009	75	20		0.0000	0.0025	0.004	0.13	0.88	1.01	0.014	0.016	0.24	0.06	1.91	10.18	0.35	6.78	8.09	2.54	62
NORTH CANAAN	001	75	29		0.0000	0.0015	0.002	0.21	0.57	0.28	0.012	0.004	0.12	0.01	1.37	9.44	0.31	7.21	8.32	2.10	55
NORWALK	001	75	28		0.0000	0.0029	0.003	0.18	0.77	1.09	0.011	0.009	0.20	0.02	1.23	10.21	0.38	3.45	8.13	3.99	53
NORWALK	005	75	28		0.0000	0.0025	0.005	0.13	0.69	1.19	0.011	0.007	0.19	0.02	1.07	8.85	0.36	3.38	8.09	3.75	57
NORWICH	001	75	30		0.0001	0.0015	0.004	0.11	0.64	0.89	0.014	0.018	1.64	0.03	1.95	9.67	0.30	4.69	8.20	3.09	54
OLD SAYBROOK	001	75	30		0.0000	0.0016	0.002	0.22	0.84	1.19	0.010	0.006	0.91	0.01	1.26	7.89	0.25	6.90	8.58	3.27	67

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
PUTNAM	002	75	29		0.0000	0.0019	0.003	0.07	0.54	0.47	0.008	0.007	0.07	0.01	2.89	5.51	0.22	3.81	8.39	2.40	57
STAMFORD	001	75	24		0.0000	0.0029	0.004	0.17	0.74	1.12	0.011	0.012	0.21	0.03	3.40	7.79	0.23	4.83	8.45	2.69	56
STAMFORD	003	75	22		0.0000	0.0029	0.003	0.19	0.66	1.15	0.010	0.014	0.19	0.03	3.59	10.76	0.49	5.88	7.98	3.75	64
STAMFORD	004	75	23		0.0000	0.0027	0.004	0.14	0.46	0.86	0.008	0.014	0.17	0.02	1.93	8.58	0.22	5.30	8.19	3.09	43
STAMFORD	007	75	26		0.0000	0.0037	0.005	0.13	1.73	0.90	0.031	0.016	0.37	0.02	2.05	10.59	0.24	5.65	8.35	2.98	74
STRATFORD	001	75	18		0.0000	0.0070	0.002	0.23	0.56	0.89	0.010	0.013	0.29	0.03	3.48	11.00	0.34	7.01	8.03	2.49	51
STRATFORD	005	75	23		0.0000	0.0027	0.005	0.13	0.61	1.20	0.010	0.022	0.24	0.03	4.66	10.65	0.25	7.77	8.70	4.10	62
THOMASTON	003	75	29		0.0000	0.0020	0.003	0.47	0.60	0.80	0.008	0.007	0.23	0.02	1.62	10.31	0.11	4.48	7.47	2.92	50
TORRINGTON	001	75	15		0.0000	0.0013	0.006	0.23	1.17	2.43	0.021	0.014	0.27	0.04	2.79	11.90	0.41	5.16	8.25	4.13	80
TORRINGTON	123	75	14		0.0000	0.0019	0.002	0.26	0.59	1.16	0.012	0.008	0.14	0.01	1.14	7.92	0.08	6.79	9.05	3.99	48
VOLUNTOWN	001	75	21		0.0000	0.0013	0.004	0.20	0.33	0.25	0.005	0.005	1.11	0.01	0.98	9.31	0.19	5.10	7.77	2.24	31
WALLINGFORD	001	75	13		0.0000	0.0022	0.001	0.04	0.50	1.24	0.009	0.010	0.14	0.02	1.65	10.77	0.10	9.26	9.11	3.85	46
WATERBURY	002	75	29		0.0000	0.0255	0.014	0.26	1.18	1.22	0.017	0.018	0.70	0.02	3.45	8.60	0.21	6.39	8.08	3.02	72
WATERBURY	003	75	26		0.0000	0.0088	0.005	0.09	0.80	1.25	0.014	0.010	0.90	0.02	1.42	8.97	0.16	5.72	8.72	3.87	60
WATERFORD	001	75	30		0.0000	0.0013	0.002	0.21	0.35	0.36	0.008	0.008	1.04	0.01	0.91	8.21	0.21	5.99	8.92	2.21	39
WILLIMANTIC	001	75	30		0.0000	0.0020	0.002	0.19	1.13	0.66	0.010	0.007	2.43	0.01	1.15	9.15	0.31	7.28	8.31	2.57	54
WINCHESTER	001	75	29		0.0000	0.0016	0.003	0.14	0.67	0.87	0.010	0.008	0.10	0.02	1.65	10.75	0.32	7.22	8.56	2.91	57
ANSONIA	003	76	30	0.27	0.0000	0.0103	0.008	0.18	0.80	1.08	0.015	0.016	0.93	0.03	3.43	13.77	0.13	3.46	8.54	3.16	62
BERLIN	001	76	7	0.06	0.0000	0.0015	0.002	0.13	0.22	0.49	0.007	0.008	0.06	0.03	3.27	18.51	0.30	6.98	9.00	2.52	38
BRIDGEPORT	123	76	31	0.55	0.0000	0.0071	0.011	0.16	1.37	1.43	0.034	0.026	0.72	0.05	4.78	14.28	0.16	3.88	8.40	3.93	77
BRISTOL	001	76	29	0.70	0.0000	0.0314	0.007	0.11	0.71	0.96	0.016	0.010	0.32	0.03	2.91	14.67	0.20	3.16	8.32	3.46	57
BRISTOL	004	76	26	0.72	0.0000	0.0165	0.007	0.19	1.03	1.60	0.023	0.011	0.97	0.03	3.42	13.03	0.36	5.03	8.49	3.76	76
BURLINGTON	001	76	4	0.10	0.0000	0.0023	0.001	0.16	0.28	0.28	0.008	0.004	0.10	0.02	2.20	13.39	0.07	5.38	9.10	0.64	28
DANBURY	123	76	28	0.34	0.0000	0.0015	0.006	0.13	0.84	0.88	0.018	0.009	0.10	0.02	2.85	11.61	0.11	3.15	8.71	2.00	54
DERBY	123	76	27	0.27	0.0000	0.0035	0.005	0.15	0.88	0.79	0.017	0.016	0.35	0.03	3.64	13.39	0.08	4.67	8.40	1.93	54
EAST HARTFORD	001	76	5	0.24	0.0000	0.0007	0.003	0.08	0.47	0.62	0.008	0.006	0.07	0.02	1.27	8.93	0.25	4.72	9.10	1.76	49
EAST HARTFORD	002	76	25	0.15	0.0000	0.0019	0.005	0.16	0.47	0.72	0.014	0.010	0.10	0.02	2.76	15.06	0.10	3.52	8.73	1.52	46
EAST WINDSOR	001	76	6	0.18	0.0000	0.0050	0.003	0.15	0.51	1.30	0.011	0.016	0.14	0.04	4.92	14.47	0.42	7.38	8.90	6.17	63
ENFIELD	123	76	27	0.41	0.0000	0.0025	0.004	0.17	0.45	0.83	0.011	0.012	0.15	0.02	3.21	12.79	0.09	4.05	9.09	2.04	45
GREENWICH	001	76	27	0.46	0.0000	0.0023	0.006	0.16	0.74	1.01	0.016	0.014	0.21	0.02	5.37	16.86	0.16	5.14	8.77	2.08	58
GREENWICH	002	76	7	0.25	0.0000	0.0021	0.001	0.18	0.51	1.12	0.009	0.011	0.19	0.04	3.61	16.15	0.33	8.27	9.20	3.79	43
GREENWICH	003	76	27	0.25	0.0000	0.0026	0.005	0.18	0.82	1.11	0.015	0.010	0.27	0.02	4.86	14.34	0.18	5.02	8.77	2.70	58
GREENWICH	004	76	21	0.23	0.0000	0.0028	0.004	0.19	0.58	0.55	0.014	0.009	0.18	0.01	4.11	13.81	0.20	4.36	8.71	1.43	46
GREENWICH	008	76	28	0.23	0.0000	0.0019	0.005	0.18	0.73	0.85	0.012	0.008	0.17	0.01	3.59	12.04	0.21	3.66	8.62	2.32	53
GROTON	123	76	31	0.14	0.0000	0.0016	0.004	0.20	0.58	0.47	0.017	0.015	0.11	0.02	3.49	13.31	0.10	4.75	8.94	1.51	45
HADDAM	002	76	29	0.14	0.0000	0.0009	0.003	0.09	0.35	0.39	0.011	0.005	0.06	0.01	2.74	12.77	0.14	3.07	9.06	1.75	36
HARTFORD	003	76	31	0.44	0.0000	0.0025	0.007	0.17	1.22	1.48	0.024	0.018	0.18	0.04	4.15	16.56	0.26	4.57	8.76	4.58	79
HARTFORD	004	76	7	0.28	0.0000	0.0018	0.003	0.12	0.66	1.17	0.011	0.017	0.09	0.04	3.61	18.62	0.45	5.62	9.10	6.99	54
HARTFORD	005	76	5	0.30	0.0000	0.0036	0.002	0.03	0.74	0.70	0.010	0.016	0.10	0.05	2.38	16.03	0.31	6.26	8.90	2.82	47
HARTFORD	123	76	8	0.29	0.0000	0.0016	0.005	0.08	0.62	1.15	0.018	0.021	0.12	0.05	2.70	7.63	0.25	0.86	9.40	3.27	45
LTCH CTY(MORRI	001	76	7	0.71	0.0000	0.0014	0.002	0.18	0.46	0.33	0.009	0.005	0.10	0.02	1.52	4.98	0.07	2.78	8.90	1.11	31
MANCHESTER	001	76	27	0.10	0.0000	0.0012	0.002	0.16	0.47	0.77	0.011	0.009	0.09	0.02	3.26	12.45	0.20	3.14	8.37	1.28	44
MANSFIELD	001	76	6	0.07	0.0000	0.0027	0.001	0.10	0.27	0.33	0.008	0.006	0.05	0.02	2.50	8.94	0.08	10.48	9.10	1.04	30
MERIDEN	002	76	26	0.72	0.0000	0.0024	0.004	0.25	0.62	0.96	0.013	0.016	0.66	0.03	2.05	10.82	0.29	2.47	8.28	3.27	53
MERIDEN	005	76	28	0.96	0.0000	0.0134	0.005	0.26	0.74	0.92	0.023	0.025	5.96	0.02	2.90	13.62	0.35	0.90	7.69	2.99	67
MERIDEN	006	76	12	2.12	0.0000	0.0027	0.007	0.13	1.05	0.81	0.019	0.014	0.57	0.03	1.63	14.41	0.58	2.35	6.80	3.38	65
MIDDLETOWN	003	76	31	0.40	0.0000	0.0019	0.005	0.08	0.98	0.96	0.022	0.011	0.13	0.03	3.02	12.32	0.11	2.46	8.62	2.73	64
MILFORD	001	76	23	0.28	0.0000	0.0048	0.004	0.16	0.73	0.93	0.013	0.013	0.21	0.02	3.93	15.22	0.06	4.34	8.80	2.31	52
MILFORD	002	76	30	0.40	0.0000	0.0036	0.004	0.18	0.77	0.89	0.015	0.015	0.18	0.02	3.93	16.89	0.23	3.94	8.79	2.79	55

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
MILFORD	006	76	3	0.19	0.0000	0.0084	0.003	0.06	0.30	0.58	0.010	0.018	0.12	0.05	1.69	18.77	0.29	6.91	9.00	2.73	39
NAUGATUCK	001	76	31	0.29	0.0000	0.0036	0.004	0.08	0.83	0.94	0.017	0.012	0.25	0.02	3.12	15.81	0.22	4.59	9.00	3.19	58
NEW BRITAIN	002	76	10	0.72	0.0000	0.0027	0.006	0.15	1.65	1.76	0.027	0.018	0.16	0.05	6.12	21.03	0.54	7.21	9.05	4.64	96
NEW BRITAIN	003	76	21	0.56	0.0000	0.0018	0.003	0.14	1.29	1.42	0.024	0.011	0.14	0.02	2.68	15.24	0.26	4.13	9.12	3.73	75
NEW BRITAIN	004	76	7	0.23	0.0000	0.0039	0.008	0.11	0.50	1.11	0.013	0.028	0.14	0.06	3.65	22.51	0.31	6.93	8.80	2.97	48
NEW BRITAIN	123	76	30	0.37	0.0000	0.0018	0.006	0.06	0.71	1.03	0.017	0.013	0.12	0.03	2.75	14.40	0.26	3.95	9.18	2.62	60
NEW HAVEN	002	76	30	0.40	0.0000	0.0018	0.007	0.26	0.94	1.32	0.019	0.017	0.17	0.04	3.72	13.77	0.24	4.62	9.17	3.99	66
NEW HAVEN	003	76	8	0.39	0.0000	0.0023	0.003	0.11	0.72	0.73	0.012	0.014	0.13	0.03	7.78	18.80	0.42	7.09	9.00	2.75	48
NEW HAVEN	005	76	10	0.32	0.0000	0.0023	0.003	0.34	0.83	0.83	0.013	0.015	0.14	0.04	2.83	16.76	0.43	4.95	8.90	2.70	64
NORTH CANAAN	001	76	29	0.16	0.0000	0.0009	0.001	0.07	0.52	0.22	0.015	0.005	0.07	0.01	2.49	10.50	0.14	3.25	9.32	1.45	47
NORWALK	001	76	5	0.30	0.0000	0.0019	0.002	0.09	0.79	1.17	0.012	0.013	0.13	0.04	2.57	19.17	0.31	7.52	9.00	4.23	55
NORWALK	005	76	30	0.40	0.0000	0.0029	0.004	0.12	0.88	1.19	0.017	0.010	0.24	0.02	3.84	14.08	0.16	4.42	9.32	3.31	60
NORWICH	001	76	30	0.16	0.0000	0.0008	0.002	0.19	0.50	0.60	0.010	0.007	0.07	0.02	2.98	13.23	0.23	3.93	9.29	2.02	47
OLD SAYBROOK	001	76	30	0.46	0.0000	0.0009	0.003	0.15	0.90	1.39	0.016	0.004	0.14	0.01	2.75	11.74	0.13	4.98	9.31	2.30	65
PUTNAM	002	76	8	0.25	0.0000	0.0004	0.001	0.04	0.56	0.28	0.009	0.005	0.03	0.02	5.04	13.31	0.00	6.68	9.00	3.43	52
STAMFORD	001	76	6	0.23	0.0000	0.0023	0.001	0.10	0.63	1.09	0.011	0.013	0.11	0.04	2.83	17.80	0.07	6.26	9.00	0.97	68
STAMFORD	003	76	21	0.27	0.0000	0.0028	0.003	0.10	0.86	1.21	0.015	0.011	0.18	0.02	3.93	14.63	0.17	4.08	8.99	2.56	68
STAMFORD	004	76	6	0.03	0.0000	0.0019	0.001	0.07	0.29	0.69	0.006	0.008	0.21	0.03	6.30	17.08	0.29	7.59	9.30	2.15	44
STAMFORD	007	76	28	0.50	0.0000	0.0032	0.005	0.15	1.21	0.81	0.030	0.013	0.28	0.02	3.92	13.80	0.13	3.52	9.18	2.53	59
STAMFORD	123	76	8	0.26	0.0000	0.0042	0.003	0.08	0.56	0.90	0.015	0.012	0.27	0.01	3.61	11.92	0.18	1.70	9.40	3.08	44
STRATFORD	001	76	25	0.20	0.0000	0.0041	0.003	0.10	0.54	0.77	0.014	0.013	0.19	0.03	3.94	14.90	0.22	4.82	8.92	2.10	52
STRATFORD	005	76	26	0.35	0.0000	0.0050	0.004	0.16	0.81	1.21	0.015	0.014	0.24	0.02	2.66	16.42	0.32	3.59	9.14	2.19	62
TORRINGTON	123	76	26	0.51	0.0000	0.0026	0.005	0.19	1.19	0.96	0.047	0.009	0.18	0.02	2.39	12.07	0.13	2.89	8.52	2.39	75
VOLUNTOWN	001	76	6	0.04	0.0000	0.0008	0.000	0.19	0.15	0.13	0.004	0.003	0.03	0.01	7.05	12.37	0.08	5.66	8.90	0.94	23
WALLINGFORD	001	76	31	0.33	0.0000	0.0017	0.005	0.04	0.74	1.05	0.015	0.013	0.18	0.03	2.90	14.26	0.15	3.86	8.71	2.73	59
WATERBURY	002	76	31	0.53	0.0000	0.0099	0.008	0.20	1.21	1.07	0.022	0.017	0.37	0.02	2.51	14.49	0.32	4.34	8.79	2.56	67
WATERBURY	003	76	7	0.20	0.0000	0.0037	0.005	0.10	0.36	1.04	0.007	0.010	0.28	0.04	6.93	12.28	0.31	6.34	8.80	2.53	55
WATERFORD	001	76	30	0.15	0.0000	0.0007	0.005	0.13	0.32	0.23	0.008	0.005	0.06	0.01	4.39	10.75	0.06	2.10	9.25	1.20	37
WILLIMANTIC	001	76	7	0.10	0.0000	0.0009	0.001	0.18	0.38	0.32	0.006	0.004	0.03	0.01	1.67	7.57	0.06	5.43	9.20	1.49	50
WINCHESTER	001	76	6	0.23	0.0000	0.0018	0.002	0.12	0.72	0.54	0.012	0.008	0.07	0.02	2.64	8.28	0.30	7.38	9.10	1.88	57
ANSONIA	003	77	30	0.60	0.0000	0.0555	0.011	0.20	1.15	1.41	0.024	0.017	1.21	0.04	4.93	10.04	0.07	5.63	9.06		65
BRIDGEPORT	123	77	29	0.66	0.0000	0.0066	0.013	0.15	1.53	1.45	0.040	0.024	0.41	0.05	4.85	11.56	0.08	6.69	9.00		73
BRISTOL	001	77	29	0.46	0.0000	0.0084	0.009	0.12	0.89	0.84	0.023	0.008	0.20	0.03	4.56	11.13	0.20	5.60	9.11		55
BRISTOL	004	77	30	0.50	0.0000	0.0145	0.019	0.20	0.97	1.36	0.022	0.009	1.34	0.02	3.76	10.14	0.19	5.28	8.99		59
DANBURY	123	77	26	0.35	0.0000	0.0016	0.007	0.18	0.95	0.92	0.020	0.010	0.08	0.03	4.33	9.35	0.08	4.83	9.04		60
DERBY	123	77	30	0.33	0.0000	0.0079	0.009	0.09	1.07	0.89	0.023	0.016	0.28	0.05	4.04	10.52	0.13	5.54	9.10		57
EAST HARTFORD	002	77	28	0.26	0.0000	0.0025	0.008	0.08	0.68	0.83	0.020	0.010	0.15	0.04	3.66	11.36	0.10	5.38	9.21		52
ENFIELD	123	77	27	0.34	0.0000	0.0009	0.006	0.10	0.51	0.75	0.015	0.084	0.22	0.02	3.04	9.20	0.05	4.81	9.13		42
GREENWICH	001	77	22	0.34	0.0000	0.0018	0.007	0.14	0.84	0.88	0.015	0.010	0.12	0.02	5.61	10.96	0.07	7.59	9.25		64
GREENWICH	003	77	29	0.26	0.0000	0.0019	0.007	0.17	0.86	1.02	0.017	0.008	0.13	0.02	5.20	10.28	0.05	6.71	9.22		61
GREENWICH	004	77	28	0.16	0.0000	0.0020	0.007	0.15	0.51	0.60	0.013	0.009	0.12	0.02	3.83	9.11	0.06	6.17	9.15		44
GREENWICH	008	77	29	0.24	0.0000	0.0015	0.006	0.16	0.89	0.85	0.015	0.008	0.12	0.01	3.35	10.45	0.07	6.07	9.27		62
GROTON	123	77	30	0.15	0.0000	0.0011	0.007	0.10	0.88	0.56	0.030	0.025	0.13	0.02	2.81	9.91	0.04	5.90	9.28		46
HADDAM	002	77	27	0.07	0.0000	0.0010	0.003	0.08	0.39	0.44	0.011	0.007	0.04	0.02	2.72	8.19	0.04	3.80	9.28		37
HARTFORD	003	77	27	0.39	0.0000	0.0017	0.010	0.14	1.31	1.37	0.026	0.014	0.17	0.05	3.58	12.12	0.06	5.21	9.16		72
HARTFORD	123	77	29	0.41	0.0000	0.0019	0.008	0.15	1.21	1.31	0.025	0.013	0.14	0.05	4.68	11.97	0.08	6.33	9.06		72
MANCHESTER	001	77	29	0.28	0.0000	0.0009	0.004	0.10	0.58	0.69	0.014	0.007	0.05	0.02	3.68	10.94	0.06	5.60	9.14		44
MERIDEN	002	77	30	0.32	0.0000	0.0031	0.005	0.20	0.81	0.93	0.020	0.015	0.65	0.04	4.56	10.99	0.07	5.66	9.16		58
MERIDEN	005	77	29	0.40	0.0000	0.0052	0.006	0.28	0.94	0.84	0.027	0.017	5.28	0.03	4.17	9.07	0.09	4.30	8.92		64

TOWN	SITE	YR	#S	AL	BE	CD	CR	CU	FE	PB	MN	NI	ZN	V	NO3	SO4	NH4	NA	PH	BENZ	TSP
MIDDLETOWN	003	77	29	0.57	0.0000	0.0016	0.007	0.04	0.88	1.11	0.023	0.010	0.12	0.03	4.62	9.99	0.08	5.60	9.06		56
MILFORD	001	77	27	0.33	0.0000	0.0033	0.004	0.15	0.66	0.75	0.014	0.014	0.15	0.03	4.13	10.03	0.13	5.43	9.13		50
MILFORD	002	77	29	0.44	0.0000	0.0028	0.004	0.09	0.91	0.96	0.018	0.020	0.14	0.03	5.24	10.54	0.08	5.94	9.15		60
NAUGATUCK	001	77	30	0.63	0.0000	0.0047	0.010	0.13	1.05	1.13	0.029	0.013	0.23	0.05	4.37	10.54	0.18	4.44	9.06		61
NEW BRITAIN	003	77	14	0.92	0.0000	0.0012	0.005	0.18	2.40	1.16	0.040	0.008	0.10	0.03	4.40	11.48	0.09	5.49	9.00		98
NEW BRITAIN	123	77	29	0.42	0.0000	0.0015	0.009	0.08	0.83	1.05	0.019	0.010	0.11	0.03	3.66	14.56	0.07	5.49	8.89		57
NEW HAVEN	002	77	28	0.65	0.0000	0.0020	0.007	0.13	1.25	1.41	0.024	0.015	0.20	0.04	4.07	10.63	0.12	4.19	9.11		64
NEW HAVEN	123	77	11			0.0018	0.010	0.04	1.19	1.90	0.027	0.018	0.22	0.06	5.22	9.17	0.14	4.96	9.43		46
NORTH CANAAN	001	77	20	0.28	0.0000	0.0007	0.005	0.07	0.51	0.24	0.014	0.004	0.03	0.02	4.06	9.76	0.03	4.78	9.21		43
NORWALK	005	77	29	0.42	0.0000	0.0023	0.009	0.10	1.00	1.17	0.020	0.008	0.14	0.03	3.38	14.73	0.08	4.94	8.83		61
NORWICH	001	77	29	0.25	0.0000	0.0008	0.004	0.09	0.67	0.70	0.015	0.008	0.05	0.03	3.11	10.87	0.09	5.48	9.15		51
OLD SAYBROOK	001	77	30	0.48	0.0000	0.0009	0.007	0.09	0.85	1.29	0.020	0.006	0.09	0.01	3.36	9.97	0.06	5.96	9.33		64
STAMFORD	007	77	25	0.32	0.0000	0.0026	0.004	0.15	0.80	0.71	0.029	0.010	0.23	0.02	4.69	9.87	0.12	5.75	9.27		61
STAMFORD	123	77	30	0.35	0.0000	0.0019	0.048	0.12	1.50	1.10	0.022	0.013	0.13	0.03	3.35	11.37	0.08	5.84	9.05		64
STRATFORD	001	77	20	0.10	0.0000	0.0022	0.005	0.10	0.46	0.52	0.012	0.008	0.10	0.02	2.67	8.97	0.06	5.96	9.15		40
STRATFORD	005	77	29	0.25	0.0000	0.0026	0.010	0.12	0.82	1.13	0.017	0.063	0.13	0.04	3.76	7.09	0.09	5.15	9.18		59
TORRINGTON	123	77	30	0.55	0.0000	0.0007	0.009	0.12	1.32	1.03	0.030	0.007	0.08	0.02	2.71	10.02	0.08	5.57	9.28		71
WALLINGFORD	001	77	27	0.46	0.0000	0.0012	0.009	0.09	1.00	1.06	0.022	0.013	0.18	0.04	3.19	10.65	0.16	5.65	9.13		60
WATERBURY	002	77	29	0.29	0.0000	0.0371	0.018	0.22	1.30	1.56	0.032	0.023	0.58	0.05	3.73	13.37	0.17	6.12	9.07		78
WATERFORD	001	77	30	0.14	0.0000	0.0006	0.008	0.07	0.37	0.27	0.011	0.006	0.04	0.02	2.83	9.66	0.07	5.98	9.35		39



LOCATION OF 1977 TOTAL SUSPENDED PARTICULATE MATTER INSTRUMENTS

FIGURE 4

III. SULFUR DIOXIDE

Conclusions:

At no monitoring site in Connecticut was the primary or secondary annual sulfur dioxide (SO_2) standard exceeded in 1977.

Neither the primary nor the secondary 24-hour ambient standard for SO_2 of 365 $\mu g/m^3$ and 260 $\mu g/m^3$, respectively, was exceeded in Connecuticut during 1977.

There was no violation of the 3-hour SO_2 standard recorded at monitoring sites in Connecticut during 1977.

Method of Measurement:

The Air Monitoring Unit uses several types of instruments to continuously measure sulfur dioxide levels. The coulometric method is employed by Philips instruments; the flame photometric method is used by Bendix instruments; and the pulse fluorescence method is used by Teco instruments.

Philips monitoring instruments were used at the following sites in 1977:

Bridgeport	001	Milford	002
Meriden	002	Hartford (5 mos.)	123

Bendix monitoring instruments were used at the following sites in 1977:

Bridgeport	123	Groton	123
Danbury	123	Hartford (7 mos.)	123
Derby	123	New Britain	123
Enfield (6 mos.)	123	New Haven	123
Greenwich	004	Stamford	123
		Waterbury	123

Teco instruments were used at the following sites in 1977:

Enfield (6 mos.)	123
Middletown (10 mos.)	003

Discussion of Data:

A total of 15 continuous SO_2 monitors recorded data in 14 towns in 1977. Ten of these sites telemetered the data to the central computer in Hartford on a real-time basis. Table 7 shows that sufficient data for valid annual means (at least 75% of the possible sampling hours) were recorded at only 3 sites. The averages for the remainder of the sites represents 50-75% of the possible sampling hours.

Of the 15 monitoring sites, 14 showed lower SO_2 annual averages in 1977 than in 1976. In six of these sites there was a decrease of more than 10 $\mu g/m^3$. The 15th monitoring site showed an increase, but the increase was less than 10 $\mu g/m^3$. The second-high 24-hour and 3-hour concentrations for 1977 also improved. For the second-high 1977 24-hour concentrations, 10 sites went down (5 sites by more than 50 $\mu g/m^3$) and 4 sites went up (none by greater than 50 $\mu g/m^3$). Of the second high 3-hour concentrations, 9 sites went down (7 sites by greater than 50 $\mu g/m^3$) and one site remained the same. The significance of these comparisons is limited by the large amount of lost data. (See the statistical analysis discussion below.)

Continuing efforts to improve the quality of the continuous SO_2 monitoring network and data this year resulted in the low number of valid annual averages. Beginning in 1977, the Quality Assurance group began applying rejection criteria (based on zero and calibration checks) to the ambient data. The Bendix SO_2 monitors had some difficulty operating within these limits and much data had to be discarded. Another quality control problem involved the purity of hydrogen gas used to operate the Bendix units. Shifts in the zero and span settings occurred as tanks of hydrogen were replaced. Data base-lines were shifted to the extent that they could not meet the criteria limits. This situation has been intermittent since August of 1977. Lastly, three Philips monitors underwent factory upgrading at the start of the year. Unfortunately, no replacement instruments were available so the sites could not be operated until those instruments were returned.

This year, for the first time, a statistical analysis of the sulfur dioxide data is included in the annual summary (see Table 8). This analysis provides information to compensate for the loss of data caused by instrumentation problems.

The format of Table 8 is the same as that used to present the total suspended particulate annual averages. However, Table 8 gives the annual arithmetic mean of the valid 24-hour SO_2 averages to allow direct comparison to the annual SO_2 standards. The 95% limits and standard deviations are also arithmetic calculations. Since the distribution of SO_2 data tends to be lognormal, the geometric means and standard deviations were used to predict the number of days the 24-hour standards of 260 $\mu g/m^3$ and 365 $\mu g/m^3$ would be exceeded at each site if sampling had been conducted every day.

It is important to note that these statistical tests require random data to be valid. This means that an equal number of samples must be collected in each season of the year and on each day of the week. A disproportionate amount of the SO_2 data lost in 1977 as a result of instrument troubles occurred in the winter and autumn months when SO_2 levels tend to be higher. Thus, all averages given here may be lower than a full year's data would indicate. Nonetheless, the data indicate with reasonable assurance, that there were no violations of the secondary or primary SO_2 standards in Connecticut. The statistical prediction of one exceedence of the secondary 24-hour SO_2 standard (260 $\mu g/m^3$) at New Haven site 123 indicates that an increase in SO_2 emissions there might jeopardize the attainment of this standard. (Two exceedences are required for the standard to be violated.)

These analyses demonstrate the effectiveness and success of the Connecticut regulation which restricts the sulfur content of fuel to .5%.

TABLE 7

ANNUAL ARITHMETIC AVERAGES OF SULFUR DIOXIDE
AT SITES WITH CONTINUOUS MONITORS

PRIMARY NAAQS 80 $\mu g/m^3$
SECONDARY NAAQS 60 $\mu g/m^3$(a)

TOWN	SITE NAME	1977 ANNUAL AVERAGE
Bridgeport-001	City Hall	31
Bridgeport-123	Hallett Street	(37)[1]
Danbury-123	Western Conn. State College	(29)[1]
Derby-123	Dziadiz Street	(26)[1]
Enfield-123	Kosciuszko Junior High School	(25)[1]
Greenwich-004	Bruce Golf Course	(34)[1]
Groton-123	Fort Griswold State Park	(24)[1]
Hartford-123	State Office Building	37
Meriden-002	Stoddard Building	(31)[1]
Middletown-003	City Hall	(29)[1]
Milford-002	Devon Community Center	(29)[1]
New Britain-123	Lake Street	(29)[1]
New Haven-123	State Street	(37)[1]
Stamford-123	Health Department	(34)[1]
Waterbury-123	Bank Street	26

(a) State of Connecticut Air Quality Standard

[1] Estimate based on partial data (50-75%)

TABLE 8

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION PAGE 1 AIR COMPLIANCE MONITORING

POLLUTANT--SULFUR DIOXIDE

DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	MEAN	95-PCT-LIMITS LOWER	UPPER	STD DEVIATION	PREDICTED DAYS OVER 260 UG/M3	PREDICTED DAYS OVER 365 UG/M3
BRIDGEPORT	01	1977	313	29.8	29	31	21.586		
BRIDGEPORT	123	1977	199	37.3	35	40	29.452		
DANBURY	123	1977	161	26.2	23	29	23.822		
DERBY	123	1977	249	21.7	21	23	14.551		
ENFIELD	123	1977	230	25.5	24	27	17.902		
GREENWICH	04	1977	174	34.3	32	37	20.594		
GROTON	123	1977	202	24.0	23	25	14.388		
HARTFORD	123	1977	273	36.4	35	38	27.849		
MERIDEN	02	1977	185	31.1	29	34	23.984		
MIDDLETOWN	03	1977	252	28.6	27	30	16.382		
MILFORD	02	1977	177	28.0	26	30	18.316		
NEW BRITAIN	123	1977	243	29.6	28	31	23.708		
NEW HAVEN	123	1977	197	37.8	34	41	35.262	1	
STAMFORD	123	1977	176	34.9	32	38	29.383		
WATERBURY	123	1977	262	25.7	24	27	19.412		

The annual averages in Table 8 vary slightly from those in Table 7 because of the manner in which they were derived. Table 7 contains the annual averages of all the available hourly readings. Table 8 contains the annual averages of all the valid 24-hour averages. (At least 18 hours of valid data are required to produce a valid 24-hour average.)

TABLE 9
SULFUR DIOXIDE

1977 CONNECTICUT
24-HOUR CONCENTRATION

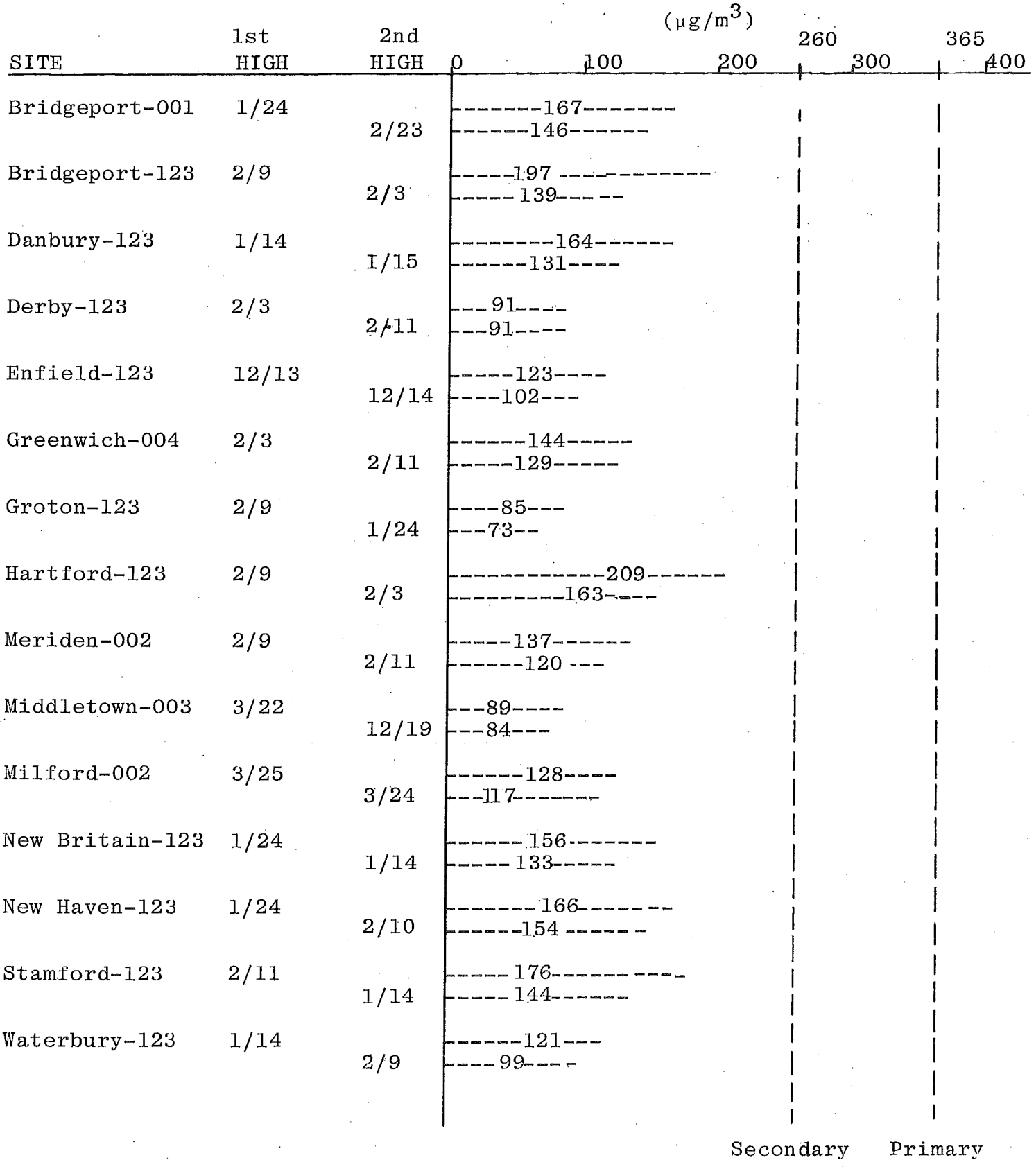


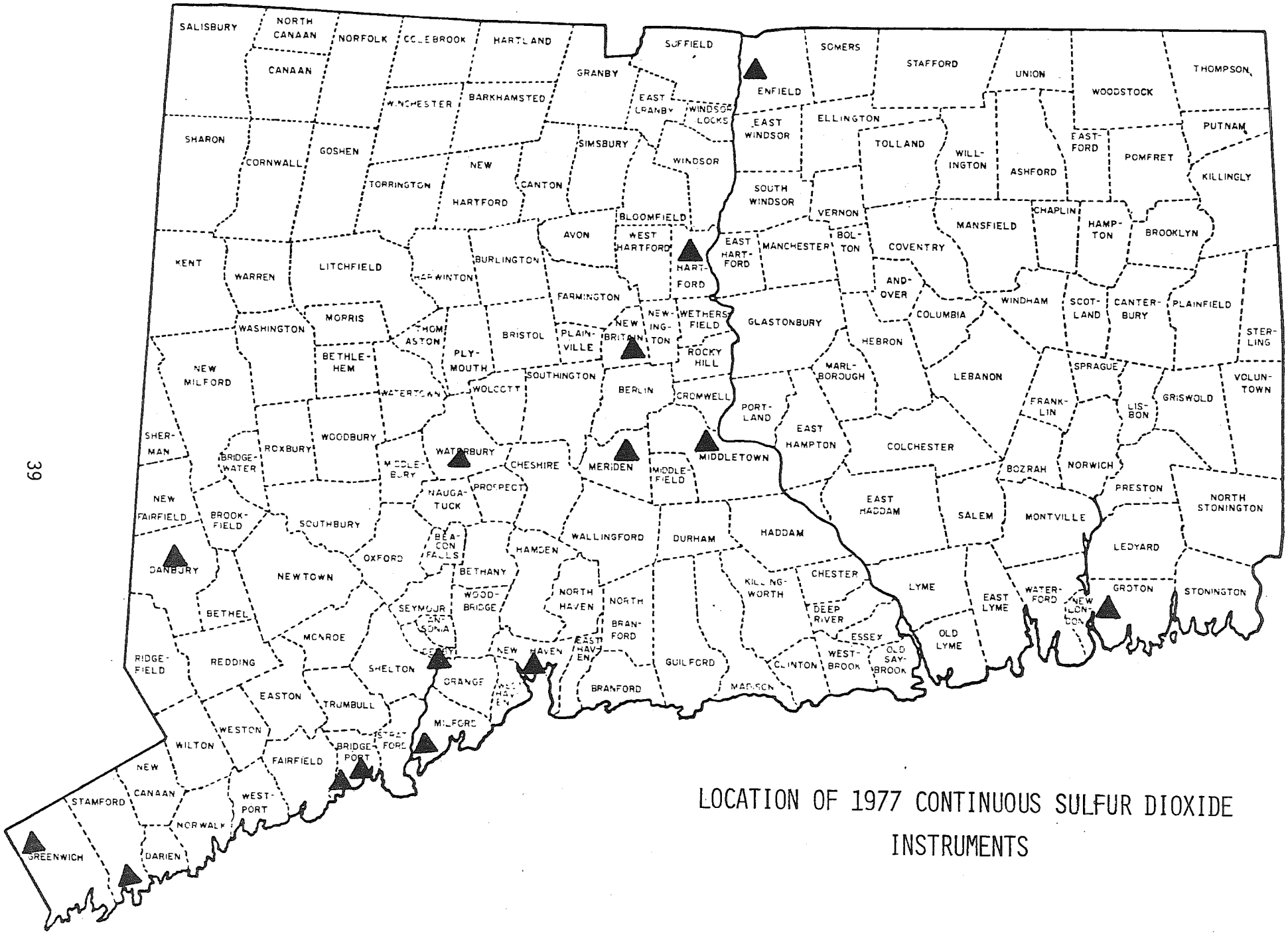
TABLE 10
SULFUR DIOXIDE

1977 - CONNECTICUT *
3-HOUR CONCENTRATION

($\mu g/m^3$)

SITE	DATE	0	100	200	300	400
Bridgeport-001	12/12	----------241---------				
Bridgeport-123	2/9	----------335----------				
Danbury-123	2/16	----------221-------				
Derby-123	3/9	----------231------				
Enfield-123	12/14	--------175-------				
Greenwich-004	2/3	----------212------				
Groton-123	1/24	----------219------				
Hartford-123	1/9	----------296---------				
Meriden-002	12/30	----------218-------				
Middletown-003	3/22	--------155-----				
Milford-002	3/24	----------237------				
New Britain-123	1/24	----------186----				
New Haven-123	2/11	----------285--------				
Stamford-123	2/11	----------277----------				
Waterbury-123	1/4	----------204-------				

* Based on second highest value at each site in 1977.



LOCATION OF 1977 CONTINUOUS SULFUR DIOXIDE INSTRUMENTS

FIGURE 5

IV. OZONE

Conclusions:

As in past years, Connecticut experienced very high concentrations of photochemical oxidants (measured as ozone) in the summer months of 1977. At each of the twelve monitored sites, levels in excess of the one-hour NAAQS of .08 ppm were frequently recorded, with one-hour average concentrations occasionally exceeding .2 ppm and maximums of up to .335 ppm being recorded in some urban areas.

Method of Measurement:

The Air Compliance Unit uses chemiluminescent instruments to measure levels of ozone, which is the major constituent of photochemical oxidants in this area. These instruments measure and record instantaneous concentrations of ozone continuously by means of a fluorescent technique. Properly calibrated, these instruments are shown to be remarkably reliable and stable.

Discussion of Data:

Table 11 shows the frequency of days with a maximum hourly ozone reading of greater than the .08 ppm standard. Table 12 shows the monthly second high ozone concentration at each site. Table 13 presents the year's high and second high concentrations at each site.

Yearly comparisons have been made using ozone data collected in Connecticut for the four years from 1974 to 1977. The frequency of days over the .08 ppm standard decreased from 1974 to 1975, but have been on the increase from 1975 to 1976 and 1977. The average second highest one-hour concentrations in 1977 have increased by an average of .02 ppm from the 1975-1976 level and .01 ppm from the 1974 level.

In order to gather information which will further the understanding of ozone production and transport, as well as to provide real-time data for the daily Pollutant Standards Index, DEP operated in 1977 a state-wide ozone monitoring network consisting of four types of sites:

Urban - Bridgeport, Derby, Hartford, Middletown, New Haven
Advection from Southwest - Danbury, Greenwich
Suburban - Enfield, Groton
Rural - Eastford, Hamden, Morris

TABLE 11

NUMBER OF DAYS WITH 1 HOUR > .08 PPM
1977

SITE	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	TOTAL
Bridgeport-123	4	12	15	16	11	5	81
Danbury-123	5	12	11	16	15	4	63
Derby-123	4	10	11	13	10	8	56
Eastford-001	8	15	9	3	*	2	37
Enfield-123	5	12	12	12	11	5	57
Greenwich-004	2	8	12	13	20	5	60
Groton-123	6	14	11	14	19	12	76
Hamden-001	8	6	7	10	9	3	43
Hartford-123	3	12	12	12	16	3	58
Morris-001	6	11	7	*	*	*	24
Middletown-003	5	12	11	12	12	2	52
New Haven-123	3	12	11	13	14	5	58

* No Data Available

TABLE 12

1977 OZONE , ppm

SITE	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Bridgeport-123	.121	.174	.184	.276	.213	.237
Danbury-123	.170	.200	.172	.285	.255	.151
Derby-123	.190	.180	.219	.335	.248	.197
Eastford-001	.196	.235	.125	.160	*	.105
Enfield-123	.198	.154	.151	.177	.244	.114
Greenwich-004	.130	.155	.180	.225	.220	.185
Groton-123	.140	.231	.194	.263	.225	.238
Hamden-001	.175	.185	.191	.276	.230	.180
Hartford-123	.178	.212	.154	.260	.255	.111
Morris-001	.185	.150	.210	*	*	*
Middletown-003	.180	.216	.153	.200	.156	.124
New Haven-123	.106	.189	.177	.333	.195	.220

* No Data Available

TABLE 13

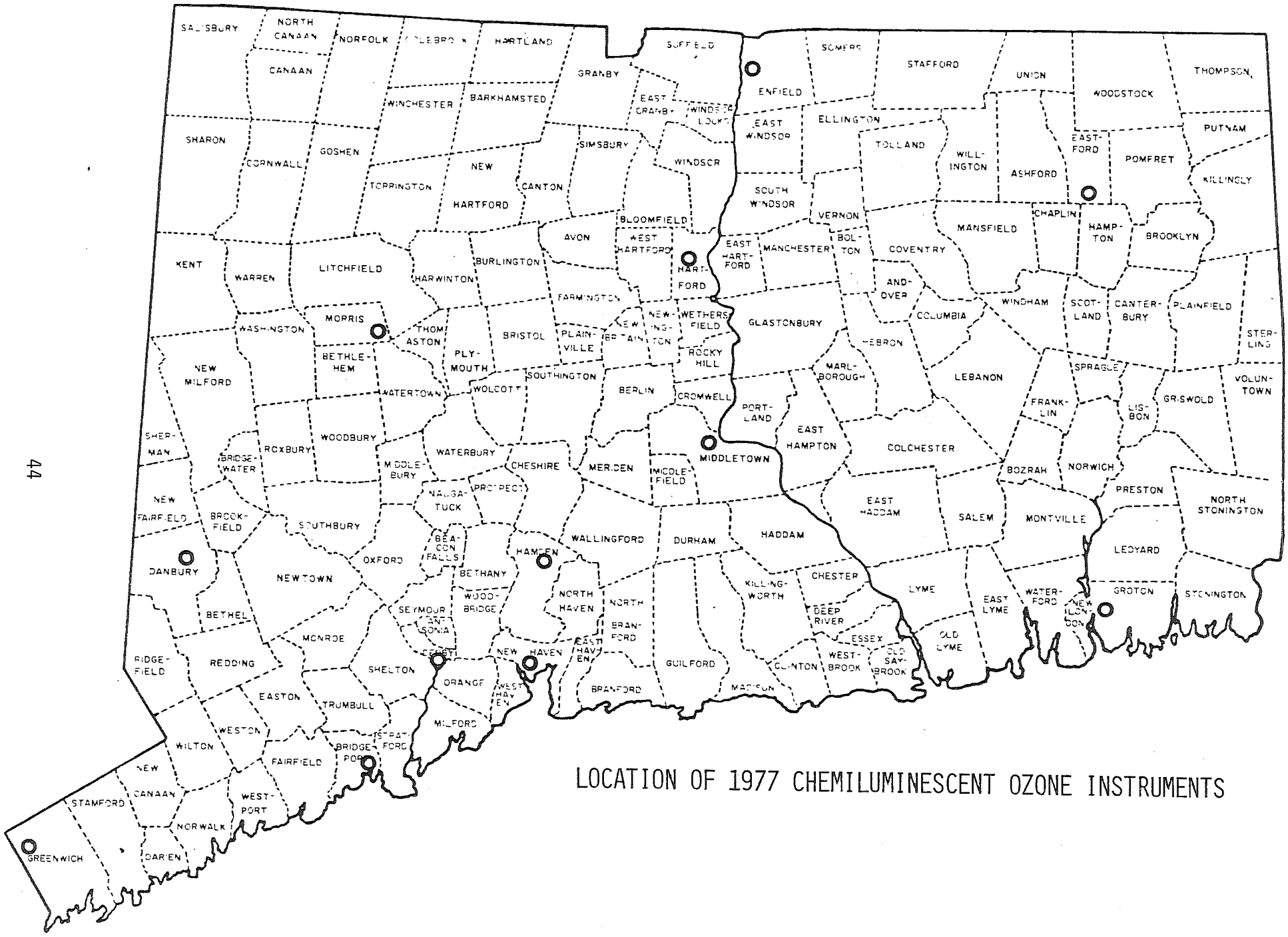
1977 OZONE
1-HOUR CONCENTRATIONS

(parts per million)

SITE	1st HIGH	2nd HIGH	.80	0	.100	.200	.300	.400
Bridgeport-123	7/16/13				.276			
		7/16/15			.274			
Danbury-123	7/17/16				.285			
		7/17/17			.265			
Derby-123	7/16/14				.335			
		7/21/17			.323			
Eastford-001	5/23/17				.235			
		5/23/18			.235			
Enfield-123	8/29/16				.244			
		8/29/17			.227			
Greenwich-004	7/16/16				.225			
		8/4/18			.220			
Groton-123	7/16/16				.263			
		8/16/15			.259			
Hamden-001	7/16/14				.276			
		7/16/17			.270			
Hartford-123	7/13/17				.260			
		8/29/15			.255			
Morris-001	6/17/14				.210			
		6/17/15			.195			
Middletown-003	5/6/15				.216			
		7/17/16			.200			
New Haven-123	7/16/16				.333			
		7/16/15			.332			

Primary

Date is read as month/day/hour of occurrence



LOCATION OF 1977 CHEMILUMINESCENT OZONE INSTRUMENTS

FIGURE 6

V. NITROGEN DIOXIDE

Conclusions:

Measured nitrogen dioxide levels at all sampling sites in Connecticut were lower than the National Ambient Air Quality Standard of 100 $\mu g/m^3$, annual arithmetic mean.

A statistical analysis of the data also demonstrates, with 95% confidence, that every site (except Hartford 123) achieved the annual NAAQS for NO_2.

Discussion of Data:

There were 24 nitrogen dioxide sites in 1977 as compared to 43 in 1976. The sites are distributed in a network which covers urban, residential and suburban locations.

The nitrogen dioxide data is presented in Table 14. The format is the same as that used to list the total suspended particulate data. Note that although the distribution of NO_2 data tends to be lognormal, the annual arithmetic mean is shown for direct comparison to the NAAQS for nitrogen dioxide. The 95 percent limits and standard deviations are also arithmetic calculations, but the geometric means and standard deviations were used to give accurate predictions of the number of days the levels of 100 $\mu g/m^3$ and 282 $\mu g/m^3$ would be exceeded at each site if sampling had been conducted on a daily basis. Although there is no 24-hour NAAQS for NO_2, the 282 $\mu g/m^3$ level was selected because at this level a 2nd stage air pollution alert is to be declared according to the State of Connecticut's Administrative Regulations for the Abatement of Air Pollution, while the 100 $\mu g/m^3$ level was selected as an indication of how many days per year the annual NAAQS may have been exceeded if sampling was performed daily.

In 1977, of the sites that had valid arithmetic means (i.e., at least 5 samples in each quarter of the year and at least 75% of the possible samples) 14 sites showed higher annual means than in 1976, with 13 of these increases being greater than 5 $\mu g/m^3$. In 1977, 6 sites showed lower annual means than in 1976, with 2 of these decreases being greater than 5 $\mu g/m^3$. Thus, these results indicate that there has been a general statewide increase in NO_2 levels. A continuation of this trend would jeopardize efforts to maintain the NAAQS for Nitrogen Dioxide.

Sample Collection and Analysis:

The Air Monitoring Unit uses gas bubblers employing the NASN Sodium Arsenite method. These instruments sample for twenty-four hours every sixth day, the same schedule as the suspended particulate instruments. The samples are later chemically analyzed in the laboratory.

TABLE 14

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION PAGE 1 AIR COMPLIANCE MONITORING

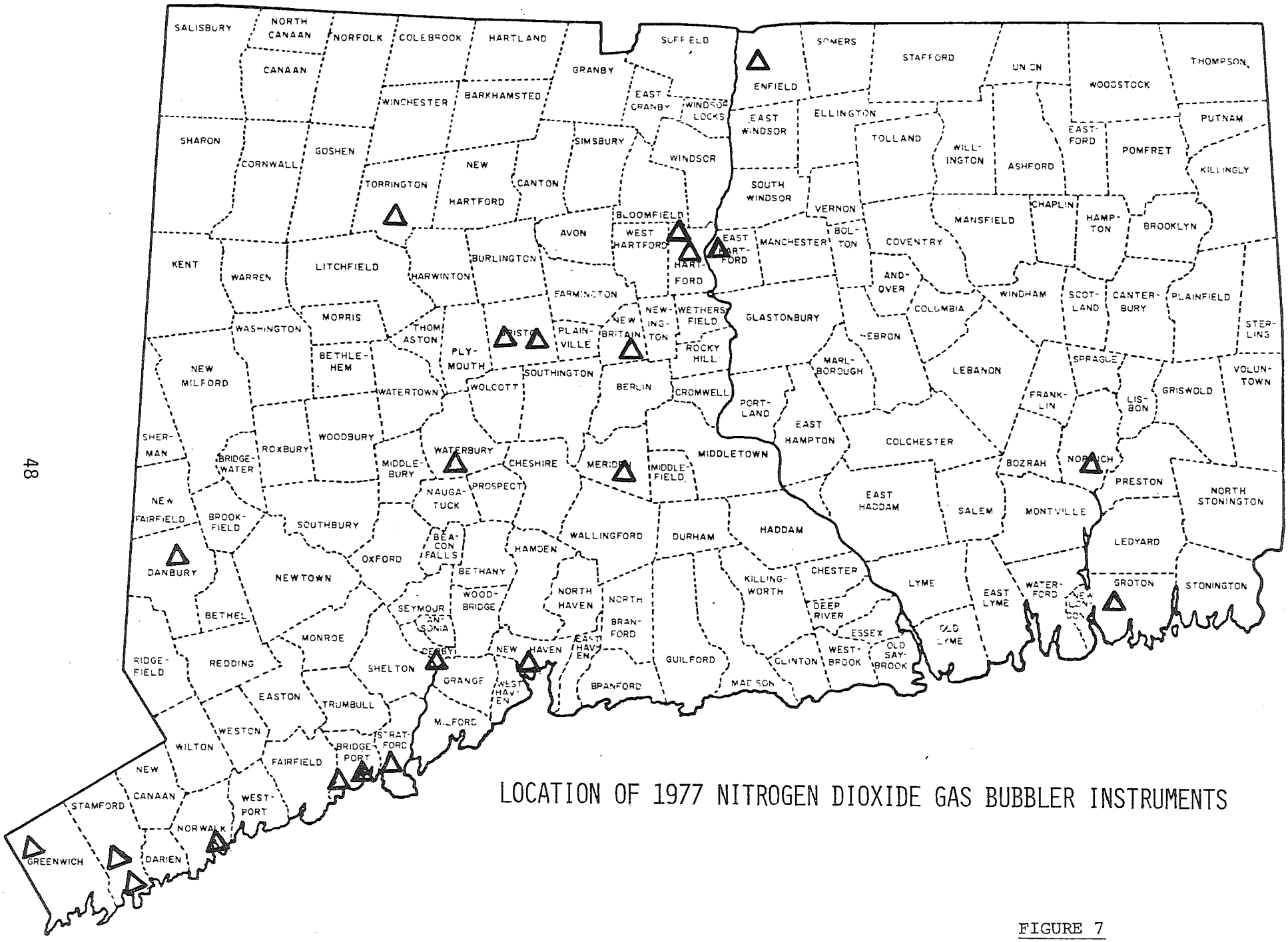
POLLUTANT--NITROGEN DIOXIDE DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	MEAN	95-PCT-LIMITS LOWER	UPPER	STD DEVIATION	PREDICTED* DAYS OVER 100 UG/M3	PREDICTED DAYS OVER 282 UG/M3
BRIDGEPORT	01	1977	57	84.7 74.7 1972	76	94	36.274	100	
BRIDGEPORT	123	1977	58	72.5 66.1	66	79	26.607	58	
BRISTOL	01	1977	59	49.7 48.0	45	54	19.605	29	
DANBURY	123	1977	61	55.0 55.8	51	59	17.784	8	
DERBY	123	1977	60	58.4	53	64	21.760	24	
EAST HARTFORD	02	1977	60	59.9 57.0	55	65	21.159	29	
ENFIELD	123	1977	59	55.0 52.1	50	60	21.909	16	
GREENWICH	01	1977	42	85.3	73	97	40.323	100	1
GREENWICH	04	1977	59	48.8 39.4	43	54	22.671	20	
GREENWICH	08	1977	14	30.9	24	38	11.799		
GROTON	123	1977	60	49.7 46.2	45	54	18.152	10	
HARTFORD	02	1977	54	56.1	50	62	23.461	29	
HARTFORD	123	1977	60	85.1 76.3	69	101	69.245	100	1
MERIDEN	02	1977	60	47.8 49.8	42	53	24.230	24	
NEW BRITAIN	123	1977	61	54.7 60.2	50	59	19.524	29	
NEW HAVEN	07	1977	39	75.3	68	83	24.377	58	
NEW HAVEN	123	1977	58	78.6 82.1	71	86	29.706	77	

POLLUTANT--NITROGEN DIOXIDE DISTRIBUTION--LOGNORMAL

TOWN NAME	SITE	YEAR	SAMPLES	MEAN	95-PCT-LIMITS LOWER	UPPER	STD DEVIATION	PREDICTED DAYS OVER 100 UG/M3	PREDICTED DAYS OVER 282 UG/M3
NORWALK	05	1977	55	74.1 66.1	66	82	31.159	67	
NORWICH	01	1977	61	51.5 48.8	48	55	15.395	3	
STAMFORD	07	1977	57	64.9 60.3	58	72	29.736	58	1
STAMFORD	123	1977	61	71.4 65.4	64	79	32.223	77	1
STRATFORD	05	1977	56	53.5 58.7	47	60	27.430	42	1
TORRINGTON	123	1977	60	54.3 48.4	50	59	18.473	13	
WATERBURY	123	1977	61	71.9 69.6	67	77	21.077	42	

* Although there is no 24-hour NAAQS for NO_2, the 282 $\mu g/m^3$ level was selected because at this level a 2nd stage air pollution alert is to be declared according to the State of Connecticut's Administrative Regulations for the Abatement of Air Pollution, while the 100 $\mu g/m^3$ level was selected as an indication of how many days per year the annual NAAQS may have been exceeded if sampling was performed daily.



LOCATION OF 1977 NITROGEN DIOXIDE GAS BUBBLER INSTRUMENTS

FIGURE 7

VI. CARBON MONOXIDE

Conclusions:

The eight-hour NAAQS of 9 ppm was exceeded in many urban centers in Connecticut (Bridgeport-004, Hartford-009, New Britain-002, New Haven-007, Norwalk-005, Stamford-020, 123 and Waterbury-004) in 1977. This represents eight of the nine carbon monoxide monitoring sites. Greenwich-001 was the only site that did not exceed this standard. No site, except Stamford-020, violated the one-hour standard of 35 ppm. There were eight exceedances of the 1-hour NAAQS in December - the only month Stamford-020 was in operation in 1977.

Method of Measurement:

The DEP Air Monitoring Unit uses instruments employing non-dispersive infrared techniques to continuously measure carbon monoxide levels. The instantaneous concentrations are recorded on strip charts from which hourly averages are extracted. The instruments are fairly insensitive to sampling line length, but concentrations vary dramatically with inlet exposure and proximity to traffic lanes.

Discussion of Data:

The network consisted of 9 carbon monoxide monitors. Stamford-123, which operated in January and February, was replaced by Stamford-020 in December.

In general, levels recorded in 1977 were slightly higher than in 1976. Comparison of Table 15 with Table 13 from the 1976 Air Quality Summary indicates that three sites recorded higher second high 8-hour average concentrations while 4 sites recorded lower second highs. The more significant increase occurred in the second high one-hour values which occurred at 5 sites - 4 of them being increased by greater than 5 ppm (Bridgeport-004, Hartford-009, New Britain-002, and New Haven-007). Table 16 presents monthly first highs such that seasonal variations in CO levels can be observed.

TABLE 15

1977 CARBON MONOXIDE ANNUAL SUMMARY, ppm

SITE	MAXIMUM 8-HOUR AVERAGE	TIME[1] OF MAXIMUM 8-HOUR	2ND HIGH 8-HOUR AVERAGE	TIME[1] OF 2ND HIGH 8- HOUR	MAXIMUM 1-HOUR AVERAGE	TIME[2] OF MAXIMUM 1-HOUR	2ND HIGH 1-HOUR AVERAGE	TIME[2] OF 2ND HIGH 1-HOUR
Bridgeport-004	13.6	2/22/24	13.4	11/10/18	23.5	3/18/18	23.0	10/28/16
Greenwich-001	8.5	2/22/25	6.1	12/14/18	15.5	2/22/20	15.0	12/14/17
Hartford-009	14.4	12/14/24	12.9	12/21/19	30.0	12/21/18	27.0	12/21/17
New Britain-002	16.2	12/1/21	15.4	12/13/17	28.0	12/15/9	26.0	9/2/14
New Haven-007	12.4	2/11/03	10.0	12/14/20	28.0	12/13/17	22.0	12/13/18
Norwalk-005	13.9	12/14/18	12.1	11/5/3	26.0	12/14/18	25.0	12/14/17
Stamford-123*	11.2	1/6/01	10.5	1/5/11	16.0	1/5/08	15.5	1/28/09
Stamford-020*	33.5	12/29/18	30.7	12/6/15	49.0	12/6/13	44.0	12/16/8
Waterbury-004*	11.8	1/24/21	11.5	2/3/15	23.0	6/17/7	21.2	2/10/10

* partial year

1 time of 8-hour averages is reported as follows: month/day/hour (EST), specifying the end of the 8-hour average period.

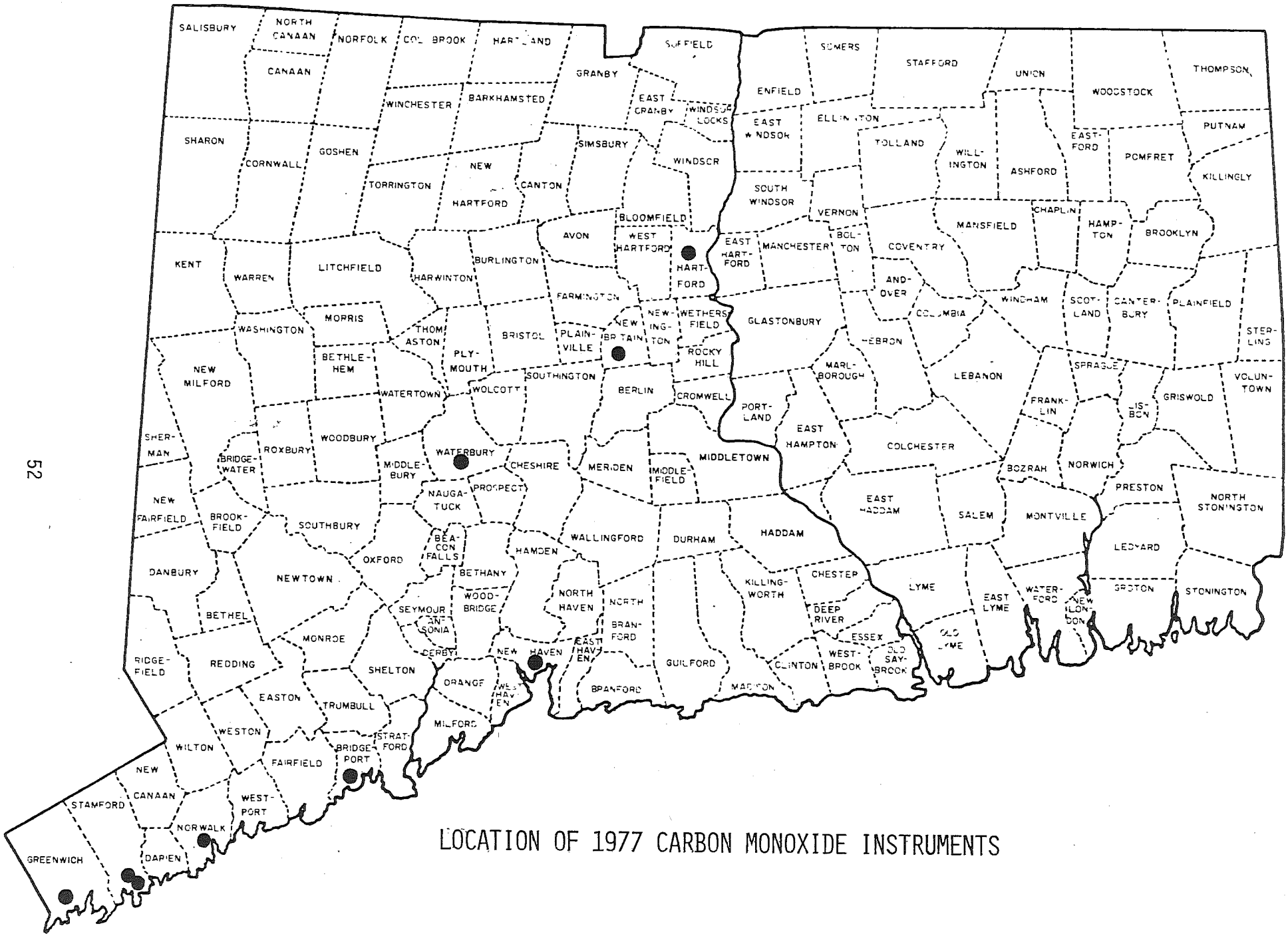
2 time of 1-hour averages is reported as follows: month/day/hour (EST), specifying the end of the 1-hour average period.

TABLE 16

1977 CARBON MONOXIDE SEASONAL FEATURES, ppm

SITE		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
Bridgeport-004	Max-1 hr.	17.5	20.0	23.5	17.0	---	14.5	13.5	15.0	15.5	23.0	22.0	22.0
	Max-8 hr.	9.3	13.6	11.1	9.1	---	9.2	9.5	7.7	12.4	13.1	13.4	12.4
Greenwich-001	Max-1 hr.	8.0	15.5	---	4.0	9.0	3.0	3.5	4.0	5.0	8.0	7.5	15.0
	Max-8 hr.	2.5	8.5	---	2.3	4.0	1.8	2.4	1.8	2.4	3.8	3.6	6.1
Hartford-009	Max-1 hr.	11.5	17.7	16.5	10.0	11.0	10.0	12.5	17.0	14.0	18.5	16.5	30.0
	Max-8 hr.	5.7	9.0	9.3	6.5	6.2	6.3	6.9	9.1	8.6	12.0	9.9	14.4
New Britain-002	Max-1 hr.	15.5	21.5	19.0	16.5	14.5	17.5	16.5	14.5	26.0	20.5	23.0	28.0
	Max-8 hr.	7.8	15.1	14.1	12.1	10.9	12.2	11.5	10.6	12.3	15.1	14.4	16.2
New Haven-007	Max-1 hr.	18.0	17.7	16.5	16.5	19.0	18.5	19.5	17.7	---	---	---	28.0
	Max-8 hr.	9.9	12.4	7.5	7.5	7.1	5.2	8.5	8.7	---	---	---	10.0
Norwalk-005	Max-1 hr.	17.3	22.6	16.8	13.0	10.2	9.5	11.5	12.1	12.0	15.5	20.5	26.0
	Max-8 hr.	8.3	11.2	11.7	8.8	4.3	4.5	8.4	10.0	7.2	10.7	12.1	13.9
Stamford-123	Max-1 hr.	16.0	13.0	---	---	---	---	---	---	---	---	---	---
	Max-8 hr.	11.2	8.2	---	---	---	---	---	---	---	---	---	---
Stamford-020	Max-1 hr.	---	---	---	---	---	---	---	---	---	---	---	49.0
	Max-8 hr.	---	---	---	---	---	---	---	---	---	---	---	33.5
Waterbury-004	Max-1 hr.	20.0	21.2	14.0	---	---	23.0	---	---	---	---	---	---
	Max-8 hr.	11.8	11.5	10.9	---	---	10.3	---	---	---	---	---	---

Max-1 hr. is maximum 1-hour average
Max-8 hr. is maximum 8-hour average



LOCATION OF 1977 CARBON MONOXIDE INSTRUMENTS

FIGURE 8

VII. ATTAINMENT AND NON-ATTAINMENT OF NAAQS IN CONNECTICUT'S AQCR'S

Connecticut's four Air Quality Control Regions (AQCR's, see Figure 9) have been analyzed for attainment status of National Ambient Air Quality Standards (NAAQS) for the following pollutants: 1) Total Suspended Particulates (TSP); 2) Sulfur Dioxide (SO_2); 3) Ozone (O_3); 4) Nitrogen Dioxide (NO_2); and 5) Carbon Monoxide (CO). Table 17 shows the attainment/non-attainment status for the NAAQS's for each pollutant in each AQCR. The regions are classified as attainment, non-attainment or unclassifiable. Regions are non-attainment if the region, or any portion thereof, was in violation of any NAAQS on the date of enactment of the Clean Air Act Amendments of 1977 (August 7, 1977). Unclassifiable regions are ones in which there were no monitors with which to determine attainment or non-attainment.

TABLE 17

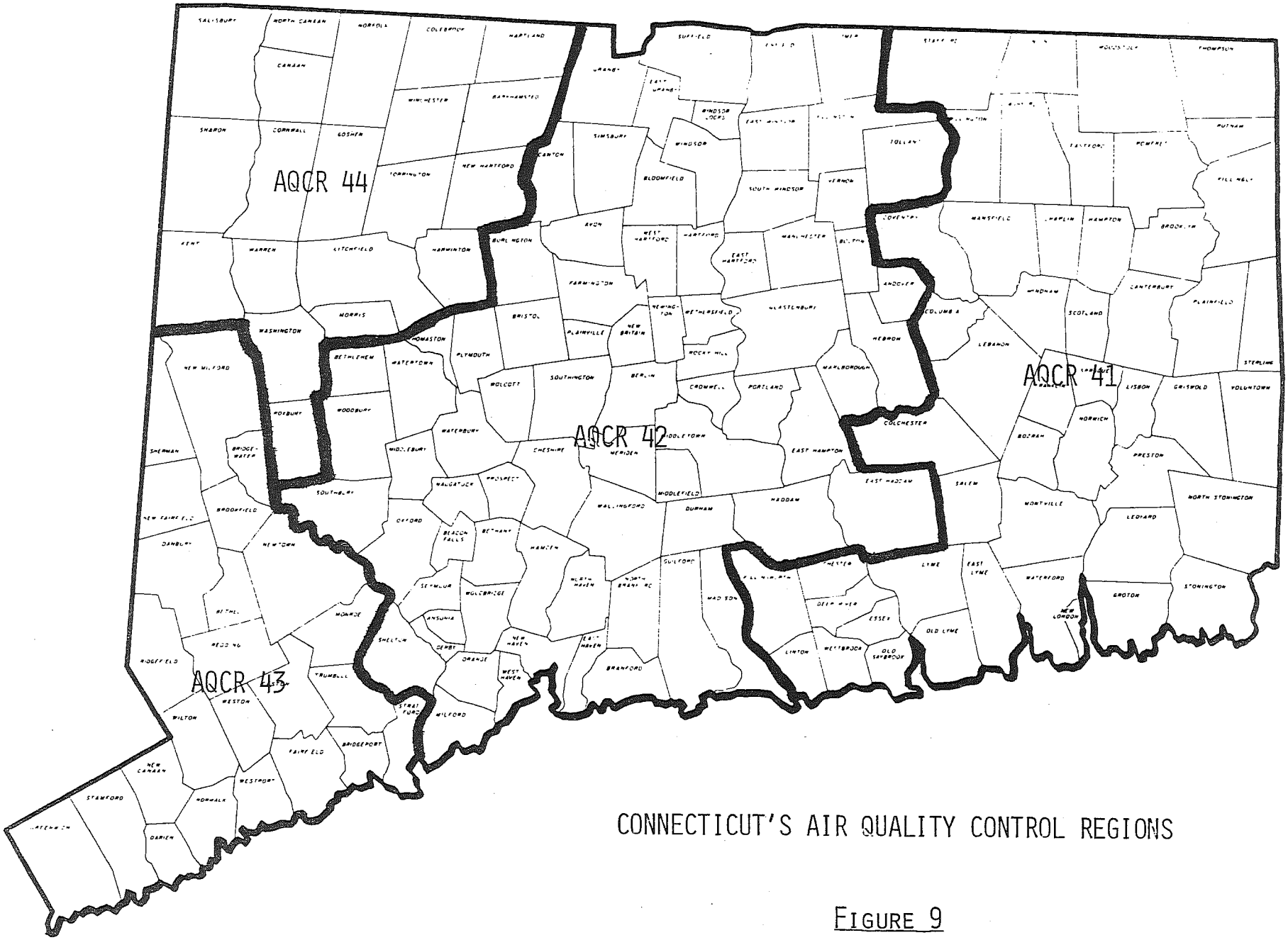
COMPLIANCE WITH NAAQS OF CONNECTICUT'S AQCR'S

	PRIMARY OR SECONDARY	NAAQS	AQCR 41	AQCR 42	AQCR 43	AQCR 44
TSP	Primary	Annual	A	X	A	A
		24-Hour	A	X	X	X
	Secondary	Annual	X	X	X	X
		24-Hour	X	X	X	X
SO_2	Primary	Annual	A	A	A	A
		24-Hour	A	A	A	A
	Secondary	Annual	A	A	A	A
		24-Hour	A	A	A	A
OZONE	Primary	1-Hour	X	X	X	X
NOx	Primary	Annual	A	A	A	A
	Secondary	Annual	A	A	A	A
CO	Primary	1-Hour	U	A	A	U
		8-Hour	U	X	X	U
	Secondary	1-Hour	U	A	A	U
		8-Hour	U	X	X	U

X = Non-Attainment

U = Unclassifiable

A = Attainment



CONNECTICUT'S AIR QUALITY CONTROL REGIONS

FIGURE 9

VIII. SPECIAL STUDIES

A. TRANSPORT OF SULFUR DIOXIDE

Several types of statistical analyses were used to demonstrate that sulfur oxides generated in the New York City - New Jersey Urban Complex (NYC-Complex) are transported into Connecticut when the prevailing winds are out of the SW and are the main causative agent of the elevated SO_2 levels coincident with this wind flow. Poor meteorological conditions associated with SW wind flow are shown to be a minor contributor to this SO_2-SW directional dependency. The average daily impact of SO_2 transport during periods of persistent SW wind flow varied from 5 $\mu g/m^3$ to 35 $\mu g/m^3$ and exhibited a statistically significant negative correlation with increasing radial distance from the NYC-Complex (SO_2 transport ($\mu g/m^3$) = 81.22 x e-0.0165 RDIST(mi); ρ = 0.78; $p < 0.01$), further strengthening the transport hypothesis. A regional control strategy is needed to effectively reduce the impact of the transport of SO_2 and other air pollutants on air quality in Connecticut and other states situated in the Northeastern United States.

B. NEW SOURCE REVIEW: AN AMBIENT ASSESSMENT TECHNIQUE

An alternative to the use of a computer resource-intensive model and one year of actual hourly meteorological data has been developed for New Source Review under the Clean Air Act Amendments of 1977 and is being used by the Connecticut Department of Environmental Protection. The technique employs a modified version of the atmospheric dispersion model PTMTP. This version allows direct input of x, y and z coordinates of up to 25 point sources and 30 receptors and automatically handles the effects of topography independently for each source-receptor alignment by simulating compressed plume flow up and over elevated terrain. Since directionally persistent winds often produce the greatest impacts from a single source or group of sources, the PTMTP revisions include an automated technique developed to account for reasonably expected wind persistency for use when actual historical meteorological data are not available. Historical ambient data are used to quantify the ambient levels caused by existing area sources and transport. The average of annual second high monitored levels (sites were grouped by source influence - sites significantly impacted by existing local point sources were excluded) are used to create a catalog of existing "bad-day" ambient levels for each town in the state. The modeled "bad-day" ambient impact(s) of the new source(s) and existing local point sources are added to the existing "bad-day" ambient level in the town to determine if the new source will cause the NAAQS to be exceeded.

C. PARTICLE SIZE DISTRIBUTION TRENDS AND SEASONAL VARIATION

Air quality standards for suspended particulates attempt to protect the health and welfare of our society by specifying the maximum total suspended particulate (TSP) in a mass concentration per cubic meter of air. Unfortunately, the problem of suspended particulate pollution is more sophisticated than the above standards admit. Particulates may vary in both size and composition. Since the effects of particulates are dependent upon the above variables, the standard does not really provide adequate protection. The submicron particulates (below one micrometer in diameter) represent the greatest threat to health. These particulates deposit deepest into the pulmonary region of the respiratory tract and the body has difficulty in expelling them. The smaller the particulate, the greater the number of particles, surface area, and reaction sites per given mass, to cause deleterious effects.

An Anderson cascade impactor has been run at the Hartford Library (site-03) for the past three years to characterize the suspended particulate size distribution. The impactor was run in conjunction with an adjacent Hi-Vol on the standard six-day sampling schedule. Twenty-four hour samples were collected every six days. The Anderson impactor separates particles according to their aerodynamic dimensions. Five stages in series utilize progressively different inlet geometries such that air velocities increase progressively with descending stages. Particulates with large aerodynamic mass are impacted on the initial stages where air velocities are low, whereas particles with small aerodynamic mass are impacted on the lower stages where the air velocities are high. The impactor was operated at 566 liters/min or 20 cfm. The effective cut-off diameters are listed for the various stages in Table 18.

The impactor data was analyzed to determine if time trends were present in either the mass on each stage, the total mass collected or the percentage of the total mass on each stage. It is hypothesized that enforcement of emission standards and improved combustion efficiency have removed larger particulates and increased the percentage of submicron particulates. To test for a trend, the above variables were correlated with time using a nonparametric Spearman correlation test. The correlation coefficient generated may vary between $\pm$ 1. If, in a set of paired data, both variables tend to rise and fall together, the correlation will be positive. If the variables are completely out of synchronization, the correlation will be negative. A correlation coefficient is significant if there is a small probability that it could have been generated by chance. A nonparametric test does not require data to be normally distributed. The time variable chosen was the six digit number generated from year, month, day.

Table 18 presents the trend correlations. The correlations between time and mass concentrations for the larger particulates on stages one through four are negative and significant (-.265 to -.048, respectively). For the three years of data analyzed, a significant down trend in mass loading for the larger particulates, above 1.1 micrometer, is indicated. The correlation for stage five is small and not significant, indicating no change. The correlations or percentages of total mass concentration collected on each stage versus time show the percentage of large particulates on stage one to be decreasing while the submicron particulates on stage 5 are increasing (-.331 and +.308, respectively). Both the total Anderson mass concentration

and the Hi-Vol mass concentration have decreased over the three-year period (-.160 and -.139, respectively). The particulate mass concentration due to larger particulates decreased slightly at this one site. This analysis does not account for the effects of differences in meteorological conditions over the 3-year period.

Seasonal oscillatory patterns are present in the Hartford Library Anderson and Hi-Vol data. Monthly averages for the Anderson stage mass concentrations, total mass concentrations, stage percentage of total mass concentration, and Hi-Vol mass concentration are presented in Tables 19 and 20 and are plotted in Figure 10. For mass concentrations, maximums tend to occur during the first quarter of the year with a minimum about the ninth month. The first Anderson percent of total mass demonstrates a similar pattern. The percent of larger particulates increases in the first quarter and decreases to a low about the ninth month. The fifth stage percentage for submicron particulates is 180 degrees out of phase with stage one. Intermediate stage percentages do not vary. Thus, there exists a seasonal oscillation in both mass concentration and the size distribution. A greater mass concentration is evident in the first quarter of the year and the percentage of larger particulates increases during this quarter with a corresponding decrease in the submicron stage concentration. The above view is reinforced by correlations between stage percents and the total Anderson mass (see Table 18). There is a significant +.221 positive correlation for the stage one percentage and a significant -.148 negative correlation for the fifth stage percent and the total Anderson mass concentration. When total Anderson mass concentrations are high, in the first quarter, the particulate size distribution shifts to larger diameters.

The Anderson and Hi-Vol mass concentrations were divided into two groups according to whether sampling took place on a weekend or weekday. T-tests showed higher Anderson mass concentrations were measured for the larger particulates on stages one to three on weekdays. The Hi-Vol demonstrated higher loadings on weekdays. Mass concentrations for stage 4 and 5, total mass concentration and stage percents of total mass concentration showed no significant difference between the groups. Speculation as to the cause of this result appears premature.

TABLE 18

Correlation Coefficients of Time vs Anderson and Hi-Vol Mass Concentrations, Anderson Stage Percentages and Total Anderson Mass Concentrations, 1975-1977*

Stage	Effective Cut-off Diameter	Mass Concentration vs Time	Percentage vs Time	Percentage vs Total Anderson Mass Concentration
1	>7.0 μm	-.265	-.331	+.221
2	3.3-7.0 μm	-.117	+.037	-.090
3	2.0-3.3 μm	-.143	-.077	-.176
4	1.1-2.0 μm	-.048	+.045	-.054
5	.01-1.1 μm	+.013	+.308	-.148
Total Anderson Mass Concentration		-.160		
Hi-Vol Mass Concentration		-.139		

*Underlined correlation coefficients are statistically significant at the .05 probability level

TABLE 19

MONTHLY AVERAGE CONCENTRATIONS FOR EACH ANDERSON IMPACTOR STAGE

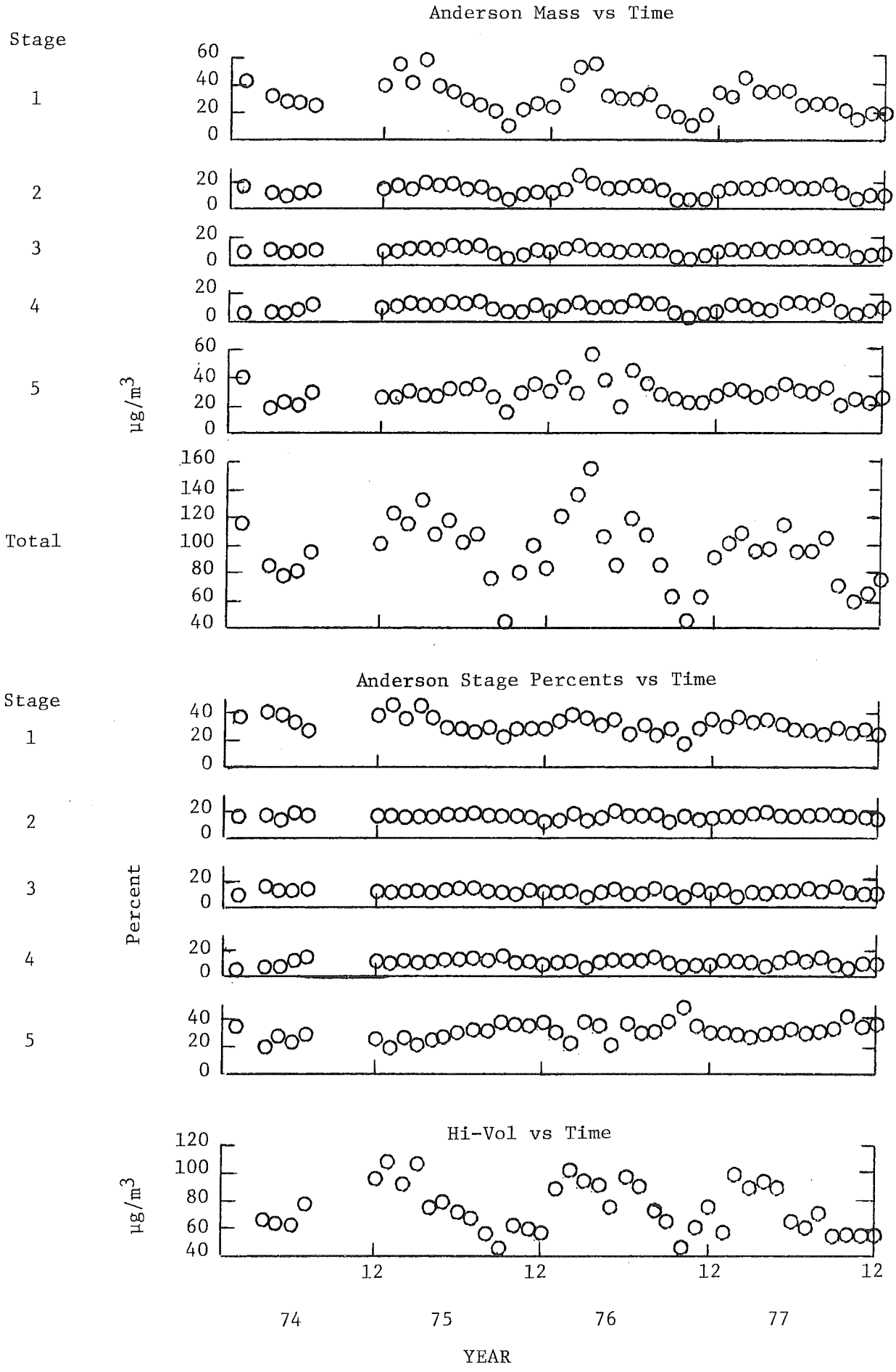
DATE MO/YR	MONTHLY AVERAGE HI-VOL CONCENTRATION, $\mu g/m^3$	STAGE 1 $\mu g/m^3$	STAGE 2 $\mu g/m^3$	STAGE 3 $\mu g/m^3$	STAGE 4 $\mu g/m^3$	STAGE 5 $\mu g/m^3$	MONTHLY AVERAGE ANDERSON IMPACTOR CONCENTRATION, $\mu g/m^3$
2-74	--	42	18	11	7	40	117
4-74	66	34	13	12	7	19	84
5-74	63	29	11	10	6	23	79
6-74	61	27	13	11	10	21	82
7-74	78	26	15	12	13	29	96
12-74	96	40	15	11	11	25	102
1-75	108	56	18	12	11	25	122
2-75	92	42	16	12	14	31	114
3-75	106	58	20	13	12	28	132
4-75	76	39	17	12	12	27	108
5-75	81	35	20	16	15	33	120
6-75	71	29	16	13	13	31	103
7-75	67	27	18	14	14	34	107
8-75	57	21	11	9	9	26	76
9-75	47	10	7	5	6	16	45
10-75	62	23	13	8	8	29	81
11-75	59	27	14	12	11	35	100
12-75	57	24	11	10	8	31	83
1-76	89	40	15	13	12	40	120
2-76	104	53	24	16	14	29	137
3-76	95	56	19	12	10	58	155
4-76	91	31	16	11	11	38	106
5-76	76	29	16	11	11	19	87
6-76	97	30	18	13	15	45	120
7-76	90	32	17	11	14	34	108
8-76	73	20	14	11	12	28	86
9-76	65	18	7	6	7	24	62
10-76	46	11	7	4	3	21	46
11-76	61	19	9	8	6	22	63
12-76	75	33	13	10	9	27	92
1-77	57	31	16	12	12	30	102
2-77	98	44	16	9	11	30	110
3-77	90	34	16	11	9	26	95
4-77	93	34	18	10	7	29	97
5-77	90	36	18	14	13	35	115
6-77	67	25	14	12	14	30	95
7-77	61	26	16	13	11	29	95
8-77	71	27	18	13	15	33	107
9-77	54	21	12	11	7	20	70
10-77	56	15	8	7	5	24	59
11-77	54	19	11	7	8	21	66
12-77	64	20	11	9	9	25	74

TABLE 20

PERCENT OF MONTHLY AVERAGE CONCENTRATIONS FOR EACH ANDERSON IMPACTOR STAGE

DATE MO/YR	STAGE 1 %	STAGE 2 %	STAGE 3 %	STAGE 4 %	STAGE 5 %
2-74	36	15	9	6	34
4-74	41	16	14	9	20
5-74	38	14	12	8	29
6-74	33	17	13	13	23
7-74	27	15	13	14	30
12-74	38	15	11	11	24
1-75	45	15	10	9	20
2-75	36	14	11	12	27
3-75	44	16	10	9	21
4-75	36	16	11	11	26
5-75	29	17	13	12	28
6-75	28	16	13	13	30
7-75	25	17	13	13	32
8-75	29	16	11	11	33
9-75	22	14	11	14	39
10-75	29	16	10	10	36
11-75	27	14	13	12	34
12-75	28	12	12	9	37
1-76	34	13	11	10	32
2-76	38	17	12	11	22
3-76	35	12	7	6	39
4-76	30	15	10	10	34
5-76	34	19	13	13	20
6-76	25	15	11	12	37
7-76	30	16	11	13	30
8-76	24	17	13	14	32
9-76	29	12	10	11	38
10-76	17	16	8	9	50
11-76	30	13	13	9	35
12-76	36	14	11	10	30
1-77	30	16	12	12	30
2-77	37	15	8	11	29
3-77	32	17	11	11	28
4-77	34	19	10	7	30
5-77	31	16	12	11	30
6-77	27	15	12	14	32
7-77	27	17	14	12	30
8-77	26	17	12	14	31
9-77	28	16	15	9	33
10-77	25	14	12	8	42
11-77	29	15	10	11	35
12-77	26	13	11	11	38

FIGURE 10


Anderson Mass vs Time
Stage
1
2
3
4
5
Total
µg/m3
60
40
20
0
160
140
120
100
80
60
40
Anderson Stage Percents vs Time
Percent
Hi-Vol vs Time
12
12
12
12
74
75
76
77
YEAR

D. PASSIVE SAMPLING ERROR

Preliminary investigations by Connecticut DEP staff members during 1976 showed passive particulate deposition to typically add 10 to 20% to the total suspended particulate (TSP) concentration. The passive particulate deposition takes place during the period when the filter is installed in the field and the Hi-Vol motor is not operating. During Hi-Vol operation, the filter may be present in the field from 2 to 10 days with the Hi-Vol actively sampling for only a single day.

The passive sampling study continued through 1977 at the Hartford Library site. Considerably more samples were collected in 1977 than 1976, 58 to 14, respectively. Sampling throughout the year allowed estimates of the passive sampling error to be made on a monthly basis. The passive sample filter was mounted in the field and collected under the same schedule as an adjacent Hi-Vol running under the six-day sampling schedule. Thus, passive and Hi-Vol samples produced matched pairs of data for analysis.

Utilizing 58 samples from the full year, the mean passive mass collected by the filter per day was calculated as 3.13 milligrams. Analysis of the passive and Hi-Vol samples showed the mean percent of mass collected by Hi-Vols due to passive sampling was 12.4% for the year. This percentage was estimated by averaging percentages calculated by dividing the passive mass by the Hi-Vol sample mass collected per sampling period. The above percentages were normalized by multiplying by [(N-1)/N] to reflect that the Hi-Vol only sampled passively for (N-1) of the N sample days. On the average, 8 $\mu g/m^3$ of the 72 $\mu g/m^3$ average Hi-Vol concentration at the Hartford Library is due to passive sampling (Table 21).

The paired passive and Hi-Vol samples were collected into monthly groups according to the Hi-Vol run date. The average monthly passive mass collected per day demonstrated an oscillatory pattern with a high of 5.1 mg/day in March and a low of 1.5 mg/day in October (Figure 11). The average Hi-Vol concentration per month demonstrated a similar oscillatory nature varying from a high of 98.2 $\mu g/m^3$ for February to a low of 54 $\mu g/m^3$ in September. Although the masses collected from the paired samples demonstrated similar oscillatory structure the ratio of the passive mass to the Hi-Vol mass for the monthly data did not remain constant. The ratio expressed as a percentage is normalized in the same manner as the yearly average above. The trend line declines from a high at the beginning of the year to lower values at the end of the year.

TABLE 21

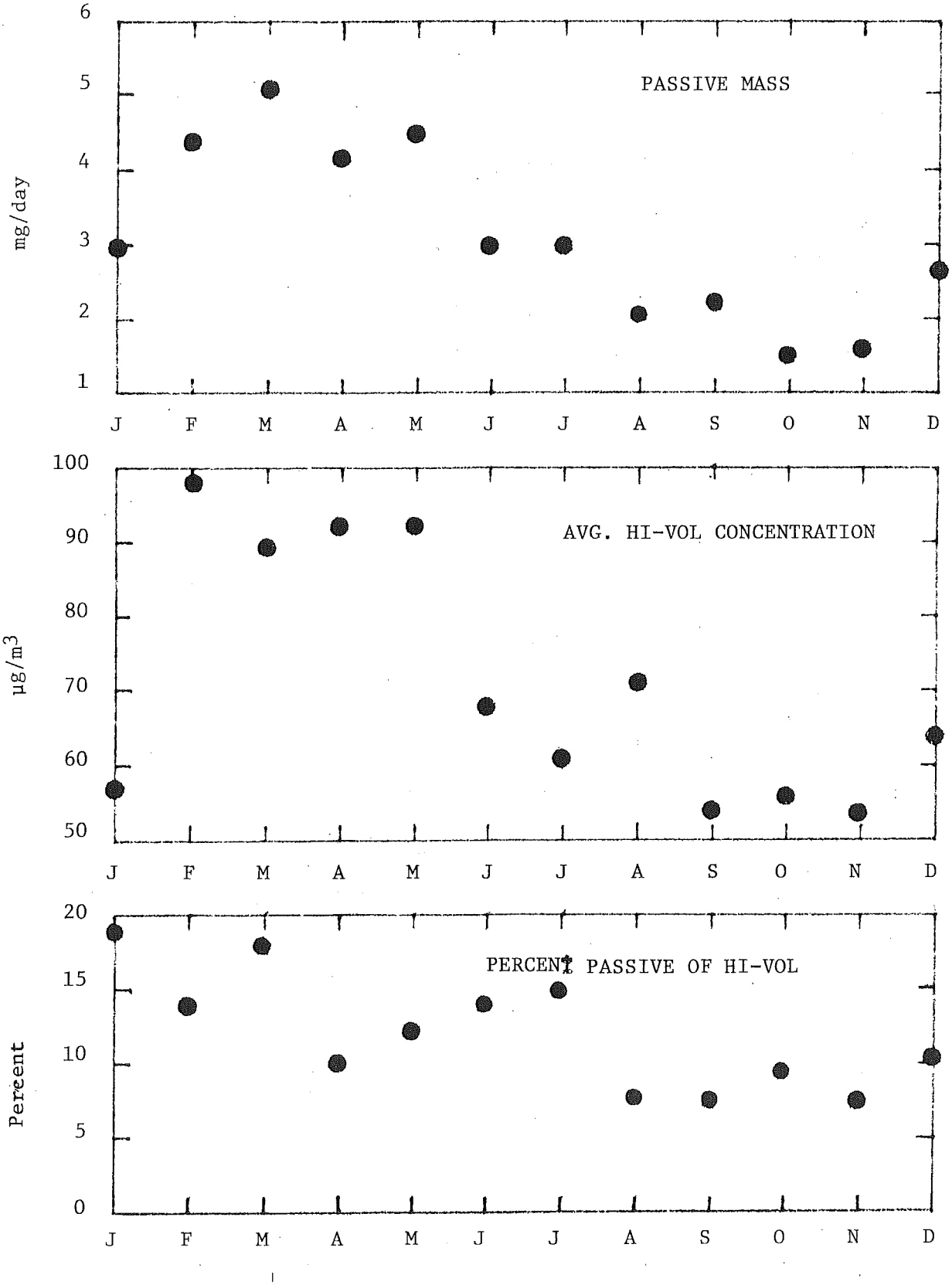
THE EFFECT OF PASSIVE SAMPLING EXPOSURE*

PERIOD	AVERAGE PASSIVE MASS PER DAY	# DAYS SAMPLED	AVERAGE HI-VOL CONCENTRATION	$\frac{(\text{TOTAL PASSIVE MASS})}{(\text{HI-VOL MASS})}\left(\frac{N-1}{N}\right) \times 100\%$
JANUARY	2.94 mg	37	57.2 $\mu g/m^3$	19.0
FEBRUARY	4.39 mg	23	98.2 $\mu g/m^3$	13.9
MARCH	5.13 mg	30	89.6 $\mu g/m^3$	18.1
APRIL	4.19 mg	26	92.6 $\mu g/m^3$	10.0
MAY	4.47 mg	34	92.7 $\mu g/m^3$	12.3
JUNE	3.00 mg	28	68.0 $\mu g/m^3$	14.1
JULY	3.03 mg	29	60.8 $\mu g/m^3$	15.0
AUGUST	2.07 mg	30	71.4 $\mu g/m^3$	7.7
SEPTEMBER	2.22 mg	9	54.0 $\mu g/m^3$	7.5
OCTOBER	1.53 mg	32	56.0 $\mu g/m^3$	9.4
NOVEMBER	1.62 mg	26	54.2 $\mu g/m^3$	7.6
DECEMBER	2.64 mg	36	63.8 $\mu g/m^3$	10.5

* Passive samples were assigned to a month according to the date that the paired Hi-Vol sampled. Due to passive sampling overlap into adjacent months the number of sampling days per month may exceed the days in the month.

FIGURE 11

1977 PASSIVE SAMPLING ERROR



E. PUBLICATIONS

The following is a partial listing of technical papers and study reports dealing with various aspects of Connecticut air pollutant levels and air quality data.

1. Bruckman, L., Asbestos: An Evaluation of Its Environmental Impact in Connecticut, internal report issued by the Connecticut Department of Environmental Protection, Hartford, Connecticut, March 12, 1976.

2. Lepow, M.L., L. Bruckman, R.A. Rubino, S. Markowitz, M. Gillette and J. Kapish, "Role of Airborne Lead in Increased Body Burden of Lead in Hartford Children," Environ. Health Perspect., May, 1974, pp. 99-102.

3. Bruckman, L. and R.A. Rubino, "Rationale Behind a Proposed Asbestos Air Quality Standard," paper presented at the 67th Annual Meeting of the Air Pollution Control Association, Denver, Colorado, June 9-11, 1974, J. Air Pollut. Cntr. Assoc., 25: 1207-15 (1975).

4. Rubino, R.A., L. Bruckman and J. Magyar, "Ozone Transport," paper presented at the 68th Annual Meeting of the Air Pollution Control Association, Boston, Massachusetts, June 15-20, 1975, J. Air Pollut. Cntr. Assoc., 26: 972-5 (1976).

5. Bruckman, L., R.A. Rubino and T. Helfgott, "Rationale Behind a Proposed Cadmium Air Quality Standard," paper presented at the 68th Annual Meeting of the Air Pollution Control Association, Boston, Massachusetts, June 15-20, 1975.

6. Rubino, R.A., L. Bruckman, A. Kramar, W. Keever and P. Sullivan, "Population Density and Its Relationship to Airborne Pollutant Concentrations and Lung Cancer Incidence in Connecticut," paper presented at the 68th Annual Meeting of the Air Pollution Control Association, Boston, Massachusetts, June 15-20, 1975.

7. Lepow, M.L., L. Bruckman, M. Gillette, R.A. Rubino and J. Kapish, "Investigations into Sources of Lead in the Environment of Urban Children," Environ. Res., 10: 415-26 (1975).

8. Bruckman, L., E. Hyne and P. Norton, "A Low Volume Particulate Ambient Air Sampler," paper presented at the APCA Specialty Conference entitled "Measurement Accuracy as it Relates to Regulation Compliance," New Orleans, Louisiana, October 26-28, 1975, APCA publication SP-16, Air Pollution Control Association, Pittsburgh, Pennsylvania, 1976.

9. Bruckman, L. and R.A. Rubino, "High Volume Sampling Errors Incurred During Passive Sample Exposure Periods," J. Air Pollut. Cntr. Assoc., 26: 881-3 (1976).

10. Bruckman, L., R.A. Rubino and B. Christine, "Asbestos and Mesothelioma Incidence in Connecticut," J. Air Pollut. Cntr. Assoc., 27: 121-6 (1977).

11. Bruckman, L., Suspended Particulate Transport in Connecticut: An Investigation Into the Relationship Between TSP Concentrations and Wind Direction in Connecticut, internal report issued by the Connecticut Department of Environmental Protection, Hartford, Connecticut, December 24, 1976.

12. Bruckman, L. and R.A. Rubino,"Monitored Asbestos Concentrations in Connecticut", paper presented at the 70th Annual Meeting of the Air Pollution Control Association, Toronto, Ontario, June 20-24, 1977.

13. Bruckman,L., "Suspended Particulate Transport", paper presented at the 70th Annual Meeting of the Air Pollution Control Association, Toronto, Ontario, June 20-24, 1977.

14. Bruckman, L., "A Study of Airborne Asbestos Fibers in Connecticut," paper presented at the "Workshop on Asbestos: Definitions and Measurement Methods" sponsored by the National Bureau of Standards/U.S. Department of Commerce, July 18-20, 1977.

15. Bruckman, L., "Monitored Asbestos Concentrations Indoors," paper presented at The Fourth Joint Conference of Sensing Environmental Pollutants, New Orleans, Louisiana, November 6-11, 1977.

16. Bruckman, L. "Suspended Particulate Transport: Investigation into the Causes of Elevated TSP Concentrations Prevalent Across Connecticut During Periods of SW Wind Flow," paper presented at the Joint Conference on Applications of Air Pollution Meteorology, Salt Lake City, Utah, November 28 - December 2, 1977.

17. Bruckman, L., E. Hyne, W. Keever, "A Comparison of Low Volume and High Volume Particulate Sampling," internal report issued by the Connecticut Department of Environmental Protection, Hartford, Connecticut, 1976.

18. "Data Validation and Monitoring Site Review", (part of the Air Quality Maintenance Planning Process), internal report issued by the Connecticut Department of Environmental Protection, Hartford, Connecticut, June 15, 1976.

19. "Air Quality Data Analysis", (part of the Air Quality Maintenance Planning Process), internal report issued by the Connecticut Department of Environmental Protection, Hartford, Connecticut, August 16, 1976.

20. Bruckman, L., "Investigation into the Causes of Elevated SO_2 Concentrations Prevalent Across Connecticut During Periods of SW Wind Flow," paper presented at the 71st Annual Meeting of the Air Pollution Control Association, Paper #78-16.4, Houston, Texas, June 25-29, 1978.

21. Anderson, M.K., "Power Plant Impact on Ambient Air: Coal vs. Oil Combustion," paper presented at the 68th Annual Meeting of the Air Pollution Control Association, Paper #75-33.5, Boston, MA, June 15-20, 1975.

22. Anderson, M.K., G.D. Wight, "New Source Review: An Ambient Assessment Technique," paper presented at the 71st Annual Meeting of the Air Pollution Control Association, Paper #78-2.4, Houston, TX, June 25-29, 1978.

23. Wolff, G.T., P.J. Lioy, G.D. Wight, R.E. Pasceri, "Aerial Investigation of the Ozone Plume Phenomenon," J. Air Pollut. Control Assoc., 27: 460-3 (1977).

24. Wolff, G.T., P.J. Lioy, R.E. Meyers, R.T. Cederall, G.D. Wight, R.E. Pasceri, R.S. Taylor, "Anatomy of Two Ozone Transport Episodes in the Washington, D.C., to Boston, Mass., Corridor," Environ. Sci. Technol., 11:506-10 (1977).

25. Wolff, G.T., P.J. Lioy, G.D. Wight, R.E. Meyers, and R.T. Cederwall, "Transport of ozone associated with an air mass," In: Proceed. 70 Annual Meeting APCA, Paper #77-20.3, Toronto, Canada, June, 1977.

26. Wight, G.D., G.T. Wolff, P.J. Lioy, R.E. Meyers, and R.T. Cederwall, "Formation and transport of ozone in the Northeast Quadrant of the U.S.," In: Proceed. ASTM Sym. Air Quality and Atmos. Ozone, Boulder, Colo., Aug. 1977.

27. Wolff, G.T., P.J. Lioy, and G.D. Wight, "An overview of the current ozone problem in the Northeastern and Midwestern U.S.," In: Proceed. Mid-Atlantic States APCA Conf. on Hydrocarbon Control Feasibility, p. 98, New York, N.Y., April 1977.

28. Wolff, G.T., P.J. Lioy, G.D. Wight, R.E. Meyers, and R.T. Cederwall, "An investigation of long-range transport of ozone across the Midwestern and Eastern U.S.," Atmos. Environ. 11:797 (1977).

IX. APPENDIX

A. CLEAN AIR ACT AMENDMENTS OF 1977*

The 1972 Clean Air Act was amended again in 1977 (PL 95-95). This legislation contained the following provisions:

TITLE I - STATIONARY SOURCES

Non-Attainment Areas

Under the original law, all areas of the nation were to have attained national ambient air standards by mid-1977. The amendments extended the deadline to December 31, 1982, except that cities with especially severe oxidant and carbon monoxide problems were given an extension to Dec. 31, 1987. States having non-attainment areas were required to submit revised implementation plans in 1979 and again in 1982.

The plans of states seeking extensions to 1987 must include alternative site analyses for proposed major sources of pollution, a schedule for implementing a vehicle inspection and maintenance program, and plans to improve public transportation. States with auto-related problems could adopt emission standards identical to California's. (California planned in 1982 to reduce the nitrogen oxide (NOx) level from 1 gram per mile to .4 grams - stricter than national standards.)

All revised implementation plans must contain a permit program for new or modified major facilities. Permits could be issued only if pollution offset requirements would be met or the new source would not exceed the new growth allowance. Prior to 1979, the EPA offset policy of Dec. 21, 1976, would be in effect in most non-attainment areas. New or expanded facilities would be required to use the best control technology and precesses available.

Conferees on HR 6161 dropped the House provision to require equal reductions in emissions every two years. But they reported their intention that "regular, consistent emission reductions will be demonstrated through the mechanism of the implementation plan" up to the attainment deadline.

Governors were given authority, until they submitted revised plans, to suspend portions of existing transportation control plans dealing with on-street parking restrictions, gas rationing and retrofit of non-commercial vehicles.

Industrial Compliance

Stationary sources which directly emit pollution could obtain delayed compliance permission from the state or EPA allowing them to continue operations temporarily even though they violated emission limitations. Orders were limited to not more than a three year delay. No orders could be issued after July, 1979, unless they established delayed compliance penalties.

* "President signs revisions in 1970 Clean Air Law", Energy/Environment, Aug. 13, 1977, pg. 1713-1718

There were exceptions. Sources using only innovative technology to control pollution were given up to a five year delay. Sources ordered to convert to coal were given until Dec. 31, 1980, to comply with state implementation plans, with authority for an additional delay up to five years. Primary nonferrous smelters operating at the time of enactment could be given two delayed compliance orders, the first until Jan. 1, 1983, the second until Jan. 1, 1988.

Penalties were designed to make non-compliance more expensive than compliance. Assessments must be no less than the quarterly equivalent of the capital costs of compliance and debt service over a normal amortization period, operation and maintenance costs foregone as a result on noncompliance, and the additional economic value gained by delay in compliance beyond July 1, 1979.

Non-Deterioration

The legislation established three categories for areas having air cleaner than national ambient standards.

Mandatory Class I areas were all international parks regardless of size, national memorial parks and wilderness areas exceeding 5,000 acres, and national parks exceeding 6,000 acres. Class II initially included all other clean-air areas, and they might be redesignated. Class III areas would be designated following hearings and studies, but several types of public lands exceeding 10,000 acres would not be eligible for Class III designation. Redesignation of federal lands requires consultation with the federal land manager.

The legislation set increments for the maximum allowable increases of particulates and sulfur dioxide for each of the three classes. Within two years, EPA was to propose increments or other means for preventing significant deterioration from nitrogen oxides, hydrocarbons, carbon monoxide and oxidants. These regulations would take effect in one year, when revision of state plans would begin. States could adopt control strategies other than increments for the four pollutants.

A variance above the sulfur dioxide increments only could be granted for up to 18 days a year in Class I areas, with different increments for high- and low-terrain areas as defined by the act. A violation of three hours in one day was considered a violation for the entire day. The governor could grant the variance only after public hearings. If the Secretary of Interior or other Cabinet officer in charge of the lands opposed the variance, the President would have to decide the issue within 90 days.

State plans must require permits for pollution sources in clean-air areas, with conditions specified in the law. Indian tribes were authorized to redesignate tribal reservation lands as Class I or Class II.

Visibility Protection

The legislation included major parts of a House provision to reduce visible pollution in mandatory Class I areas.

Within six months, the Interior Secretary was to identify all federal Class I areas where visibility is an important value. Interior and EPA would list such areas and recommendations for improvement within one year and periodically when appropriate.

States must identify the sources that impair visibility, and set emission limitations based on the best available retrofit technology for each source. Requirements of this section must be included in state implementation plans.

New Source Standards

Performance standards for new sources of pollution were revised.

Boilers fired by fossil fuels were required to use "the best technological system of continuous emission reduction," no matter if they used untreated low-sulfur coal as a step toward compliance. Standards for such sources included both performance standards for emissions and a percentage reduction in pollution from untreated fuel. EPA was permitted to set a range of pollutant reductions to reflect varying fuel characteristics.

Waivers from the new source performance standards could be granted on a unit-by-unit or source-by-source basis to permit use of innovative continuous emission control technology. But the cumulative period of all waivers could not exceed seven years after the first waiver was granted to that unit or four years after the unit began operating, whichever occurred earlier.

Enforcement

The law authorized the courts to impose civil penalties of up to $25,000 per day for violations of the act. Knowing violations of the delayed compliance penalty provisions were made subject to criminal sanctions.

Implementation Plans

States were directed to revise implementation plans to meet new requirements of the law. Plans must include air quality maintenance measures and preconstruction permit requirements.

EPA was prohibited from requiring indirect source review programs, except with respect to certain federally funded projects. However, state and local governments were allowed to adopt and enforce such programs.

This section also:

* Required that preconstruction reviews of direct sources include consideration of energy, environmental and economic impacts.
* Provided that implementation plans require the payment of permit fees by the owner or operator of major stationary sources.
* Prohibited owners or operators of stationary sources from making employees bear the costs of periodic shutdowns or production curtailments undertaken as supplemental or intermittent control measures.

Control Regions

Each state was required to send to EPA, within 120 days of enactment of the law, a list identifying air quality levels within its control regions. EPA was given 60 days to approve each list.

Governors were authorized to revise the boundaries of air quality control regions within their states in order to improve management.

Air Quality Standards

EPA must review criteria for ambient air quality standards by Dec. 31, 1980. Subsequent reviews of standards are required at least once every five years thereafter. The EPA Administrator must appoint an independent scientific committee of seven members to recommend new standards.

Within one year of enactment, EPA must set a national primary standard for nitrogen dioxide concentrations over a period of not more than three hours.

Other Provisions

Other sections of Title I did the following:

* Prohibited EPA from charging fees for training employees of state and local air pollution control agencies.
* Required EPA to publish information on basic transportation control measures within 180 days of enactement, and information on additional measures within one year.
* Gave the governors authority to temporarily suspend state implementation plans when there is a presidential finding of an energy or economic emergency in the nation or region. However, only the President was authorized to suspend federal standards or requirements.
* Authorized EPA to establish design, equipment or operational standards when it is not feasible to set emission standards for hazardous air pollutants.
* Authorized EPA to require revision of state plans to prevent or eliminate air pollution dangers to persons in foreign countries.
* Abolished the President's Air Quality Advisory Board.
* Required federal facilities to comply with all procedural and substantive requirements of the law.
* Classified radioactive substances as air pollutants, and required EPA to study several unregulated pollutants for possible inclusion under the act.
* Stated that tall stacks are not a means of emission limitation under the act, but made one exception for a 20-year-old steam plant operated by the Tennessee Valley Authority.
* Provided that the President or governor might require the use of local coal by certain plants in order to prevent severe economic disruption or unemployment.
* Provided for interstate cooperation to reduce air pollution.
* Required members of state boards with permit or enforcement authority under the act to disclose potential conflicts of interest, but let the states determine specific requirements.

* Required the states to notify the public of air pollution levels exceeding primary standards, and to educate the public about hazards and improvement measures.
* Provided for continuing research on the effects of various substances and activities on stratospheric ozone.

Title II - Mobile Sources

Auto Emissions

The 1977 standards of 1.5 grams per mile of hydrocarbons (HC), 15 grams of carbon monoxide (CO) and 2 grams of nitrogen oxide (NOx) were extended through model years 1978 and 1979. In 1980 the standards were tightened to .41 HC, 7 CO and 2 NOx. In 1981 and beyond they were set at .41 HC, 3.4 CO and 1 NOx. However, the CO standard for 1981 and 1982 could be waived up to 7 grams by the EPA if public health did not require the statutory standard and if technology to meet it did not exist.

Other waivers were permitted for NOx. Small manufacturers, including American Motors Corp., that depend on emissions technology produced by other companies, were given a two-year waiver until 1983 to meet 1 gram NOx. A waiver to 1.5 grams NOx for any four-year period after 1980 was permitted for certain innovative technology on up to 50,000 vehicles or engines produced by one company. A four-year waiver to 1.5 grams NOx was permitted for light-duty diesel engines as well, but only for model years 1981-1984.

The original statutory standard of .4 NOx was retained only as a research objective. EPA was to issue regulations within 180 days requiring manufacturers to build demonstration vehicles, and was to issue its own report by July 1, 1980.

High-Altitude Vehicles

Existing high altitude regulations were suspended until 1981. Models 1981-1983 must meet standards based on percentage reduction no greater than those for all cars, based on emissions from 1970 cars operating at high altitudes. For 1984 and thereafter, cars must meet statutory standards at all altitudes.

Trucks, Buses and Motorcycles

EPA must set interim standards for HC and CO through 1982, with statutory HC and CO standards becoming effective in 1983 and statutory NOx in 1985. Statutory standards for heavy-duty vehicles mandate a 90 per cent reduction from baseline for HC and CO, and a 75 percent reduction from baseline for NOx. Revision of any statutory standard requires four years of leadtime.

Tampering

Prohibited removal of or tampering with emission control systems by manufacturers and dealers, independent repair and service businesses, and selling, leasing, trading or fleet operations. Authorized civil penalties of up to $2500 per vehicle.

Warranties and Parts

The legislation set a performance warranty of 24 months or 24,000 miles, during which the car manufacturer would have to bring into compliance with emissions standards any vehicle which failed an inspection and maintenance test. Catalytic converters, thermal reactors and other emission control devices must be warranted for five years or 50,000 miles.

Within two years of enactment, EPA was to provide regulations to certify parts made by other than the car manufacturer. Repairs and maintenance could be performed at any service shop using certified parts. The cost of any major part used principally for emission control and scheduled for replacement during the useful life of the vehicle must be borne by the manufacturer. Car owners were made responsible for properly maintaining vehicles and equipment.

Production Line Test

The final legislation did not include the Senate bill's provision for a production line test. But conferees recognized existing authority for EPA to test or require testing of new cars to see whether they comply with emission standards. The conference report directed EPA to revise test procedures to provide a short production line test that would "assure reasonable statistical certainty that each car produced will be able to pass an emissions inspection."

Fuels and Additives

Directed EPA to require manufacturers of fuels and fuel additives to test the potential health effects of their products, including the effect of a substance on emission control performance. Fuels or additives introduced into commerce or increased in concentration between Jan. 1, 1974, and March 31, 1977, must be removed no later than Sept. 15, 1978.

The legislation relaxed standards on lead levels in gasoline produced by small refineries, and directed EPA to set new standards for the period beyond Oct. 1, 1982.

California Waiver

EPA was authorized to grant a waiver from automobile emissions standards for California if EPA determines that the state standards are in the aggregate as protective of public health and welfare as the federal standards.

Title III - Miscellaneous Provisions

Emergency Powers

Authorized the EPA Administrator to issue emergency orders in a public health emergency and required him to bring civil suit within 24 hours of such orders. Violators could be fined up to $5,000 a day.

Citizen Suits

Allowed citizens to bring suit against sources to force compliance with emission standards or limitations, to prevent construction or modification of a major emitting facility without a permit, and to stop violation of conditions or requirements specified by the state or EPA under several provisions of the law.

Civil Litigation

The legislation retained existing provisions giving the Department of Justice primary responsibility for controlling and supervising civil litigation involving EPA. In addition, it gave statutory sanction for the June 13, 1977, memorandum of understanding between the department and EPA, and stated that all cases filed after enactment should be subject to it. The conference report detailed several items in the memorandum.

Courts were authorized to award reasonable attorneys' fees and other costs in judicial review proceedings when appropriate.

Administrative Procedures

The conference modified provisions in the House bill that changed the administrative procedures in EPA rulemaking and the standards of judicial review. The Senate deleted application of proposed new rules in several instances, but generally concurred with House provisions. The courts were urged to continue thorough and comprehensive review.

Economic Impact Assessment

Required EPA to prepare an economic impact assessment on proposed regulations, with required analysis of five items. But EPA rules could not be challenged on failure to comply with this section.

National Commission

Established a National Commission on Air Quality of 13 members, including four from Congress. The commission was directed to make five studies in three years with a total authorization of $10-million.

Conflicts of Interest

Required financial disclosure by members of the Scientific Review Committee established in Title I, and prohibited conflicts of interest, one year after enactment, by officers and employees of EPA and officers of other organizations (including nonprofit organizations) engaged in activities related to air quality.

Employment Effects

Directed EPA to investigate, report and advise on the potential loss or shifts of employment resulting from the Clean Air Act. Protected employees who believed they were fired or discriminated against as a result of their testimony or legal action under the act, and authorized the Secretary of

Labor to award compensatory damages for violations.

Sewage Treatment Grants

Authorized EPA to withhold, condition or restrict construction grants for sewage treatment plants under limited circumstances related to the Clean Air Act.

Air Quality Monitoring

Required EPA within one year of enactment to set regulations establishing a standard air quality index for monitoring and reporting by state and local governments.

Vapor Recovery

Required the owners of retail outlets to pay for vapor recovery equipment on fuel storage tanks and pumps within three years. Independent marketers selling less than 50,000 gallons of gasoline per month were not required to install and use the equipment, unless their state or local governments required it.

Authorization

Title III authorized $200 million each year for fiscal 1978-1981 to implement provisions not authorized elsewhere, and $4 million for each of the four years for notification grants to the states.

Title IV - Studies

Administrative Standards

Provided a uniform standard of proof for EPA regulation of air pollutants applied to national ambient air quality, new stationary source performance, hazardous stationary source emissions, auto emissions, regulation of fuels and additives, and aircraft emissions. Authorized EPA to regulate any future air pollution from these sources.

Interagency Cooperation

Required creation within three months of enactment of the law a Task Force on Environmental Cancer and Heart and Lung Disease, led by EPA and including representatives of the National Institutes of Health, to conduct research programs and report to Congress annually.

Studies

The legislation required EPA and other agencies to conduct the following studies:

* Suspended particulate matter (18 months).
* Odorous emissions (by Jan. 1, 1979).

* A list of all known chemical contaminants that have been found in human tissue (12 months), and an explanation of the origin of these chemicals (18 months). If feasible, EPA was to conduct an epidemiological study of the relationship between levels of chemicals in the environment and in human tissue (no deadline).
* Air quality for the Gulf Coast and other areas, including analysis of liquid and solid aerosols (no deadline).
* Potential dislocation of employees due to implementation of laws administered by EPA (12 months).
* Health effects of auto-related pollutants, including sulfur compounds (annually).
* Sulfur-bearing compounds from motor vehicle engines and aircraft engines (12 months).
* Railroad emissions (six months).
* Economic measures to control air pollution (24 months).
* Penalties for NOx emissions from stationary sources (12 months).