1987

STATE OF CONNECTICUT
ANNUAL AIR QUALITY SUMMARY

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TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

I. INTRODUCTION

The 1987 Air Quality Summary of Ambient Air Quality in Connecticut is a compilation of all air pollutant measurements made at the Department of Environmental Protection (DEP) air monitoring network sites.

A. OVERVIEW OF AIR POLLUTANT CONCENTRATIONS IN CONNECTICUT

The assessment of ambient air quality in Connecticut is made by comparing the measured concentrations of a pollutant to each of two Federal air quality standards. The first is the primary standard which is established to protect public health with an adequate margin of safety. The second is the secondary standard which is established to protect plants and animals and to prevent economic damage. The specific air quality standards are listed in Table 1 along with the time and data constraints imposed on each.

The following section briefly describes the status of Connecticut's air quality for the year 1987. More detailed discussions of each of the six pollutants are provided in subsequent sections of this Air Quality Summary.

1. TOTAL SUSPENDED PARTICULATES (TSP)

Measured total suspended particulate (TSP) levels did not exceed the primary annual standard of 75 $\mu g/m^3$ or the secondary annual standard of 60 $\mu g/m^3$ in Connecticut during 1987. And neither the primary 24-hour standard of 260 $\mu g/m^3$ nor the secondary 24-hour standard of 150 $\mu g/m^3$ was exceeded at any site in 1987. Two exceedances of a standard are required at a particular site for the standard to be violated. No site recorded violations of any particulate standard in 1987.

In general, measured TSP levels in Connecticut were higher in 1987, in terms of annual average concentration values, than they were in 1986 (see Table 3).

2. SULFUR DIOXIDE (SO_2)

None of the air quality standards for sulfur dioxide were exceeded in Connecticut in 1987. Measured concentrations were below the 80 $\mu g/m^3$ primary annual standard, the 365 $\mu g/m^3$ primary 24-hour standard, and the 1300 $\mu g/m^3$ secondary 3-hour standard.

The results of continuous SO_2 monitoring indicate that sulfur dioxide levels in 1987 were not significantly different from those in 1986 (see Table 4). Temperature is an important factor in determining SO_2 emissions. The lack of change in measured SO_2 levels may have been due to the fact that, for Connecticut, 1987 was not appreciably cooler than 1986. This can be shown by the number of "degree days" : a measure of heating requirement (see Tables 31 and 32). As the number of degree days increases, the amount of fuel that must be burned to heat buildings also increases. Consequently, as more fossil fuel is burned, the emissions of sulfur oxides are proportionately increased. There was only about a 1% decrease in degree days for Connecticut as a whole from 1986 to 1987.

3. <u>OZONE</u> (O_3)

National Ambient Air Quality Standards (NAAQS) - On February 8, 1979, the U.S. Environmental Protection Agency (EPA) established an ambient air quality standard for ozone of 0.12 ppm for a one-hour average. That level is not to be exceeded more than once per year. Furthermore, in order to determine compliance with the 0.12 ppm ozone standard, EPA directs the states to record the number of daily exceedances of 0.12 ppm at a given monitoring site over a consecutive 3-year period and then calculate the average number of daily exceedances for this interval. If the resulting average value is less than or equal to 1.0, (that is, if the fourth highest daily value in a consecutive 3-year period is less than or equal to 0.12 ppm), the ozone standard is considered to be attained. The definition of the pollutant was also changed, along with the numerical value of the standard, partly because the instruments used to measure photochemical oxidants in the air really measure only ozone. Ozone is one of a group of chemicals which are formed photochemically in the air and are called photochemical oxidants. In the past, the two terms have often been used interchangeably. This 1987 Air Quality Summary uses the term "ozone" in conjunction with the new NAAQS to reflect the changes in both the numerical value of the NAAQS and the definition of the pollutant.

The primary 1-hour ozone standard was exceeded at all the DEP monitoring sites in 1987 (see Table 2).

The incidence of ozone levels in excess of the 1-hour 0.12 ppm ozone standard increased significantly from 1986 to 1987 (see Tables 18 and 19). Most of this difference is attributable to the changes in meteorological factors which occur from year-to-year. The formation of ozone is facilitated by high temperatures and strong sunlight in the presence of hydrocarbons and oxides of nitrogen. The prevailing southwest wind transports hydrocarbons and nitrogen oxides generated in the New Jersey - New York City Metropolitan Area into Connecticut. Along the way, these chemicals react in the presence of strong sunlight, forming ozone. Consequently, the ozone levels across Connecticut are highest when the prevailing wind flow is out of the southwest (see Table 21). However, there are recorded exceedences of the NAAQS for ozone on non-southwest wind days. This suggests that pollution control programs currently being implemented in this state are needed to protect the public health of Connecticut's citizenry on days when Connecticut is responsible for its own pollution.

4. <u>NITROGEN DIOXIDE</u> (NO_2)

The annual average NO_2 standard of 100 µg/m^3 was not exceeded at any site in Connecticut in 1987.

5. <u>CARBON MONOXIDE</u> (CO)

The primary eight-hour standard of 9 ppm was exceeded at one of the five carbon monoxide monitoring sites in Connecticut during 1987 (see Table 2). The standard was exceeded eight times at Hartford 017. Two exceedances at a particular site are required for a standard to be violated. This means that the eight-hour standard was violated at Hartford 017 in 1987. A violation also occurred at Hartford 017 in 1986.

There were no violations of the primary one-hour standard of 35 ppm in 1987.

TABLE 1

ASSESSMENT OF AMBIENT AIR QUALITY

POLLUTANT	SAMPLING PERIOD	DATA REDUCTION	STATISTICAL BASE	AMBIENT AIR QUALITY STANDARDS			
				PRIMARY		SECONDARY	
				µg/m³	ppm	µg/m³	ppm
Total Suspended Particulates	24 Hours (every sixth day)[1]	24-Hour Average	Annual Geometric Mean	75		60*	
			24-Hour Average[3]	260		150	
Sulfur Oxides (measured as sulfur dioxide)	Continuous[2]	1-Hour Average	Annual Arithmetic Mean	80	0.03		
			24-Hour Average[3]	365	0.14		
			3-Hour Average[3]			1300	
Nitrogen Dioxide	Continuous[2]	1-Hour Average	Annual Arithmetic Mean	100	0.05	100	0.05
Ozone	Continuous[2]	1-Hour Average	1-Hour Average[4]	235	0.12	235	0.12
Lead	24 Hours (every sixth day)[5]	Monthly Composite	Weighted 3-Month Average	1.5		1.5	
Carbon Monoxide	Continuous[2]	1-Hour Average	8-Hour Average[3]	10**	9	10**	9
			1-Hour Average[3]	40**	35	40**	35

[1] EPA assessment criteria require at least 5 samples per calendar quarter and, if one month has no samples, then the other two months in that quarter must have at least two samples each.

[2] EPA assessment criteria require at least 75% of the possible data to compute a valid average.

[3] Not to be exceeded more than once per year.

[4] Not to be exceeded more than an average of once per year in three years.

[5] State of Connecticut assessment criteria require 75% of the possible data to compute a valid average.

* A guide to be used in assessing implementation plans to achieve the 24-hour standard.

** Units are mg/m³.

TABLE 2

AIR QUALITY STANDARDS EXCEEDED IN CONNECTICUT IN 1987 BASED ON MEASURED CONCENTRATIONS

		OZONE		CARBON MONOXIDE	
		Level Exceeding 1-Hour Standard		Level Exceeding 8-Hour Standard	
TOWN	SITE	Highest Observed Level (ppm)	Number of Days Standard Exceeded	Highest Observed Level 8-Hour / 1-Hour (ppm)	Number of Times Standard Exceeded
Bridgeport	123	0.179	3	-	-
Danbury	123	0.162	6	-	-
Greenwich	017	0.172	10	-	-
Groton	008	0.196	10	-	-
Hartford	017	-	-	15.8 / 30.0	8
Madison	002	0.170	6	-	-
Middletown	007	0.195	5	-	-
New Haven	123	0.192	9	-	-
Stafford	001	0.150	2	-	-
Stratford	007	0.201	18	-	-

- : The pollutant is not monitored at the site.

6. LEAD (Pb)

The primary and secondary ambient air quality standard for lead is 1.5 µg/m^3,maximum arithmetic mean averaged over three consecutive calendar months. As has been the case since 1980, the lead standard was not exceeded at any site in Connecticut during 1987.

A downward trend in measured concentrations of lead has been observed since 1978. This trend is due to the decreasing use of leaded gasoline.

B. TRENDS

Any attempt to assess statewide trends in air pollution levels must account for the tendency of local changes to obscure the statewide pattern. In order to reach some statistically valid conclusions concerning trends in pollutant levels in Connecticut, the DEP has applied a statistical test called a paired *t* test (referred to hereafter as the *t* test) to the annual average data for two pollutants. The *t* test has been applied to 1977-1987 total suspended particulate (TSP) data and to 1978-1987 continuous SO_2 data.

The *t* test is a parametric test which can ascertain statistically significant changes (increases or decreases) in the annual average pollutant concentrations at all the monitoring sites in Connecticut. The *t* test makes it possible to overcome the trend analysis problems which arise due to the changes in the number and location of monitoring sites from year-to-year, as well as problems associated with making equitable comparisons among sites. The annual mean pollutant concentrations 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 the increases at several sites is of much greater importance than the magnitude of the decreases at other sites, the *t* test will show that the increase was statistically significant for those two years.

The results of the *t* test for TSP and continuous SO2 data are presented in Tables 3 and 4, respectively. These analyses were performed only on data computed for sites at which the EPA's minimum sampling criteria were met. The years of data that were paired, the number of sites used, and the statewide average and standard deviation of the geometric mean pollutant concentrations at the sites are provided in the first four columns of each table. The statistical significance of any change in the statewide pollutant average is provided in the remaining columns. The significance of a change is indicated by an arrow for each confidence limit, and is also given numerically as the number of chances in 10,000 of not occurring under the heading "actual significance of change". For example, the statewide annual average for TSP decreased between 1977 and 1978 from 54.8 to 52.7. This change represented a significant decrease at the 95% confidence level, but it did not represent a significant change at the 99% confidence level. The "actual significance of change" is given as 0.0216, meaning that there are 216 chances in 10,000 that this measured decrease in TSP levels did not occur.

1. TSP

The results of the *t* test for TSP (see Table 3) show that total suspended particulate levels in Connecticut prior to 1986 improved year by year or remained unchanged, except for the periods 1981-1982 and 1983-1985 when levels increased significantly. The significant drop in measured TSP levels between 1979 and 1980 can be attributed to the elimination of passive sampling error through the use of retractable lids on the hi-vol monitors. From 1986 to 1987, there was again a significant increase in TSP levels.

These trend analyses do not account for the uncertainty associated with the individual annual mean computed for each TSP site. Most TSP sampling is conducted only every sixth day,

TABLE 3

TSP TRENDS: 1977-1987
(PAIRED *t* TEST)

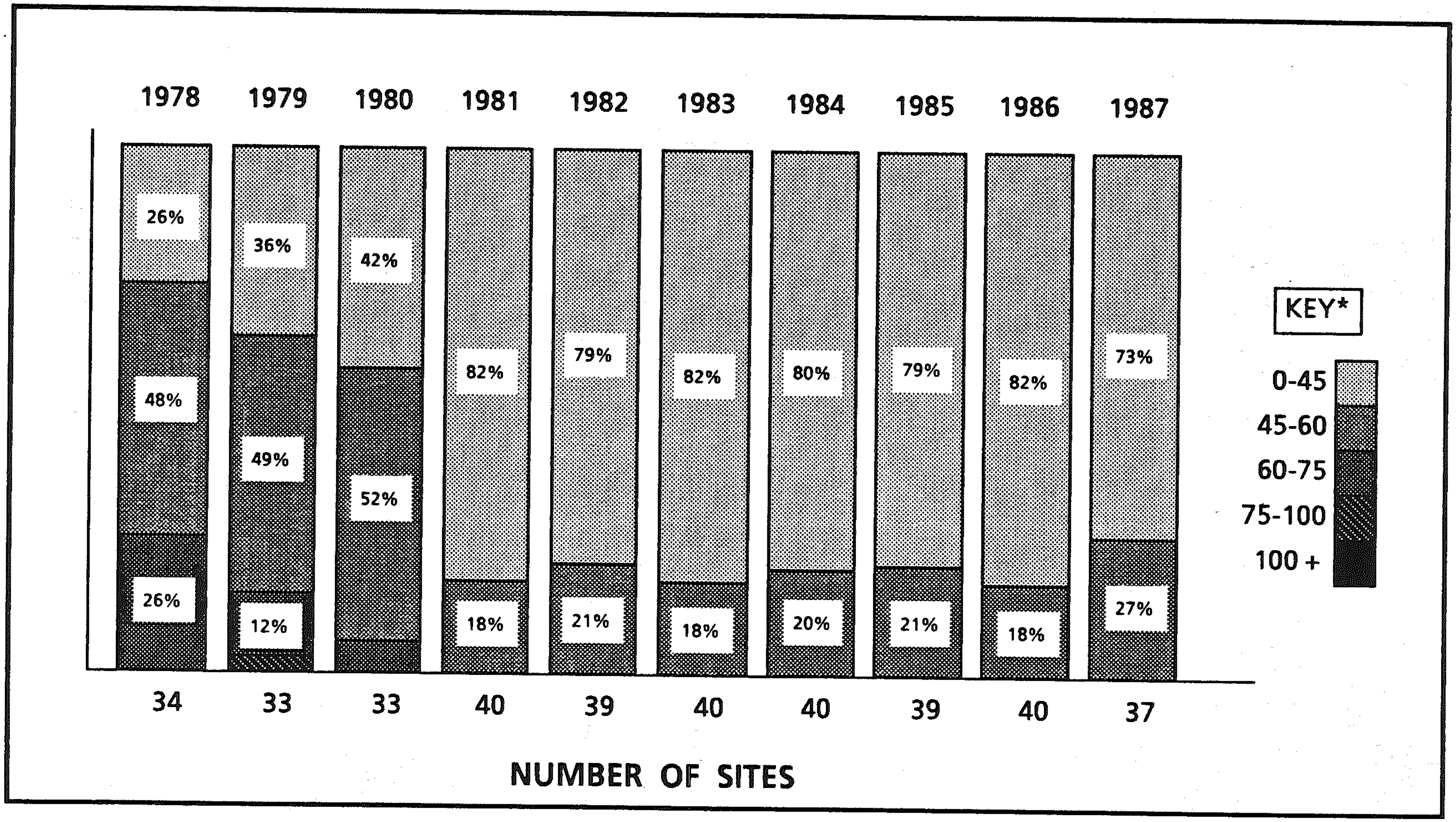
PAIRED YEARS	NUMBER OF SITES	AVERAGE OF ANNUAL GEOMETRIC MEANS (µg/m³)	STANDARD DEVIATION (µg/m³)	SIGNIFICANCE LEVEL		
				TREND AT		PROBABILITY THAT CHANGE IS NOT SIGNIFICANT
				95% LEVEL	99% LEVEL	
77 78	30 30	54.8 52.7	9.8 9.3	↓	N.C.	0.0216
78 79	32 32	51.4 49.9	12.1 12.5	N.C.	N.C.	0.1530
79 80	32 32	49.3 45.4	13.2 10.0	↓	↓	0.0001
80 81	26 26	45.2 38.0	10.1 8.4	↓	↓	0.0001
81 82	37 37	38.3 40.5	6.8 8.0	↑	↑	0.0001
82 83	36 36	41.3 39.5	7.3 6.7	↓	↓	0.0001
83 84	38 38	39.6 40.5	6.7 6.5	↑	↑	0.0008
84 85	36 36	40.7 41.9	6.3 7.5	↑	N.C.	0.0141
85 86	39 39	41.4 39.7	7.7 7.4	↓	↓	0.0005
86 87	37 37	39.9 40.7	7.7 7.6	↑	N.C.	0.0202

Key to Symbols : ↓ = Significant downward trend
↑ = Significant upward trend
N.C. = No significant change

FIGURE 1

TOTAL SUSPENDED PARTICULATE MATTER TREND

"PERCENT OF SITES WITHIN EACH RANGE"



PRIMARY ANNUAL STANDARD = 75 µg/m³

SECONDARY ANNUAL STANDARD = 60 µg/m³

* ANNUAL GEOMETRIC MEAN (µg/m³)

producing a maximum possible total of 61 samples per year. Therefore, the *t* test really compares year-to-year averages of the sampled concentrations, not actual annual averages. However, the every-sixth-day sampling schedule is believed to be sufficient to produce representative annual averages. The every-sixth-day schedule for TSP sampling began in 1971.

Significant changes in annual TSP levels can be caused by a number of things. Among these are simple changes of weather, particularly the wind; changes in annual fuel use associated with conservation efforts or heating demand; the frequency of precipitation events, which wash out particulates from the atmosphere; changes in average wind speed, since higher winds result in greater dilution of emissions; and a change in the frequency of southwesterly winds, which affect the amount of particulate matter transported into Connecticut from the New York City metropolitan area and from other sources of emissions located to the southwest.

Figure 1 shows the long-term trend of TSP concentrations in Connecticut in graphical form. The trend chart is based on data obtained from high volume sampling devices. High volume sampler data at a site are included only if there was a sufficient number of samples taken in a year to compute a valid annual geometric mean concentration.

2. SO_2

Connecticut has been measuring ambient levels of sulfur dioxide since prior to the inception of the SO_2 standards in 1971. Several monitoring methods have been employed including bubblers, sulfation plates, and various types of continuous instruments. The bubblers became the EPA reference method, but unfortunately the field data have turned out to be very unreliable. The sulfation plates were in use for 15 years, but they do not measure SO_2 directly. Sulfation rate-derived SO_2 values were thought to be reliable, but recent information has cast doubt on their reliability. Continuous monitors presently yield reliable data, but this has not always been the case. The earliest continuous monitors (conductometric and coulometric) were subject to interference from many chemicals other than SO_2 and also had difficulties with quality control. Later generations of instruments (flame photometric and pulsed fluorescent) alleviated these problems, and there has been a corresponding increase in the reliability of the data, especially since 1978.

In order to perform a valid trend analysis, the data for the period of interest must be adequate, reliable and from similar sampling methods. Up until 1978, the only method which was thought to consistently fit these criteria was the sulfation plate. Between 1978 and 1982 there were approximately three times as much sulfation rate data as continuous SO_2 data and the former method was used for the purpose of analyzing SO_2 trends. However, recent information now indicates that sulfation rate-derived SO_2 values may not be as accurate as once thought. Sulfation rate data are dependent on relative humidity and wind speed -- being extremely sensitive to the latter -- and the precision of the data suffers even under uniform conditions. Furthermore, EPA has requested that DEP use continuous SO_2 data in order to analyze SO_2 trends. Consequently, the SO_2 trend analysis now uses only continuous SO_2 data. The data are restricted to the period 1977-1987 because earlier data are judged not to be adequate or reliable. The results are summarized in Table 4 and Figure 2.

In response to the skyrocketing prices of low sulfur fuels in the late 1970's, most states relaxed their sulfur-in-fuel requirements to the full extent the law allowed, creating considerable pressure on Connecticut to follow suit. This caused Connecticut to reevaluate its philosophy for controlling sulfur oxide emissions in 1981. To meet the challenge of increased costs of fuel in the economy, DEP restructured its air pollution control requirements for fuel burning sources. Under this new "three-pronged" program, Connecticut's businesses and industries are (1) now allowed (effective November 1981) to burn a less expensive grade of oil with a higher sulfur content -- one percent (1.0%) sulfur oil, and (2) allowed to burn higher sulfur content oil in exchange for reductions in energy use. The third aspect of the program is the repeal of the 24-hour secondary air quality standard for sulfur oxides.

This action increased statewide allowable sulfur oxide emissions by almost 60%. (Sulfur oxide emissions were not doubled by going from 0.5% to 1.0% sulfur-in-fuel since residential fuel users, which account for almost one-third of annual statewide sulfur oxide emissions, use distillate fuel oil with a sulfur content of less than 0.5%.) One would expect measured SO_2 levels to increase in 1982 and subsequent years, as compared to 1981, due to the use of 1.0% sulfur oil. However, no significant trend was apparent in 1982; SO_2 levels actually declined in 1983; and since 1983, there has been no significant change in SO_2 levels (see Table 4). This may be attributable to year-to-year fluctuations in meteorology or decreased fuel use caused by increased fuel prices and/or increased fuel efficiency (i.e., 'tighter' buildings).

The long-term trend of SO_2 concentrations is shown in graphical form in Figure 2. An improvement in SO_2 levels is demonstrated by the decrease over time of concentrations in excess of 40 $\mu g/m^3$. Table 4 shows the year-to-year trend in ambient SO_2 levels. Decreases in SO_2 concentrations from 1979 to 1980 and from 1982 to 1983 are evident. However, no significant change in SO_2 levels is evident since 1983.

Continuous SO_2 monitors were operated each year at five (5) sites between 1982 and 1987. The mean SO_2 levels at these five locations are depicted in Figures 2A through 2D. Figure 2A shows the annual geometric mean SO_2 levels at each of the five sites. There is no clear trend at any of the sites, except for decreasing levels at Bridgeport-123. Figure 2B shows the yearly average of the mean SO_2 concentrations at all the sites. Annual SO_2 levels appear to decrease from 1982 to 1984 and increase moderately thereafter. Figure 2C illustrates the three-year running averages of the data depicted in Figure 2B. Three-year running averages tend to smooth out the year-to-year effects of meteorology on pollutant levels. Figure 2C apppears to show moderately increasing levels of SO_2 after 1984. Figure 2D is a linear regression of the data presented in Figure 2A. Although there appears to be a moderately decreasing trend in SO_2 levels, the 95% confidence limits do not confirm this. The confidence bands -- and the fact that much of the data lies outside these bands -- lead one to conclude that no valid statistical inference can be made about SO_2 trends during the period 1982-1987. This long term trend analysis also demonstrates that there is no clear evidence of any impact on SO_2 levels resulting from the State's decision to allow fuel burning sources to use 1% sulfur oil since 1982. This conclusion is reinforced by the data presented in Table 4.

C. AIR MONITORING NETWORK

A computerized Air Monitoring Network consisting of an IBM System 7 computer and numerous telemetered monitoring sites has operated in Connecticut for several years. In 1985, this data acquisition system was modernized by installing new data loggers at the monitoring sites and replacing the dedicated IBM System 7 computer with a non-dedicated Data General Eclipse MV/10000 computer. This essentially improved both data accuracy and data capture. As many as 12 measurement parameters are transmitted from a site via telephone lines to the Data General unit located in the DEP Hartford office. The data are then compiled three times daily into 24-hour summaries. The telemetered sites are located in the towns of Bridgeport, Danbury, East Hartford, East Haven, Enfield, Greenwich, Groton, Hartford, Madison, Middletown, Milford, New Britain, New Haven, Norwalk, Stafford, Stamford, Stratford and Waterbury.

Continuously measured parameters include the pollutants sulfur dioxide, particulates (measured as the coefficient of haze), carbon monoxide, nitrogen dioxide and ozone. Meteorological data consists of

TABLE 4

SO2 TRENDS FROM CONTINUOUS DATA: 1978-1987
(PAIRED *t* TEST)

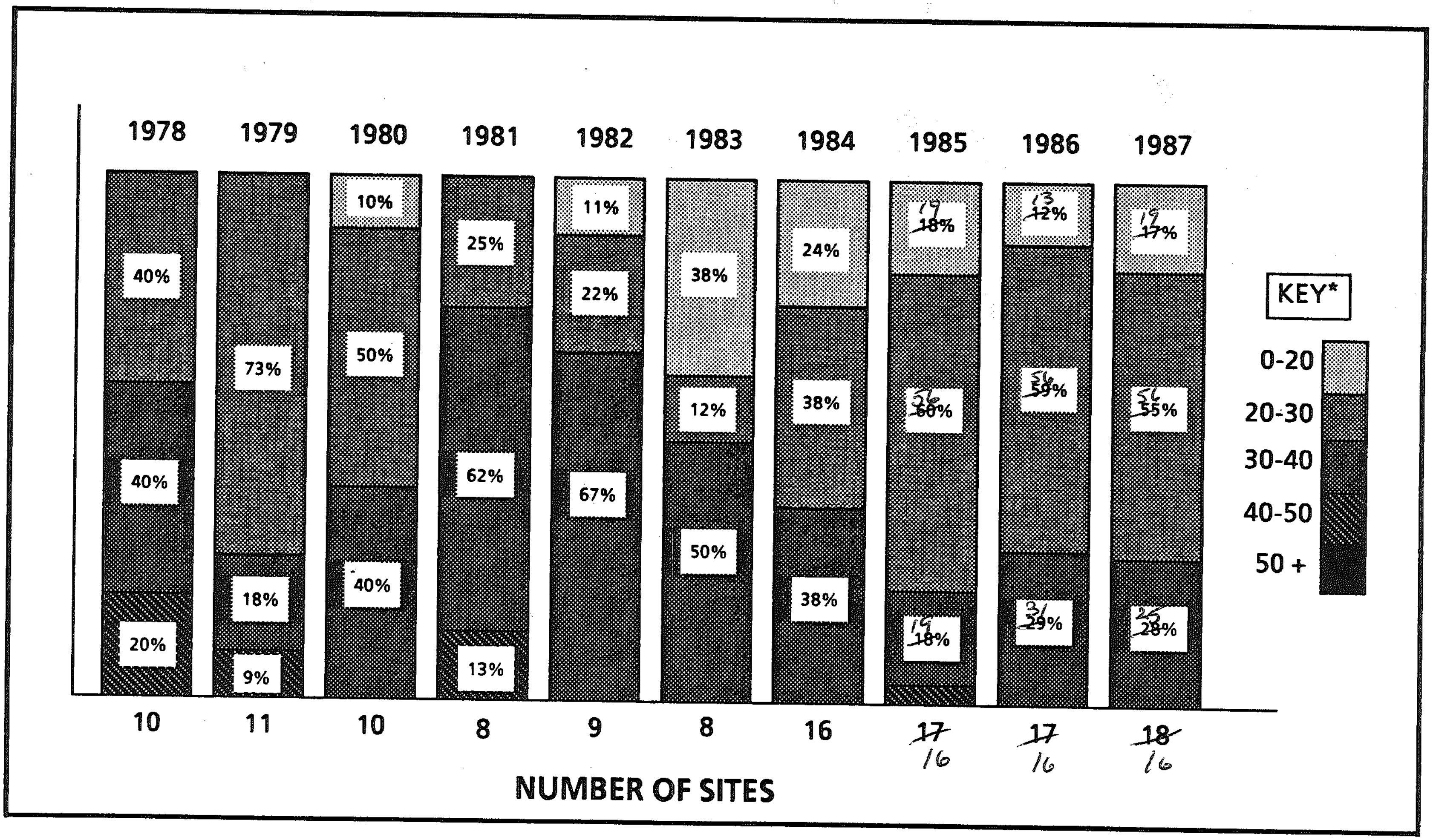
PAIRED YEARS	NUMBER OF SITES	AVERAGE OF ANNUAL GEOMETRIC MEANS (µg/m3)	STANDARD DEVIATION (µg/m3)	SIGNIFICANCE LEVEL		
				TREND AT		PROBABILITY THAT CHANGE IS NOT SIGNIFICANT
				95% LEVEL	99% LEVEL	
78 79	9 9	23.8 21.3	6.1 5.3	N.C.	N.C.	0.1238
79 80	10 10	21.8 19.8	4.5 5.2	↓	N.C.	0.0215
80 81	8 8	21.1 20.9	4.1 4.4	N.C.	N.C.	0.9100
81 82	8 8	20.9 21.0	4.4 4.5	N.C.	N.C.	0.9522
82 83	8 8	20.0 18.1	5.0 5.1	↓	↓	0.0002
83 84	8 8	18.1 18.2	5.1 4.5	N.C.	N.C.	0.9237
84 85	~~15~~ 14 ~~15~~ 14	~~16.4~~ 16.3 ~~16.5~~ 16.7	~~4.4~~ 4.5 ~~4.9~~ 5.0	N.C.	N.C.	0.6753 ~~0.9654~~
85 86	~~16~~ 15 ~~16~~ 15	~~14.6~~ 14.9 ~~15.5~~ 15.7	5.3 4.4	N.C.	N.C.	0.4672 ~~0.3772~~
86 87	~~16~~ 13 ~~16~~ 13	~~15.6~~ 15.2 ~~16.1~~ 15.3	~~4.4~~ 4.5 ~~4.7~~ 4.8	N.C.	N.C.	0.8966 ~~0.4899~~

Key to Symbols : ↓ = Significant downward trend
↑ = Significant upward trend
N.C. = No significant change

FIGURE 2

SULFUR DIOXIDE TREND FROM CONTINUOUS DATA

"PERCENT OF SITES WITHIN EACH RANGE"



PRIMARY ANNUAL STANDARD = 80 µg/m³

* ANNUAL ARITHMETIC MEAN (µg/m³)

FIGURE 2A

ANNUAL GEOMETRIC MEAN CONCENTRATIONS OF SO2 (PPB) FOR 1982-1987 AT EACH OF FIVE CONCURRENTLY OPERATING SITES

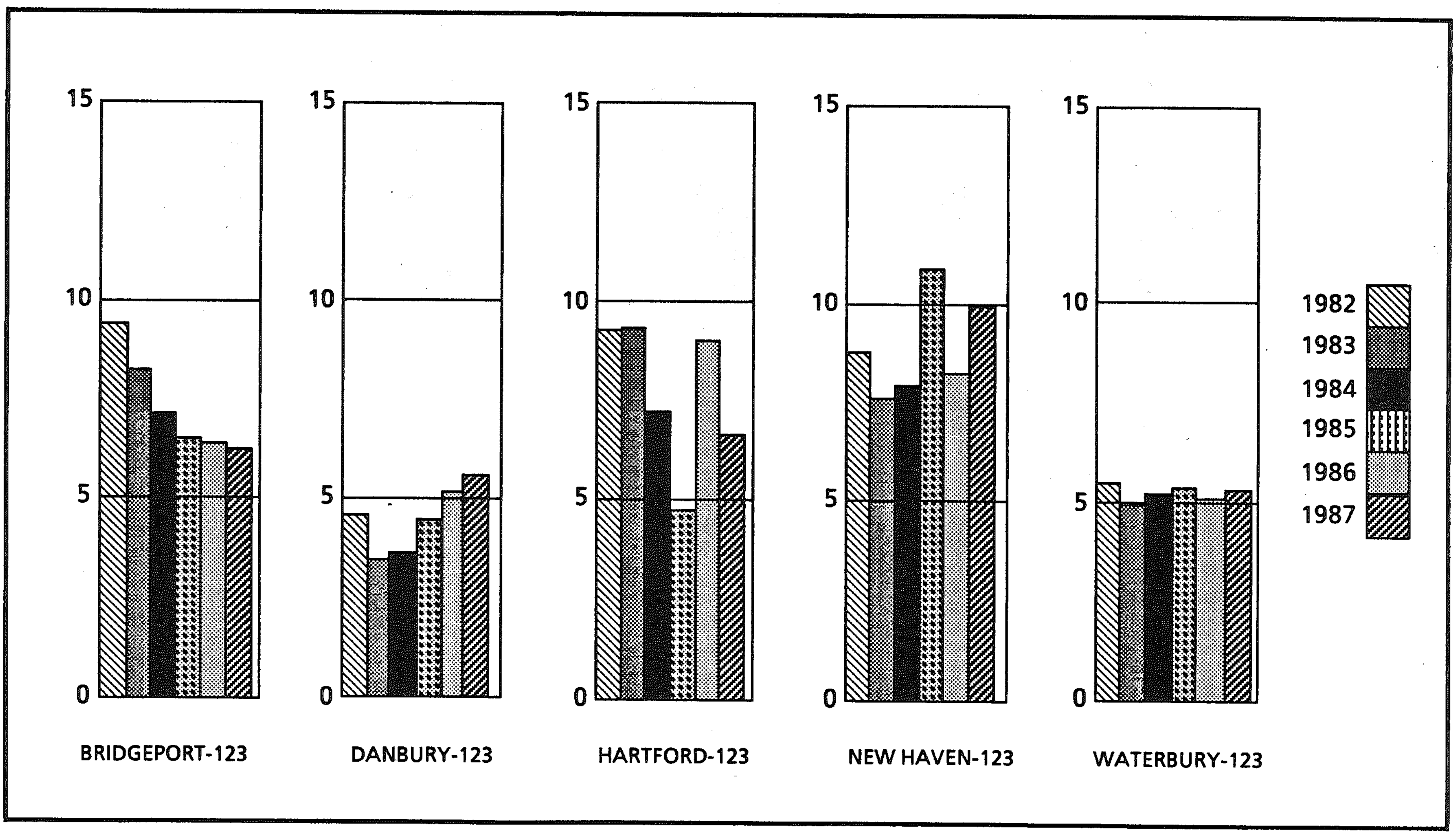


FIGURE 2B

THE AVERAGE OF THE ANNUAL GEOMETRIC MEAN SO2 CONCENTRATIONS FOR 1982-1987 AT FIVE CONCURRENTLY OPERATING SITES

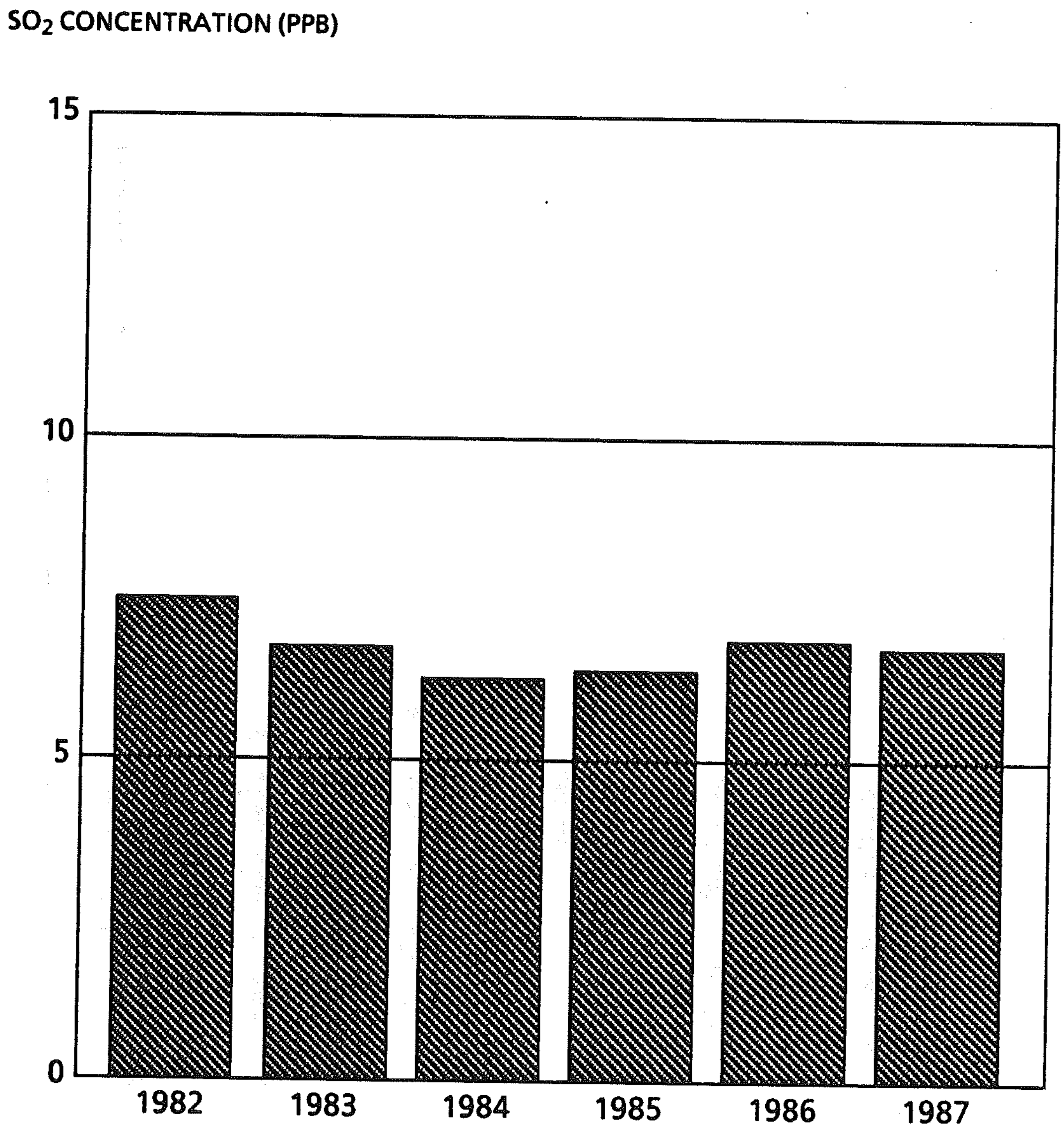


FIGURE 2C

THREE-YEAR RUNNING AVERAGES OF THE ANNUAL GEOMETRIC MEAN SO2 CONCENTRATIONS FOR 1982-1987 AT FIVE CONCURRENTLY OPERATING SITES

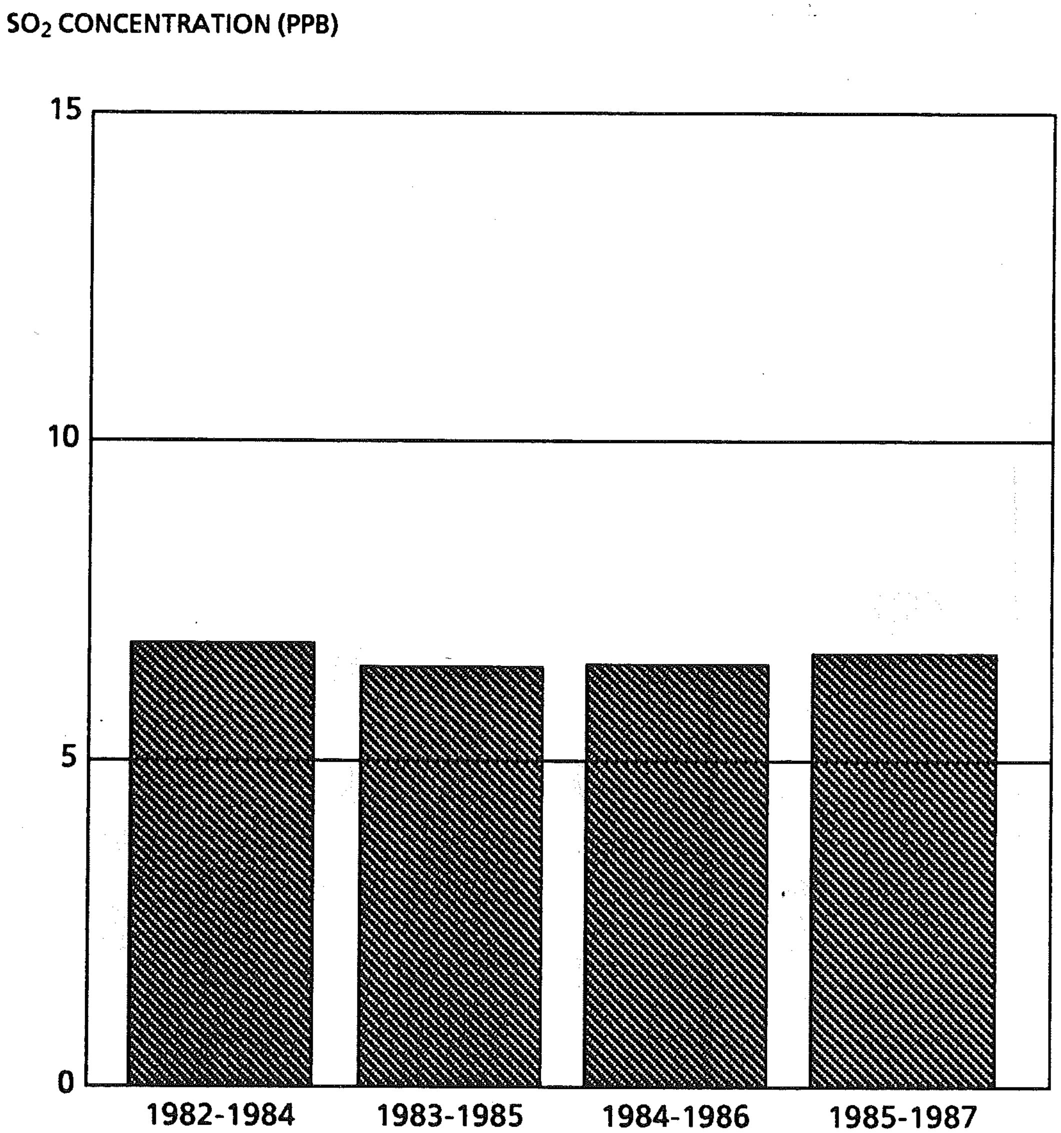
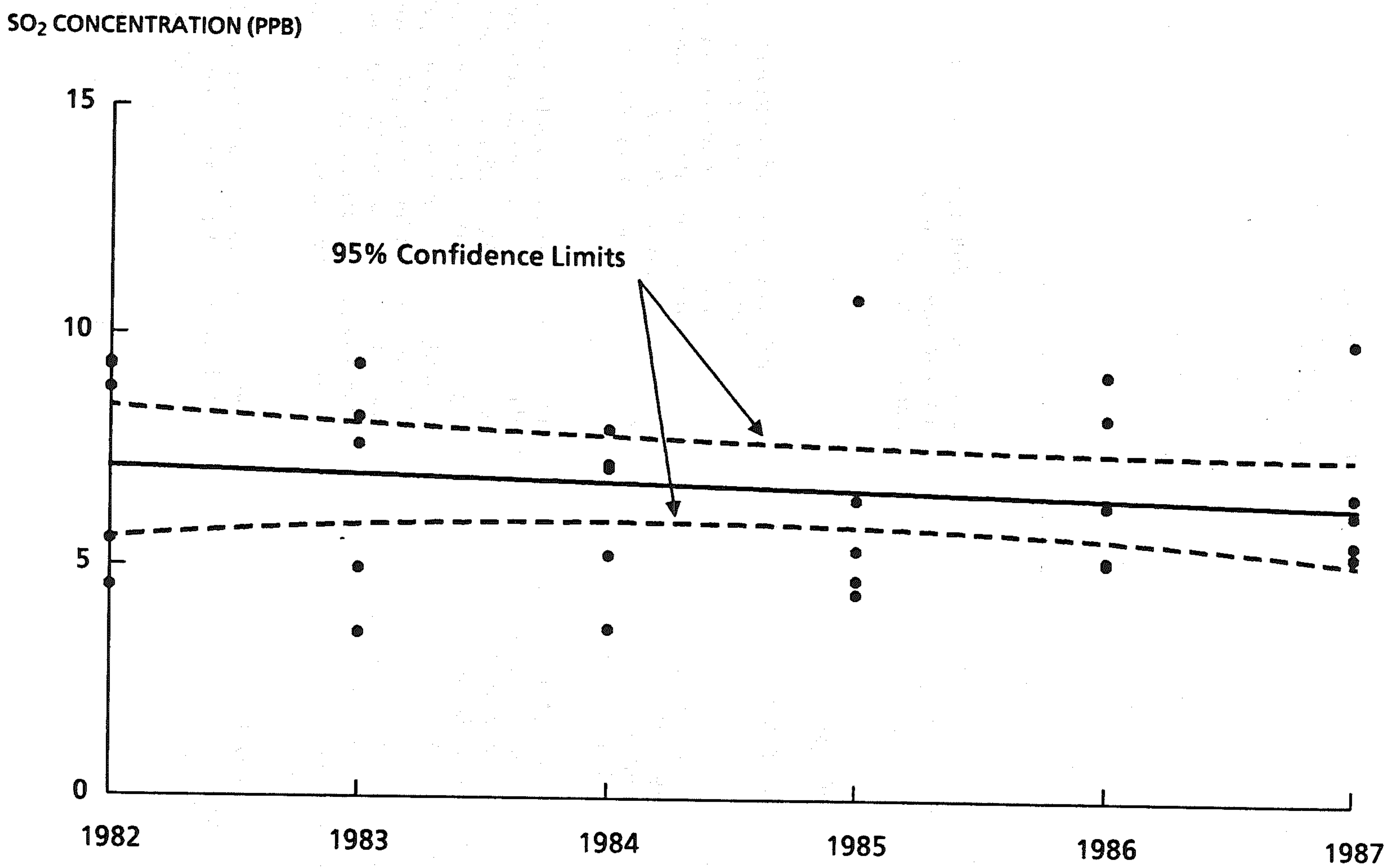


FIGURE 2D

TREND OF THE ANNUAL GEOMETRIC MEAN SO2 CONCENTRATIONS FOR 1982-1987 AT FIVE CONCURRENTLY OPERATING SITES



wind speed and direction, wind horizontal sigma, temperature, precipitation, barometric pressure and solar radiation (insolation).

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

The complete monitoring network used in 1987 consisted of:

40	Total suspended particulate hi-vol sites
14	Lead hi-vol sites
6	Lead lo-vol sites
18	Sulfur dioxide sites
10	Ozone sites
3	Nitrogen dioxide sites
5	Carbon monoxide sites

A complete description of all permanent air monitoring sites in Connecticut operated by DEP in 1987 is available from the Department of Environmental Protection, Air Compliance Unit, Monitoring Section, State Office Building, Hartford, Connecticut, 06106.

D. POLLUTANT STANDARDS INDEX

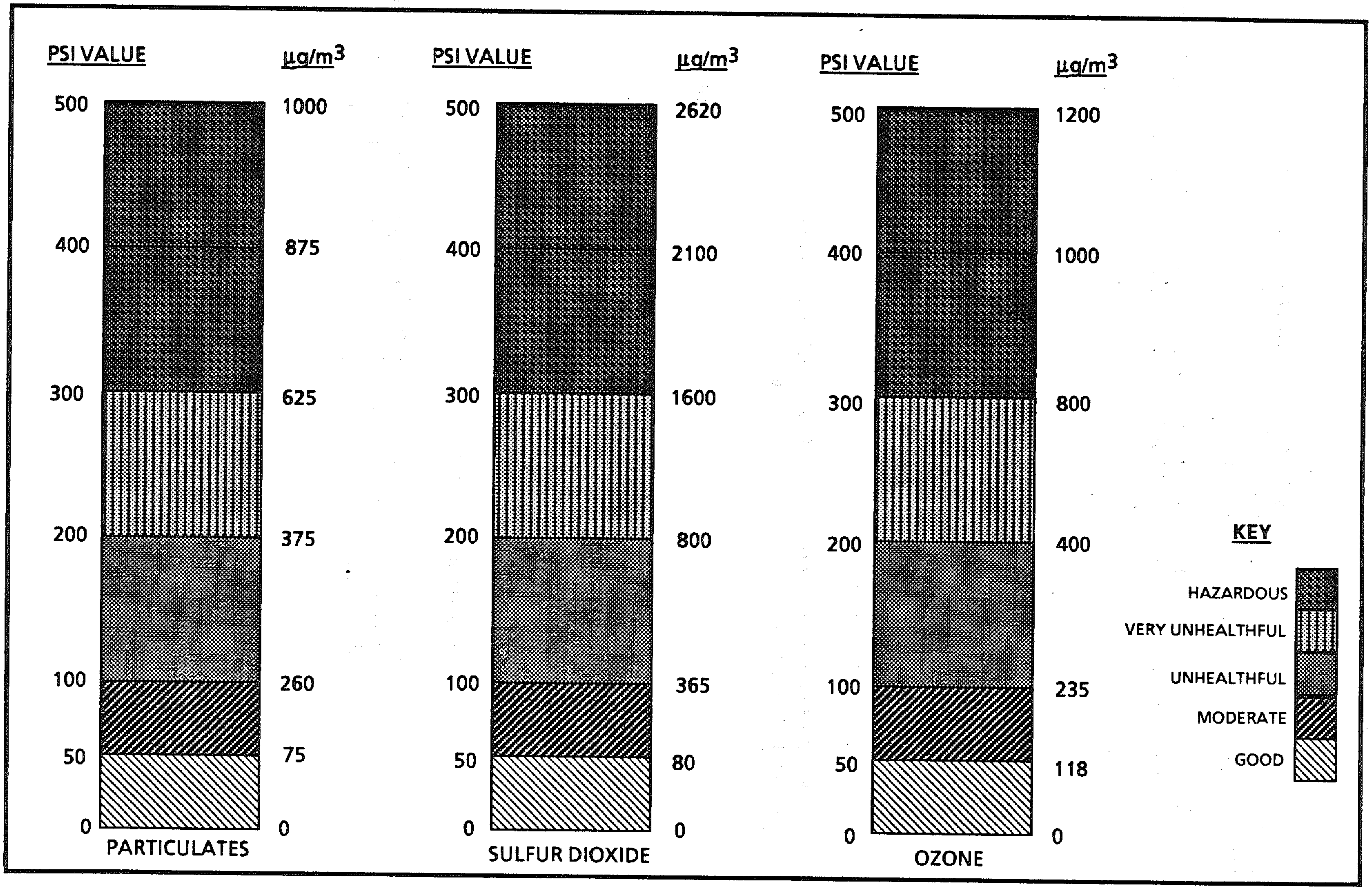
The Pollutant Standards Index (PSI) is a daily air quality index recommended for common use in state and local agencies by the U.S. Environmental Protection Agency. Starting on November 15, 1976, Connecticut began reporting the PSI on a 7-day basis, but is currently reporting the PSI on a 5-day basis (i.e., with predictions for the weekends). The PSI incorporates three pollutants : sulfur dioxide, total suspended particulates and ozone. 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 (TSP, SO_2, and O_3) in Connecticut. For the winter of 1987, Connecticut reported the total suspended particulate PSI for the towns of Bridgeport, Danbury, Greenwich, Groton, Hartford, Meriden, Milford, New Britain, New Haven, Norwalk, Norwich, Stamford, Wallingford, and Waterbury; and reported the sulfur dioxide PSI for the towns of Bridgeport, Danbury, East Hartford, Enfield, Greenwich, Groton, Hartford, Milford, New Britain, New Haven, Norwalk, Stamford, and Waterbury. For the summer, the ozone PSI was reported for the towns of Bridgeport, Danbury, East Hartford, Greenwich, Groton, Madison, Middletown, New Haven, Stafford, and Stratford. Each day, the pollutant with the highest PSI value of all the pollutants being monitored is reported for each town, 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 approximately 3 PM, five days a week, and can be heard by dialing 566-3449. Predictions for weekends are included on the Friday recordings. 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 during weekday afternoons from the American Lung Association of Connecticut in East Hartford. The number there is 289-5401 or 1-800-992-2263.

FIGURE 3

POLLUTANT STANDARDS INDEX



E. QUALITY ASSURANCE

Quality Assurance requirements for State and Local Air Monitoring Stations (SLAMS) and the National Air Monitoring Stations (NAMS), as part of the (SLAMS) network, are specified by the code of Federal Regulations, Title 40, Part 58, Appendix A.

The regulations were enacted to provide a consistent approach to Quality Assurance activities across the country so that ambient data with a defined precision and accuracy is produced.

A Quality Assurance program was initiated in Connecticut with written procedures covering, but not limited to, the following:

Equipment procurement
Equipment installation
Equipment calibration
Equipment operation
Sample analysis
Maintenance audits
Performance audits
Data handling and assessment

Quality assurance procedures for the above activities were fully operational on January 1, 1981 for all NAMS monitoring sites. On January 1, 1983 the above procedures were fully operational for all SLAMS monitoring sites.

Data precision and accuracy values are reported in the form of 95% probability limits as defined by equations found in Appendix A of the Federal regulations cited above.

1. PRECISION

Precision is a measure of data repeatability (grouping) and is determined in the following manner:

a. Manual Samplers (TSP)

A second (co-located) TSP hi-vol sampler is placed alongside a regular TSP network sampler and operated concurrently. The concentration values from the co-located hi-vol sampler are compared to the network sampler and precision values are generated from the comparison.

b. Manual Samplers (Lead)

Duplicate strips are cut from the hi-vol sampler filters and individually analyzed for lead. The resulting concentration values are compared, and precision values are generated from the comparison.

c. Automated Analyzers (SO_2,O_3,CO and NO_2)

All NAMS and SLAMS analyzers are challenged with a low level pollutant concentration a minimum of once every two weeks: 0.08 to 0.10 ppm for SO_2, O_3

and NO_2, and 8 to 10 ppm for CO. The comparison of analyzer response to input concentration is used to generate automated analyzer precision values.

2. ACCURACY

Accuracy is an estimate of the closeness of a measured value to a known value and is determined in the following manner:

a. Manual Methods (TSP and Lead)

Accuracy for TSP and lead is assessed by auditing the flow measurement phase of the sampling method. In Connecticut, this is accomplished by attaching a secondary standard calibrated orifice to the hi-vol inlet and comparing the flow rates. A minimum of 25% of the TSP and lead network samplers are audited each quarter.

b. Automated Analyzers (SO_2, O_3, CO and NO_2)

Automated analyzer data accuracy is determined by challenging each analyzer with three predetermined concentration levels. Accuracy values are calculated for a number of analyzers, in a pollutant sampling network, at each concentration level. Automated analyzer response is audited at three concentration levels and zero. The results for each concentration for a particular pollutant are used to assess automated analyzer accuracy. The audit concentration levels are as follows:

SO_2, O_3, and NO_2 (PPM)	CO (PPM)
0.03 to 0.08	3 to 8
0.15 to 0.20	15 to 20
0.35 to 0.45	35 to 45
0.80 to 0.90 (NO_2 only)	

II. TOTAL SUSPENDED PARTICULATES

HEALTH EFFECTS

Particulates are solid particles or liquid droplets small enough to remain suspended in air. They include dust, soot, and smoke -- particles that may be irritating but are usually not poisonous -- and bits of solid or liquid substances that may be highly toxic. The smaller the particles, the more likely they are to reach the innermost parts of the lungs and work their damage.

The harm may be physical: clogging the lung sacs, as in anthracosis, or coal miners' "black lung" from inhaling coal dust; asbestosis or silicosis in people exposed to asbestos fibers or dusts from silicate rocks; and byssinosis, or textile workers' "brown lung" from inhaling cotton fibers.

The harm may also be chemical: changes in the human body caused by chemical reactions with pollution particles that pass through the lung membranes to poison the blood or be carried by the blood to other organs. This can happen with inhaled lead, cadmium, beryllium, and other metals, and with certain complex organic compounds that can cause cancer.

Many studies indicate that particulates and sulfur oxides (they often occur together) increase the incidence and severity of respiratory disease.

CONCLUSIONS

Measured TSP levels did not exceed the primary annual standard of 75 $\mu g/m^3$, the secondary annual standard of 60 $\mu g/m^3$, or the primary 24-hour standard of 260 $\mu g/m^3$ during 1987. Although the secondary 24-hour standard of 150 $\mu g/m^3$ was exceeded once at both Norwalk 005 and Waterbury 007, there were no violations of the standard.

SAMPLE COLLECTION AND ANALYSIS

High 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. Retractable lids have been installed on the hi-vols in order to eliminate the passive sampling error. The samplers operate (from midnight to midnight, standard time) every sixth day at all sites.

The matter collected on the filters is analyzed for weight and chemical composition. The air flow through the filter is recorded during sampling. 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 at each hi-vol site as follows. Three standardized strips of every hi-vol filter are cut out and prepared for three different analyses. In the first analysis, a composite sample composed of a strip from each of several filters collected in a quarter-year is digested in acid, and the resulting solution is analyzed for metals by means of an atomic absorption spectrophotometer. The results are reported for each individual metal in $\mu g/m^3$. In the second analysis, a composite sample is dissolved in water, filtered and the resulting solution is analyzed by means of wet chemistry techniques to determine the concentration of the particular water soluble components. The results are reported for each individual constituent of the water soluble fraction in $\mu g/m^3$. In the third analysis, total sulfates are determined by means of the same procedure used in the second analysis, but each sample collected in the quarter-year is analyzed individually and the results from all the samples are averaged (see Table 9). Before 1983, composite, rather than individual, samples were used to determine total sulfates.

Low Volume Sampler (Lo-vol) - The low volume 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. The filters are chemically analyzed in the same manner as those from the hi-vol sampler.

It should be noted that in 1985 the methods used to analyze the water soluble components of both the hi-vol and lo-vol filters were updated to reflect the latest available technology. Consequently, the accuracy of the analysis methods increased, and the resulting quarterly and monthly concentrations of ammonium, nitrate and sulfate were significantly higher than their counterparts in previous years. This is especially true for sulfate.

DISCUSSION OF DATA

Monitoring Network - In 1987, 40 hi-vol and 2 lo-vol particulate samplers were operated in Connecticut (see Figure 4). 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 the National Ambient Air Quality Standards (NAAQS).

Precision and Accuracy - Precision checks were conducted at three hi-vol sampling sites which had co-located samplers. On the basis of 166 precision checks, the 95% probability limits for precision ranged from -12% to + 12%. Accuracy is based on air flow through the monitor. The 95% probability limits for accuracy, based on 79 audits conducted on the hi-vol monitoring system network, ranged from -6% to + 4%. (See section I.E. of this Air Quality Summary for a discussion of precision and accuracy.)

Annual Averages - The Federal EPA has established minimum sampling criteria (see Table 1) for use in determining compliance with either the primary or secondary annual NAAQS for TSP. Using the EPA criteria, one finds that neither the primary annual standard nor the secondary annual standard was exceeded in Connecticut in 1987. Of the 37 sites that had valid annual geometric means (as determined by EPA minimum sampling criteria) in both 1986 and 1987, 23 sites had higher annual geometric means when compared to 1986, and 13 had lower annual geometric means. The largest increase was 5.0 $\mu g/m^3$ at Willimantic 002; the largest decrease was 3.7 $\mu g/m^3$ at Naugatuck 001 (see Table 5).

Historical Data - A summary of annual average TSP data for 1985 -1987 is presented in Table 5. For data going back to 1957, see previous editions of the Air Quality Summary. Table 5 also includes an indication of whether the aforementioned EPA minimum sampling criteria were met at each site for each year. If the sampling was insufficient to meet the EPA criteria, an asterisk appears next to the number of samples.

Statistical Projections - The statistical projections presented in Table 5 are prepared by a DEP computer program which analyzes data from all sites operated by DEP. Input to the program includes site location and year, the number of samples (usually a maximum of 61), the annual geometric mean concentration and the geometric standard deviation. The program lists the input and calculates the 95% confidence limits about the mean and the statistical projections of the number of days in each year the primary and secondary 24-hour NAAQS would have been exceeded if sampling had been conducted every day. This analysis, like the ambient standards, is based on the assumption that the particulate data are log-normally distributed. For comparison, Table 5 also shows the number of days at a site when the secondary 24-hour standard of 150 $\mu g/m^3$ was exceeded, as demonstrated by actual measurements at the site.

The statistical projections in Table 5 indicate that more frequent TSP sampling in 1987 might have resulted in measured violations (i.e., two or more exceedances) of the secondary 24-hour standard at Bridgeport 123, Danbury 002, Danbury 123, Hartford 003, Meriden 002, Middletown 003, Norwalk 005, Stamford 001, Waterbury 005, Waterbury-007 and Willimantic 002. Statistical projections regarding the primary 24-hour standard of 260 $\mu g/m^3$ are omitted from the table because there were no predicted and no measured exceedances of this standard at any site.

Because manpower and economic limitations dictate that hi-vol sampling for particulate matter cannot be conducted every day, a degree of uncertainty is introduced as to whether the air quality at a site has either met or exceeded the national standards. 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 5), at Hartford 003 in 1985, 58 samples were analyzed and a geometric mean of 50.8 $\mu g/m^3$ was then calculated. The columns labeled "95-PCT-LIMITS" show the lower and upper limits of the 95% confidence interval to be 46 and 55 $\mu g/m^3$, respectively. This means that, if a larger sample set (i.e., greater than 58 samples) were collected in 1985 at this site, there is a 95% chance that the geometric mean would fall between these limits. If the upper limit happened to be less than 60 $\mu g/m^3$, the national ambient secondary standard for particulates, then one could be confident that the secondary standard was met at the site. If the upper limit happened to be greater, and the lower limit less, than 60 $\mu g/m^3$, then one could not be confident that the secondary standard was met at the site. If both the upper and lower limits were greater than 60 $\mu g/m^3$, then one could be confident that the standard was exceeded. These three possibilities are illustrated in Table X.

In Table 6, one can examine the 1987 monitoring sites for compliance with air quality standards, using the State's hi-vol confidence limit criteria. The table shows that the DEP is confident that the primary annual standard and the secondary annual standard were achieved at all 40 sites.

24-Hour Averages - Table 7 presents the first and second high 24-hour concentrations recorded at each site. There were no violations (i.e., more than one exceedance) of the primary 24-hour standard and no violations of the secondary 24-hour standard at any site in Connecticut in 1987, which was also the case in 1986. The second high 24-hour average decreased at 26 of the 37 sites which met the minimum EPA sampling criteria in both 1986 and 1987. Eleven (11) of these decreases were greater than or equal to 20 $\mu g/m^3$, and the largest was 44 $\mu g/m^3$ at Stratford 005. The second high 24-hour average increased at 11 of the sites, and the largest of these increases was 21 $\mu g/m^3$ at Danbury 002.

Table 8 summarizes the statistical predictions from Table 5 regarding the number of days exceeding the 24-hour standards. If sampling had been conducted every day in 1987, there would have been no site with a violation of the primary 24-hour standard. However, 11 sites are predicted to have violations of the secondary 24-hour standard.

Hi-vol Averages - Quarterly and annual averages of thirteen chemical components or characteristics of the particulate matter collected at each hi-vol sampling location have been computed for the year 1987 and are presented in Table 9.

Lo-vol Averages - For a number of years, the DEP has been experimenting and gathering data with the lo-vol particulate monitor. Lo-vols, which operate continuously for one month, have three advantages and one disadvantage in relation to hi-vols. First, the lo-vol's continuous operation can provide annual averages which include every day of the year, rather than the fractional portion of the year sampled by hi-vols every sixth day. Second, the lo-vol needs less frequent servicing (12 times/year) than the hi-vol (61 times/year for every-sixth-day sampling). Therefore, it is more cost-effective to operate. Third, the lo-vol has a higher collection efficiency than the hi-vol, especially for small, respirable particles. The disadvantage of the lo-vol is that it does not provide daily samples for direct comparison to the 24-hour TSP standards (although 24-hour averages can be obtained by statistical interpolation).

The two lo-vol sites are located at rural locations. One site is in Mansfield and the other is in Putnam. The use of the lo-vols made it possible to continue to obtain data on annual average particulate levels at these rural sites.

Monthly and annual averages of the chemical components from the lo-vol TSP monitors have been computed for 1987 and are presented in Table 10.

10 High Days with Wind Data - Table 11 lists the 10 highest 24-hour average TSP readings with the dates of occurrence for each TSP hi-vol site in Connecticut during 1987. This table also shows the average wind conditions which occurred on each of these dates. The resultant wind direction (DIR, in compass degrees clockwise from true north) and velocity (VEL, in mph), the average wind speed (SPD, in mph), and the ratio between the velocity and the speed are presented for each of four National Weather Service stations located in or near Connecticut. The resultant wind direction and velocity are vector quantities and are computed from the individual wind direction and speed readings in each day. The closer the wind speed ratio is to 1.000, the more persistent the wind. It should be noted that the Connecticut stations have local influences which change the speed and shift the direction of the near-surface air flow (e.g., the Bradley Field air flow is channeled north-south by the Connecticut River Valley and the Bridgeport air flow is frequently subject to sea breezes).

On a statewide basis, this table shows that approximately 36% of the high TSP days occur with winds out of the southwest quadrant and most of those days have relatively persistent winds. This relationship between southwest winds and high TSP levels is more prevalent in southwestern Connecticut. However, many of the maximum levels at some urban sites do not occur with southwest winds, indicating that these sites are possibly influenced by local sources or transport from different out-of-state sources. As noted above, a large scale southwesterly air flow is often diverted into a southerly flow up the Connecticut River Valley. At sites in the Connecticut River Valley, many of the highest TSP days occur when the winds at Bradley Airport are from the south.

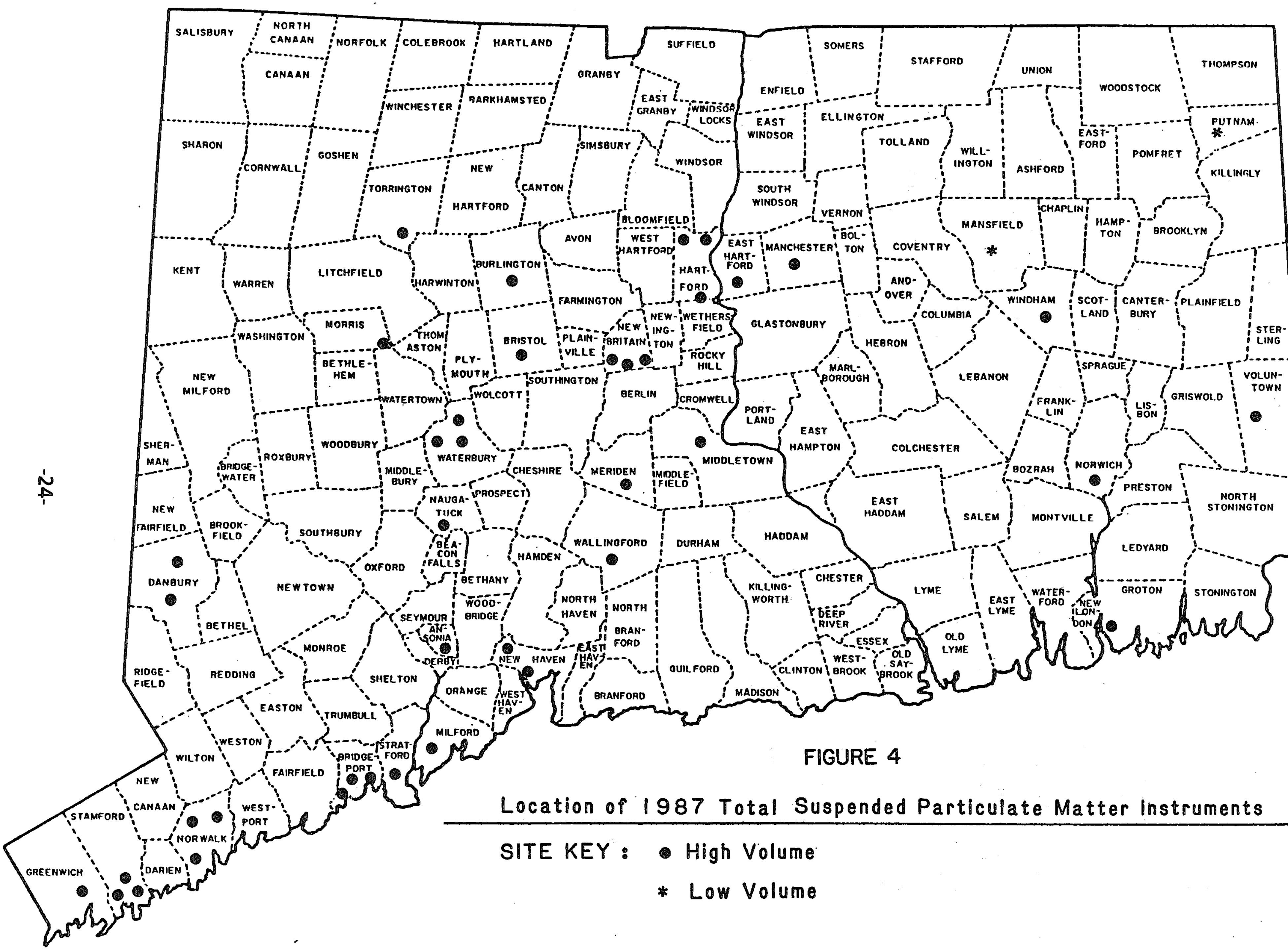


FIGURE 4

Location of 1987 Total Suspended Particulate Matter Instruments

SITE KEY : ● High Volume

* Low Volume

TABLE 5

1985–1987 TSP ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	GEOM STD DEV	LOGNORMAL DISTRIBUTION: PREDICTED DAYS OVER 150 UG/M3	MEASURED DAYS OVER 150 UG/M3
ANSONIA	004	1985	59	39.4	35	44	1.612	1	
ANSONIA	004	1986	59	36.6	32	42	1.699	1	
ANSONIA	004	1987	59	38.8	35	43	1.598	1	
BRIDGEPORT	001	1985	59	43.0	39	47	1.479		
BRIDGEPORT	001	1986	61	40.4	37	45	1.529		
BRIDGEPORT	001	1987	60	41.6	38	46	1.492		
BRIDGEPORT	009	1985	57	39.7	35	45	1.615	1	
BRIDGEPORT	009	1986	59	37.5	34	42	1.571		
BRIDGEPORT	009	1987	35*	36.4	31	43	1.627	1	
BRIDGEPORT	123	1985	57	59.6	53	67	1.586	8	
BRIDGEPORT	123	1986	59	48.5	44	54	1.528	1	
BRIDGEPORT	123	1987	58	51.5	47	57	1.508	2	
BRISTOL	001	1985	60	36.4	33	40	1.487		
BRISTOL	001	1986	58	39.3	35	44	1.655	1	
BRISTOL	001	1987	58	38.2	35	42	1.435		
BURLINGTON	001	1985	59	20.1	18	22	1.589		
BURLINGTON	001	1986	58	18.0	16	21	1.837		
BURLINGTON	001	1987	60	19.1	17	22	1.722		
DANBURY	002	1985	61	44.3	41	48	1.445		
DANBURY	002	1986	57	43.4	39	48	1.579	1	
DANBURY	002	1987	60	48.1	43	54	1.606	3	
DANBURY	123	1985	58	43.3	39	48	1.552	1	
DANBURY	123	1986	60	42.9	38	48	1.648	2	
DANBURY	123	1987	61	44.2	39	49	1.618	2	
EAST HARTFORD	004	1985	57	41.9	38	46	1.522		
EAST HARTFORD	004	1986	60	40.7	36	46	1.608	1	
EAST HARTFORD	004	1987	56	40.5	36	45	1.576	1	

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE GEOMETRIC MEAN HAS UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 5, CONTINUED

1985–1987 TSP ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	GEOM STD DEV	LOGNORMAL DISTRIBUTION PREDICTED DAYS OVER 150 UG/M3	MEASURED DAYS OVER 150 UG/M3
GREENWICH	008	1985	60	43.8	39	49	1.576	1	
GREENWICH	008	1986	59	36.7	33	41	1.510		
GREENWICH	008	1987	58	37.6	34	42	1.541		
GROTON	006	1985	59	34.1	31	38	1.533		
GROTON	006	1986	61	32.3	29	36	1.537		
GROTON	006	1987	58	36.0	32	41	1.651	1	
HARTFORD	003	1985	58	50.8	46	55	1.442		
HARTFORD	003	1986	57	50.4	45	56	1.537	2	
HARTFORD	003	1987	59	51.0	46	56	1.512	2	
HARTFORD	013	1985	46*	42.5	38	48	1.531		
HARTFORD	013	1986	60	44.6	40	50	1.559	1	
HARTFORD	013	1987	59	43.2	39	47	1.488		
HARTFORD	014	1985	58	43.7	40	48	1.453		
HARTFORD	014	1986	61	41.8	38	46	1.542	1	
HARTFORD	014	1987	60	42.4	39	47	1.505		
MANCHESTER	001	1985	55	35.1	31	39	1.565		
MANCHESTER	001	1986	60	34.7	31	39	1.664	1	
MANCHESTER	001	1987	59	34.8	31	39	1.537		
MERIDEN	002	1985	59	44.9	41	50	1.519	1	
MERIDEN	002	1986	60	45.1	40	51	1.655	3	
MERIDEN	002	1987	60	44.6	40	50	1.608	2	
MIDDLETOWN	003	1985	57	41.7	38	46	1.481		
MIDDLETOWN	003	1986	56	44.4	39	50	1.627	2	
MIDDLETOWN	003	1987	61	43.1	39	48	1.611	2	
MILFORD	002	1985	60	44.9	41	49	1.472		
MILFORD	002	1986	58	40.9	37	45	1.527		
MILFORD	002	1987	11*	43.4	34	55	1.445		

* SAMPLING NOT RAMDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE GEOMETRIC MEAN HAS UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 5, CONTINUED

1985-1987 TSP ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	GEOM STD DEV	LOGNORMAL DISTRIBUTION PREDICTED DAYS OVER 150 UG/M3	MEASURED DAYS OVER 150 UG/M3
MORRIS	001	1985	60	25.6	23	29	1.586		
MORRIS	001	1986	61	21.9	19	25	1.857		
MORRIS	001	1987	60	23.9	21	27	1.576		
NAUGATUCK	001	1985	60	45.2	41	50	1.574	2	
NAUGATUCK	001	1986	59	43.9	39	49	1.617	2	
NAUGATUCK	001	1987	57	40.2	36	45	1.597	1	
NEW BRITAIN	007	1985	59	37.8	35	41	1.456		
NEW BRITAIN	007	1986	61	36.0	32	40	1.589		
NEW BRITAIN	007	1987	59	37.2	34	41	1.516		
NEW BRITAIN	008	1985	59	37.2	34	41	1.525		
NEW BRITAIN	008	1986	60	35.9	32	40	1.632	1	
NEW BRITAIN	008	1987	57	35.4	32	39	1.570		
NEW BRITAIN	009	1985	56	34.5	31	38	1.517		
NEW BRITAIN	009	1986	59	33.5	30	37	1.596		
NEW BRITAIN	009	1987	58	33.2	30	37	1.562		
NEW HAVEN	002	1985	51	48.8	44	54	1.466	1	
NEW HAVEN	002	1986	51	42.7	38	49	1.644	2	
NEW HAVEN	002	1987	53	45.7	41	51	1.565	1	
NEW HAVEN	013	1985	55	44.1	40	48	1.451		
NEW HAVEN	013	1986	52	42.6	38	48	1.555	1	
NEW HAVEN	013	1987	59	45.2	41	49	1.437		
NORWALK	001	1985	50	41.5	37	46	1.527		
NORWALK	001	1986	60	37.6	34	42	1.566		
NORWALK	001	1987	30*	46.1	39	54	1.555	1	

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE GEOMETRIC MEAN HAS UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 5, CONTINUED

1985–1987 TSP ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

								LOGNORMAL DISTRIBUTION	
TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95–PCT–LIMITS LOWER	95–PCT–LIMITS UPPER	GEOM STD DEV	PREDICTED DAYS OVER 150 UG/M3	MEASURED DAYS OVER 150 UG/M3
NORWALK	005	1985	57	46.4	42	51	1.502	1	
NORWALK	005	1986	53	51.3	45	58	1.645	5	
NORWALK	005	1987	55	51.3	45	58	1.651	7	1
NORWALK	012	1985	59	41.1	37	45	1.466		
NORWALK	012	1986	56	39.4	35	44	1.603	1	
NORWALK	012	1987	60	43.1	39	48	1.517		
NORWICH	002	1985	54	43.4	39	49	1.567	1	1
NORWICH	002	1986	55	41.0	37	46	1.576	1	
NORWICH	002	1987	59	42.2	38	46	1.477		
STAMFORD	001	1985	56	56.8	51	63	1.557	5	1
STAMFORD	001	1986	58	49.4	45	55	1.504	1	
STAMFORD	001	1987	57	46.6	42	52	1.589	2	
STAMFORD	007	1985	58	47.1	43	51	1.435		
STAMFORD	007	1986	57	46.0	41	51	1.538	1	
STAMFORD	007	1987	59	45.6	41	50	1.532	1	
STAMFORD	021	1985	53	44.8	41	49	1.411		
STAMFORD	021	1986	56	43.8	40	48	1.504		
STAMFORD	021	1987	57	46.4	42	52	1.545	1	
STRATFORD	005	1985	58	44.2	40	49	1.566	1	
STRATFORD	005	1986	59	43.8	39	49	1.614	2	
STRATFORD	005	1987	61	44.5	40	49	1.523	1	
TORRINGTON	001	1985	60	37.6	34	42	1.613	1	
TORRINGTON	001	1986	60	36.8	32	42	1.763	2	
TORRINGTON	001	1987	50	38.0	33	43	1.645	1	
VOLUNTOWN	001	1985	56	23.3	21	26	1.495		
VOLUNTOWN	001	1986	60	21.0	18	24	1.701		
VOLUNTOWN	001	1987	59	20.5	19	23	1.513		

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE GEOMETRIC MEAN HAS UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 5, CONTINUED

1985–1987 TSP ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

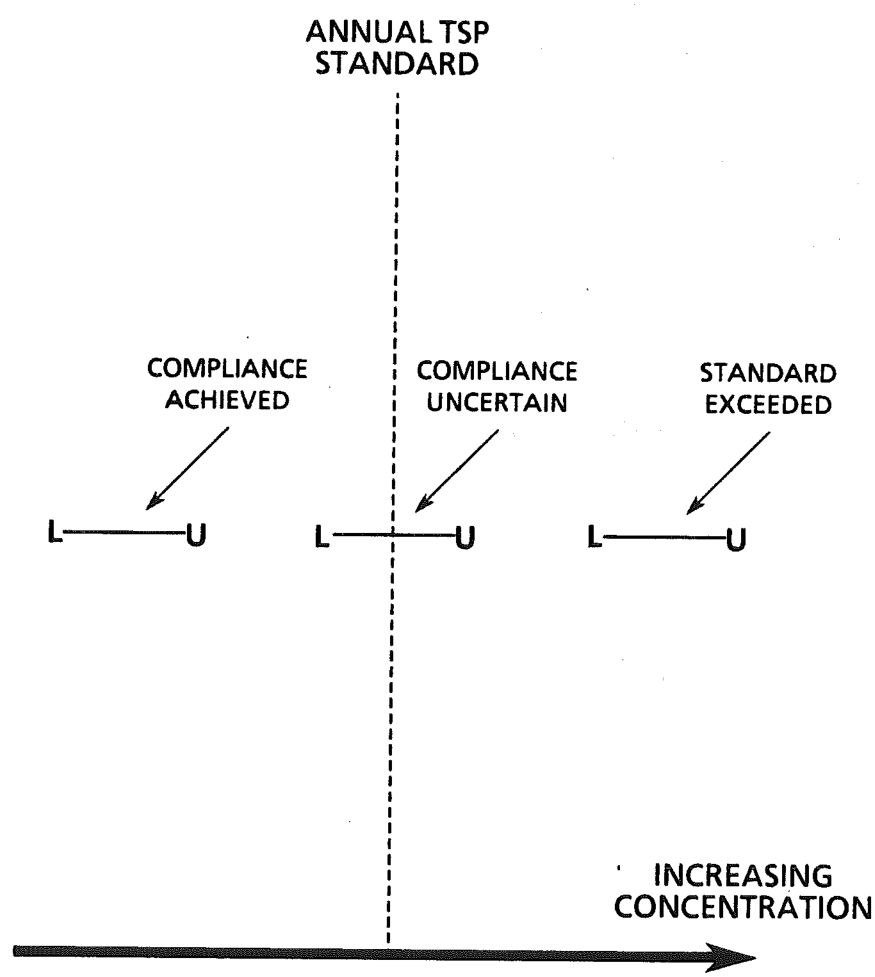
TOWN NAME	SITE	YEAR	SAMPLES	GEOM MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	GEOM STD DEV	LOGNORMAL DISTRIBUTION PREDICTED DAYS OVER 150 UG/M3	MEASURED DAYS OVER 150 UG/M3
WALLINGFORD	001	1985	59	43.1	39	48	1.597	1	
WALLINGFORD	001	1986	60	41.5	36	47	1.759	4	
WALLINGFORD	001	1987	61	40.8	37	45	1.579	1	
WATERBURY	005	1985	56	42.8	38	48	1.567	1	
WATERBURY	005	1986	61	43.3	38	49	1.686	3	
WATERBURY	005	1987	57	41.2	37	47	1.646	2	
WATERBURY	006	1985	59	35.7	32	39	1.502		
WATERBURY	006	1986	57	33.3	29	38	1.674	1	
WATERBURY	006	1987	58	34.0	31	38	1.539		
WATERBURY	007	1985	60	50.6	45	56	1.581	3	
WATERBURY	007	1986	60	50.4	44	57	1.697	7	
WATERBURY	007	1987	59	51.3	46	57	1.595	4	1
WILLIMANTIC	002	1985	60	37.3	34	41	1.559		
WILLIMANTIC	002	1986	57	39.5	35	45	1.700	2	
WILLIMANTIC	002	1987	47	44.5	39	51	1.600	2	

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE GEOMETRIC MEAN HAS UNITS OF MICROGRAMS PER CUBIC METER.

FIGURE X

COMPLIANCE WITH THE ANNUAL TSP STANDARDS USING 95% CONFIDENCE LIMITS ABOUT THE ANNUAL GEOMETRIC MEAN CONCENTRATION



L = The lower limit of the 95% confidence interval about the annual geometric mean concentration.

U = The upper limit of the 95% confidence interval about the annual geometric mean concentration.

TABLE 6

COMPLIANCE WITH ANNUAL TSP STANDARDS DURING 1987*

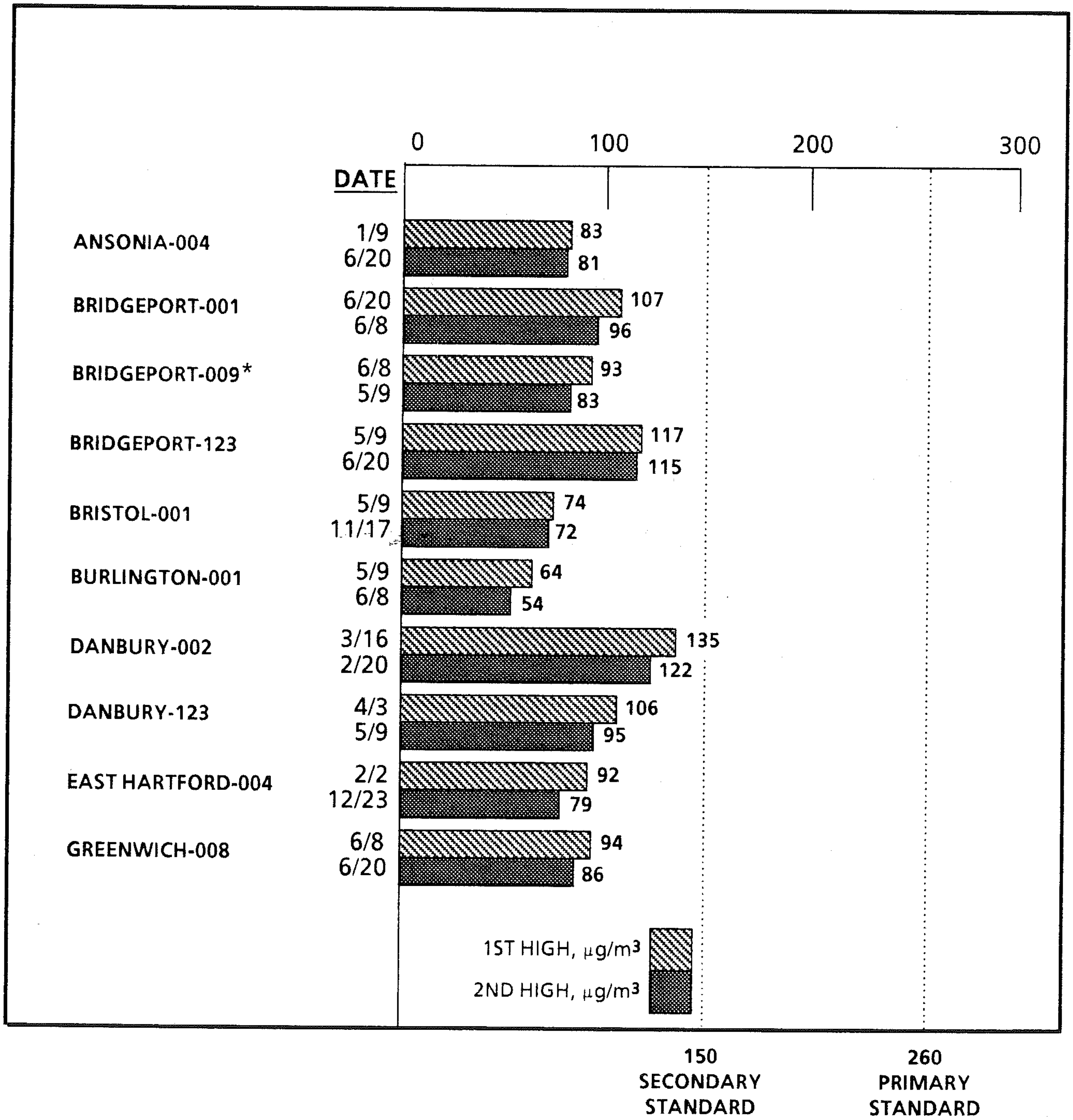
NUMBER OF SITES

	EXCEEDED	UNCERTAIN	ACHIEVED
PRIMARY STANDARD (75 μg/m3)	0	0	40
SECONDARY STANDARD (60 μg/m3)	0	0	40

* Using 95% confidence limits about the geometric mean concentration at each site.

TABLE 7

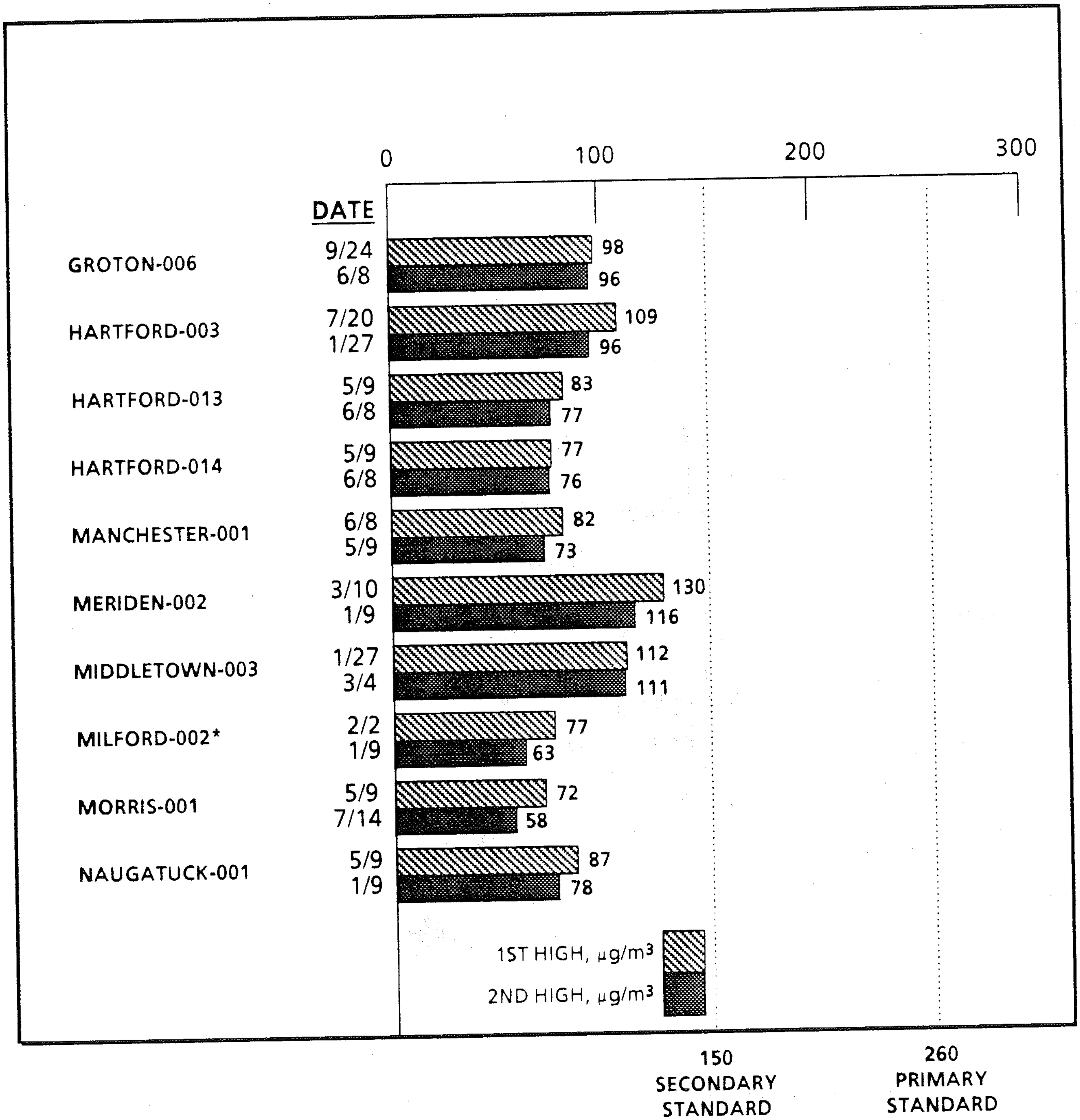
1987 MAXIMUM 24-HOUR TSP CONCENTRATIONS



* Database for the site is deficient in number or distribution of observations.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

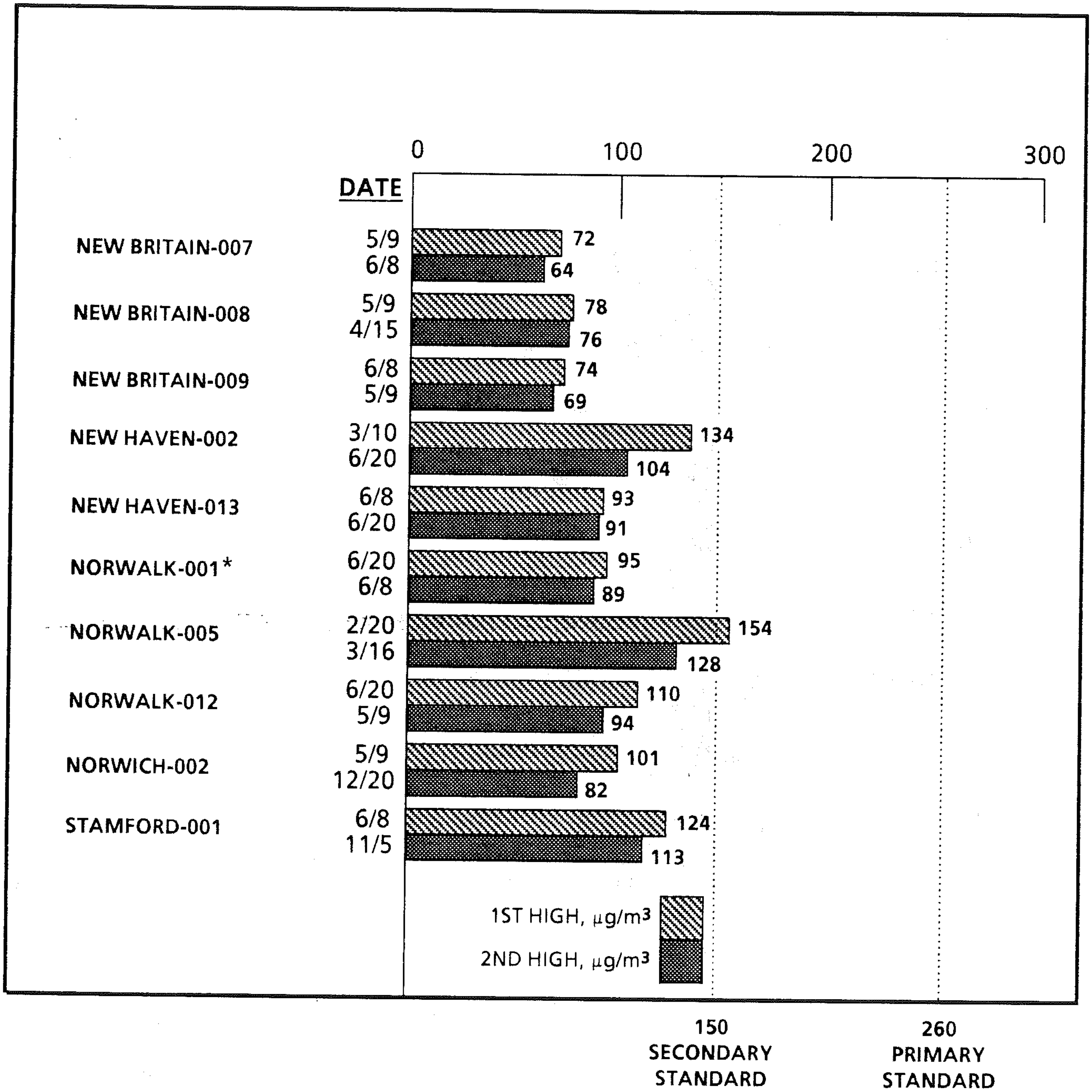
TABLE 7, CONTINUED



* Database for the site is deficient in number or distribution of observations.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

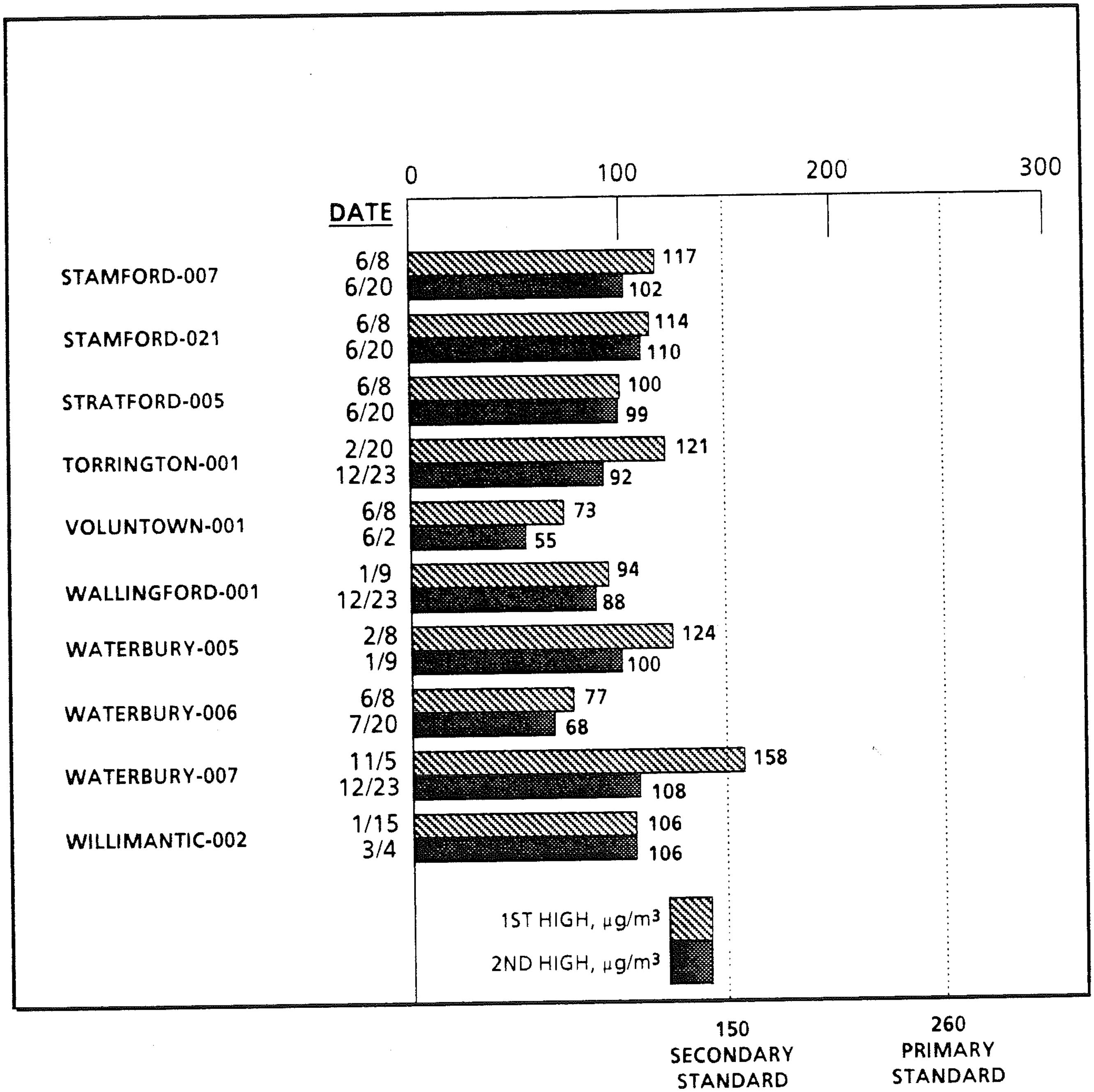
TABLE 7, CONTINUED



* Database for the site is deficient in number or distribution of observations.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

TABLE 7, CONTINUED



* Database for the site is deficient in number or distribution of observations.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

TABLE 8

SUMMARY OF THE STATISTICALLY PREDICTED NUMBER OF HI-VOL SITES EXCEEDING THE 24-HOUR TSP STANDARDS

		SITES WITH ≥ 2 DAYS EXCEEDING THE SECONDARY STANDARD (150 µg/m3)		SITES WITH ≥ 2 DAYS EXCEEDING THE PRIMARY STANDARD (260 µg/m3)	
YEAR	NO. OF SITES[1]	No. of Sites	Percentage of All Sites	No. of Sites	Percentage of All Sites
1972	46	43	93%	13	28%
1973	44	31	70%	11	25%
1974	62	49	79%	5	8%
1975	51	38	75%	2	4%
1976	38	33	87%	1	3%
1977	37	25	68%	0	0%
1978	34	20	59%	5	15%
1979	33	20	61%	2	6%
1980	33	14	42%	0	0%
1981	40	14	35%	0	0%
1982	39	11	28%	0	0%
1983	40	2	5%	0	0%
1984	40	4	10%	0	0%
1985	39	4	10%	0	0%
1986	40	13	33%	0	0%
1987	37	11	30%	0	0%

[1] Only those sites are used which have sufficient data to permit the calculation of a valid annual average concentration.

TABLE 9

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
ANSONIA	~~0060~~ 0008	004

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	3.8	3.7	4.0	4.9	4.1
CHROMIUM	2	2	2	3	2
COPPER	50	40	90	70	60
IRON	650	650	730	510	640
LEAD	60	50	40	60	50
MANGANESE	12	13	12	9	11
NICKEL	19	13	11	15	15
VANADIUM	50	20	20	30	30
ZINC	160	120	250	220	190
WATER SOLUBLES (ng/m³)					
NITRATE	2380	4130	3620	2260	3080
SULFATE	7110	8600	9700	8520	8480
AMMONIUM	360	350	<10	70	190[a]
TSP (µg/m³)	43	51	40	38	43
SAMPLE COUNT	15	14	15	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
BRIDGEPORT	**0060**	**001**

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.1	1.2	2.2	1.4	1.7
CHROMIUM	2	6	3	3	4
COPPER	40	80	90	80	70
IRON	810	870	680	630	750
LEAD	60	50	30	50	50
MANGANESE	26	17	11	10	16
NICKEL	11	15	10	10	12
VANADIUM	20	10	10	20	20
ZINC	50	60	60	60	60
WATER SOLUBLES (ng/m³)					
NITRATE	2830	4230	3920	2630	3400
SULFATE	7080	7900	9360	7610	7990
AMMONIUM	350	370	30	120	220
TSP (µg/m³)	53	52	38	37	45
SAMPLE COUNT	15	15	15	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
BRIDGEPORT	0060	009

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1		<.1	
CADMIUM	2.5	1.5		0.4	
CHROMIUM	2	6		<1	
COPPER	50	80		20	
IRON	520	840		130	
LEAD	50	50		10	
MANGANESE	12	17		2	
NICKEL	13	21		4	
VANADIUM	30	30		10	
ZINC	50	60		20	
WATER SOLUBLES (ng/m^3)					
NITRATE	2810	4490		870	
SULFATE	6380	8120	10670	6780	
AMMONIUM	450	100		50	
TSP ($\mu g/m^3$)	38	54	41	24	
SAMPLE COUNT	15	12	1	7	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
BRIDGEPORT	0060	123

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.2	1.5	1.5	1.7	1.5
CHROMIUM	3	17	19	10	13
COPPER	80	200	180	90	140
IRON	890	1400	1330	860	1140
LEAD	70	80	50	50	60
MANGANESE	17	32	26	19	24
NICKEL	13	28	24	21	22
VANADIUM	30	20	20	20	20
ZINC	60	80	70	70	70
WATER SOLUBLES (ng/m³)					
NITRATE	2270	4020	3750	3050	3300
SULFATE	7050	9360	9160	8570	8570
AMMONIUM	390	280	50	130	210
TSP (µg/m³)	57	68	49	48	56
SAMPLE COUNT	14	15	16	13	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
BRISTOL	0070	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.3	0.9	1.5	1.4	1.3
CHROMIUM	2	2	2	2	2
COPPER	50	100	150	110	100
IRON	670	530	530	610	590
LEAD	60	30	10	40	40
MANGANESE	15	12	10	12	12
NICKEL	27	4	6	6	11
VANADIUM	60	10	<10	10	20[a]
ZINC	50	40	50	40	50
WATER SOLUBLES (ng/m³)					
NITRATE	2410	3280	2820	2500	2740
SULFATE	8100	7970	9850	8530	8600
AMMONIUM	410	<10	30	70	130[b]
TSP (µg/m³)	45	45	34	39	41
SAMPLE COUNT	15	14	14	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.
[b] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
BURLINGTON	0085	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.6	0.5	1.2	1.0	0.8
CHROMIUM	1	1	1	1	1
COPPER	50	60	70	50	60
IRON	130	270	240	170	200
LEAD	20	10	10	10	10
MANGANESE	4	7	5	4	5
NICKEL	4	2	4	3	3
VANADIUM	<10	<10	<10	10	<10[a]
ZINC	20	20	30	20	20
WATER SOLUBLES (ng/m3)					
NITRATE	1520	1630	1660	1550	1590
SULFATE	5000	6440	6760	5320	5910
AMMONIUM	100	10	<10	<10	30[b]
TSP (μg/m3)	16	32	22	18	22
SAMPLE COUNT	14	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 1st, 2nd and 3rd quarters.
[b] The average was calculated using one quarter of the reportable limit in the 3rd and 4th quarters.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
DANBURY	0175	002

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.9	1.3	1.3	1.2	1.2
CHROMIUM	3	1	2	2	2
COPPER	50	80	80	40	60
IRON	1340	770	650	760	880
LEAD	50	90	70	50	70
MANGANESE	26	16	10	13	16
NICKEL	12	5	7	8	8
VANADIUM	20	10	10	20	20
ZINC	40	60	60	50	50
WATER SOLUBLES (ng/m3)					
NITRATE	2440	3330	3150	2660	2890
SULFATE	7130	8290	9330	8010	8210
AMMONIUM	250	170	10	50	120
TSP (µg/m3)	75	59	39	43	54
SAMPLE COUNT	15	14	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
DANBURY	0175	123

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.1	1.2	1.1	1.3	1.2
CHROMIUM	3	2	3	3	3
COPPER	60	70	80	60	70
IRON	970	830	740	650	800
LEAD	60	30	20	40	40
MANGANESE	20	16	12	12	15
NICKEL	13	5	7	9	8
VANADIUM	40	10	<10	20	20[a]
ZINC	40	40	40	40	40
WATER SOLUBLES (ng/m^3)					
NITRATE	2230	3130	2960	2430	2690
SULFATE	6740	7910	8810	7470	7750
AMMONIUM	180	80	10	30	70
TSP (μg/m^3)	55	59	40	43	49
SAMPLE COUNT	15	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
EAST HARTFORD	0220	004

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.0	1.8	1.5	1.9	1.8
CHROMIUM	3	2	3	3	3
COPPER	30	50	100	110	70
IRON	870	700	720	680	740
LEAD	60	40	30	50	50
MANGANESE	17	12	11	11	13
NICKEL	11	6	7	10	8
VANADIUM	10	10	<10	20	10[a]
ZINC	40	40	40	50	40
WATER SOLUBLES (ng/m^3)					
NITRATE	2360	3250	2490	2620	2690
SULFATE	6470	8730	9700	7450	8110
AMMONIUM	280	<10	60	150	120[b]
TSP (µg/m^3)	51	49	37	40	44
SAMPLE COUNT	14	15	14	13	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.
[b] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
GREENWICH	0330	008

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.0	1.3	1.1	1.5	1.2
CHROMIUM	2	1	2	2	2
COPPER	70	110	60	50	70
IRON	620	660	720	650	670
LEAD	50	40	10	30	30
MANGANESE	13	10	9	9	10
NICKEL	9	8	8	9	8
VANADIUM	<10	20	10	10	10[a]
ZINC	50	50	60	40	50
WATER SOLUBLES (ng/m^3)					
NITRATE	2660	3880	3340	2440	3110
SULFATE	6970	8720	9950	7770	8450
AMMONIUM	310	270	<10	40	150[b]
TSP (µg/m^3)	41	51	37	35	41
SAMPLE COUNT	12	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 1st quarter.
[b] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
GROTON	0350	006

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.6	0.8	1.0	2.1	1.1
CHROMIUM	1	2	2	2	2
COPPER	50	90	80	60	70
IRON	400	590	750	490	560
LEAD	30	20	<10	30	20[a]
MANGANESE	9	10	12	10	10
NICKEL	27	30	16	15	22
VANADIUM	50	60	30	30	40
ZINC	30	30	40	40	40
WATER SOLUBLES (ng/m³)					
NITRATE	2290	4120	2530	2470	2870
SULFATE	6820	10100	8330	7250	8170
AMMONIUM	280	270	<10	110	160[a]
TSP (µg/m³)	35	51	41	36	41
SAMPLE COUNT	14	15	15	14	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
HARTFORD	0420	003

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.2	1.4	1.5	2.7	2.0
CHROMIUM	4	8	6	5	6
COPPER	40	50	60	40	50
IRON	1030	1130	1400	990	1130
LEAD	60	70	50	60	60
MANGANESE	20	17	17	18	18
NICKEL	14	12	11	12	12
VANADIUM	20	10	10	20	20
ZINC	60	60	100	70	70
WATER SOLUBLES (ng/m3)					
NITRATE	2490	4080	2480	2890	2990
SULFATE	7550	9080	8550[a]	8850	8510
AMMONIUM	300	150	50	50	140
TSP (μg/m3)	61	60	47	52	55
SAMPLE COUNT	15	15	14[a]	15	

[a] The sample count for sulfate in the 3rd quarter is 13.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
HARTFORD	0420	013

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.2	1.2	1.2	2.3	1.4
CHROMIUM	5	2	2	7	4
COPPER	90	110	160	380	180
IRON	810	790	810	1000	850
LEAD	80	60	20	80	60
MANGANESE	19	13	13	17	15
NICKEL	13	9	5	12	10
VANADIUM	10	10	10	20	10
ZINC	50	380	50	70	140
WATER SOLUBLES (ng/m3)					
NITRATE	2470	3660	2950	2900	3000
SULFATE	7550	8600	8780	7790	8210
AMMONIUM	490	190	60	110	210
TSP (μg/m3)	47	51	40	48	46
SAMPLE COUNT	15	15	16	13	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
HARTFORD	0420	014

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.4	1.4	1.1	1.5	1.3
CHROMIUM	3	3	2	3	3
COPPER	30	40	50	40	40
IRON	860	720	760	800	780
LEAD	70	50	30	50	50
MANGANESE	17	14	12	13	14
NICKEL	15	7	5	9	9
VANADIUM	20	10	10	20	20
ZINC	50	40	40	60	50
WATER SOLUBLES (ng/m³)					
NITRATE	2310	4110	2460	2780	2920
SULFATE	7630	8720	8740	7820	8250
AMMONIUM	490	170	40	60	180
TSP (µg/m³)	53	52	37	43	46
SAMPLE COUNT	14	15	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
MORRIS	0478	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.8	1.5	0.7	0.9	1.0
CHROMIUM	1	<1	1	1	1[a]
COPPER	50	140	90	70	90
IRON	270	310	250	240	270
LEAD	20	20	<10	20	20[b]
MANGANESE	5	7	5	5	6
NICKEL	4	3	4	4	4
VANADIUM	<10	<10	<10	<10	<10
ZINC	20	20	30	30	30
WATER SOLUBLES (ng/m^3)					
NITRATE	1240	2050	1520	1370	1550
SULFATE	5530	6920	7200	5960	6430
AMMONIUM	100	<10	30	<10	30[c]
TSP (µg/m^3)	21	36	26	22	26
SAMPLE COUNT	14	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 2nd quarter.
[b] The average was calculated using one quarter of the reportable limit in the 3rd quarter.
[c] The average was calculated using one quarter of the reportable limit in the 2nd and 4th quarters.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
MIDDLETOWN	0570	003

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.3	1.1	0.7	1.4	1.1
CHROMIUM	4	2	2	4	3
COPPER	60	80	80	40	70
IRON	840	650	800	740	760
LEAD	60	40	30	50	50
MANGANESE	21	16	14	15	16
NICKEL	14	9	7	10	10
VANADIUM	20	10	<10	20	10[a]
ZINC	70	40	70	110	70
WATER SOLUBLES (ng/m³)					
NITRATE	2700	3650	2520	2340	2800
SULFATE	8930	8860	9630	8200	8920
AMMONIUM	530	40	10	70	160
TSP (µg/m³)	58	53	41	41	48
SAMPLE COUNT	15	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
MILFORD	0590	002

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1				
CADMIUM	1.5				
CHROMIUM	10				
COPPER	170				
IRON	760				
LEAD	40				
MANGANESE	16				
NICKEL	20				
VANADIUM	30				
ZINC	70				
WATER SOLUBLES (ng/m3					
NITRATE	2700				
SULFATE	7850				
AMMONIUM	420				
TSP (µg/m3)	46				
SAMPLE COUNT	11				

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NAUGATUCK	0660	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	3.4	7.7	8.5	4.0	6.1
CHROMIUM	4	4	3	4	4
COPPER	60	50	50	50	50
IRON	720	670	860	660	740
LEAD	70	50	40	70	60
MANGANESE	14	13	18	15	15
NICKEL	10	7	8	8	8
VANADIUM	20	10	10	10	10
ZINC	60	60	80	90	70
WATER SOLUBLES (ng/m³)					
NITRATE	2180	3410	2860	2620	2780
SULFATE	8050	9350	10070	9070	9160
AMMONIUM	530	90	<10	60	180[a]
TSP (μg/m³)	47	50	39	39	44
SAMPLE COUNT	15	15	16	11	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NEW BRITAIN	0680	007

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.3	1.2	2.4	0.9	1.5
CHROMIUM	3	4	2	8	4
COPPER	30	50	80	60	60
IRON	610	590	520	550	570
LEAD	60	40	20	60	40
MANGANESE	12	10	9	10	10
NICKEL	11	6	5	9	8
VANADIUM	20	<10	10	10	10[a]
ZINC	40	40	40	40	40
WATER SOLUBLES (ng/m³)					
NITRATE	2790	3520	2900	2700	2990
SULFATE	6960	9040	8940	8120	8280
AMMONIUM	470	90	10	50	160
TSP (µg/m³)	42	46	34	37	40
SAMPLE COUNT	15	15	16	13	

[a] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NEW BRITAIN	0680	008

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.7	0.7	0.7	0.9	0.7
CHROMIUM	2	2	2	2	2
COPPER	40	100	100	60	70
IRON	590	650	640	520	600
LEAD	60	40	30	50	50
MANGANESE	12	12	10	9	11
NICKEL	6	5	5	7	6
VANADIUM	10	10	10	10	10
ZINC	30	40	40	50	40
WATER SOLUBLES (ng/m3)					
NITRATE	2190	3810	2840	2680	2850
SULFATE	6600	8760	9110	7220	7900
AMMONIUM	360	210	40	50	170
TSP (µg/m3)	38	49	33	35	39
SAMPLE COUNT	15	13	15	14	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NEW BRITAIN	0680	009

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.1	1.4	0.7	0.9	1.0
CHROMIUM	1	3	4	3	3
COPPER	80	150	170	100	130
IRON	460	500	570	390	480
LEAD	60	30	20	40	40
MANGANESE	10	10	10	8	10
NICKEL	8	6	6	7	7
VANADIUM	10	<10	10	20	10[a]
ZINC	40	40	60	60	50
WATER SOLUBLES (ng/m3)					
NITRATE	1970	3570	2650	2240	2620
SULFATE	6660	8130	8340	7570	7680
AMMONIUM	490	100	70	100	190
TSP (μg/m3)	36	44	32	32	36
SAMPLE COUNT	15	15	15	13	

[a] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NEW HAVEN	0700	002

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.8	1.0	1.6	0.9	1.1
CHROMIUM	6	2	2	5	4
COPPER	150	110	160	590	260
IRON	1260	780	1160	860	1020
LEAD	100	50	50	50	60
MANGANESE	25	13	18	13	17
NICKEL	26	7	9	14	14
VANADIUM	30	10	10	20	20
ZINC	70	40	50	50	50
WATER SOLUBLES (ng/m3)					
NITRATE	3040	3860	2980	2430	3050
SULFATE	7640[a]	7910	8790	7910	8120
AMMONIUM	840	200	<10	160	270[b]
TSP (µg/m3)	70[a]	52	42	43	50
SAMPLE COUNT	12[a]	12	16	14	

[a] The sample count for sulfate and TSP in the 1st quarter is 11.
[b] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NEW HAVEN	0700	013

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.6	2.0	1.6	0.9	1.5
CHROMIUM	3	3	2	2	2
COPPER	150	230	140	80	150
IRON	790	850	800	670	780
LEAD	70	50	30	60	50
MANGANESE	15	15	11	11	13
NICKEL	25	12	8	15	15
VANADIUM	50	10	10	30	30
ZINC	60	70	50	70	60
WATER SOLUBLES (ng/m³)					
NITRATE	2680	4560	3340	2480	3220
SULFATE	7970	9320	10060	8770	9040
AMMONIUM	700	330	20	170	300
TSP (µg/m³)	52	59	41	43	48
SAMPLE COUNT	15	13	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NORWALK	0820	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1			
CADMIUM	1.3	1.8			
CHROMIUM	3	2			
COPPER	80	100			
IRON	910	1370			
LEAD	50	40			
MANGANESE	16	13			
NICKEL	9	9			
VANADIUM	10	<10			
ZINC	90	80			
WATER SOLUBLES (ng/m3)					
NITRATE	2190	3410			
SULFATE	7420	9450			
AMMONIUM	290	180			
TSP (µg/m3)	47	53			
SAMPLE COUNT	15	15			

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NORWALK	0820	005

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.3	1.3	1.5	0.6	1.2
CHROMIUM	4	2	3	2	3
COPPER	70	210	290	180	180
IRON	1640	980	1130	900	1170
LEAD	70	40	40	50	50
MANGANESE	29	17	14	13	19
NICKEL	12	8	8	9	9
VANADIUM	20	<10	10	10	10[a]
ZINC	100	70	80	90	90
WATER SOLUBLES (ng/m^3)					
NITRATE	2670	4270	3190	2410	3150
SULFATE	8160	9730	10710	8220	9140
AMMONIUM	330	200	10	80	160
TSP (µg/m^3)	78	62	54	46	61
SAMPLE COUNT	15	15	12	14	

[a] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NORWALK	0820	012

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.0	1.5	1.1	1.0	1.1
CHROMIUM	3	3	2	2	3
COPPER	40	70	90	30	60
IRON	870	970	890	620	840
LEAD	70	50	30	40	50
MANGANESE	16	14	11	10	13
NICKEL	10	7	6	9	8
VANADIUM	10	10	<10	10	10[a]
ZINC	60	60	60	50	60
WATER SOLUBLES (ng/m3)					
NITRATE	2630	4300	3470	2740	3290
SULFATE	6960	9130	9980	7710	8450
AMMONIUM	380	230	50	100	190
TSP (µg/m3)	48	58	42	39	47
SAMPLE COUNT	15	15	15	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
NORWICH	0840	002

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.1	1.6	1.1	2.0	1.4
CHROMIUM	3	1	1	2	2
COPPER	180	170	150	110	150
IRON	870	570	730	500	670
LEAD	70	40	30	40	50
MANGANESE	16	10	10	8	11
NICKEL	12	10	12	11	11
VANADIUM	10	10	20	20	20
ZINC	50	50	40	40	50
WATER SOLUBLES (ng/m^3)					
NITRATE	2700	3670	2440	2080	2710
SULFATE	7970	10090	9000	7630	8650
AMMONIUM	380	210	10	70	170
TSP ($\mu g/m^3$)	56	51	37	39	46
SAMPLE COUNT	15	14	15	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
STAMFORD	1080	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.2	1.6	1.1	1.5	1.3
CHROMIUM	3	2	6	3	4
COPPER	30	40	60	50	50
IRON	740	940	930	670	810
LEAD	50	50	40	40	50
MANGANESE	16	15	12	12	14
NICKEL	21	11	11	13	14
VANADIUM	30	20	20	20	20
ZINC	60	60	70	70	70
WATER SOLUBLES (ng/m^3)					
NITRATE	2920	5000	3680	2610	3500
SULFATE	7480	10070	10660	8210	9050
AMMONIUM	320	340	20	130	200
TSP ($\mu g/m^3$)	49	68	46	45	51
SAMPLE COUNT	15	13	14	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
STAMFORD	1080	007

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.3	2.0	6.9	4.2	3.9
CHROMIUM	3	2	2	3	3
COPPER	20	40	50	50	40
IRON	600	680	700	720	680
LEAD	70	50	40	80	60
MANGANESE	17	12	12	15	14
NICKEL	17	10	9	13	12
VANADIUM	30	30	10	20	20
ZINC	90	80	100	180	110
WATER SOLUBLES (ng/m³)					
NITRATE	3020	4020	3460	2920	3340
SULFATE	7710	9500	10020	8400	8890
AMMONIUM	400	280	60	90	210
TSP (µg/m³)	51	57	42	50	50
SAMPLE COUNT	15	14	15	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
STAMFORD	1080	021

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.8	2.0	1.9	1.3	1.7
CHROMIUM	3	2	2	3	3
COPPER	50	60	70	50	60
IRON	830	880	890	720	830
LEAD	60	50	60	130	80
MANGANESE	15	14	13	12	13
NICKEL	15	12	9	14	12
VANADIUM	20	30	20	20	20
ZINC	60	70	80	70	70
WATER SOLUBLES (ng/m^3)					
NITRATE	3770	4760	3870	3010	3820
SULFATE	7670	9810	10700	8880	9270
AMMONIUM	650	330	60	210	310
TSP ($\mu g/m^3$)	46	67	49	42	51
SAMPLE COUNT	14	13	15	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
STRATFORD	1110	0005

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.0	2.9	2.9	2.6	2.6
CHROMIUM	4	4	18	3	7
COPPER	120	130	80	40	90
IRON	1210	780	780	570	830
LEAD	120	50	30	100	70
MANGANESE	18	12	11	11	13
NICKEL	16	13	19	11	15
VANADIUM	30	20	20	20	20
ZINC	70	50	50	60	60
WATER SOLUBLES (ng/m^3)					
NITRATE	2200	4260	3120	2780	3090
SULFATE	7190	8910	9470	7960	8400
AMMONIUM	280	230	10	130	160
TSP ($\mu g/m^3$)	57	57	40	41	49
SAMPLE COUNT	15	15	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
TORRINGTON	1160	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.0	1.2	0.8	1.6	1.1
CHROMIUM	4	2	2	3	3
COPPER	120	150	140	80	120
IRON	1030	520	580	750	690
LEAD	70	40	70	50	60
MANGANESE	16	7	10	21	13
NICKEL	10	3	4	5	5
VANADIUM	20	10	10	10	10
ZINC	50	50	50	50	50
WATER SOLUBLES (ng/m³)					
NITRATE	2100	2620	2080	2500	2320
SULFATE	9000	8630	9110	7730	8620
AMMONIUM	350	60	<10	50	90[a]
TSP (μg/m³)	55	45	33	43	43
SAMPLE COUNT	9	12	16	13	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
VOLUNTOWN	1205	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.0	1.3	0.7	1.1	1.0
CHROMIUM	1	<1	<1	1	1[a]
COPPER	180	140	180	100	150
IRON	140	190	180	110	160
LEAD	30	10	<10	10	10[b]
MANGANESE	4	4	4	3	4
NICKEL	5	4	3	3	4
VANADIUM	10	10	<10	<10	10[c]
ZINC	30	20	30	20	30
WATER SOLUBLES (ng/m3)					
NITRATE	1620	2210	1220	1540	1650
SULFATE	5410	7500	6630	5540	6280
AMMONIUM	140	90	<10	10	60[b]
TSP (μg/m3)	20	30	22	18	22
SAMPLE COUNT	14	15	15	15	

[a] The average was calculated using one quarter of the reportable limit in the 2nd and 3rd quarters.
[b] The average was calculated using one quarter of the reportable limit in the 3rd quarter.
[c] The average was calculated using one quarter of the reportable limit in the 3rd and 4th quarters.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
WALLINGFORD	1210	001

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m^3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.1	1.4	1.3	2.3	1.5
CHROMIUM	3	3	2	3	3
COPPER	40	50	40	30	40
IRON	910	720	650	590	720
LEAD	60	40	10	40	40
MANGANESE	17	10	10	10	12
NICKEL	17	9	7	9	10
VANADIUM	20	20	10	20	20
ZINC	40	60	40	50	50
WATER SOLUBLES (ng/m^3)					
NITRATE	2440	3910	2710	2630	2920
SULFATE	8280	9390	9600	8270	8900
AMMONIUM	340	130	<10	90	140[a]
TSP ($\mu g/m^3$)	53	50	37	40	45
SAMPLE COUNT	15	15	16	15	

[a] The average was calculated using one quarter of the reportable limit in the 3rd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
WATERBURY	1240	005

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.8	2.5	3.6	1.8	2.5
CHROMIUM	27	7	5	18	14
COPPER	80	130	100	90	100
IRON	960	630	800	740	780
LEAD	90	50	40	80	60
MANGANESE	17	10	12	12	13
NICKEL	15	6	8	10	10
VANADIUM	30	10	10	20	20
ZINC	270	100	100	220	170
WATER SOLUBLES (ng/m³)					
NITRATE	2840	3060	2530	2630	2750
SULFATE	8460	7790	9140	7640	8280
AMMONIUM	1080	240	170	200	400
TSP (µg/m³)	58	50	38	42	46
SAMPLE COUNT	13	13	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
WATERBURY	1240	006

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	0.9	1.5	2.6	1.5	1.6
CHROMIUM	8	6	3	6	6
COPPER	60	60	100	70	70
IRON	900	380	480	530	580
LEAD	40	30	20	40	30
MANGANESE	15	8	8	9	10
NICKEL	11	4	6	8	7
VANADIUM	10	<10	10	10	10[a]
ZINC	90	50	60	130	80
WATER SOLUBLES (ng/m³)					
NITRATE	2540	3190	2540	3010	2810
SULFATE	7330	8320	9770	8230	8420
AMMONIUM	500	120	10	90	180
TSP (µg/m³)	37	41	34	36	37
SAMPLE COUNT	15	14	15	14	

[a] The average was calculated using one quarter of the reportable limit in the 2nd quarter.

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN	AREA	SITE
WATERBURY	1240	007

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m³)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.5	3.4	3.6	2.2	2.7
CHROMIUM	9	14	16	14	13
COPPER	40	80	100	80	80
IRON	1090	880	890	1200	1020
LEAD	80	70	40	90	70
MANGANESE	21	13	13	19	17
NICKEL	16	10	11	15	13
VANADIUM	30	10	10	30	20
ZINC	90	110	100	180	120
WATER SOLUBLES (ng/m³)					
NITRATE	2340	4110	3150	2840	3080
SULFATE	8430	9150	10720	8910	9330
AMMONIUM	520	170	60	130	220
TSP (µg/m³)	59	61	49	60	57
SAMPLE COUNT	15	13	16	15	

TABLE 9, CONTINUED

QUARTERLY CHEMICAL CHARACTERIZATION OF 1987 HI-VOL TSP

TOWN WILLIMANTIC — AREA 1410 — SITE 002

	QUARTERLY AVG				ANNUAL AVG
	1ST	2ND	3RD	4TH	
METALS (ng/m3)					
BERYLLIUM	<.1	<.1	<.1	<.1	<.1
CADMIUM	2.3	1.5	0.9	0.6	1.5
CHROMIUM	3	1	1	1	2
COPPER	50	100	150	60	90
IRON	1170	490	530	500	720
LEAD	120	30	30	50	60
MANGANESE	17	8	8	6	11
NICKEL	64	9	4	9	25
VANADIUM	160	20	10	20	60
ZINC	170	50	30	100	90
WATER SOLUBLES (ng/m3)					
NITRATE	2210	3190	2650	1640	2520
SULFATE	10110	8420	8380	9200	9070
AMMONIUM	550	10	10	50	190
TSP (μg/m3)	66	43	33	54	50
SAMPLE COUNT	15	14	11	7	

TABLE 10

MONTHLY CHEMICAL CHARACTERIZATION OF 1987 LO-VOL TSP

TOWN	AREA	SITE
MANSFIELD	0520	001

	MONTHLY AVERAGE												ANNUAL AVG
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
METALS (ng/m³)													
BERYLLIUM	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1		<.1	<.1
CADMIUM	1.1	.7	0.4	1.3	0.4	0.6	.1	0.2	0.1	0.6		.4	0.5
CHROMIUM	5	1	3	<1	1	<1	1	1	2	1		1	2[a]
COPPER	10	10	10	<10	<10	<10	<10	10	10	10		<10	10[b]
IRON	550	440	650	330	510	530	600	480	640	510		430	520
LEAD	30	20	20	10	10	20	20	10	10	20		20	20
MANGANESE	17	8	11	4	10	8	9	8	8	10		8	9
NICKEL	10	6	6	4	11	10	10	11	10	8		9	9
VANADIUM	10	10	10	10	20	20	20	20	20	10		20	20
ZINC	100	20	20	20	20	30	30	30	30	30		40	30
WATER SOLUBLES (ng/m³)													
NITRATE	980	2080	2970	1840	1470	2630	730	2630	2470	2380		2490	2060
SULFATE	2440	3750	5170	4540	5310	8510	10930	5970	6630	5570		5380	6420
AMMONIUM	600	90	380	<10	30	130	260	<10	10	<10		260	160[c]
TSP (µg/m³)	19	29	40	23	55	42	37	29	32	28		27	33

[a] The average was calculated using one quarter of the reportable limit in April and June.
[b] The average was calculated using one quarter of the reportable limit in April, May, June, July, and December.
[c] The average was calculated using one quarter of the reportable limit in April, August, and October.

TABLE 10, CONTINUED

MONTHLY CHEMICAL CHARACTERIZATION OF 1987 LO-VOL TSP

TOWN	AREA	SITE
PUTNAM	0900	002

	MONTHLY AVERAGE												ANNUAL AVG
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
METALS (ng/m³)													
BERYLLIUM	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
CADMIUM	1.4	0.6	1.7	0.4	0.9	0.1	0.5	0.7	0.1	0.6	0.7	1.2	0.7
CHROMIUM	6	3	12	1	<1	1	12	3	8	5	3	4	5[a]
COPPER	40	50	10	<10	<10	<10	10	10	<10	<10	10	10	10[b]
IRON	530	880	950	310	350	400	650	860	380	340	720	570	580
LEAD	30	20	20	10	10	10	20	20	20	30	40	40	20
MANGANESE	15	12	13	4	7	7	10	10	6	7	13	9	9
NICKEL	11	7	11	5	3	2	15	6	7	5	10	11	8
VANADIUM	<10	10	20	10	<10	<10	10	10	10	10	20	20	10[c]
ZINC	110	50	30	20	30	20	40	30	30	30	40	40	40
WATER SOLUBLES (ng/m³)													
NITRATE	1390	2070	2540	1540	1000	3090	1660	2340	1910	2250	3190	2170	2100
SULFATE	7500	5140	5370	5570	4880	7200	12830	6110	6250	5840	6350	6480	6630
AMMONIUM	20	40	110	10	40	10	110	<10	<10	<10	10	60	30[d]
TSP (µg/m³)	39	52	53	26	46	42	36	30	25	27	43	40	38

[a] The average was calculated using one quarter of the reportable limit in May.
[b] The average was calculated using one quarter of the reportable limit in April, May, June, September, and October.
[c] The average was calculated using one quarter of the reportable limit in January, May, and June.
[d] The average was calculated using one quarter of the reportable limit in August, September, and October.

TABLE 11

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
ANSONIA-004 (0059)	TSP	83	81	77	75	73	71	66	66	62	61
	DATE	1/ 9/87	6/20/87	7/20/87	6/ 8/87	12/23/87	5/ 8/87	10/24/87	4/15/87	11/23/87	3/28/87
METEOROLOGICAL SITE	DIR (DEG)	260	170	200	250	270	110	170	150	200	40
NEWARK	VEL (MPH)	6.2	4.4	4.7	10.4	8.6	3.2	5.1	4.1	5.0	7.0
	SPD (MPH)	8.2	6.9	6.5	11.6	9.1	6.6	5.3	5.6	6.3	9.5
	RATIO	0.754	0.632	0.726	0.896	0.946	0.484	0.951	0.728	0.795	0.741
METEOROLOGICAL SITE	DIR (DEG)	310	360	210	240	290	80	180	170	180	10
BRADLEY	VEL (MPH)	5.7	4.5	7.2	7.1	5.8	.5	7.0	1.7	6.1	5.5
	SPD (MPH)	6.3	4.6	8.9	8.8	6.9	6.3	8.2	5.2	7.8	5.9
	RATIO	0.903	0.987	0.813	0.813	0.843	0.086	0.855	0.331	0.788	0.926
METEOROLOGICAL SITE	DIR (DEG)	310	130	210	240	280	150	160	190	230	50
BRIDGEPORT	VEL (MPH)	5.6	1.7	5.6	7.2	9.5	6.0	2.9	2.1	10.4	6.3
	SPD (MPH)	6.0	4.2	5.9	7.3	10.1	6.8	4.6	3.7	11.5	8.5
	RATIO	0.920	0.413	0.957	0.983	0.942	0.894	0.629	0.555	0.902	0.749
METEOROLOGICAL SITE	DIR (DEG)	310	340	240	270	290	90	220	80	240	40
WORCESTER	VEL (MPH)	7.8	4.7	6.4	5.9	6.2	1.3	5.4	2.8	7.6	4.5
	SPD (MPH)	9.1	5.6	8.2	7.8	6.6	5.9	7.3	5.2	8.8	4.9
	RATIO	0.861	0.836	0.778	0.758	0.942	0.214	0.738	0.536	0.862	0.923
BRIDGEPORT-001 (0060)	TSP	107	96	88	77	69	63	62	61	59	58
	DATE	6/20/87	6/ 8/87	5/ 9/87	2/ 2/87	3/ 4/87	7/20/87	4/27/87	2/14/87	10/ 6/87	1/ 9/87
METEOROLOGICAL SITE	DIR (DEG)	170	250	240	220	360	200	100	320	150	260
NEWARK	VEL (MPH)	4.4	10.4	10.7	6.5	9.3	4.7	8.5	10.2	6.1	6.2
	SPD (MPH)	6.9	11.6	11.1	7.3	10.8	6.5	11.9	11.2	6.9	8.2
	RATIO	0.632	0.896	0.964	0.892	0.859	0.726	0.714	0.909	0.891	0.754
METEOROLOGICAL SITE	DIR (DEG)	360	240	240	240	360	210	110	340	170	310
BRADLEY	VEL (MPH)	4.5	7.1	6.2	2.7	5.3	7.2	5.1	4.6	4.7	5.7
	SPD (MPH)	4.6	8.8	9.2	4.9	6.3	8.9	8.2	6.8	7.3	6.3
	RATIO	0.987	0.813	0.674	0.554	0.838	0.813	0.626	0.675	0.638	0.903
METEOROLOGICAL SITE	DIR (DEG)	130	240	220	250	360	210	120	330	190	310
BRIDGEPORT	VEL (MPH)	1.7	7.2	9.0	6.3	4.3	5.6	9.0	7.9	4.8	5.6
	SPD (MPH)	4.2	7.3	9.6	7.2	8.3	5.9	10.8	8.8	6.6	6.0
	RATIO	0.413	0.983	0.935	0.875	0.514	0.957	0.837	0.906	0.732	0.920
METEOROLOGICAL SITE	DIR (DEG)	340	270	290	280	10	240	100	320	210	310
WORCESTER	VEL (MPH)	4.7	5.9	10.1	6.0	5.3	6.4	6.4	8.4	4.3	7.8
	SPD (MPH)	5.6	7.8	11.9	6.8	5.6	8.2	7.6	8.9	7.2	9.1
	RATIO	0.836	0.758	0.843	0.883	0.942	0.778	0.836	0.939	0.600	0.861
BRIDGEPORT-009 (0035)	TSP	93	83	71	70	62	55	52	51	50	49
	DATE	6/ 8/87	5/ 9/87	2/ 2/87	4/27/87	4/15/87	5/15/87	5/21/87	3/28/87	6/ 2/87	1/15/87
METEOROLOGICAL SITE	DIR (DEG)	250	240	220	100	150	270	80	40	90	250
NEWARK	VEL (MPH)	10.4	10.7	6.5	8.5	4.1	4.7	4.9	7.0	3.8	10.0
	SPD (MPH)	11.6	11.1	7.3	11.9	5.6	11.6	8.8	9.5	8.3	10.9
	RATIO	0.896	0.964	0.892	0.714	0.728	0.404	0.555	0.741	0.452	0.920
METEOROLOGICAL SITE	DIR (DEG)	240	240	240	110	170	310	190	10	30	250
BRADLEY	VEL (MPH)	7.1	6.2	2.7	5.1	1.7	6.0	5.9	5.5	4.9	4.4
	SPD (MPH)	8.8	9.2	4.9	8.2	5.2	11.1	8.9	5.9	7.2	5.6
	RATIO	0.813	0.674	0.554	0.626	0.331	0.540	0.662	0.926	0.678	0.780

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	240	220	250	120	190	290	110	50	70	260
BRIDGEPORT	VEL (MPH)	7.2	9.0	6.3	9.0	2.1	4.9	6.6	6.3	5.5	9.0
	SPD (MPH)	7.3	9.6	7.2	10.8	3.7	9.2	7.2	8.5	5.9	9.3
	RATIO	0.983	0.935	0.875	0.837	0.555	0.537	0.919	0.749	0.940	0.960
METEOROLOGICAL SITE	DIR (DEG)	270	290	280	100	80	300	220	40	60	280
WORCESTER	VEL (MPH)	5.9	10.1	6.0	6.4	2.8	9.4	6.0	4.5	5.5	6.4
	SPD (MPH)	7.8	11.9	6.8	7.6	5.2	14.1	7.2	4.9	5.9	7.8
	RATIO	0.758	0.843	0.883	0.836	0.536	0.670	0.832	0.923	0.926	0.830
BRIDGEPORT-123 (0058)	TSP	117	115	107	84	82	78	77	75	74	73
	DATE	5/ 9/87	6/20/87	6/ 8/87	2/14/87	11/ 5/87	7/20/87	1/ 9/87	5/15/87	4/27/87	6/14/87
METEOROLOGICAL SITE	DIR (DEG)	240	170	250	320	290	200	260	270	100	240
NEWARK	VEL (MPH)	10.7	4.4	10.4	10.2	11.7	4.7	6.2	4.7	8.5	9.8
	SPD (MPH)	11.1	6.9	11.6	11.2	13.5	6.5	8.2	11.6	11.9	10.6
	RATIO	0.964	0.632	0.896	0.909	0.867	0.726	0.754	0.404	0.714	0.923
METEOROLOGICAL SITE	DIR (DEG)	240	360	240	340	310	210	310	310	110	250
BRADLEY	VEL (MPH)	6.2	4.5	7.1	4.6	10.5	7.2	5.7	6.0	5.1	4.9
	SPD (MPH)	9.2	4.6	8.8	6.8	12.9	8.9	6.3	11.1	8.2	7.8
	RATIO	0.674	0.987	0.813	0.675	0.808	0.813	0.903	0.540	0.626	0.635
METEOROLOGICAL SITE	DIR (DEG)	220	130	240	330	310	210	310	290	120	230
BRIDGEPORT	VEL (MPH)	9.0	1.7	7.2	7.9	7.6	5.6	5.6	4.9	9.0	6.4
	SPD (MPH)	9.6	4.2	7.3	8.8	8.9	5.9	6.0	9.2	10.8	6.5
	RATIO	0.935	0.413	0.983	0.906	0.853	0.957	0.920	0.537	0.837	0.987
METEOROLOGICAL SITE	DIR (DEG)	290	340	270	320	300	240	310	300	100	270
WORCESTER	VEL (MPH)	10.1	4.7	5.9	8.4	11.1	6.4	7.8	9.4	6.4	6.3
	SPD (MPH)	11.9	5.6	7.8	8.9	12.5	8.2	9.1	14.1	7.6	8.2
	RATIO	0.843	0.836	0.758	0.939	0.886	0.778	0.861	0.670	0.836	0.774
BRISTOL-001 (0058)	TSP	74	72	67	67	63	61	61	60	58	55
	DATE	5/ 9/87	11/17/87	11/23/87	4/15/87	3/28/87	3/10/87	12/23/87	1/ 9/87	7/20/87	3/16/87
METEOROLOGICAL SITE	DIR (DEG)	240	130	200	150	40	20	270	260	200	350
NEWARK	VEL (MPH)	10.7	5.3	5.0	4.1	7.0	19.6	8.6	6.2	4.7	12.5
	SPD (MPH)	11.1	6.9	6.3	5.6	9.5	19.7	9.1	8.2	6.5	13.8
	RATIO	0.964	0.770	0.795	0.728	0.741	0.994	0.946	0.754	0.726	0.907
METEOROLOGICAL SITE	DIR (DEG)	240	180	180	170	10	30	290	310	210	360
BRADLEY	VEL (MPH)	6.2	5.4	6.1	1.7	5.5	16.5	5.8	5.7	7.2	9.9
	SPD (MPH)	9.2	7.5	7.8	5.2	5.9	17.7	6.9	6.3	8.9	10.4
	RATIO	0.674	0.727	0.788	0.331	0.926	0.933	0.843	0.903	0.813	0.959
METEOROLOGICAL SITE	DIR (DEG)	220	160	230	190	50	20	280	310	210	350
BRIDGEPORT	VEL (MPH)	9.0	5.4	10.4	2.1	6.3	12.7	9.5	5.6	5.6	12.0
	SPD (MPH)	9.6	8.6	11.5	3.7	8.5	14.1	10.1	6.0	5.9	12.2
	RATIO	0.935	0.624	0.902	0.555	0.749	0.898	0.942	0.920	0.957	0.980
METEOROLOGICAL SITE	DIR (DEG)	290	210	240	80	40	20	290	310	240	340
WORCESTER	VEL (MPH)	10.1	7.1	7.6	2.8	4.5	9.1	6.2	7.8	6.4	9.9
	SPD (MPH)	11.9	8.5	8.8	5.2	4.9	9.5	6.6	9.1	8.2	10.1
	RATIO	0.843	0.833	0.862	0.536	0.923	0.959	0.942	0.861	0.778	0.985

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
BURLINGTON-001 (0060)	TSP	64	54	44	40	40	38	36	35	33	32
	DATE	5/ 9/87	6/ 8/87	5/15/87	7/14/87	6/20/87	7/20/87	11/ 5/87	5/ 3/87	4/15/87	10/24/87
METEOROLOGICAL SITE	DIR (DEG)	240	250	270	200	170	200	290	30	150	170
NEWARK	VEL (MPH)	10.7	10.4	4.7	4.7	4.4	4.7	11.7	9.2	4.1	5.1
	SPD (MPH)	11.1	11.6	11.6	8.3	6.9	6.5	13.5	9.5	5.6	5.3
	RATIO	0.964	0.896	0.404	0.560	0.632	0.726	0.867	0.975	0.728	0.951
METEOROLOGICAL SITE	DIR (DEG)	240	240	310	220	360	210	310	360	170	180
BRADLEY	VEL (MPH)	6.2	7.1	6.0	5.9	4.5	7.2	10.5	4.5	1.7	7.0
	SPD (MPH)	9.2	8.8	11.1	9.3	4.6	8.9	12.9	5.9	5.2	8.2
	RATIO	0.674	0.813	0.540	0.629	0.987	0.813	0.808	0.766	0.331	0.855
METEOROLOGICAL SITE	DIR (DEG)	220	240	290	200	130	210	310	60	190	160
BRIDGEPORT	VEL (MPH)	9.0	7.2	4.9	6.1	1.7	5.6	7.6	5.0	2.1	2.9
	SPD (MPH)	9.6	7.3	9.2	6.5	4.2	5.9	8.9	6.0	3.7	4.6
	RATIO	0.935	0.983	0.537	0.950	0.413	0.957	0.853	0.831	0.555	0.629
METEOROLOGICAL SITE	DIR (DEG)	290	270	300	230	340	240	300	80	80	220
WORCESTER	VEL (MPH)	10.1	5.9	9.4	5.2	4.7	6.4	11.1	4.1	2.8	5.4
	SPD (MPH)	11.9	7.8	14.1	7.9	5.6	8.2	12.5	5.8	5.2	7.3
	RATIO	0.843	0.758	0.670	0.656	0.836	0.778	0.886	0.716	0.536	0.738
DANBURY-002 (0060)	TSP	135	122	110	109	107	103	93	88	82	81
	DATE	3/16/87	2/20/87	4/ 3/87	2/26/87	2/14/87	3/ 4/87	1/ 9/87	5/ 9/87	3/10/87	6/ 8/87
METEOROLOGICAL SITE	DIR (DEG)	350	320	330	350	320	360	260	240	20	250
NEWARK	VEL (MPH)	12.5	10.9	2.3	10.2	10.2	9.3	6.2	10.7	19.6	10.4
	SPD (MPH)	13.8	11.2	8.6	10.5	11.2	10.8	8.2	11.1	19.7	11.6
	RATIO	0.907	0.977	0.268	0.969	0.909	0.859	0.754	0.964	0.994	0.896
METEOROLOGICAL SITE	DIR (DEG)	360	330	340	10	340	360	310	240	30	240
BRADLEY	VEL (MPH)	9.9	8.0	1.6	6.0	4.6	5.3	5.7	6.2	16.5	7.1
	SPD (MPH)	10.4	8.6	7.0	6.8	6.8	6.3	6.3	9.2	17.7	8.8
	RATIO	0.959	0.929	0.232	0.893	0.675	0.838	0.903	0.674	0.933	0.813
METEOROLOGICAL SITE	DIR (DEG)	350	330	110	340	330	360	310	220	20	240
BRIDGEPORT	VEL (MPH)	12.0	9.8	5.0	9.3	7.9	4.3	5.6	9.0	12.7	7.2
	SPD (MPH)	12.2	9.9	7.5	9.6	8.8	8.3	6.0	9.6	14.1	7.3
	RATIO	0.980	0.983	0.673	0.962	0.906	0.514	0.920	0.935	0.898	0.983
METEOROLOGICAL SITE	DIR (DEG)	340	330	180	350	320	10	310	290	20	270
WORCESTER	VEL (MPH)	9.9	10.9	1.5	10.1	8.4	5.3	7.8	10.1	9.1	5.9
	SPD (MPH)	10.1	11.4	4.6	10.5	8.9	5.6	9.1	11.9	9.5	7.8
	RATIO	0.985	0.959	0.326	0.960	0.939	0.942	0.861	0.843	0.959	0.758
DANBURY-123 (0061)	TSP	106	95	94	90	81	78	74	70	70	69
	DATE	4/ 3/87	5/ 9/87	1/ 9/87	11/ 5/87	6/ 8/87	3/28/87	12/23/87	3/16/87	4/27/87	2/20/87
METEOROLOGICAL SITE	DIR (DEG)	330	240	260	290	250	40	270	350	100	320
NEWARK	VEL (MPH)	2.3	10.7	6.2	11.7	10.4	7.0	8.6	12.5	8.5	10.9
	SPD (MPH)	8.6	11.1	8.2	13.5	11.6	9.5	9.1	13.8	11.9	11.2
	RATIO	0.268	0.964	0.754	0.867	0.896	0.741	0.946	0.907	0.714	0.977
METEOROLOGICAL SITE	DIR (DEG)	340	240	310	310	240	10	290	360	110	330
BRADLEY	VEL (MPH)	1.6	6.2	5.7	10.5	7.1	5.5	5.8	9.9	5.1	8.0
	SPD (MPH)	7.0	9.2	6.3	12.9	8.8	5.9	6.9	10.4	8.2	8.6
	RATIO	0.232	0.674	0.903	0.808	0.813	0.926	0.843	0.959	0.626	0.929

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	110	220	310	310	240	50	280	350	120	330
BRIDGEPORT	VEL (MPH)	5.0	9.0	5.6	7.6	7.2	6.3	9.5	12.0	9.0	9.8
	SPD (MPH)	7.5	9.6	6.0	8.9	7.3	8.5	10.1	12.2	10.8	9.9
	RATIO	0.673	0.935	0.920	0.853	0.983	0.749	0.942	0.980	0.837	0.983
METEOROLOGICAL SITE	DIR (DEG)	180	290	310	300	270	40	290	340	100	330
WORCESTER	VEL (MPH)	1.5	10.1	7.8	11.1	5.9	4.5	6.2	9.9	6.4	10.9
	SPD (MPH)	4.6	11.9	9.1	12.5	7.8	4.9	6.6	10.1	7.6	11.4
	RATIO	0.326	0.843	0.861	0.886	0.758	0.923	0.942	0.985	0.836	0.959
EAST HARTFORD-004 (0056)	TSP	92	79	75	74	71	70	70	70	65	64
	DATE	2/ 2/87	12/23/87	5/ 9/87	1/ 9/87	1/27/87	3/10/87	7/20/87	1/21/87	6/ 8/87	4/15/87
METEOROLOGICAL SITE	DIR (DEG)	220	270	240	260	10	20	200	270	250	150
NEWARK	VEL (MPH)	6.5	8.6	10.7	6.2	9.4	19.6	4.7	7.6	10.4	4.1
	SPD (MPH)	7.3	9.1	11.1	8.2	9.6	19.7	6.5	8.6	11.6	5.6
	RATIO	0.892	0.946	0.964	0.754	0.975	0.994	0.726	0.886	0.896	0.728
METEOROLOGICAL SITE	DIR (DEG)	240	290	240	310	10	30	210	270	240	170
BRADLEY	VEL (MPH)	2.7	5.8	6.2	5.7	3.8	16.5	7.2	2.3	7.1	1.7
	SPD (MPH)	4.9	6.9	9.2	6.3	4.3	17.7	8.9	3.6	8.8	5.2
	RATIO	0.554	0.843	0.674	0.903	0.880	0.933	0.813	0.628	0.813	0.331
METEOROLOGICAL SITE	DIR (DEG)	250	280	220	310	30	20	210	310	240	190
BRIDGEPORT	VEL (MPH)	6.3	9.5	9.0	5.6	6.3	12.7	5.6	4.8	7.2	2.1
	SPD (MPH)	7.2	10.1	9.6	6.0	6.8	14.1	5.9	5.9	7.3	3.7
	RATIO	0.875	0.942	0.935	0.920	0.937	0.898	0.957	0.817	0.983	0.555
METEOROLOGICAL SITE	DIR (DEG)	280	290	290	310	360	20	240	290	270	80
WORCESTER	VEL (MPH)	6.0	6.2	10.1	7.8	3.4	9.1	6.4	6.3	5.9	2.8
	SPD (MPH)	6.8	6.6	11.9	9.1	3.9	9.5	8.2	7.3	7.8	5.2
	RATIO	0.883	0.942	0.843	0.861	0.872	0.959	0.778	0.858	0.758	0.536
GREENWICH-008 (0058)	TSP	94	86	85	75	71	63	59	58	54	52
	DATE	6/ 8/87	6/20/87	5/ 9/87	2/ 2/87	6/26/87	7/20/87	11/23/87	11/ 5/87	5/15/87	3/28/87
METEOROLOGICAL SITE	DIR (DEG)	250	170	240	220	80	200	200	290	270	40
NEWARK	VEL (MPH)	10.4	4.4	10.7	6.5	7.3	4.7	5.0	11.7	4.7	7.0
	SPD (MPH)	11.6	6.9	11.1	7.3	7.8	6.5	6.3	13.5	11.6	9.5
	RATIO	0.896	0.632	0.964	0.892	0.947	0.726	0.795	0.867	0.404	0.741
METEOROLOGICAL SITE	DIR (DEG)	240	360	240	240	70	210	180	310	310	10
BRADLEY	VEL (MPH)	7.1	4.5	6.2	2.7	2.7	7.2	6.1	10.5	6.0	5.5
	SPD (MPH)	8.8	4.6	9.2	4.9	4.7	8.9	7.8	12.9	11.1	5.9
	RATIO	0.813	0.987	0.674	0.554	0.576	0.813	0.788	0.808	0.540	0.926
METEOROLOGICAL SITE	DIR (DEG)	240	130	220	250	90	210	230	310	290	50
BRIDGEPORT	VEL (MPH)	7.2	1.7	9.0	6.3	9.2	5.6	10.4	7.6	4.9	6.3
	SPD (MPH)	7.3	4.2	9.6	7.2	9.3	5.9	11.5	8.9	9.2	8.5
	RATIO	0.983	0.413	0.935	0.875	0.984	0.957	0.902	0.853	0.537	0.749
METEOROLOGICAL SITE	DIR (DEG)	270	340	290	280	100	240	240	300	300	40
WORCESTER	VEL (MPH)	5.9	4.7	10.1	6.0	3.7	6.4	7.6	11.1	9.4	4.5
	SPD (MPH)	7.8	5.6	11.9	6.8	4.6	8.2	8.8	12.5	14.1	4.9
	RATIO	0.758	0.836	0.843	0.883	0.804	0.778	0.862	0.886	0.670	0.923

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)		RANK	1	2	3	4	5	6	7	8	9	10
GROTON-006 (0058)		TSP	98	96	74	74	73	72	68	68	66	64
		DATE	9/24/87	6/ 8/87	11/23/87	5/ 9/87	6/ 3/87	8/25/87	8/19/87	4/ 3/87	12/23/87	6/20/87
	METEOROLOGICAL SITE	DIR (DEG)	260	250	200	240	110	270	230	330	270	170
	NEWARK	VEL (MPH)	8.3	10.4	5.0	10.7	5.6	4.7	3.3	2.3	8.6	4.4
		SPD (MPH)	9.9	11.6	6.3	11.1	7.0	5.0	6.8	8.6	9.1	6.9
		RATIO	0.841	0.896	0.795	0.964	0.799	0.931	0.493	0.268	0.946	0.632
	METEOROLOGICAL SITE	DIR (DEG)	300	240	180	240	180	280	340	340	290	360
	BRADLEY	VEL (MPH)	6.6	7.1	6.1	6.2	4.7	6.9	1.1	1.6	5.8	4.5
		SPD (MPH)	8.9	8.8	7.8	9.2	7.5	8.6	4.5	7.0	6.9	4.6
		RATIO	0.739	0.813	0.788	0.674	0.631	0.805	0.240	0.232	0.843	0.987
	METEOROLOGICAL SITE	DIR (DEG)	280	240	230	220	100	250	210	110	280	130
	BRIDGEPORT	VEL (MPH)	6.5	7.2	10.4	9.0	7.5	9.1	3.8	5.0	9.5	1.7
		SPD (MPH)	7.2	7.3	11.5	9.6	7.8	9.2	5.8	7.5	10.1	4.2
		RATIO	0.909	0.983	0.902	0.935	0.965	0.984	0.665	0.673	0.942	0.413
	METEOROLOGICAL SITE	DIR (DEG)	310	270	240	290	120	280	320	180	290	340
	WORCESTER	VEL (MPH)	6.8	5.9	7.6	10.1	3.6	7.6	1.6	1.5	6.2	4.7
		SPD (MPH)	8.3	7.8	8.8	11.9	5.5	8.9	5.0	4.6	6.6	5.6
		RATIO	0.813	0.758	0.862	0.843	0.666	0.853	0.327	0.326	0.942	0.836
HARTFORD-003 (0059)		TSP	109	96	96	85	83	82	82	80	80	76
		DATE	7/20/87	1/27/87	12/23/87	6/ 8/87	11/17/87	3/10/87	11/ 5/87	5/ 9/87	2/20/87	3/ 4/87
	METEOROLOGICAL SITE	DIR (DEG)	200	10	270	250	130	20	290	240	320	360
	NEWARK	VEL (MPH)	4.7	9.4	8.6	10.4	5.3	19.6	11.7	10.7	10.9	9.3
		SPD (MPH)	6.5	9.6	9.1	11.6	6.9	19.7	13.5	11.1	11.2	10.8
		RATIO	0.726	0.975	0.946	0.896	0.770	0.994	0.867	0.964	0.977	0.859
	METEOROLOGICAL SITE	DIR (DEG)	210	10	290	240	180	30	310	240	330	360
	BRADLEY	VEL (MPH)	7.2	3.8	5.8	7.1	5.4	16.5	10.5	6.2	8.0	5.3
		SPD (MPH)	8.9	4.3	6.9	8.8	7.5	17.7	12.9	9.2	8.6	6.3
		RATIO	0.813	0.880	0.843	0.813	0.727	0.933	0.808	0.674	0.929	0.838
	METEOROLOGICAL SITE	DIR (DEG)	210	30	280	240	160	20	310	220	330	360
	BRIDGEPORT	VEL (MPH)	5.6	6.3	9.5	7.2	5.4	12.7	7.6	9.0	9.8	4.3
		SPD (MPH)	5.9	6.8	10.1	7.3	8.6	14.1	8.9	9.6	9.9	8.3
		RATIO	0.957	0.937	0.942	0.983	0.624	0.898	0.853	0.935	0.983	0.514
	METEOROLOGICAL SITE	DIR (DEG)	240	360	290	270	210	20	300	290	330	10
	WORCESTER	VEL (MPH)	6.4	3.4	6.2	5.9	7.1	9.1	11.1	10.1	10.9	5.3
		SPD (MPH)	8.2	3.9	6.6	7.8	8.5	9.5	12.5	11.9	11.4	5.6
		RATIO	0.778	0.872	0.942	0.758	0.833	0.959	0.886	0.843	0.959	0.942
HARTFORD-013 (0059)		TSP	83	77	74	74	73	71	69	68	68	66
		DATE	5/ 9/87	6/ 8/87	1/27/87	7/20/87	11/23/87	3/10/87	4/15/87	11/ 5/87	12/23/87	6/20/87
	METEOROLOGICAL SITE	DIR (DEG)	240	250	10	200	200	20	150	290	270	170
	NEWARK	VEL (MPH)	10.7	10.4	9.4	4.7	5.0	19.6	4.1	11.7	8.6	4.4
		SPD (MPH)	11.1	11.6	9.6	6.5	6.3	19.7	5.6	13.5	9.1	6.9
		RATIO	0.964	0.896	0.975	0.726	0.795	0.994	0.728	0.867	0.946	0.632
	METEOROLOGICAL SITE	DIR (DEG)	240	240	10	210	180	30	170	310	290	360
	BRADLEY	VEL (MPH)	6.2	7.1	3.8	7.2	6.1	16.5	1.7	10.5	5.8	4.5
		SPD (MPH)	9.2	8.8	4.3	8.9	7.8	17.7	5.2	12.9	6.9	4.6
		RATIO	0.674	0.813	0.880	0.813	0.788	0.933	0.331	0.808	0.843	0.987

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	220	240	30	210	230	20	190	310	280	130
BRIDGEPORT	VEL (MPH)	9.0	7.2	6.3	5.6	10.4	12.7	2.1	7.6	9.5	1.7
	SPD (MPH)	9.6	7.3	6.8	5.9	11.5	14.1	3.7	8.9	10.1	4.2
	RATIO	0.935	0.983	0.937	0.957	0.902	0.898	0.555	0.853	0.942	0.413
METEOROLOGICAL SITE	DIR (DEG)	290	270	360	240	240	20	80	300	290	340
WORCESTER	VEL (MPH)	10.1	5.9	3.4	6.4	7.6	9.1	2.8	11.1	6.2	4.7
	SPD (MPH)	11.9	7.8	3.9	8.2	8.8	9.5	5.2	12.5	6.6	5.6
	RATIO	0.843	0.758	0.872	0.778	0.862	0.959	0.536	0.886	0.942	0.836
HARTFORD-014 (0060)	TSP	77	76	72	72	71	68	68	67	65	64
	DATE	5/ 9/87	6/ 8/87	1/27/87	12/23/87	3/10/87	1/ 9/87	6/ 2/87	6/20/87	3/28/87	2/ 2/87
METEOROLOGICAL SITE	DIR (DEG)	240	250	10	270	20	260	90	170	40	220
NEWARK	VEL (MPH)	10.7	10.4	9.4	8.6	19.6	6.2	3.8	4.4	7.0	6.5
	SPD (MPH)	11.1	11.6	9.6	9.1	19.7	8.2	8.3	6.9	9.5	7.3
	RATIO	0.964	0.896	0.975	0.946	0.994	0.754	0.452	0.632	0.741	0.892
METEOROLOGICAL SITE	DIR (DEG)	240	240	10	290	30	310	30	360	10	240
BRADLEY	VEL (MPH)	6.2	7.1	3.8	5.8	16.5	5.7	4.9	4.5	5.5	2.7
	SPD (MPH)	9.2	8.8	4.3	6.9	17.7	6.3	7.2	4.6	5.9	4.9
	RATIO	0.674	0.813	0.880	0.843	0.933	0.903	0.678	0.987	0.926	0.554
METEOROLOGICAL SITE	DIR (DEG)	220	240	30	280	20	310	70	130	50	250
BRIDGEPORT	VEL (MPH)	9.0	7.2	6.3	9.5	12.7	5.6	5.5	1.7	6.3	6.3
	SPD (MPH)	9.6	7.3	6.8	10.1	14.1	6.0	5.9	4.2	8.5	7.2
	RATIO	0.935	0.983	0.937	0.942	0.898	0.920	0.940	0.413	0.749	0.875
METEOROLOGICAL SITE	DIR (DEG)	290	270	360	290	20	310	60	340	40	280
WORCESTER	VEL (MPH)	10.1	5.9	3.4	6.2	9.1	7.8	5.5	4.7	4.5	6.0
	SPD (MPH)	11.9	7.8	3.9	6.6	9.5	9.1	5.9	5.6	4.9	6.8
	RATIO	0.843	0.758	0.872	0.942	0.959	0.861	0.926	0.836	0.923	0.883
MANCHESTER-001 (0059)	TSP	82	73	63	60	58	58	57	55	54	54
	DATE	6/ 8/87	5/ 9/87	1/27/87	11/ 5/87	6/ 2/87	6/20/87	4/ 3/87	11/23/87	5/21/87	2/ 2/87
METEOROLOGICAL SITE	DIR (DEG)	250	240	10	290	90	170	330	200	80	220
NEWARK	VEL (MPH)	10.4	10.7	9.4	11.7	3.8	4.4	2.3	5.0	4.9	6.5
	SPD (MPH)	11.6	11.1	9.6	13.5	8.3	6.9	8.6	6.3	8.8	7.3
	RATIO	0.896	0.964	0.975	0.867	0.452	0.632	0.268	0.795	0.555	0.892
METEOROLOGICAL SITE	DIR (DEG)	240	240	10	310	30	360	340	180	190	240
BRADLEY	VEL (MPH)	7.1	6.2	3.8	10.5	4.9	4.5	1.6	6.1	5.9	2.7
	SPD (MPH)	8.8	9.2	4.3	12.9	7.2	4.6	7.0	7.8	8.9	4.9
	RATIO	0.813	0.674	0.880	0.808	0.678	0.987	0.232	0.788	0.662	0.554
METEOROLOGICAL SITE	DIR (DEG)	240	220	30	310	70	130	110	230	110	250
BRIDGEPORT	VEL (MPH)	7.2	9.0	6.3	7.6	5.5	1.7	5.0	10.4	6.6	6.3
	SPD (MPH)	7.3	9.6	6.8	8.9	5.9	4.2	7.5	11.5	7.2	7.2
	RATIO	0.983	0.935	0.937	0.853	0.940	0.413	0.673	0.902	0.919	0.875
METEOROLOGICAL SITE	DIR (DEG)	270	290	360	300	60	340	180	240	220	280
WORCESTER	VEL (MPH)	5.9	10.1	3.4	11.1	5.5	4.7	1.5	7.6	6.0	6.0
	SPD (MPH)	7.8	11.9	3.9	12.5	5.9	5.6	4.6	8.8	7.2	6.8
	RATIO	0.758	0.843	0.872	0.886	0.926	0.836	0.326	0.862	0.832	0.883

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)		RANK	1	2	3	4	5	6	7	8	9	10
MERIDEN-002 (0060)		TSP	130	116	89	89	85	83	82	78	76	72
		DATE	3/10/87	1/ 9/87	5/ 9/87	3/16/87	3/28/87	12/23/87	3/ 4/87	6/ 8/87	1/27/87	7/20/87
	METEOROLOGICAL SITE	DIR (DEG)	20	260	240	350	40	270	360	250	10	200
	NEWARK	VEL (MPH)	19.6	6.2	10.7	12.5	7.0	8.6	9.3	10.4	9.4	4.7
		SPD (MPH)	19.7	8.2	11.1	13.8	9.5	9.1	10.8	11.6	9.6	6.5
		RATIO	0.994	0.754	0.964	0.907	0.741	0.946	0.859	0.896	0.975	0.726
	METEOROLOGICAL SITE	DIR (DEG)	30	310	240	360	10	290	360	240	10	210
	BRADLEY	VEL (MPH)	16.5	5.7	6.2	9.9	5.5	5.8	5.3	7.1	3.8	7.2
		SPD (MPH)	17.7	6.3	9.2	10.4	5.9	6.9	6.3	8.8	4.3	8.9
		RATIO	0.933	0.903	0.674	0.959	0.926	0.843	0.838	0.813	0.880	0.813
	METEOROLOGICAL SITE	DIR (DEG)	20	310	220	350	50	280	360	240	30	210
	BRIDGEPORT	VEL (MPH)	12.7	5.6	9.0	12.0	6.3	9.5	4.3	7.2	6.3	5.6
		SPD (MPH)	14.1	6.0	9.6	12.2	8.5	10.1	8.3	7.3	6.8	5.9
		RATIO	0.898	0.920	0.935	0.980	0.749	0.942	0.514	0.983	0.937	0.957
	METEOROLOGICAL SITE	DIR (DEG)	20	310	290	340	40	290	10	270	360	240
	WORCESTER	VEL (MPH)	9.1	7.8	10.1	9.9	4.5	6.2	5.3	5.9	3.4	6.4
		SPD (MPH)	9.5	9.1	11.9	10.1	4.9	6.6	5.6	7.8	3.9	8.2
		RATIO	0.959	0.861	0.843	0.985	0.923	0.942	0.942	0.758	0.872	0.778
MIDDLETOWN-003 (0061)		TSP	112	111	93	88	84	77	77	77	76	75
		DATE	1/27/87	3/ 4/87	1/ 9/87	1/21/87	11/ 5/87	4/ 3/87	12/23/87	5/ 9/87	6/20/87	4/15/87
	METEOROLOGICAL SITE	DIR (DEG)	10	360	260	270	290	330	270	240	170	150
	NEWARK	VEL (MPH)	9.4	9.3	6.2	7.6	11.7	2.3	8.6	10.7	4.4	4.1
		SPD (MPH)	9.6	10.8	8.2	8.6	13.5	8.6	9.1	11.1	6.9	5.6
		RATIO	0.975	0.859	0.754	0.886	0.867	0.268	0.946	0.964	0.632	0.728
	METEOROLOGICAL SITE	DIR (DEG)	10	360	310	270	310	340	290	240	360	170
	BRADLEY	VEL (MPH)	3.8	5.3	5.7	2.3	10.5	1.6	5.8	6.2	4.5	1.7
		SPD (MPH)	4.3	6.3	6.3	3.6	12.9	7.0	6.9	9.2	4.6	5.2
		RATIO	0.880	0.838	0.903	0.628	0.808	0.232	0.843	0.674	0.987	0.331
	METEOROLOGICAL SITE	DIR (DEG)	30	360	310	310	310	110	280	220	130	190
	BRIDGEPORT	VEL (MPH)	6.3	4.3	5.6	4.8	7.6	5.0	9.5	9.0	1.7	2.1
		SPD (MPH)	6.8	8.3	6.0	5.9	8.9	7.5	10.1	9.6	4.2	3.7
		RATIO	0.937	0.514	0.920	0.817	0.853	0.673	0.942	0.935	0.413	0.555
	METEOROLOGICAL SITE	DIR (DEG)	360	10	310	290	300	180	290	290	340	80
	WORCESTER	VEL (MPH)	3.4	5.3	7.8	6.3	11.1	1.5	6.2	10.1	4.7	2.8
		SPD (MPH)	3.9	5.6	9.1	7.3	12.5	4.6	6.6	11.9	5.6	5.2
		RATIO	0.872	0.942	0.861	0.858	0.886	0.326	0.942	0.843	0.836	0.536
MORRIS-001 (0060)		TSP	72	58	56	46	46	43	40	38	37	36
		DATE	5/ 9/87	7/14/87	6/ 8/87	4/15/87	7/20/87	6/20/87	8/ 7/87	11/ 5/87	5/15/87	6/ 2/87
	METEOROLOGICAL SITE	DIR (DEG)	240	200	250	150	200	170	160	290	270	90
	NEWARK	VEL (MPH)	10.7	4.7	10.4	4.1	4.7	4.4	4.6	11.7	4.7	3.8
		SPD (MPH)	11.1	8.3	11.6	5.6	6.5	6.9	6.6	13.5	11.6	8.3
		RATIO	0.964	0.560	0.896	0.728	0.726	0.632	0.698	0.867	0.404	0.452
	METEOROLOGICAL SITE	DIR (DEG)	240	220	240	170	210	360	210	310	310	30
	BRADLEY	VEL (MPH)	6.2	5.9	7.1	1.7	7.2	4.5	5.9	10.5	6.0	4.9
		SPD (MPH)	9.2	9.3	8.8	5.2	8.9	4.6	7.2	12.9	11.1	7.2
		RATIO	0.674	0.629	0.813	0.331	0.813	0.987	0.823	0.808	0.540	0.678

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	220	200	240	190	210	130	150	310	290	70
	VEL (MPH)	9.0	6.1	7.2	2.1	5.6	1.7	3.8	7.6	4.9	5.5
	SPD (MPH)	9.6	6.5	7.3	3.7	5.9	4.2	4.9	8.9	9.2	5.9
	RATIO	0.935	0.950	0.983	0.555	0.957	0.413	0.783	0.853	0.537	0.940
METEOROLOGICAL SITE WORCESTER	DIR (DEG)	290	230	270	80	240	340	230	300	300	60
	VEL (MPH)	10.1	5.2	5.9	2.8	6.4	4.7	3.9	11.1	9.4	5.5
	SPD (MPH)	11.9	7.9	7.8	5.2	8.2	5.6	4.5	12.5	14.1	5.9
	RATIO	0.843	0.656	0.758	0.536	0.778	0.836	0.876	0.886	0.670	0.926
NAUGATUCK-001 (0057)	TSP	87	78	73	71	68	63	63	61	59	59
	DATE	5/ 9/87	1/ 9/87	6/ 8/87	1/27/87	1/21/87	11/ 5/87	7/20/87	4/15/87	11/23/87	6/20/87
METEOROLOGICAL SITE NEWARK	DIR (DEG)	240	260	250	10	270	290	200	150	200	170
	VEL (MPH)	10.7	6.2	10.4	9.4	7.6	11.7	4.7	4.1	5.0	4.4
	SPD (MPH)	11.1	8.2	11.6	9.6	8.6	13.5	6.5	5.6	6.3	6.9
	RATIO	0.964	0.754	0.896	0.975	0.886	0.867	0.726	0.728	0.795	0.632
METEOROLOGICAL SITE BRADLEY	DIR (DEG)	240	310	240	10	270	310	210	170	180	360
	VEL (MPH)	6.2	5.7	7.1	3.8	2.3	10.5	7.2	1.7	6.1	4.5
	SPD (MPH)	9.2	6.3	8.8	4.3	3.6	12.9	8.9	5.2	7.8	4.6
	RATIO	0.674	0.903	0.813	0.880	0.628	0.808	0.813	0.331	0.788	0.987
METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	220	310	240	30	310	310	210	190	230	130
	VEL (MPH)	9.0	5.6	7.2	6.3	4.8	7.6	5.6	2.1	10.4	1.7
	SPD (MPH)	9.6	6.0	7.3	6.8	5.9	8.9	5.9	3.7	11.5	4.2
	RATIO	0.935	0.920	0.983	0.937	0.817	0.853	0.957	0.555	0.902	0.413
METEOROLOGICAL SITE WORCESTER	DIR (DEG)	290	310	270	360	290	300	240	80	240	340
	VEL (MPH)	10.1	7.8	5.9	3.4	6.3	11.1	6.4	2.8	7.6	4.7
	SPD (MPH)	11.9	9.1	7.8	3.9	7.3	12.5	8.2	5.2	8.8	5.6
	RATIO	0.843	0.861	0.758	0.872	0.858	0.886	0.778	0.536	0.862	0.836
NEW BRITAIN-007 (0059)	TSP	72	64	62	62	60	60	59	57	56	54
	DATE	5/ 9/87	6/ 8/87	3/10/87	12/23/87	3/28/87	11/ 5/87	4/15/87	7/20/87	6/20/87	6/ 2/87
METEOROLOGICAL SITE NEWARK	DIR (DEG)	240	250	20	270	40	290	150	200	170	90
	VEL (MPH)	10.7	10.4	19.6	8.6	7.0	11.7	4.1	4.7	4.4	3.8
	SPD (MPH)	11.1	11.6	19.7	9.1	9.5	13.5	5.6	6.5	6.9	8.3
	RATIO	0.964	0.896	0.994	0.946	0.741	0.867	0.728	0.726	0.632	0.452
METEOROLOGICAL SITE BRADLEY	DIR (DEG)	240	240	30	290	10	310	170	210	360	30
	VEL (MPH)	6.2	7.1	16.5	5.8	5.5	10.5	1.7	7.2	4.5	4.9
	SPD (MPH)	9.2	8.8	17.7	6.9	5.9	12.9	5.2	8.9	4.6	7.2
	RATIO	0.674	0.813	0.933	0.843	0.926	0.808	0.331	0.813	0.987	0.678
METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	220	240	20	280	50	310	190	210	130	70
	VEL (MPH)	9.0	7.2	12.7	9.5	6.3	7.6	2.1	5.6	1.7	5.5
	SPD (MPH)	9.6	7.3	14.1	10.1	8.5	8.9	3.7	5.9	4.2	5.9
	RATIO	0.935	0.983	0.898	0.942	0.749	0.853	0.555	0.957	0.413	0.940
METEOROLOGICAL SITE WORCESTER	DIR (DEG)	290	270	20	290	40	300	80	240	340	60
	VEL (MPH)	10.1	5.9	9.1	6.2	4.5	11.1	2.8	6.4	4.7	5.5
	SPD (MPH)	11.9	7.8	9.5	6.6	4.9	12.5	5.2	8.2	5.6	5.9
	RATIO	0.843	0.758	0.959	0.942	0.923	0.886	0.536	0.778	0.836	0.926

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
NEW BRITAIN-008 (0057)	TSP	78	76	71	63	62	59	57	55	54	53
	DATE	5/ 9/87	4/15/87	6/ 8/87	11/ 5/87	6/20/87	7/20/87	3/28/87	12/23/87	1/ 9/87	3/10/87
METEOROLOGICAL SITE	DIR (DEG)	240	150	250	290	170	200	40	270	260	20
NEWARK	VEL (MPH)	10.7	4.1	10.4	11.7	4.4	4.7	7.0	8.6	6.2	19.6
	SPD (MPH)	11.1	5.6	11.6	13.5	6.9	6.5	9.5	9.1	8.2	19.7
	RATIO	0.964	0.728	0.896	0.867	0.632	0.726	0.741	0.946	0.754	0.994
METEOROLOGICAL SITE	DIR (DEG)	240	170	240	310	360	210	10	290	310	30
BRADLEY	VEL (MPH)	6.2	1.7	7.1	10.5	4.5	7.2	5.5	5.8	5.7	16.5
	SPD (MPH)	9.2	5.2	8.8	12.9	4.6	8.9	5.9	6.9	6.3	17.7
	RATIO	0.674	0.331	0.813	0.808	0.987	0.813	0.926	0.843	0.903	0.933
METEOROLOGICAL SITE	DIR (DEG)	220	190	240	310	130	210	50	280	310	20
BRIDGEPORT	VEL (MPH)	9.0	2.1	7.2	7.6	1.7	5.6	6.3	9.5	5.6	12.7
	SPD (MPH)	9.6	3.7	7.3	8.9	4.2	5.9	8.5	10.1	6.0	14.1
	RATIO	0.935	0.555	0.983	0.853	0.413	0.957	0.749	0.942	0.920	0.898
METEOROLOGICAL SITE	DIR (DEG)	290	80	270	300	340	240	40	290	310	20
WORCESTER	VEL (MPH)	10.1	2.8	5.9	11.1	4.7	6.4	4.5	6.2	7.8	9.1
	SPD (MPH)	11.9	5.2	7.8	12.5	5.6	8.2	4.9	6.6	9.1	9.5
	RATIO	0.843	0.536	0.758	0.886	0.836	0.778	0.923	0.942	0.861	0.959
NEW BRITAIN-009 (0058)	TSP	74	69	60	57	57	56	54	54	53	53
	DATE	6/ 8/87	5/ 9/87	1/27/87	7/20/87	11/ 5/87	6/ 2/87	3/28/87	2/ 2/87	1/21/87	6/20/87
METEOROLOGICAL SITE	DIR (DEG)	250	240	10	200	290	90	40	220	270	170
NEWARK	VEL (MPH)	10.4	10.7	9.4	4.7	11.7	3.8	7.0	6.5	7.6	4.4
	SPD (MPH)	11.6	11.1	9.6	6.5	13.5	8.3	9.5	7.3	8.6	6.9
	RATIO	0.896	0.964	0.975	0.726	0.867	0.452	0.741	0.892	0.886	0.632
METEOROLOGICAL SITE	DIR (DEG)	240	240	10	210	310	30	10	240	270	360
BRADLEY	VEL (MPH)	7.1	6.2	3.8	7.2	10.5	4.9	5.5	2.7	2.3	4.5
	SPD (MPH)	8.8	9.2	4.3	8.9	12.9	7.2	5.9	4.9	3.6	4.6
	RATIO	0.813	0.674	0.880	0.813	0.808	0.678	0.926	0.554	0.628	0.987
METEOROLOGICAL SITE	DIR (DEG)	240	220	30	210	310	70	50	250	310	130
BRIDGEPORT	VEL (MPH)	7.2	9.0	6.3	5.6	7.6	5.5	6.3	6.3	4.8	1.7
	SPD (MPH)	7.3	9.6	6.8	5.9	8.9	5.9	8.5	7.2	5.9	4.2
	RATIO	0.983	0.935	0.937	0.957	0.853	0.940	0.749	0.875	0.817	0.413
METEOROLOGICAL SITE	DIR (DEG)	270	290	360	240	300	60	40	280	290	340
WORCESTER	VEL (MPH)	5.9	10.1	3.4	6.4	11.1	5.5	4.5	6.0	6.3	4.7
	SPD (MPH)	7.8	11.9	3.9	8.2	12.5	5.9	4.9	6.8	7.3	5.6
	RATIO	0.758	0.843	0.872	0.778	0.886	0.926	0.923	0.883	0.858	0.836
NEW HAVEN-002 (0053)	TSP	134	104	94	90	88	81	80	72	71	71
	DATE	3/10/87	6/20/87	1/27/87	2/ 2/87	5/ 9/87	12/23/87	1/ 9/87	8/19/87	11/ 5/87	1/21/87
METEOROLOGICAL SITE	DIR (DEG)	20	170	10	220	240	270	260	230	290	270
NEWARK	VEL (MPH)	19.6	4.4	9.4	6.5	10.7	8.6	6.2	3.3	11.7	7.6
	SPD (MPH)	19.7	6.9	9.6	7.3	11.1	9.1	8.2	6.8	13.5	8.6
	RATIO	0.994	0.632	0.975	0.892	0.964	0.946	0.754	0.493	0.867	0.886
METEOROLOGICAL SITE	DIR (DEG)	30	360	10	240	240	290	310	340	310	270
BRADLEY	VEL (MPH)	16.5	4.5	3.8	2.7	6.2	5.8	5.7	1.1	10.5	2.3
	SPD (MPH)	17.7	4.6	4.3	4.9	9.2	6.9	6.3	4.5	12.9	3.6
	RATIO	0.933	0.987	0.880	0.554	0.674	0.843	0.903	0.240	0.808	0.628

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	20	130	30	250	220	280	310	210	310	310
BRIDGEPORT	VEL (MPH)	12.7	1.7	6.3	6.3	9.0	9.5	5.6	3.8	7.6	4.8
	SPD (MPH)	14.1	4.2	6.8	7.2	9.6	10.1	6.0	5.8	8.9	5.9
	RATIO	0.898	0.413	0.937	0.875	0.935	0.942	0.920	0.665	0.853	0.817
METEOROLOGICAL SITE	DIR (DEG)	20	340	360	280	290	290	310	320	300	290
WORCESTER	VEL (MPH)	9.1	4.7	3.4	6.0	10.1	6.2	7.8	1.6	11.1	6.3
	SPD (MPH)	9.5	5.6	3.9	6.8	11.9	6.6	9.1	5.0	12.5	7.3
	RATIO	0.959	0.836	0.872	0.883	0.843	0.942	0.861	0.327	0.886	0.858
NEW HAVEN-013 (0059)	TSP	93	91	89	83	77	76	67	66	66	63
	DATE	6/ 8/87	6/20/87	3/10/87	5/ 9/87	2/ 2/87	1/ 9/87	4/27/87	4/15/87	11/ 5/87	8/19/87
METEOROLOGICAL SITE	DIR (DEG)	250	170	20	240	220	260	100	150	290	230
NEWARK	VEL (MPH)	10.4	4.4	19.6	10.7	6.5	6.2	8.5	4.1	11.7	3.3
	SPD (MPH)	11.6	6.9	19.7	11.1	7.3	8.2	11.9	5.6	13.5	6.8
	RATIO	0.896	0.632	0.994	0.964	0.892	0.754	0.714	0.728	0.867	0.493
METEOROLOGICAL SITE	DIR (DEG)	240	360	30	240	240	310	110	170	310	340
BRADLEY	VEL (MPH)	7.1	4.5	16.5	6.2	2.7	5.7	5.1	1.7	10.5	1.1
	SPD (MPH)	8.8	4.6	17.7	9.2	4.9	6.3	8.2	5.2	12.9	4.5
	RATIO	0.813	0.987	0.933	0.674	0.554	0.903	0.626	0.331	0.808	0.240
METEOROLOGICAL SITE	DIR (DEG)	240	130	20	220	250	310	120	190	310	210
BRIDGEPORT	VEL (MPH)	7.2	1.7	12.7	9.0	6.3	5.6	9.0	2.1	7.6	3.8
	SPD (MPH)	7.3	4.2	14.1	9.6	7.2	6.0	10.8	3.7	8.9	5.8
	RATIO	0.983	0.413	0.898	0.935	0.875	0.920	0.837	0.555	0.853	0.665
METEOROLOGICAL SITE	DIR (DEG)	270	340	20	290	280	310	100	80	300	320
WORCESTER	VEL (MPH)	5.9	4.7	9.1	10.1	6.0	7.8	6.4	2.8	11.1	1.6
	SPD (MPH)	7.8	5.6	9.5	11.9	6.8	9.1	7.6	5.2	12.5	5.0
	RATIO	0.758	0.836	0.959	0.843	0.883	0.861	0.836	0.536	0.886	0.327
NORWALK-001 (0030)	TSP	95	89	85	76	76	72	67	62	60	55
	DATE	6/20/87	6/ 8/87	5/ 9/87	2/20/87	2/26/87	4/15/87	2/ 2/87	3/16/87	5/15/87	2/14/87
METEOROLOGICAL SITE	DIR (DEG)	170	250	240	320	350	150	220	350	270	320
NEWARK	VEL (MPH)	4.4	10.4	10.7	10.9	10.2	4.1	6.5	12.5	4.7	10.2
	SPD (MPH)	6.9	11.6	11.1	11.2	10.5	5.6	7.3	13.8	11.6	11.2
	RATIO	0.632	0.896	0.964	0.977	0.969	0.728	0.892	0.907	0.404	0.909
METEOROLOGICAL SITE	DIR (DEG)	360	240	240	330	10	170	240	360	310	340
BRADLEY	VEL (MPH)	4.5	7.1	6.2	8.0	6.0	1.7	2.7	9.9	6.0	4.6
	SPD (MPH)	4.6	8.8	9.2	8.6	6.8	5.2	4.9	10.4	11.1	6.8
	RATIO	0.987	0.813	0.674	0.929	0.893	0.331	0.554	0.959	0.540	0.675
METEOROLOGICAL SITE	DIR (DEG)	130	240	220	330	340	190	250	350	290	330
BRIDGEPORT	VEL (MPH)	1.7	7.2	9.0	9.8	9.3	2.1	6.3	12.0	4.9	7.9
	SPD (MPH)	4.2	7.3	9.6	9.9	9.6	3.7	7.2	12.2	9.2	8.8
	RATIO	0.413	0.983	0.935	0.983	0.962	0.555	0.875	0.980	0.537	0.906
METEOROLOGICAL SITE	DIR (DEG)	340	270	290	330	350	80	280	340	300	320
WORCESTER	VEL (MPH)	4.7	5.9	10.1	10.9	10.1	2.8	6.0	9.9	9.4	8.4
	SPD (MPH)	5.6	7.8	11.9	11.4	10.5	5.2	6.8	10.1	14.1	8.9
	RATIO	0.836	0.758	0.843	0.959	0.960	0.536	0.883	0.985	0.670	0.939

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)		RANK	1	2	3	4	5	6	7	8	9	10
NORWALK-005 (0055)		TSP	154	128	105	104	103	101	95	92	91	91
		DATE	2/20/87	3/16/87	6/20/87	3/10/87	6/ 8/87	2/26/87	2/ 2/87	1/ 9/87	11/ 5/87	4/15/87
	METEOROLOGICAL SITE	DIR (DEG)	320	350	170	20	250	350	220	260	290	150
	NEWARK	VEL (MPH)	10.9	12.5	4.4	19.6	10.4	10.2	6.5	6.2	11.7	4.1
		SPD (MPH)	11.2	13.8	6.9	19.7	11.6	10.5	7.3	8.2	13.5	5.6
		RATIO	0.977	0.907	0.632	0.994	0.896	0.969	0.892	0.754	0.867	0.728
	METEOROLOGICAL SITE	DIR (DEG)	330	360	360	30	240	10	240	310	310	170
	BRADLEY	VEL (MPH)	8.0	9.9	4.5	16.5	7.1	6.0	2.7	5.7	10.5	1.7
		SPD (MPH)	8.6	10.4	4.6	17.7	8.8	6.8	4.9	6.3	12.9	5.2
		RATIO	0.929	0.959	0.987	0.933	0.813	0.893	0.554	0.903	0.808	0.331
	METEOROLOGICAL SITE	DIR (DEG)	330	350	130	20	240	340	250	310	310	190
	BRIDGEPORT	VEL (MPH)	9.8	12.0	1.7	12.7	7.2	9.3	6.3	5.6	7.6	2.1
		SPD (MPH)	9.9	12.2	4.2	14.1	7.3	9.6	7.2	6.0	8.9	3.7
		RATIO	0.983	0.980	0.413	0.898	0.983	0.962	0.875	0.920	0.853	0.555
	METEOROLOGICAL SITE	DIR (DEG)	330	340	340	20	270	350	280	310	300	80
	WORCESTER	VEL (MPH)	10.9	9.9	4.7	9.1	5.9	10.1	6.0	7.8	11.1	2.8
		SPD (MPH)	11.4	10.1	5.6	9.5	7.8	10.5	6.8	9.1	12.5	5.2
		RATIO	0.959	0.985	0.836	0.959	0.758	0.960	0.883	0.861	0.886	0.536
NORWALK-012 (0060)		TSP	110	94	93	71	70	68	66	63	62	61
		DATE	6/20/87	5/ 9/87	6/ 8/87	2/ 2/87	7/20/87	4/15/87	2/14/87	10/ 6/87	2/20/87	11/23/87
	METEOROLOGICAL SITE	DIR (DEG)	170	240	250	220	200	150	320	150	320	200
	NEWARK	VEL (MPH)	4.4	10.7	10.4	6.5	4.7	4.1	10.2	6.1	10.9	5.0
		SPD (MPH)	6.9	11.1	11.6	7.3	6.5	5.6	11.2	6.9	11.2	6.3
		RATIO	0.632	0.964	0.896	0.892	0.726	0.728	0.909	0.891	0.977	0.795
	METEOROLOGICAL SITE	DIR (DEG)	360	240	240	240	210	170	340	170	330	180
	BRADLEY	VEL (MPH)	4.5	6.2	7.1	2.7	7.2	1.7	4.6	4.7	8.0	6.1
		SPD (MPH)	4.6	9.2	8.8	4.9	8.9	5.2	6.8	7.3	8.6	7.8
		RATIO	-0.987	0.674	0.813	0.554	0.813	0.331	0.675	0.638	0.929	0.788
	METEOROLOGICAL SITE	DIR (DEG)	130	220	240	250	210	190	330	190	330	230
	BRIDGEPORT	VEL (MPH)	1.7	9.0	7.2	6.3	5.6	2.1	7.9	4.8	9.8	10.4
		SPD (MPH)	4.2	9.6	7.3	7.2	5.9	3.7	8.8	6.6	9.9	11.5
		RATIO	0.413	0.935	0.983	0.875	0.957	0.555	0.906	0.732	0.983	0.902
	METEOROLOGICAL SITE	DIR (DEG)	340	290	270	280	240	80	320	210	330	240
	WORCESTER	VEL (MPH)	4.7	10.1	5.9	6.0	6.4	2.8	8.4	4.3	10.9	7.6
		SPD (MPH)	5.6	11.9	7.8	6.8	8.2	5.2	8.9	7.2	11.4	8.8
		RATIO	0.836	0.843	0.758	0.883	0.778	0.536	0.939	0.600	0.959	0.862
NORWICH-002 (0059)		TSP	101	82	81	81	76	72	69	69	67	66
		DATE	5/ 9/87	12/23/87	6/ 8/87	3/ 4/87	3/28/87	1/ 9/87	6/ 2/87	1/27/87	3/10/87	4/21/87
	METEOROLOGICAL SITE	DIR (DEG)	240	270	250	360	40	260	90	10	20	60
	NEWARK	VEL (MPH)	10.7	8.6	10.4	9.3	7.0	6.2	3.8	9.4	19.6	7.1
		SPD (MPH)	11.1	9.1	11.6	10.8	9.5	8.2	8.3	9.6	19.7	9.3
		RATIO	0.964	0.946	0.896	0.859	0.741	0.754	0.452	0.975	0.994	0.764
	METEOROLOGICAL SITE	DIR (DEG)	240	290	240	360	10	310	30	10	30	80
	BRADLEY	VEL (MPH)	6.2	5.8	7.1	5.3	5.5	5.7	4.9	3.8	16.5	.5
		SPD (MPH)	9.2	6.9	8.8	6.3	5.9	6.3	7.2	4.3	17.7	7.0
		RATIO	0.674	0.843	0.813	0.838	0.926	0.903	0.678	0.880	0.933	0.065

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)		RANK	1	2	3	4	5	6	7	8	9	10
	METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	220	280	240	360	50	310	70	30	20	110
		VEL (MPH)	9.0	9.5	7.2	4.3	6.3	5.6	5.5	6.3	12.7	3.8
		SPD (MPH)	9.6	10.1	7.3	8.3	8.5	6.0	5.9	6.8	14.1	6.0
		RATIO	0.935	0.942	0.983	0.514	0.749	0.920	0.940	0.937	0.898	0.632
	METEOROLOGICAL SITE WORCESTER	DIR (DEG)	290	290	270	10	40	310	60	360	20	30
		VEL (MPH)	10.1	6.2	5.9	5.3	4.5	7.8	5.5	3.4	9.1	1.4
		SPD (MPH)	11.9	6.6	7.8	5.6	4.9	9.1	5.9	3.9	9.5	5.0
		RATIO	0.843	0.942	0.758	0.942	0.923	0.861	0.926	0.872	0.959	0.278
STAMFORD-001 (0057)		TSP	124	113	106	91	89	78	71	68	67	65
		DATE	6/ 8/87	11/ 5/87	6/20/87	4/15/87	5/ 9/87	2/ 2/87	7/20/87	11/23/87	5/21/87	7/14/87
	METEOROLOGICAL SITE NEWARK	DIR (DEG)	250	290	170	150	240	220	200	200	80	200
		VEL (MPH)	10.4	11.7	4.4	4.1	10.7	6.5	4.7	5.0	4.9	4.7
		SPD (MPH)	11.6	13.5	6.9	5.6	11.1	7.3	6.5	6.3	8.8	8.3
		RATIO	0.896	0.867	0.632	0.728	0.964	0.892	0.726	0.795	0.555	0.560
	METEOROLOGICAL SITE BRADLEY	DIR (DEG)	240	310	360	170	240	240	210	180	190	220
		VEL (MPH)	7.1	10.5	4.5	1.7	6.2	2.7	7.2	6.1	5.9	5.9
		SPD (MPH)	8.8	12.9	4.6	5.2	9.2	4.9	8.9	7.8	8.9	9.3
		RATIO	0.813	0.808	0.987	0.331	0.674	0.554	0.813	0.788	0.662	0.629
	METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	240	310	130	190	220	250	210	230	110	200
		VEL (MPH)	7.2	7.6	1.7	2.1	9.0	6.3	5.6	10.4	6.6	6.1
		SPD (MPH)	7.3	8.9	4.2	3.7	9.6	7.2	5.9	11.5	7.2	6.5
		RATIO	0.983	0.853	0.413	0.555	0.935	0.875	0.957	0.902	0.919	0.950
	METEOROLOGICAL SITE WORCESTER	DIR (DEG)	270	300	340	80	290	280	240	240	220	230
		VEL (MPH)	5.9	11.1	4.7	2.8	10.1	6.0	6.4	7.6	6.0	5.2
		SPD (MPH)	7.8	12.5	5.6	5.2	11.9	6.8	8.2	8.8	7.2	7.9
		RATIO	0.758	0.886	0.836	0.536	0.843	0.883	0.778	0.862	0.832	0.656
STAMFORD-007 (0059)		TSP	117	102	102	80	77	76	73	71	71	69
		DATE	6/ 8/87	6/20/87	11/ 5/87	2/ 2/87	5/ 9/87	2/20/87	8/25/87	11/23/87	4/ 9/87	6/ 2/87
	METEOROLOGICAL SITE NEWARK	DIR (DEG)	250	170	290	220	240	320	270	200	330	90
		VEL (MPH)	10.4	4.4	11.7	6.5	10.7	10.9	4.7	5.0	9.8	3.8
		SPD (MPH)	11.6	6.9	13.5	7.3	11.1	11.2	5.0	6.3	10.4	8.3
		RATIO	0.896	0.632	0.867	0.892	0.964	0.977	0.931	0.795	0.943	0.452
	METEOROLOGICAL SITE BRADLEY	DIR (DEG)	240	360	310	240	240	330	280	180	10	30
		VEL (MPH)	7.1	4.5	10.5	2.7	6.2	8.0	6.9	6.1	4.4	4.9
		SPD (MPH)	8.8	4.6	12.9	4.9	9.2	8.6	8.6	7.8	5.0	7.2
		RATIO	0.813	0.987	0.808	0.554	0.674	0.929	0.805	0.788	0.874	0.678
	METEOROLOGICAL SITE BRIDGEPORT	DIR (DEG)	240	130	310	250	220	330	250	230	340	70
		VEL (MPH)	7.2	1.7	7.6	6.3	9.0	9.8	9.1	10.4	6.2	5.5
		SPD (MPH)	7.3	4.2	8.9	7.2	9.6	9.9	9.2	11.5	7.5	5.9
		RATIO	0.983	0.413	0.853	0.875	0.935	0.983	0.984	0.902	0.830	0.940
	METEOROLOGICAL SITE WORCESTER	DIR (DEG)	270	340	300	280	290	330	280	240	350	60
		VEL (MPH)	5.9	4.7	11.1	6.0	10.1	10.9	7.6	7.6	6.2	5.5
		SPD (MPH)	7.8	5.6	12.5	6.8	11.9	11.4	8.9	8.8	6.6	5.9
		RATIO	0.758	0.836	0.886	0.883	0.843	0.959	0.853	0.862	0.944	0.926

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
STAMFORD-021 (0057)	TSP	114	110	94	83	82	77	76	71	68	67
	DATE	6/ 8/87	6/20/87	5/ 9/87	3/ 4/87	7/20/87	2/ 2/87	4/15/87	11/ 5/87	8/19/87	6/26/87
METEOROLOGICAL SITE	DIR (DEG)	250	170	240	360	200	220	150	290	230	80
NEWARK	VEL (MPH)	10.4	4.4	10.7	9.3	4.7	6.5	4.1	11.7	3.3	7.3
	SPD (MPH)	11.6	6.9	11.1	10.8	6.5	7.3	5.6	13.5	6.8	7.8
	RATIO	0.896	0.632	0.964	0.859	0.726	0.892	0.728	0.867	0.493	0.947
METEOROLOGICAL SITE	DIR (DEG)	240	360	240	360	210	240	170	310	340	70
BRADLEY	VEL (MPH)	7.1	4.5	6.2	5.3	7.2	2.7	1.7	10.5	1.1	2.7
	SPD (MPH)	8.8	4.6	9.2	6.3	8.9	4.9	5.2	12.9	4.5	4.7
	RATIO	0.813	0.987	0.674	0.838	0.813	0.554	0.331	0.808	0.240	0.576
METEOROLOGICAL SITE	DIR (DEG)	240	130	220	360	210	250	190	310	210	90
BRIDGEPORT	VEL (MPH)	7.2	1.7	9.0	4.3	5.6	6.3	2.1	7.6	3.8	9.2
	SPD (MPH)	7.3	4.2	9.6	8.3	5.9	7.2	3.7	8.9	5.8	9.3
	RATIO	0.983	0.413	0.935	0.514	0.957	0.875	0.555	0.853	0.665	0.984
METEOROLOGICAL SITE	DIR (DEG)	270	340	290	10	240	280	80	300	320	100
WORCESTER	VEL (MPH)	5.9	4.7	10.1	5.3	6.4	6.0	2.8	11.1	1.6	3.7
	SPD (MPH)	7.8	5.6	11.9	5.6	8.2	6.8	5.2	12.5	5.0	4.6
	RATIO	0.758	0.836	0.843	0.942	0.778	0.883	0.536	0.886	0.327	0.804
STRATFORD-005 (0061)	TSP	100	99	95	92	88	85	77	74	71	70
	DATE	6/ 8/87	6/20/87	1/ 9/87	5/ 9/87	2/ 2/87	3/10/87	7/20/87	11/ 5/87	11/23/87	3/16/87
METEOROLOGICAL SITE	DIR (DEG)	250	170	260	240	220	20	200	290	200	350
NEWARK	VEL (MPH)	10.4	4.4	6.2	10.7	6.5	19.6	4.7	11.7	5.0	12.5
	SPD (MPH)	11.6	6.9	8.2	11.1	7.3	19.7	6.5	13.5	6.3	13.8
	RATIO	0.896	0.632	0.754	0.964	0.892	0.994	0.726	0.867	0.795	0.907
METEOROLOGICAL SITE	DIR (DEG)	240	360	310	240	240	30	210	310	180	360
BRADLEY	VEL (MPH)	7.1	4.5	5.7	6.2	2.7	16.5	7.2	10.5	6.1	9.9
	SPD (MPH)	8.8	4.6	6.3	9.2	4.9	17.7	8.9	12.9	7.8	10.4
	RATIO	0.813	0.987	0.903	0.674	0.554	0.933	0.813	0.808	0.788	0.959
METEOROLOGICAL SITE	DIR (DEG)	240	130	310	220	250	20	210	310	230	350
BRIDGEPORT	VEL (MPH)	7.2	1.7	5.6	9.0	6.3	12.7	5.6	7.6	10.4	12.0
	SPD (MPH)	7.3	4.2	6.0	9.6	7.2	14.1	5.9	8.9	11.5	12.2
	RATIO	0.983	0.413	0.920	0.935	0.875	0.898	0.957	0.853	0.902	0.980
METEOROLOGICAL SITE	DIR (DEG)	270	340	310	290	280	20	240	300	240	340
WORCESTER	VEL (MPH)	5.9	4.7	7.8	10.1	6.0	9.1	6.4	11.1	7.6	9.9
	SPD (MPH)	7.8	5.6	9.1	11.9	6.8	9.5	8.2	12.5	8.8	10.1
	RATIO	0.758	0.836	0.861	0.843	0.883	0.959	0.778	0.886	0.862	0.985
TORRINGTON-001 (0050)	TSP	121	92	74	73	72	60	59	58	58	58
	DATE	2/20/87	12/23/87	6/20/87	3/28/87	6/ 8/87	11/23/87	7/20/87	1/ 9/87	11/17/87	5/15/87
METEOROLOGICAL SITE	DIR (DEG)	320	270	170	40	250	200	200	260	130	270
NEWARK	VEL (MPH)	10.9	8.6	4.4	7.0	10.4	5.0	4.7	6.2	5.3	4.7
	SPD (MPH)	11.2	9.1	6.9	9.5	11.6	6.3	6.5	8.2	6.9	11.6
	RATIO	0.977	0.946	0.632	0.741	0.896	0.795	0.726	0.754	0.770	0.404
METEOROLOGICAL SITE	DIR (DEG)	330	290	360	10	240	180	210	310	180	310
BRADLEY	VEL (MPH)	8.0	5.8	4.5	5.5	7.1	6.1	7.2	5.7	5.4	6.0
	SPD (MPH)	8.6	6.9	4.6	5.9	8.8	7.8	8.9	6.3	7.5	11.1
	RATIO	0.929	0.843	0.987	0.926	0.813	0.788	0.813	0.903	0.727	0.540

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	330	280	130	50	240	230	210	310	160	290
BRIDGEPORT	VEL (MPH)	9.8	9.5	1.7	6.3	7.2	10.4	5.6	5.6	5.4	4.9
	SPD (MPH)	9.9	10.1	4.2	8.5	7.3	11.5	5.9	6.0	8.6	9.2
	RATIO	0.983	0.942	0.413	0.749	0.983	0.902	0.957	0.920	0.624	0.537
METEOROLOGICAL SITE	DIR (DEG)	330	290	340	40	270	240	240	310	210	300
WORCESTER	VEL (MPH)	10.9	6.2	4.7	4.5	5.9	7.6	6.4	7.8	7.1	9.4
	SPD (MPH)	11.4	6.6	5.6	4.9	7.8	8.8	8.2	9.1	8.5	14.1
	RATIO	0.959	0.942	0.836	0.923	0.758	0.862	0.778	0.861	0.833	0.670
VOLUNTOWN-001 (0059)	TSP	73	55	51	38	38	37	32	31	31	31
	DATE	6/ 8/87	6/ 2/87	6/20/87	5/15/87	2/ 2/87	5/ 9/87	11/ 5/87	6/14/87	1/21/87	9/12/87
METEOROLOGICAL SITE	DIR (DEG)	250	90	170	270	220	240	290	240	270	100
NEWARK	VEL (MPH)	10.4	3.8	4.4	4.7	6.5	10.7	11.7	9.8	7.6	9.5
	SPD (MPH)	11.6	8.3	6.9	11.6	7.3	11.1	13.5	10.6	8.6	9.6
	RATIO	0.896	0.452	0.632	0.404	0.892	0.964	0.867	0.923	0.886	0.988
METEOROLOGICAL SITE	DIR (DEG)	240	30	360	310	240	240	310	250	270	120
BRADLEY	VEL (MPH)	7.1	4.9	4.5	6.0	2.7	6.2	10.5	4.9	2.3	5.9
	SPD (MPH)	8.8	7.2	4.6	11.1	4.9	9.2	12.9	7.8	3.6	8.5
	RATIO	0.813	0.678	0.987	0.540	0.554	0.674	0.808	0.635	0.628	0.696
METEOROLOGICAL SITE	DIR (DEG)	240	70	130	290	250	220	310	230	310	100
BRIDGEPORT	VEL (MPH)	7.2	5.5	1.7	4.9	6.3	9.0	7.6	6.4	4.8	9.9
	SPD (MPH)	7.3	5.9	4.2	9.2	7.2	9.6	8.9	6.5	5.9	10.1
	RATIO	0.983	0.940	0.413	0.537	0.875	0.935	0.853	0.987	0.817	0.984
METEOROLOGICAL SITE	DIR (DEG)	270	60	340	300	280	290	300	270	290	110
WORCESTER	VEL (MPH)	5.9	5.5	4.7	9.4	6.0	10.1	11.1	6.3	6.3	4.7
	SPD (MPH)	7.8	5.9	5.6	14.1	6.8	11.9	12.5	8.2	7.3	6.6
	RATIO	0.758	0.926	0.836	0.670	0.883	0.843	0.886	0.774	0.858	0.710
WALLINGFORD-001 (0061)	TSP	94	88	81	79	77	74	71	69	67	67
	DATE	1/ 9/87	12/23/87	5/ 9/87	1/15/87	6/ 8/87	7/20/87	6/20/87	3/10/87	1/21/87	2/ 2/87
METEOROLOGICAL SITE	DIR (DEG)	260	270	240	250	250	200	170	20	270	220
NEWARK	VEL (MPH)	6.2	8.6	10.7	10.0	10.4	4.7	4.4	19.6	7.6	6.5
	SPD (MPH)	8.2	9.1	11.1	10.9	11.6	6.5	6.9	19.7	8.6	7.3
	RATIO	0.754	0.946	0.964	0.920	0.896	0.726	0.632	0.994	0.886	0.892
METEOROLOGICAL SITE	DIR (DEG)	310	290	240	250	240	210	360	30	270	240
BRADLEY	VEL (MPH)	5.7	5.8	6.2	4.4	7.1	7.2	4.5	16.5	2.3	2.7
	SPD (MPH)	6.3	6.9	9.2	5.6	8.8	8.9	4.6	17.7	3.6	4.9
	RATIO	0.903	0.843	0.674	0.780	0.813	0.813	0.987	0.933	0.628	0.554
METEOROLOGICAL SITE	DIR (DEG)	310	280	220	260	240	210	130	20	310	250
BRIDGEPORT	VEL (MPH)	5.6	9.5	9.0	9.0	7.2	5.6	1.7	12.7	4.8	6.3
	SPD (MPH)	6.0	10.1	9.6	9.3	7.3	5.9	4.2	14.1	5.9	7.2
	RATIO	0.920	0.942	0.935	0.960	0.983	0.957	0.413	0.898	0.817	0.875
METEOROLOGICAL SITE	DIR (DEG)	310	290	290	280	270	240	340	20	290	280
WORCESTER	VEL (MPH)	7.8	6.2	10.1	6.4	5.9	6.4	4.7	9.1	6.3	6.0
	SPD (MPH)	9.1	6.6	11.9	7.8	7.8	8.2	5.6	9.5	7.3	6.8
	RATIO	0.861	0.942	0.843	0.830	0.758	0.778	0.836	0.959	0.858	0.883

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
WATERBURY-005 (0057)	TSP	124	100	84	80	78	76	75	74	71	66
	DATE	2/ 8/87	1/ 9/87	5/ 9/87	2/14/87	11/ 5/87	6/ 8/87	1/21/87	12/23/87	11/17/87	4/15/87
METEOROLOGICAL SITE	DIR (DEG)	170	260	240	320	290	250	270	270	130	150
NEWARK	VEL (MPH)	4.0	6.2	10.7	10.2	11.7	10.4	7.6	8.6	5.3	4.1
	SPD (MPH)	6.8	8.2	11.1	11.2	13.5	11.6	8.6	9.1	6.9	5.6
	RATIO	0.585	0.754	0.964	0.909	0.867	0.896	0.886	0.946	0.770	0.728
METEOROLOGICAL SITE	DIR (DEG)	170	310	240	340	310	240	270	290	180	170
BRADLEY	VEL (MPH)	4.1	5.7	6.2	4.6	10.5	7.1	2.3	5.8	5.4	1.7
	SPD (MPH)	4.5	6.3	9.2	6.8	12.9	8.8	3.6	6.9	7.5	5.2
	RATIO	0.922	0.903	0.674	0.675	0.808	0.813	0.628	0.843	0.727	0.331
METEOROLOGICAL SITE	DIR (DEG)	140	310	220	330	310	240	310	280	160	190
BRIDGEPORT	VEL (MPH)	4.0	5.6	9.0	7.9	7.6	7.2	4.8	9.5	5.4	2.1
	SPD (MPH)	5.8	6.0	9.6	8.8	8.9	7.3	5.9	10.1	8.6	3.7
	RATIO	0.690	0.920	0.935	0.906	0.853	0.983	0.817	0.942	0.624	0.555
METEOROLOGICAL SITE	DIR (DEG)	170	310	290	320	300	270	290	290	210	80
WORCESTER	VEL (MPH)	3.2	7.8	10.1	8.4	11.1	5.9	6.3	6.2	7.1	2.8
	SPD (MPH)	5.5	9.1	11.9	8.9	12.5	7.8	7.3	6.6	8.5	5.2
	RATIO	0.594	0.861	0.843	0.939	0.886	0.758	0.858	0.942	0.833	0.536
WATERBURY-006 (0058)	TSP	77	68	62	61	53	53	52	52	51	51
	DATE	6/ 8/87	7/20/87	1/ 9/87	1/21/87	3/28/87	11/17/87	11/23/87	11/ 5/87	2/ 2/87	12/23/87
METEOROLOGICAL SITE	DIR (DEG)	250	200	260	270	40	130	200	290	220	270
NEWARK	VEL (MPH)	10.4	4.7	6.2	7.6	7.0	5.3	5.0	11.7	6.5	8.6
	SPD (MPH)	11.6	6.5	8.2	8.6	9.5	6.9	6.3	13.5	7.3	9.1
	RATIO	0.896	0.726	0.754	0.886	0.741	0.770	0.795	0.867	0.892	0.946
METEOROLOGICAL SITE	DIR (DEG)	240	210	310	270	10	180	180	310	240	290
BRADLEY	VEL (MPH)	7.1	7.2	5.7	2.3	5.5	5.4	6.1	10.5	2.7	5.8
	SPD (MPH)	8.8	8.9	6.3	3.6	5.9	7.5	7.8	12.9	4.9	6.9
	RATIO	0.813	0.813	0.903	0.628	0.926	0.727	0.788	0.808	0.554	0.843
METEOROLOGICAL SITE	DIR (DEG)	240	210	310	310	50	160	230	310	250	280
BRIDGEPORT	VEL (MPH)	7.2	5.6	5.6	4.8	6.3	5.4	10.4	7.6	6.3	9.5
	SPD (MPH)	7.3	5.9	6.0	5.9	8.5	8.6	11.5	8.9	7.2	10.1
	RATIO	0.983	0.957	0.920	0.817	0.749	0.624	0.902	0.853	0.875	0.942
METEOROLOGICAL SITE	DIR (DEG)	270	240	310	290	40	210	240	300	280	290
WORCESTER	VEL (MPH)	5.9	6.4	7.8	6.3	4.5	7.1	7.6	11.1	6.0	6.2
	SPD (MPH)	7.8	8.2	9.1	7.3	4.9	8.5	8.8	12.5	6.8	6.6
	RATIO	0.758	0.778	0.861	0.858	0.923	0.833	0.862	0.886	0.883	0.942
WATERBURY-007 (0059)	TSP	158	108	107	94	94	86	85	85	78	78
	DATE	11/ 5/87	12/23/87	1/ 9/87	11/17/87	11/23/87	6/ 8/87	5/15/87	1/21/87	5/ 9/87	3/16/87
METEOROLOGICAL SITE	DIR (DEG)	290	270	260	130	200	250	270	270	240	350
NEWARK	VEL (MPH)	11.7	8.6	6.2	5.3	5.0	10.4	4.7	7.6	10.7	12.5
	SPD (MPH)	13.5	9.1	8.2	6.9	6.3	11.6	11.6	8.6	11.1	13.8
	RATIO	0.867	0.946	0.754	0.770	0.795	0.896	0.404	0.886	0.964	0.907

TABLE 11, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE TSP DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	310	290	310	180	180	240	310	270	240	360
BRADLEY	VEL (MPH)	10.5	5.8	5.7	5.4	6.1	7.1	6.0	2.3	6.2	9.9
	SPD (MPH)	12.9	6.9	6.3	7.5	7.8	8.8	11.1	3.6	9.2	10.4
	RATIO	0.808	0.843	0.903	0.727	0.788	0.813	0.540	0.628	0.674	0.959
METEOROLOGICAL SITE	DIR (DEG)	310	280	310	160	230	240	290	310	220	350
BRIDGEPORT	VEL (MPH)	7.6	9.5	5.6	5.4	10.4	7.2	4.9	4.8	9.0	12.0
	SPD (MPH)	8.9	10.1	6.0	8.6	11.5	7.3	9.2	5.9	9.6	12.2
	RATIO	0.853	0.942	0.920	0.624	0.902	0.983	0.537	0.817	0.935	0.980
METEOROLOGICAL SITE	DIR (DEG)	300	290	310	210	240	270	300	290	290	340
WORCESTER	VEL (MPH)	11.1	6.2	7.8	7.1	7.6	5.9	9.4	6.3	10.1	9.9
	SPD (MPH)	12.5	6.6	9.1	8.5	8.8	7.8	14.1	7.3	11.9	10.1
	RATIO	0.886	0.942	0.861	0.833	0.862	0.758	0.670	0.858	0.843	0.985
		NE		NW	NW	NW	NW	NW	NE		NW
WILLIMANTIC-002 (0047)	TSP	106	106	99	90	82	81	78	67	67	67
	DATE	3/ 4/87	1/15/87	12/23/87	2/26/87	1/ 9/87	2/20/87	11/ 5/87	6/ 2/87	2/ 2/87	2/14/87
METEOROLOGICAL SITE	DIR (DEG)	360	250	270	350	260	320	290	90	220	320
NEWARK	VEL (MPH)	9.3	10.0	8.6	10.2	6.2	10.9	11.7	3.8	6.5	10.2
	SPD (MPH)	10.8	10.9	9.1	10.5	8.2	11.2	13.5	8.3	7.3	11.2
	RATIO	0.859	0.920	0.946	0.969	0.754	0.977	0.867	0.452	0.892	0.909
METEOROLOGICAL SITE	DIR (DEG)	360	250	290	10	310	330	310	30	240	340
BRADLEY	VEL (MPH)	5.3	4.4	5.8	6.0	5.7	8.0	10.5	4.9	2.7	4.6
	SPD (MPH)	6.3	5.6	6.9	6.8	6.3	8.6	12.9	7.2	4.9	6.8
	RATIO	0.838	0.780	0.843	0.893	0.903	0.929	0.808	0.678	0.554	0.675
METEOROLOGICAL SITE	DIR (DEG)	360	260	280	340	310	330	310	70	250	330
BRIDGEPORT	VEL (MPH)	4.3	9.0	9.5	9.3	5.6	9.8	7.6	5.5	6.3	7.9
	SPD (MPH)	8.3	9.3	10.1	9.6	6.0	9.9	8.9	5.9	7.2	8.8
	RATIO	0.514	0.960	0.942	0.962	0.920	0.983	0.853	0.940	0.875	0.906
METEOROLOGICAL SITE	DIR (DEG)	10	280	290	350	310	330	300	60	280	320
WORCESTER	VEL (MPH)	5.3	6.4	6.2	10.1	7.8	10.9	11.1	5.5	6.0	8.4
	SPD (MPH)	5.6	7.8	6.6	10.5	9.1	11.4	12.5	5.9	6.8	8.9
	RATIO	0.942	0.830	0.942	0.960	0.861	0.959	0.886	0.926	0.883	0.939

2

$SW = \frac{133}{390} = 34.1$

$NE = \frac{59}{390} = 15.1$

$NW = \frac{119}{390} = 30.5$

$SE = \frac{8}{390} = 2.0$

III. SULFUR DIOXIDE

HEALTH EFFECTS

Sulfur oxides are gases that come from the burning of sulfur-containing fuel, mainly coal and oil-derived fuels, and also from the smelting of metals and from certain industrial processes. They have a distinctive odor. Sulfur dioxide (SO_2) comprises about 95 percent of these gases, so scientists use a test for SO_2 alone as a measure of all sulfur oxides.

Exposure to high levels of sulfur oxides can cause an obstruction of breathing that doctors call "pulmonary flow resistance." The amount of breathing obstruction has a direct relation to the amount of sulfur compounds in the air. The effect of sulfur pollution is enhanced by the presence of other pollutants, especially particulates and oxidants. Moreover, the harm that results from two or more pollutants is more than additive. Each augments the other, and the combined effect is greater than the sum of the effects that each alone would have.

Many types of respiratory disease are associated with sulfur oxides:coughs and colds, asthma, bronchitis, and emphysema. Some researchers believe that the harm is not only due to the sulfur oxide gases but also other sulfur compounds that accompany the oxides.

CONCLUSIONS

Sulfur dioxide concentrations in 1987 did not exceed any federal primary or secondary standards. Measured concentrations were substantially below the 365 $\mu g/m^3$ primary 24-hour standard and well below both the 80 $\mu g/m^3$ primary annual standard and the 1300 $\mu g/m^3$ secondary 3-hour standard.

METHOD OF MEASUREMENT

The DEP Air Monitoring Unit used the pulsed fluorescence method (Teco instruments) to continuously measure sulfur dioxide levels at all 18 sites in 1987.

DISCUSSION OF DATA

Monitoring Network - Eighteen continuous SO_2 monitors were used to record data in fourteen towns during 1987 (see Figure 5):

Bridgeport 012
Bridgeport 123
Danbury 123
East Hartford 005
East Haven 003
Enfield 005
Greenwich 017
Groton 007
Hartford 123
Milford 010
New Britain 011
New Haven 017
New Haven 123
Norwalk 013
Stamford 025
Stamford 123
Waterbury 008
Waterbury 123

All of these sites telemetered the data to the central computer in Hartford three times each day (i.e., at 0700, 1400, and 2400 hours).

Precision and Accuracy - 697 precision checks were made on SO_2 monitors in 1987, yielding 95% probability limits ranging from -7% to +8%. Accuracy is determined by introducing a known amount of SO_2 into each of the monitors. Three different concentration levels are tested: low, medium, and high. The 95% probability limits for accuracy based on 17 audits were: low, -7% to +7%; medium, -3% to +9%; and high, -5% to +10%.

Annual Averages - SO_2 levels were below the primary annual standard of 80 µg/m³ at all sites in 1987 (see Table 12). The annual average SO_2 levels increased at 9 of the 16 monitoring sites that had adequate data in both 1986 and 1987 to produce valid annual averages. Seven sites showed increases from 1986 to 1987. East Hartford 005 experienced the highest increase (4 µg/m³). Hartford 123 showed the largest annual average decrease (8 µg/m³).

Statistical Projections - A statistical analysis of the sulfur dioxide data is presented in Table 13. This analysis provides information to compensate for any loss of data caused by instrumentation problems. The format of Table 13 is the same as that used to present the total suspended particulate annual averages (see Table 6). However, Table 13 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 the SO_2 data tends to be lognormal, the geometric means and standard deviations were used to predict the number of days the 24-hour standard of 365 µg/m³would be exceeded at each site if sampling had been conducted every day.

It is important to note that these statistical tests require that the data be random for the test 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. For the 18 sites that operated in 1987, the distribution and quantity of SO_2 data were adequate. The data for these sites indicate that there were no violations of the primary SO_2 standard in Connecticut in the last three years. However, statistical predictions of one day exceeding the primary 24-hour standard (365 µg/m³) did occur during this period at one site (Bridgeport 012) in 1985. This indicates that a slight increase in SO_2 emissions might have jeopardized the attainment of the standard at this site. Two days over the standard are required for the standard to be violated.

24-Hour Averages - Table 14 presents the first and second high calendar day average concentrations recorded at each monitoring site. In 1987 no sites recorded SO_2 levels in excess of the 24-hour primary standard of 365 µg/m³. Second high calendar day average concentrations decreased at 8 of the 16 SO_2 monitoring sites that had a sufficient distribution and quantity of data in both 1986 and 1987. The decreases ranged from 1 µg/m³ at New Britain 011 to 30 µg/m³ at Stamford 025. Seven of the sites had second high concentrations that increased from 1986 to 1987. These increases ranged from 1 µg/m³ at Hartford 123 to 49 µg/m³ at East Hartford 005.

Current EPA policy bases compliance with the primary 24-hour SO_2 standard on calendar day averages. Assessment of compliance is based on the second highest calendar day average in the year. Running averages are averages computed for the 24-hour periods ending at every hour. If running averages were used, assessment of compliance would be based on the value of the second highest of the two highest non-overlapping 24-hour periods in the year. There has been some contention over which average is the more appropriate one on which to base compliance. Table 15 contains the maximum 24-hour SO_2 readings from both the running averages and the calendar day averages for comparison. The maximum calendar day readings are all lower than the maximum running average readings, and the differences range up to 21 µg/m³ at New Haven 017.

3-Hour Averages - Table 16 presents the first and second high 3-hour concentrations recorded at each monitoring site. Measured SO_2 concentrations were far below the federal secondary 3-hour standard of 1300 µg/m³ at all DEP monitoring sites in 1987. Of the 16 sites that had a sufficient distribution and quantity of data in both 1986 and 1987, 9 had higher second high concentrations in

1987. These increases ranged from 5 $\mu g/m^3$ at Waterbury 123 to ~~88~~ 82 $\mu g/m^3$ at ~~East Hartford 005.~~ Danbury 123. ~~Seven~~ Six sites had lower second high concentrations in 1987. The decreases ranged from 9 $\mu g/m^3$ at East Haven 003 to 217 $\mu g/m^3$ at New Haven 123.

10-High Days with Wind Data - Table 17 lists the ten highest 24-hour calendar day SO_2 averages and the dates of occurrence for each SO_2 site in Connecticut during 1987. The table also shows the average wind conditions that occurred on each of these dates. (The origin and use of these wind data are described in the discussion of Table 11 in the TSP section of this Air Quality Summary.)

Once again, as with TSP, many (i.e., 37.7%) of the highest SO_2 days occurred with winds out of the southwest quadrant, and most of these days had relatively persistent winds. This relationship is caused, at least in part, by SO_2 transport, but any transport is limited by the chemical instability of SO_2. In the atmosphere, SO_2 reacts with other gases to produce, among other things, sulfate particulates. Therefore, SO_2 is not likely to be transported very long distances. Previous studies conducted by the DEP have shown that, during periods of southwest winds, levels of SO_2 in Connecticut decrease with distance from the New York City metropolitan area. This relationship tends to support the transport hypothesis. On the other hand, these studies also revealed that certain meteorological parameters, most notably mixing height and wind speed, are more conducive to high SO_2 levels on days when there are southwesterly winds than on other days.

The data in Table 17 were used to make a tally, by date, of the frequency of occurrence of high SO_2 levels. Only those sites were used which had a sufficient distribution and quantity of data in 1987 to produce a valid annual average. (In 1987, all 18 sites were used.) If a given date recurred at five or more sites in this tally, the SO_2 levels and meteorological conditions were investigated further. There were 15 such days. A close look at these 15 days revealed two important points. First, 12 of the 15 days occurred during winter, and the rest occurred in late autumn. This can be attributed to more fuel being burned during the cold weather. Second, 6 of the 15 days had relatively persistent southwest winds for the calendar day, and 3 other days had such winds for the previous 24 hours.

In summary, high levels of SO_2 in Connecticut seem to be caused by a number of related factors. First, Connecticut experiences its highest SO_2 levels during the winter months, when there is an increased amount of fuel combustion. Second, the New York City metropolitan area, a large emission source, is located to the southwest of Connecticut and southwest winds occur relatively often in this region in comparison to other wind directions. Also, adverse meteorological conditions are often associated with southwest winds. The net effect is that during the winter months when a persistent southwesterly wind occurs, an air mass picks up increased amounts of SO_2 over the New York City metropolitan area and transports this SO_2 into Connecticut. Here, the SO_2 levels remain high because the relatively low mixing heights associated with the southwest flow and low winter temperatures will not allow much vertical mixing. The levels of transported SO_2 eventually decline with increasing distance from New York City, as the SO_2 is dispersed and as it slowly reacts to produce sulfate particulates. These sulfate particulates may fall to the ground in either a dry state (dry deposition) or in a wet state after combination with water droplets (wet deposition or "acid rain").

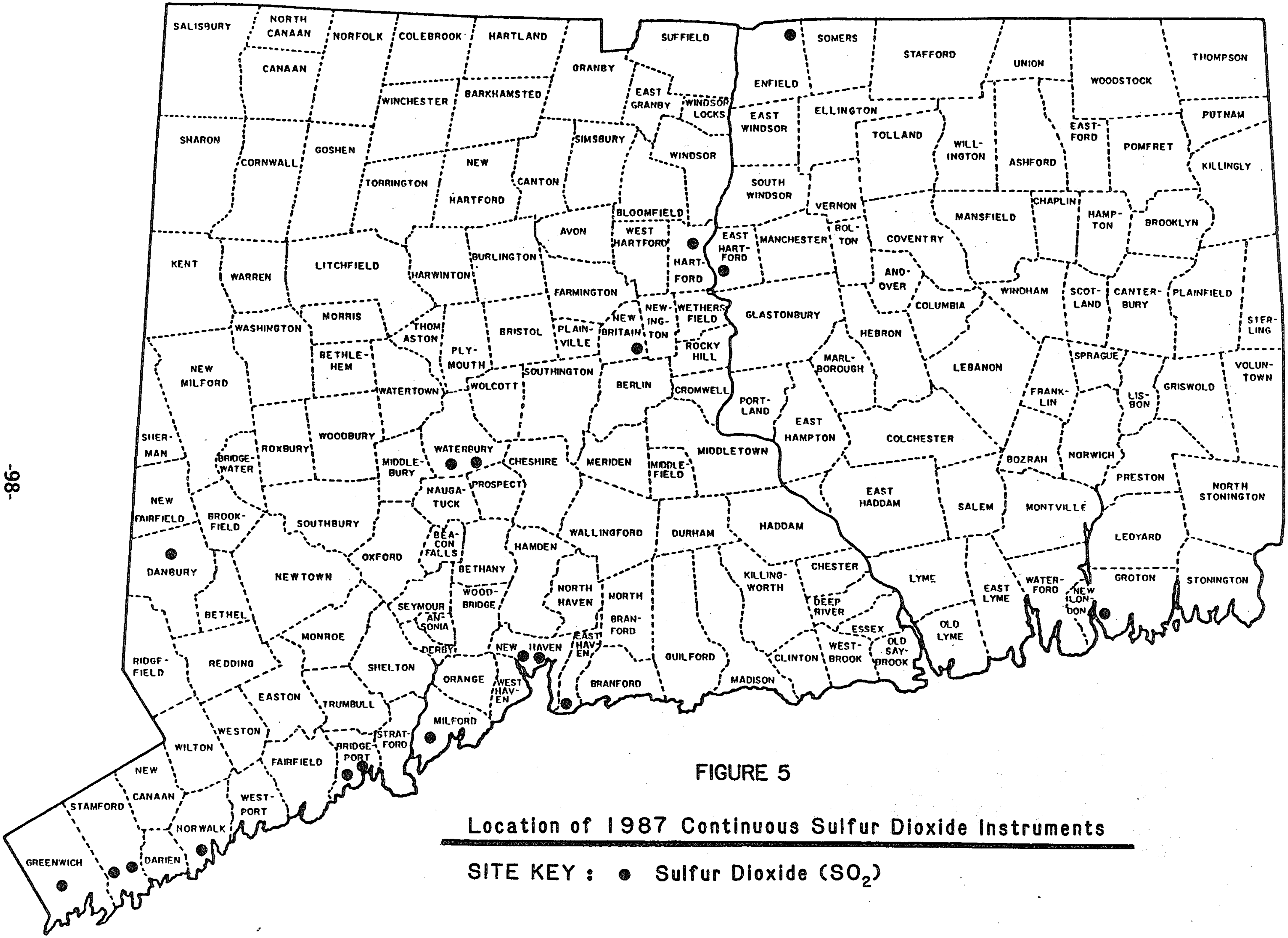


FIGURE 5

Location of 1987 Continuous Sulfur Dioxide Instruments

SITE KEY : ● Sulfur Dioxide (SO_2)

TABLE 12

1987 ANNUAL ARITHMETIC AVERAGES OF SULFUR DIOXIDE AT SITES WITH CONTINUOUS MONITORS

(PRIMARY STANDARD: 80 µg/m³)

TOWN	SITE NAME	ANNUAL AVG* (µg/m³)
Bridgeport-012	Edison School	33
Bridgeport-123	Hallett Street	~~31~~ 28
Danbury-123	Western CT State College	21
East Hartford-005	Fire House - Engine Co. #5	26
East Haven-003	Animal Shelter	25
Enfield-005	Department of Corrections	17
Greenwich-017	Greenwich Point Park	12
Groton-007	Fire Headquarters	19
Hartford-123	State Office Building	27
Milford-010	Devon Community Center	25
New Britain-011	Armory	26
New Haven-017	Lombard St. Fire House	36**
New Haven-123	State Street	40
Norwalk-013	Ludlow School	23
Stamford-025	Recreation Center	29**
Stamford-123	Health Department	29
Waterbury-008	Armory	31
Waterbury-123	Bank Street	22

* The annual averages are expressed in terms of the arithmetic mean because the primary ambient air quality standard for SO_2 is defined as the annual arithmetic mean concentration. This differs from the trend analysis presented earlier in section I.B. of this Air Quality Summary which made use of the annual geometric mean.

** A valid annual average cannot be calculated because the number of observations is insufficient or is poorly distributed.

TABLE 13

1985–1987 SO2 ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	ARITHMETIC MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	STD DEVIATION	LOGNORMAL DISTRIBUTION: PREDICTED DAYS OVER 365 UG/M3
BRIDGEPORT	012	1985	317	36.0	35	37	30.464	1
BRIDGEPORT	012	1986	353	32.6	32	33	25.153	
BRIDGEPORT	012	1987	351	33.4	33	34	25.564	
BRIDGEPORT	123	1985	355	30.8	31	31	24.961	
BRIDGEPORT	123	1986	360	29.8	30	30	23.094	
BRIDGEPORT	123	1987	306	28.3	28	29	22.802	
DANBURY	123	1985	292	20.0	20	20	17.747	
DANBURY	123	1986	360	20.1	20	20	14.590	
DANBURY	123	1987	345	20.9	21	21	16.253	
EAST HARTFORD	005	1985	306	19.8	19	20	20.695	
EAST HARTFORD	005	1986	314*	21.8	21	22	17.838	
EAST HARTFORD	005	1987	327	26.3	26	27	21.715	
EAST HAVEN	003	1985	332	24.8	24	25	23.377	
EAST HAVEN	003	1986	354	21.6	21	22	20.122	
EAST HAVEN	003	1987	346	25.1	25	25	20.861	
ENFIELD	005	1985	345	12.7	13	13	13.625	
ENFIELD	005	1986	335	15.9	16	16	13.614	
ENFIELD	005	1987	343	16.8	17	17	16.057	
GREENWICH	017	1985	357	14.4	14	14	12.452	
GREENWICH	017	1986	346	13.9	14	14	12.487	
GREENWICH	017	1987	346	12.2	12	12	10.825	
GROTON	007	1985	354	21.3	21	21	13.955	
GROTON	007	1986	343	21.5	21	22	13.408	
GROTON	007	1987	353	18.9	19	19	13.858	

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE ANNUAL AVERAGES IN TABLE 13 VARY SLIGHTLY FROM THOSE IN TABLE 12 DUE TO THE MANNER IN WHICH THEY WERE DERIVED. THE AVERAGES IN TABLE 12 ARE BASED ON THE AVAILABLE HOURLY READINGS, WHILE THOSE IN TABLE 13 ARE BASED ON VALID 24-HOUR AVERAGES. (AT LEAST 18 HOURLY READINGS ARE REQUIRED TO PRODUCE A VALID 24-HOUR AVERAGE.)

THE ARITHMETIC MEAN AND THE STANDARD DEVIATION HAVE UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 13, CONTINUED

1985–1987 SO2 ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	ARITHMETIC MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	LOGNORMAL DISTRIBUTION STD DEVIATION	LOGNORMAL DISTRIBUTION PREDICTED DAYS OVER 365 UG/M3
HARTFORD	123	1985	361	22.8	23	23	22.298	
HARTFORD	123	1986	348	34.8	34	35	23.498	
HARTFORD	123	1987	341	26.0	26	26	21.972	
MILFORD	002	1985	349	29.3	29	30	27.498	
MILFORD	002	1986	362	33.8	34	34	32.389	
MILFORD	010	1987	332	25.1	25	25	21.359	
NEW BRITAIN	011	1985	360	23.0	23	23	19.693	
NEW BRITAIN	011	1986	358	25.8	26	26	21.270	
NEW BRITAIN	011	1987	364	25.9	26	26	21.866	
NEW HAVEN	017	1985	341	36.2	36	37	31.069	
NEW HAVEN	017	1986	352	35.5	35	36	30.593	
NEW HAVEN	017	1987	327*	36.3	36	37	31.847	
NEW HAVEN	123	1985	357	44.3	44	45	36.297	
NEW HAVEN	123	1986	351	39.2	39	40	35.466	
NEW HAVEN	123	1987	348	39.7	39	40	31.906	
NORWALK	013	1985	364	23.1	23	23	22.858	
NORWALK	013	1986	348	23.3	23	24	21.868	
NORWALK	013	1987	344	23.1	23	23	23.071	
PRESTON	002	1985	349	13.0	13	13	10.803	
PRESTON	002	1986	84*	19.2	18	20	13.297	
STAMFORD	025	1985	280*	28.5	28	29	21.965	
STAMFORD	025	1986	347	29.3	29	30	23.547	
STAMFORD	025	1987	319*	29.2	29	30	23.574	

* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE ANNUAL AVERAGES IN TABLE 13 VARY SLIGHTLY FROM THOSE IN TABLE 12 DUE TO THE MANNER IN WHICH THEY WERE DERIVED. THE AVERAGES IN TABLE 12 ARE BASED ON THE AVAILABLE HOURLY READINGS, WHILE THOSE IN TABLE 13 ARE BASE ON VALID 24-HOUR AVERAGES. (AT LEAST 18 HOURLY READINGS ARE REQUIRED TO PRODUCE A VALID 24-HOUR AVERAGE.)

THE ARITHMETIC MEAN AND THE STANDARD DEVIATION HAVE UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 13, CONTINUED

1985–1987 SO2 ANNUAL AVERAGES AND STATISTICAL PROJECTIONS

TOWN NAME	SITE	YEAR	SAMPLES	ARITHMETIC MEAN	95-PCT-LIMITS LOWER	95-PCT-LIMITS UPPER	STD DEVIATION	LOGNORMAL DISTRIBUTION: PREDICTED DAYS OVER 365 UG/M3
STAMFORD	123	1985	353	28.6	28	29	22.817	
STAMFORD	123	1986	355	27.5	27	28	20.827	
STAMFORD	123	1987	357	29.4	29	30	23.767	
WATERBURY	008	1986	125*	33.8	32	35	22.397	
WATERBURY	008	1987	343	30.6	30	31	23.874	
WATERBURY	123	1985	351	23.0	23	23	19.482	
WATERBURY	123	1986	359	22.0	22	22	18.366	
WATERBURY	123	1987	349	21.5	21	22	17.693	

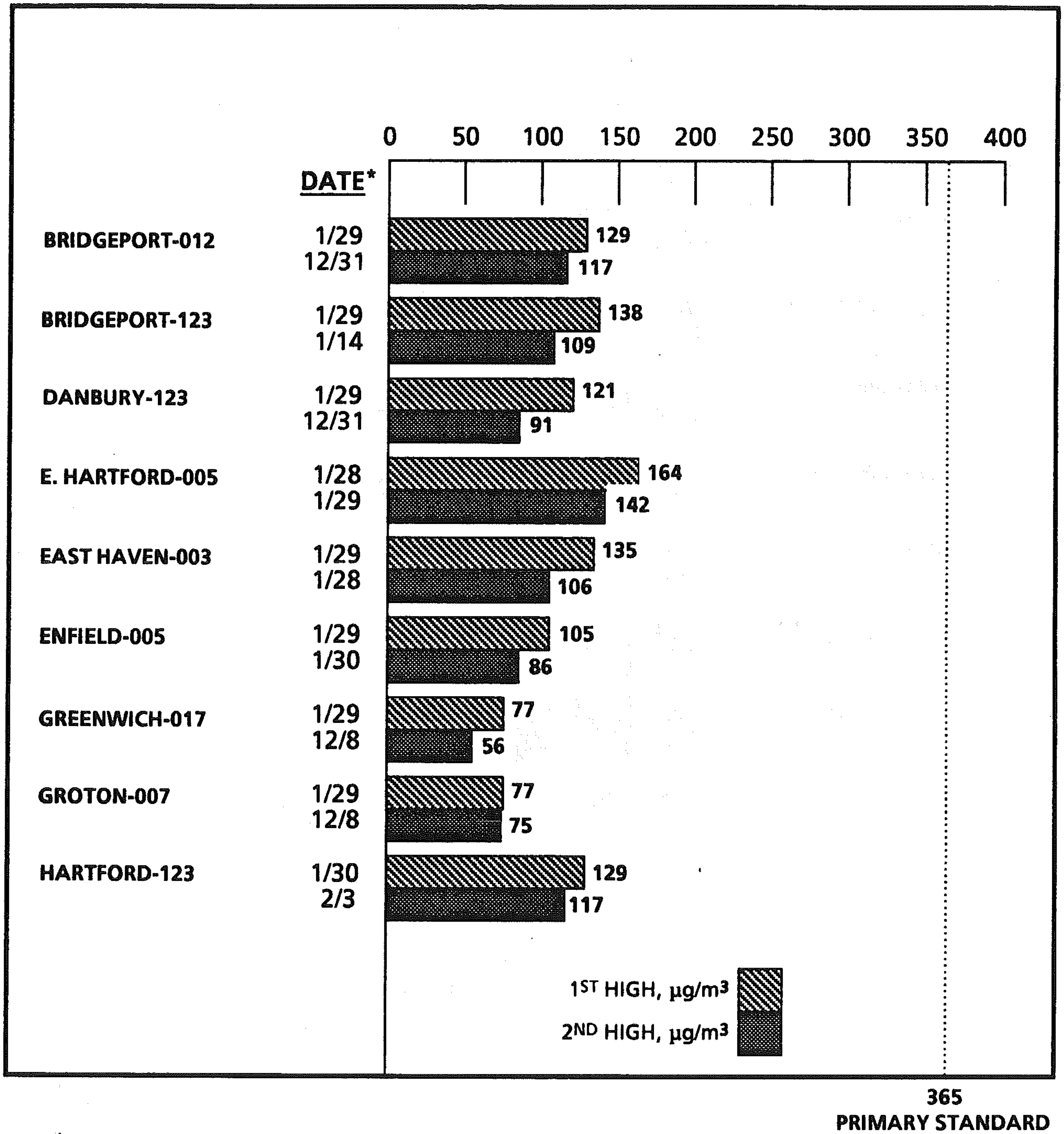
* SAMPLING NOT RANDOM OR OF INSUFFICIENT SIZE FOR REPRESENTATIVE ANNUAL STATISTICS.

N.B. THE ANNUAL AVERAGES IN TABLE 13 VARY SLIGHTLY FROM THOSE IN TABLE 12 DUE TO THE MANNER IN WHICH THEY WERE DERIVED. THE AVERAGES IN TABLE 12 ARE BASED ON THE AVAILABLE HOURLY READINGS, WHILE THOSE IN TABLE 13 ARE BASED ON VALID 24-HOUR AVERAGES. (AT LEAST 18 HOURLY READINGS ARE REQUIRED TO PRODUCE A VALID 24-HOUR AVERAGE.)

THE ARITHMETIC MEAN AND THE STANDARD DEVIATION HAVE UNITS OF MICROGRAMS PER CUBIC METER.

TABLE 14

1987 MAXIMUM CALENDAR DAY AVERAGE SO2 CONCENTRATIONS

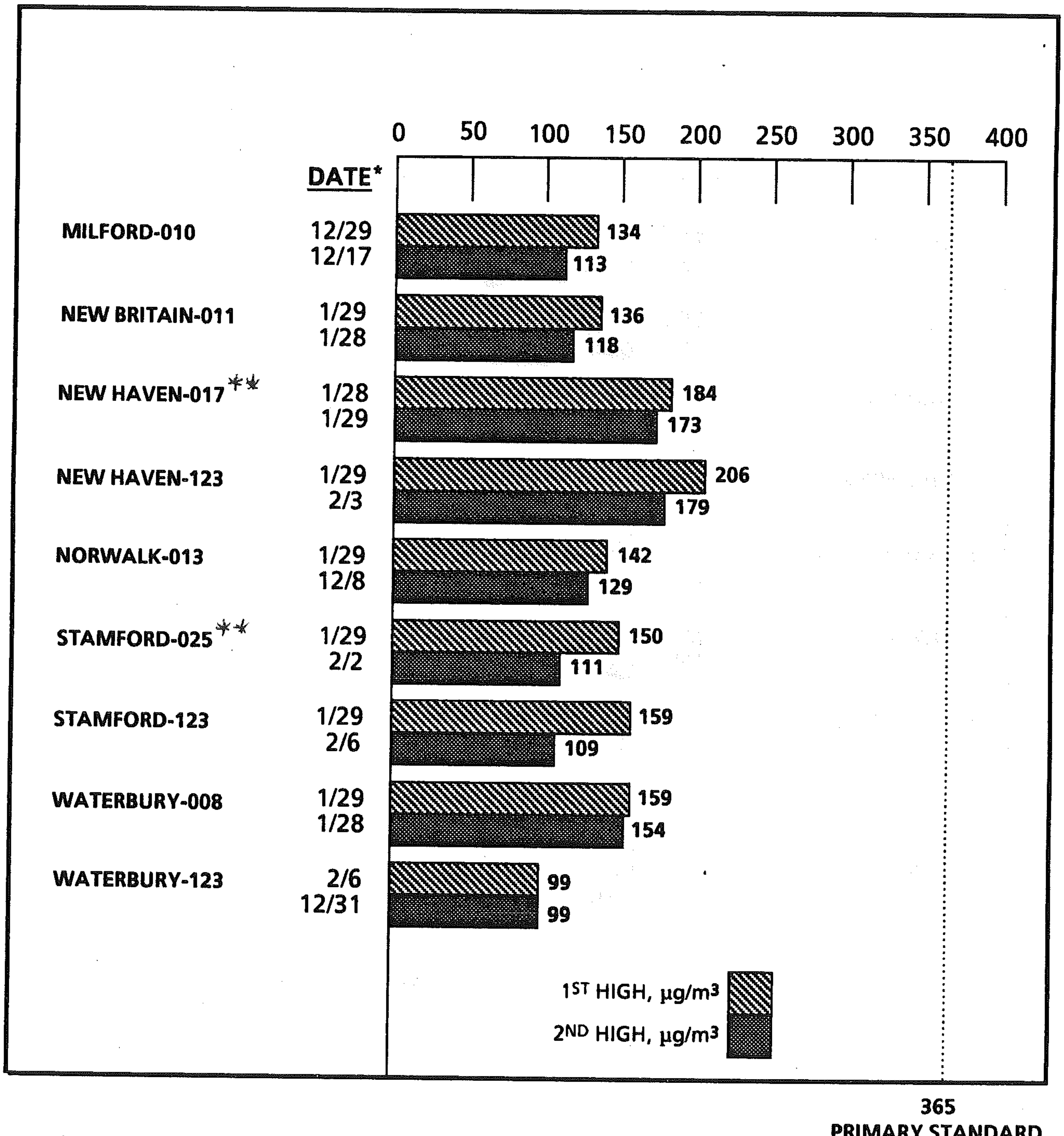


* Date is month/day of occurrence.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

TABLE 14, CONTINUED

1987 MAXIMUM CALENDAR DAY AVERAGE SO2 CONCENTRATIONS



* Date is month/day of occurrence.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

** The database for the site is deficient in the number or distribution of observations.

TABLE 15

COMPARISONS OF FIRST AND SECOND HIGH CALENDAR DAY AND 24-HOUR RUNNING SO2 AVERAGES FOR 1987

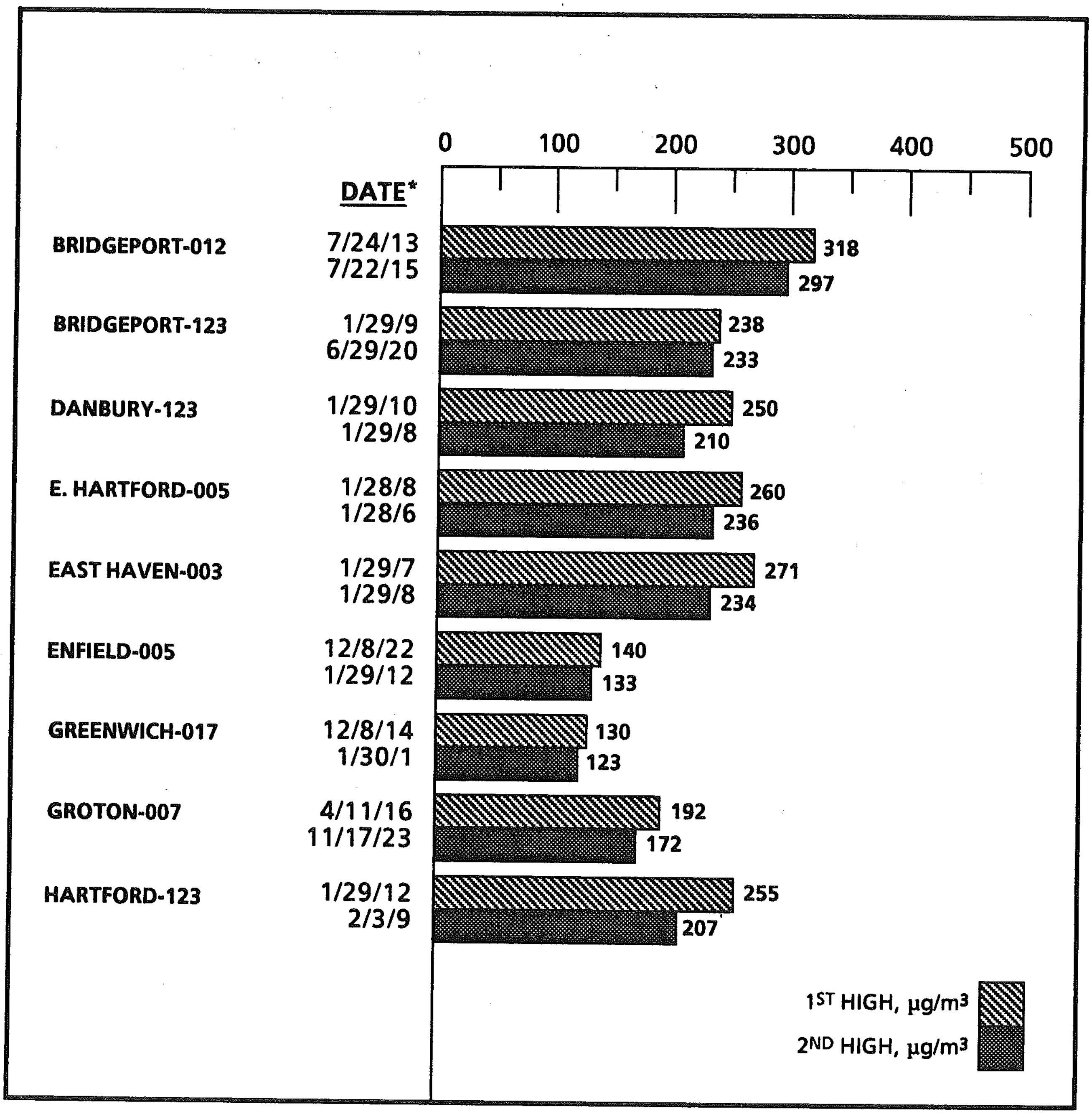
SITE	FIRST HIGH AVERAGE		SECOND HIGH AVERAGE	
	RUNNING 24-HOUR	CALENDAR DAY	RUNNING 24-HOUR	CALENDAR DAY
Bridgeport-012	139	129	135	117
Bridgeport-123	142	138	127	109
Danbury-123	123	121	104	86
E. Hartford-005	165	164	148	142
East Haven-003	142	135	121	106
Enfield-005	106	105	98	86
Greenwich-017	81	77	76	56
Groton-007	87	77	82	75
Hartford-123	145	129	133	117
Milford-010	151	134	116	113
New Britain-011	143	136	128	118
New Haven-017*	205	184	181	173
New Haven-123	208	206	200	179
Norwalk-013	146	142	131	129
Stamford-025*	163	150	139	111
Stamford-123	162	159	142	109
Waterbury-008	164	159	155	154
Waterbury-123	111	99	106	99

N.B. The averages have units of $\mu g/m^3$.

* The number or distribution of observations is inadequate for the calculation of a valid annual average.

TABLE 16

1987 MAXIMUM 3-HOUR RUNNING AVERAGE SO2 CONCENTRATIONS



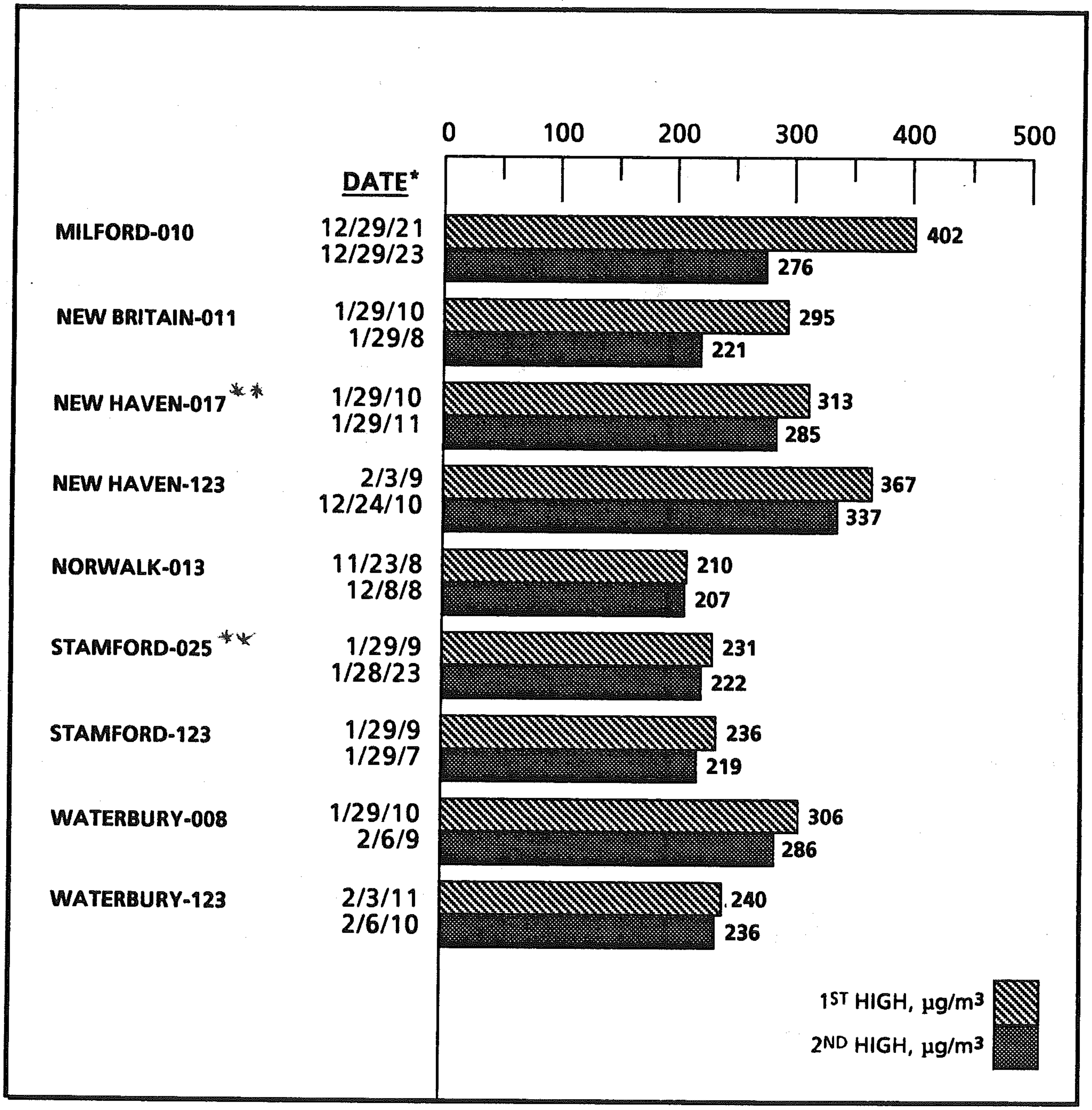
* Date is month/day/ending hour of occurrence.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

Secondary standard = 1300 µg/m³.

TABLE 16, CONTINUED

1987 MAXIMUM 3-HOUR RUNNING AVERAGE SO2 CONCENTRATIONS



* Date is month/day/ending hour of occurrence.

N.B. When a listed concentration occurs more than once at a site, the earliest date of occurrence is given first.

Secondary standard = 1300 µg/m^3.

** The database for the site is deficient in the number or distribution of observations.

TABLE 17

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
BRIDGEPORT-012 (0351)	SO2	129	117	116	112	111	111	106	104	102	99
	DATE	1/29/87	12/31/87	1/14/87	12/ 9/87	2/ 2/87	2/ 3/87	11/23/87	12/ 8/87	12/22/87	2/ 6/87
METEOROLOGICAL SITE	DIR (DEG)	350	200	200	190	240	270	180	170	180	220
NEWARK	VEL (MPH)	1.3	4.7	6.0	6.0	2.7	3.2	6.1	2.6	4.3	3.8
	SPD (MPH)	1.4	7.2	7.0	8.3	4.9	4.7	7.8	3.9	7.6	5.8
	RATIO	0.925	0.653	0.846	0.717	0.554	0.679	0.788	0.670	0.567	0.654
METEOROLOGICAL SITE	DIR (DEG)	260	220	220	210	220	270	200	200	190	240
BRADLEY	VEL (MPH)	3.3	4.6	9.3	8.3	6.5	8.1	5.0	3.2	3.7	6.9
	SPD (MPH)	4.7	5.9	9.9	8.5	7.3	9.2	6.3	4.9	4.3	8.6
	RATIO	0.699	0.785	0.942	0.983	0.892	0.881	0.795	0.657	0.867	0.801
METEOROLOGICAL SITE	DIR (DEG)	350	280	260	250	250	280	230	250	220	230
BRIDGEPORT	VEL (MPH)	5.7	2.7	6.8	7.3	6.3	4.9	10.4	8.3	1.7	7.0
	SPD (MPH)	6.5	3.6	7.2	7.9	7.2	5.8	11.5	8.5	3.7	7.6
	RATIO	0.881	0.755	0.940	0.927	0.875	0.856	0.902	0.984	0.462	0.915
METEOROLOGICAL SITE	DIR (DEG)	320	260	270	260	280	290	240	270	270	290
WORCESTER	VEL (MPH)	7.4	8.6	9.1	9.5	6.0	5.8	7.6	8.0	4.1	5.2
	SPD (MPH)	8.2	11.2	10.1	11.5	6.8	6.6	8.8	9.5	6.0	6.8
	RATIO	0.904	0.766	0.901	0.828	0.883	0.876	0.862	0.848	0.687	0.768
BRIDGEPORT-123 (0306)	SO2	138	109	109	109	99	97	93	91	88	88
	DATE	1/29/87	2/ 2/87	1/14/87	2/ 3/87	1/30/87	2/ 7/87	11/24/87	11/23/87	1/15/87	1/21/87
METEOROLOGICAL SITE	DIR (DEG)	350	240	200	270	360	300	240	180	250	270
NEWARK	VEL (MPH)	1.3	2.7	6.0	3.2	6.4	4.3	3.9	6.1	4.4	2.3
	SPD (MPH)	1.4	4.9	7.0	4.7	6.5	6.8	7.3	7.8	5.6	3.6
	RATIO	0.925	0.554	0.846	0.679	0.992	0.637	0.532	0.788	0.780	0.628
METEOROLOGICAL SITE	DIR (DEG)	260	220	220	270	50	290	240	200	250	270
BRADLEY	VEL (MPH)	3.3	6.5	9.3	8.1	2.1	4.7	5.5	5.0	10.0	7.6
	SPD (MPH)	4.7	7.3	9.9	9.2	5.8	7.6	6.5	6.3	10.9	8.6
	RATIO	.0.699	0.892	0.942	0.881	0.368	0.616	0.849	0.795	0.920	0.886
METEOROLOGICAL SITE	DIR (DEG)	350	250	260	280	80	310	260	230	260	310
BRIDGEPORT	VEL (MPH)	5.7	6.3	6.8	4.9	7.2	1.9	6.0	10.4	9.0	4.8
	SPD (MPH)	6.5	7.2	7.2	5.8	9.6	5.8	6.2	11.5	9.3	5.9
	RATIO	0.881	0.875	0.940	0.856	0.746	0.329	0.974	0.902	0.960	0.817
METEOROLOGICAL SITE	DIR (DEG)	320	280	270	290	70	320	280	240	280	290
WORCESTER	VEL (MPH)	7.4	6.0	9.1	5.8	4.9	7.0	5.3	7.6	6.4	6.3
	SPD (MPH)	8.2	6.8	10.1	6.6	5.5	7.9	7.5	8.8	7.8	7.3
	RATIO	0.904	0.883	0.901	0.876	0.901	0.880	0.714	0.862	0.830	0.858
DANBURY-123 (0345)	SO2	121	91	86	76	74	71	71	70	68	67
	DATE	1/29/87	12/31/87	1/28/87	1/30/87	1/21/87	2/ 3/87	2/ 2/87	2/ 7/87	12/19/87	2/ 6/87
METEOROLOGICAL SITE	DIR (DEG)	350	200	310	360	270	270	240	300	250	220
NEWARK	VEL (MPH)	1.3	4.7	1.2	6.4	2.3	3.2	2.7	4.3	4.1	3.8
	SPD (MPH)	1.4	7.2	1.7	6.5	3.6	4.7	4.9	6.8	5.6	5.8
	RATIO	0.925	0.653	0.667	0.992	0.628	0.679	0.554	0.637	0.735	0.654
METEOROLOGICAL SITE	DIR (DEG)	260	220	290	50	270	270	220	290	240	240
BRADLEY	VEL (MPH)	3.3	4.6	2.2	2.1	7.6	8.1	6.5	4.7	6.5	6.9
	SPD (MPH)	4.7	5.9	5.0	5.8	8.6	9.2	7.3	7.6	8.1	8.6
	RATIO	0.699	0.785	0.442	0.368	0.886	0.881	0.892	0.616	0.813	0.801

8

5

3

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	350	280	310	80	310	280	250	310	270	230
BRIDGEPORT	VEL (MPH)	5.7	2.7	1.8	7.2	4.8	4.9	6.3	1.9	8.9	7.0
	SPD (MPH)	6.5	3.6	5.3	9.6	5.9	5.8	7.2	5.8	10.1	7.6
	RATIO	0.881	0.755	0.334	0.746	0.817	0.856	0.875	0.329	0.880	0.915
METEOROLOGICAL SITE	DIR (DEG)	320	260	350	70	290	290	280	320	280	290
WORCESTER	VEL (MPH)	7.4	8.6	1.6	4.9	6.3	5.8	6.0	7.0	6.7	5.2
	SPD (MPH)	8.2	11.2	4.7	5.5	7.3	6.6	6.8	7.9	8.1	6.8
	RATIO	0.904	0.766	0.333	0.901	0.858	0.876	0.883	0.880	0.834	0.768
EAST HARTFORD-005 (0327)	SO2	164	142	114	106	97	88	83	81	76	74
	DATE	1/28/87	1/29/87	1/ 6/87	1/30/87	12/ 8/87	12/ 9/87	2/15/87	1/21/87	1/27/87	11/ 8/87
METEOROLOGICAL SITE	DIR (DEG)	310	350	180	360	170	190	330	270	10	200
NEWARK	VEL (MPH)	1.2	1.3	2.4	6.4	2.6	6.0	13.9	2.3	3.8	6.5
	SPD (MPH)	1.7	1.4	5.3	6.5	3.9	8.3	15.0	3.6	4.3	7.6
	RATIO	0.667	0.925	0.450	0.992	0.670	0.717	0.932	0.628	0.880	0.854
METEOROLOGICAL SITE	DIR (DEG)	290	260	100	50	200	210	320	270	10	220
BRADLEY	VEL (MPH)	2.2	3.3	1.6	2.1	3.2	8.3	14.4	7.6	9.4	8.8
	SPD (MPH)	5.0	4.7	8.1	5.8	4.9	8.5	15.0	8.6	9.6	8.9
	RATIO	0.442	0.699	0.194	0.368	0.657	0.983	0.963	0.886	0.975	0.988
METEOROLOGICAL SITE	DIR (DEG)	310	350	240	80	250	250	340	310	30	250
BRIDGEPORT	VEL (MPH)	1.8	5.7	2.4	7.2	8.3	7.3	12.3	4.8	6.3	5.8
	SPD (MPH)	5.3	6.5	5.9	9.6	8.5	7.9	12.9	5.9	6.8	6.3
	RATIO	0.334	0.881	0.415	0.746	0.984	0.927	0.954	0.817	0.937	0.914
METEOROLOGICAL SITE	DIR (DEG)	350	320	240	70	270	260	320	290	360	260
WORCESTER	VEL (MPH)	1.6	7.4	3.4	4.9	8.0	9.5	9.6	6.3	3.4	10.4
	SPD (MPH)	4.7	8.2	5.5	5.5	9.5	11.5	10.4	7.3	3.9	11.9
	RATIO	0.333	0.904	0.631	0.901	0.848	0.828	0.927	0.858	0.872	0.876
EAST HAVEN-003 (0346)	SO2	135	106	101	98	86	82	81	80	76	76
	DATE	1/29/87	1/28/87	2/ 3/87	12/ 8/87	12/19/87	12/23/87	1/ 6/87	1/21/87	12/17/87	12/12/87
METEOROLOGICAL SITE	DIR (DEG)	350	310	270	170	250	290	180	270	340	20
NEWARK	VEL (MPH)	1.3	1.2	3.2	2.6	4.1	5.8	2.4	2.3	14.8	2.6
	SPD (MPH)	1.4	1.7	4.7	3.9	5.6	6.9	5.3	3.6	15.4	2.9
	RATIO	0.925	0.667	0.679	0.670	0.735	0.843	0.450	0.628	0.965	0.906
METEOROLOGICAL SITE	DIR (DEG)	260	290	270	200	240	270	100	270	320	250
BRADLEY	VEL (MPH)	3.3	2.2	8.1	3.2	6.5	8.6	1.6	7.6	16.0	5.7
	SPD (MPH)	4.7	5.0	9.2	4.9	8.1	9.1	8.1	8.6	16.4	6.2
	RATIO	0.699	0.442	0.881	0.657	0.813	0.946	0.194	0.886	0.975	0.927
METEOROLOGICAL SITE	DIR (DEG)	350	310	280	250	270	280	240	310	340	330
BRIDGEPORT	VEL (MPH)	5.7	1.8	4.9	8.3	8.9	9.5	2.4	4.8	14.1	4.0
	SPD (MPH)	6.5	5.3	5.8	8.5	10.1	10.1	5.9	5.9	14.4	6.3
	RATIO	0.881	0.334	0.856	0.984	0.880	0.942	0.415	0.817	0.984	0.632
METEOROLOGICAL SITE	DIR (DEG)	320	350	290	270	280	290	240	290	340	20
WORCESTER	VEL (MPH)	7.4	1.6	5.8	8.0	6.7	6.2	3.4	6.3	16.2	.3
	SPD (MPH)	8.2	4.7	6.6	9.5	8.1	6.6	5.5	7.3	16.2	3.6
	RATIO	0.904	0.333	0.876	0.848	0.834	0.942	0.631	0.858	0.995	0.081

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
ENFIELD-005 (0343)	SO2	105	86	82	80	73	68	65	64	63	62
	DATE	1/29/87	1/30/87	12/ 9/87	1/28/87	2/ 7/87	1/14/87	1/15/87	2/ 2/87	1/21/87	1/18/87
METEOROLOGICAL SITE	DIR (DEG)	350	360	190	310	300	200	250	240	270	10
NEWARK	VEL (MPH)	1.3	6.4	6.0	1.2	4.3	6.0	4.4	2.7	2.3	4.4
	SPD (MPH)	1.4	6.5	8.3	1.7	6.8	7.0	5.6	4.9	3.6	4.7
	RATIO	0.925	0.992	0.717	0.667	0.637	0.846	0.780	0.554	0.628	0.923
METEOROLOGICAL SITE	DIR (DEG)	260	50	210	290	290	220	250	220	270	30
BRADLEY	VEL (MPH)	3.3	2.1	8.3	2.2	4.7	9.3	10.0	6.5	7.6	7.2
	SPD (MPH)	4.7	5.8	8.5	5.0	7.6	9.9	10.9	7.3	8.6	7.9
	RATIO	0.699	0.368	0.983	0.442	0.616	0.942	0.920	0.892	0.886	0.906
METEOROLOGICAL SITE	DIR (DEG)	350	80	250	310	310	260	260	250	310	30
BRIDGEPORT	VEL (MPH)	5.7	7.2	7.3	1.8	1.9	6.8	9.0	6.3	4.8	8.0
	SPD (MPH)	6.5	9.6	7.9	5.3	5.8	7.2	9.3	7.2	5.9	8.8
	RATIO	0.881	0.746	0.927	0.334	0.329	0.940	0.960	0.875	0.817	0.908
METEOROLOGICAL SITE	DIR (DEG)	320	70	260	350	320	270	280	280	290	90
WORCESTER	VEL (MPH)	7.4	4.9	9.5	1.6	7.0	9.1	6.4	6.0	6.3	1.0
	SPD (MPH)	8.2	5.5	11.5	4.7	7.9	10.1	7.8	6.8	7.3	4.3
	RATIO	0.904	0.901	0.828	0.333	0.880	0.901	0.830	0.883	0.858	0.221
GREENWICH-017 (0346)	SO2	77	56	55	51	45	44	44	44	43	42
	DATE	1/29/87	12/ 8/87	2/ 2/87	12/31/87	11/13/87	1/22/87	1/28/87	1/18/87	1/30/87	2/ 7/87
METEOROLOGICAL SITE	DIR (DEG)	350	170	240	200	210	20	310	10	360	300
NEWARK	VEL (MPH)	1.3	2.6	2.7	4.7	5.0	8.7	1.2	4.4	6.4	4.3
	SPD (MPH)	1.4	3.9	4.9	7.2	8.3	8.8	1.7	4.7	6.5	6.8
	RATIO	0.925	0.670	0.554	0.653	0.606	0.988	0.667	0.923	0.992	0.637
METEOROLOGICAL SITE	DIR (DEG)	260	200	220	220	230	20	290	30	50	290
BRADLEY	VEL (MPH)	3.3	3.2	6.5	4.6	8.4	11.6	2.2	7.2	2.1	4.7
	SPD (MPH)	4.7	4.9	7.3	5.9	8.9	13.5	5.0	7.9	5.8	7.6
	RATIO	0.699	0.657	0.892	0.785	0.942	0.855	0.442	0.906	0.368	0.616
METEOROLOGICAL SITE	DIR (DEG)	350	250	250	280	260	50	310	30	80	310
BRIDGEPORT	VEL (MPH)	5.7	8.3	6.3	2.7	9.3	12.8	1.8	8.0	7.2	1.9
	SPD (MPH)	6.5	8.5	7.2	3.6	9.3	12.9	5.3	8.8	9.6	5.8
	RATIO	0.881	0.984	0.875	0.755	0.993	0.989	0.334	0.908	0.746	0.329
METEOROLOGICAL SITE	DIR (DEG)	320	270	280	260	260	70	350	90	70	320
WORCESTER	VEL (MPH)	7.4	8.0	6.0	8.6	6.6	7.4	1.6	1.0	4.9	7.0
	SPD (MPH)	8.2	9.5	6.8	11.2	7.6	8.3	4.7	4.3	5.5	7.9
	RATIO	0.904	0.848	0.883	0.766	0.863	0.888	0.333	0.221	0.901	0.880
GROTON-007 (0353)	SO2	77	75	74	71	64	62	62	61	58	57
	DATE	1/29/87	12/ 8/87	11/14/87	2/ 2/87	4/11/87	12/23/87	11/17/87	11/13/87	11/24/87	12/19/87
METEOROLOGICAL SITE	DIR (DEG)	350	170	270	240	180	290	180	210	240	250
NEWARK	VEL (MPH)	1.3	2.6	2.1	2.7	5.1	5.8	5.4	5.0	3.9	4.1
	SPD (MPH)	1.4	3.9	4.7	4.9	7.5	6.9	7.5	8.3	7.3	5.6
	RATIO	0.925	0.670	0.445	0.554	0.676	0.843	0.727	0.606	0.532	0.735
METEOROLOGICAL SITE	DIR (DEG)	260	200	260	220	190	270	130	230	240	240
BRADLEY	VEL (MPH)	3.3	3.2	5.5	6.5	5.9	8.6	5.3	8.4	5.5	6.5
	SPD (MPH)	4.7	4.9	7.2	7.3	6.5	9.1	6.9	8.9	6.5	8.1
	RATIO	0.699	0.657	0.769	0.892	0.907	0.946	0.770	0.942	0.849	0.813

4

3

4

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	350	250	310	250	200	280	160	260	260	270
BRIDGEPORT	VEL (MPH)	5.7	8.3	6.9	6.3	3.9	9.5	5.4	9.3	6.0	8.9
	SPD (MPH)	6.5	8.5	8.9	7.2	4.9	10.1	8.6	9.3	6.2	10.1
	RATIO	0.881	0.984	0.775	0.875	0.798	0.942	0.624	0.993	0.974	0.880
METEOROLOGICAL SITE	DIR (DEG)	320	270	300	280	270	290	210	260	280	280
WORCESTER	VEL (MPH)	7.4	8.0	6.6	6.0	3.8	6.2	7.1	6.6	5.3	6.7
	SPD (MPH)	8.2	9.5	7.6	6.8	6.3	6.6	8.5	7.6	7.5	8.1
	RATIO	0.904	0.848	0.860	0.883	0.595	0.942	0.833	0.863	0.714	0.834
HARTFORD-123 (0341)	SO2	129	117	117	111	108	101	94	93	93	93
	DATE	1/30/87	12/ 8/87	2/ 3/87	12/31/87	1/21/87	1/14/87	12/23/87	2/ 6/87	12/ 9/87	2/ 2/87
METEOROLOGICAL SITE	DIR (DEG)	360	170	270	200	270	200	290	220	190	240
NEWARK	VEL (MPH)	6.4	2.6	3.2	4.7	2.3	6.0	5.8	3.8	6.0	2.7
	SPD (MPH)	6.5	3.9	4.7	7.2	3.6	7.0	6.9	5.8	8.3	4.9
	RATIO	0.992	0.670	0.679	0.653	0.628	0.846	0.843	0.654	0.717	0.554
METEOROLOGICAL SITE	DIR (DEG)	50	200	270	220	270	220	270	240	210	220
BRADLEY	VEL (MPH)	2.1	3.2	8.1	4.6	7.6	9.3	8.6	6.9	8.3	6.5
	SPD (MPH)	5.8	4.9	9.2	5.9	8.6	9.9	9.1	8.6	8.5	7.3
	RATIO	0.368	0.657	0.881	0.785	0.886	0.942	0.946	0.801	0.983	0.892
METEOROLOGICAL SITE	DIR (DEG)	80	250	280	280	310	260	280	230	250	250
BRIDGEPORT	VEL (MPH)	7.2	8.3	4.9	2.7	4.8	6.8	9.5	7.0	7.3	6.3
	SPD (MPH)	9.6	8.5	5.8	3.6	5.9	7.2	10.1	7.6	7.9	7.2
	RATIO	0.746	0.984	0.856	0.755	0.817	0.940	0.942	0.915	0.927	0.875
METEOROLOGICAL SITE	DIR (DEG)	70	270	290	260	290	270	290	290	260	280
WORCESTER	VEL (MPH)	4.9	8.0	5.8	8.6	6.3	9.1	6.2	5.2	9.5	6.0
	SPD (MPH)	5.5	9.5	6.6	11.2	7.3	10.1	6.6	6.8	11.5	6.8
	RATIO	0.901	0.848	0.876	0.766	0.858	0.901	0.942	0.768	0.828	0.883
MILFORD-010 (0332)	SO2	134	113	99	98	97	91	87	87	84	81
	DATE	12/29/87	12/17/87	12/22/87	12/ 8/87	1/29/87	12/18/87	11/13/87	12/19/87	2/ 2/87	1/14/87
METEOROLOGICAL SITE	DIR (DEG)	360	340	180	170	350	330	210	250	240	200
NEWARK	VEL (MPH)	13.2	14.8	4.3	2.6	1.3	7.3	5.0	4.1	2.7	6.0
	SPD (MPH)	14.2	15.4	7.6	3.9	1.4	8.3	8.3	5.6	4.9	7.0
	RATIO	0.929	0.965	0.567	0.670	0.925	0.878	0.606	0.735	0.554	0.846
METEOROLOGICAL SITE	DIR (DEG)	350	320	190	200	260	300	230	240	220	220
BRADLEY	VEL (MPH)	12.0	16.0	3.7	3.2	3.3	9.6	8.4	6.5	6.5	9.3
	SPD (MPH)	14.1	16.4	4.3	4.9	4.7	9.8	8.9	8.1	7.3	9.9
	RATIO	0.852	0.975	0.867	0.657	0.699	0.980	0.942	0.813	0.892	0.942
METEOROLOGICAL SITE	DIR (DEG)	10	340	220	250	350	340	260	270	250	260
BRIDGEPORT	VEL (MPH)	17.2	14.1	1.7	8.3	5.7	9.1	9.3	8.9	6.3	6.8
	SPD (MPH)	18.5	14.4	3.7	8.5	6.5	9.3	9.3	10.1	7.2	7.2
	RATIO	0.929	0.984	0.462	0.984	0.881	0.978	0.993	0.880	0.875	0.940
METEOROLOGICAL SITE	DIR (DEG)	20	340	270	270	320	330	260	280	280	270
WORCESTER	VEL (MPH)	10.1	16.2	4.1	8.0	7.4	9.7	6.6	6.7	6.0	9.1
	SPD (MPH)	11.5	16.2	6.0	9.5	8.2	10.1	7.6	8.1	6.8	10.1
	RATIO	0.882	0.995	0.687	0.848	0.904	0.963	0.863	0.834	0.883	0.901

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
NEW BRITAIN-011 (0364)	SO2	136	118	109	96	95	95	95	94	93	92
	DATE	1/29/87	1/28/87	1/30/87	2/ 6/87	1/10/87	12/ 9/87	12/ 8/87	2/ 3/87	12/31/87	1/21/87
METEOROLOGICAL SITE	DIR (DEG)	350	310	360	220	360	190	170	270	200	270
NEWARK	VEL (MPH)	1.3	1.2	6.4	3.8	4.7	6.0	2.6	3.2	4.7	2.3
	SPD (MPH)	1.4	1.7	6.5	5.8	4.9	8.3	3.9	4.7	7.2	3.6
	RATIO	0.925	0.667	0.992	0.654	0.964	0.717	0.670	0.679	0.653	0.628
METEOROLOGICAL SITE	DIR (DEG)	260	290	50	240	50	210	200	270	220	270
BRADLEY	VEL (MPH)	3.3	2.2	2.1	6.9	5.7	8.3	3.2	8.1	4.6	7.6
	SPD (MPH)	4.7	5.0	5.8	8.6	8.3	8.5	4.9	9.2	5.9	8.6
	RATIO	0.699	0.442	0.368	0.801	0.687	0.983	0.657	0.881	0.785	0.886
METEOROLOGICAL SITE	DIR (DEG)	350	310	80	230	70	250	250	280	280	310
BRIDGEPORT	VEL (MPH)	5.7	1.8	7.2	7.0	7.6	7.3	8.3	4.9	2.7	4.8
	SPD (MPH)	6.5	5.3	9.6	7.6	9.5	7.9	8.5	5.8	3.6	5.9
	RATIO	0.881	0.334	0.746	0.915	0.800	0.927	0.984	0.856	0.755	0.817
METEOROLOGICAL SITE	DIR (DEG)	320	350	70	290	60	260	270	290	260	290
WORCESTER	VEL (MPH)	7.4	1.6	4.9	5.2	3.1	9.5	8.0	5.8	8.6	6.3
	SPD (MPH)	8.2	4.7	5.5	6.8	4.0	11.5	9.5	6.6	11.2	7.3
	RATIO	0.904	0.333	0.901	0.768	0.769	0.828	0.848	0.876	0.766	0.858
NEW HAVEN-017 (0327)	SO2	184	173	166	161	144	134	133	129	126	126
	DATE	1/28/87	1/29/87	12/ 8/87	2/ 3/87	12/31/87	1/14/87	2/ 2/87	1/30/87	12/19/87	12/23/87
METEOROLOGICAL SITE	DIR (DEG)	310	350	170	270	200	200	240	360	250	290
NEWARK	VEL (MPH)	1.2	1.3	2.6	3.2	4.7	6.0	2.7	6.4	4.1	5.8
	SPD (MPH)	1.7	1.4	3.9	4.7	7.2	7.0	4.9	6.5	5.6	6.9
	RATIO	0.667	0.925	0.670	0.679	0.653	0.846	0.554	0.992	0.735	0.843
METEOROLOGICAL SITE	DIR (DEG)	290	260	200	270	220	220	220	50	240	270
BRADLEY	VEL (MPH)	2.2	3.3	3.2	8.1	4.6	9.3	6.5	2.1	6.5	8.6
	SPD (MPH)	5.0	4.7	4.9	9.2	5.9	9.9	7.3	5.8	8.1	9.1
	RATIO	0.442	0.699	0.657	0.881	0.785	0.942	0.892	0.368	0.813	0.946
METEOROLOGICAL SITE	DIR (DEG)	310	350	250	280	280	260	250	80	270	280
BRIDGEPORT	VEL (MPH)	1.8	5.7	8.3	4.9	2.7	6.8	6.3	7.2	8.9	9.5
	SPD (MPH)	5.3	6.5	8.5	5.8	3.6	7.2	7.2	9.6	10.1	10.1
	RATIO	0.334	0.881	0.984	0.856	0.755	0.940	0.875	0.746	0.880	0.942
METEOROLOGICAL SITE	DIR (DEG)	350	320	270	290	260	270	280	70	280	290
WORCESTER	VEL (MPH)	1.6	7.4	8.0	5.8	8.6	9.1	6.0	4.9	6.7	6.2
	SPD (MPH)	4.7	8.2	9.5	6.6	11.2	10.1	6.8	5.5	8.1	6.6
	RATIO	0.333	0.904	0.848	0.876	0.766	0.901	0.883	0.901	0.834	0.942
NEW HAVEN-123 (0348)	SO2	206	179	160	160	149	143	141	128	127	125
	DATE	1/29/87	2/ 3/87	12/23/87	1/30/87	12/19/87	1/21/87	12/31/87	12/12/87	12/22/87	1/28/87
METEOROLOGICAL SITE	DIR (DEG)	350	270	290	360	250	270	200	20	180	310
NEWARK	VEL (MPH)	1.3	3.2	5.8	6.4	4.1	2.3	4.7	2.6	4.3	1.2
	SPD (MPH)	1.4	4.7	6.9	6.5	5.6	3.6	7.2	2.9	7.6	1.7
	RATIO	0.925	0.679	0.843	0.992	0.735	0.628	0.653	0.906	0.567	0.667
METEOROLOGICAL SITE	DIR (DEG)	260	270	270	50	240	270	220	250	190	290
BRADLEY	VEL (MPH)	3.3	8.1	8.6	2.1	6.5	7.6	4.6	5.7	3.7	2.2
	SPD (MPH)	4.7	9.2	9.1	5.8	8.1	8.6	5.9	6.2	4.3	5.0
	RATIO	0.699	0.881	0.946	0.368	0.813	0.886	0.785	0.927	0.867	0.442

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	350	280	280	80	270	310	280	330	220	310
BRIDGEPORT	VEL (MPH)	5.7	4.9	9.5	7.2	8.9	4.8	2.7	4.0	1.7	1.8
	SPD (MPH)	6.5	5.8	10.1	9.6	10.1	5.9	3.6	6.3	3.7	5.3
	RATIO	0.881	0.856	0.942	0.746	0.880	0.817	0.755	0.632	0.462	0.334
METEOROLOGICAL SITE	DIR (DEG)	320	290	290	70	280	290	260	20	270	350
WORCESTER	VEL (MPH)	7.4	5.8	6.2	4.9	6.7	6.3	8.6	.3	4.1	1.6
	SPD (MPH)	8.2	6.6	6.6	5.5	8.1	7.3	11.2	3.6	6.0	4.7
	RATIO	0.904	0.876	0.942	0.901	0.834	0.858	0.766	0.081	0.687	0.333
NORWALK-013 (0344)	SO2	142	129	113	111	101	97	95	94	86	86
	DATE	1/29/87	12/ 8/87	1/28/87	1/14/87	12/19/87	12/22/87	11/23/87	2/ 2/87	12/31/87	2/ 7/87
METEOROLOGICAL SITE	DIR (DEG)	350	170	310	200	250	180	180	240	200	300
NEWARK	VEL (MPH)	1.3	2.6	1.2	6.0	4.1	4.3	6.1	2.7	4.7	4.3
	SPD (MPH)	1.4	3.9	1.7	7.0	5.6	7.6	7.8	4.9	7.2	6.8
	RATIO	0.925	0.670	0.667	0.846	0.735	0.567	0.788	0.554	0.653	0.637
METEOROLOGICAL SITE	DIR (DEG)	260	200	290	220	240	190	200	220	220	290
BRADLEY	VEL (MPH)	3.3	3.2	2.2	9.3	6.5	3.7	5.0	6.5	4.6	4.7
	SPD (MPH)	4.7	4.9	5.0	9.9	8.1	4.3	6.3	7.3	5.9	7.6
	RATIO	0.699	0.657	0.442	0.942	0.813	0.867	0.795	0.892	0.785	0.616
METEOROLOGICAL SITE	DIR (DEG)	350	250	310	260	270	220	230	250	280	310
BRIDGEPORT	VEL (MPH)	5.7	8.3	1.8	6.8	8.9	1.7	10.4	6.3	2.7	1.9
	SPD (MPH)	6.5	8.5	5.3	7.2	10.1	3.7	11.5	7.2	3.6	5.8
	RATIO	0.881	0.984	0.334	0.940	0.880	0.462	0.902	0.875	0.755	0.329
METEOROLOGICAL SITE	DIR (DEG)	320	270	350	270	280	270	240	280	260	320
WORCESTER	VEL (MPH)	7.4	8.0	1.6	9.1	6.7	4.1	7.6	6.0	8.6	7.0
	SPD (MPH)	8.2	9.5	4.7	10.1	8.1	6.0	8.8	6.8	11.2	7.9
	RATIO	0.904	0.848	0.333	0.901	0.834	0.687	0.862	0.883	0.766	0.880
STAMFORD-025 (0319)	SO2	150	111	109	104	104	103	101	101	94	93
	DATE	1/29/87	2/ 2/87	12/22/87	1/28/87	1/14/87	12/ 9/87	12/31/87	2/ 3/87	12/ 8/87	2/ 6/87
METEOROLOGICAL SITE	DIR (DEG)	350	240	180	310	200	190	200	270	170	220
NEWARK	VEL (MPH)	1.3	2.7	4.3	1.2	6.0	6.0	4.7	3.2	2.6	3.8
	SPD (MPH)	1.4	4.9	7.6	1.7	7.0	8.3	7.2	4.7	3.9	5.8
	RATIO	0.925	0.554	0.567	0.667	0.846	0.717	0.653	0.679	0.670	0.654
METEOROLOGICAL SITE	DIR (DEG)	260	220	190	290	220	210	220	270	200	240
BRADLEY	VEL (MPH)	3.3	6.5	3.7	2.2	9.3	8.3	4.6	8.1	3.2	6.9
	SPD (MPH)	4.7	7.3	4.3	5.0	9.9	8.5	5.9	9.2	4.9	8.6
	RATIO	0.699	0.892	0.867	0.442	0.942	0.983	0.785	0.881	0.657	0.801
METEOROLOGICAL SITE	DIR (DEG)	350	250	220	310	260	250	280	280	250	230
BRIDGEPORT	VEL (MPH)	5.7	6.3	1.7	1.8	6.8	7.3	2.7	4.9	8.3	7.0
	SPD (MPH)	6.5	7.2	3.7	5.3	7.2	7.9	3.6	5.8	8.5	7.6
	RATIO	0.881	0.875	0.462	0.334	0.940	0.927	0.755	0.856	0.984	0.915
METEOROLOGICAL SITE	DIR (DEG)	320	280	270	350	270	260	260	290	270	290
WORCESTER	VEL (MPH)	7.4	6.0	4.1	1.6	9.1	9.5	8.6	5.8	8.0	5.2
	SPD (MPH)	8.2	6.8	6.0	4.7	10.1	11.5	11.2	6.6	9.5	6.8
	RATIO	0.904	0.883	0.687	0.333	0.901	0.828	0.766	0.876	0.848	0.768

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
STAMFORD-123 (0357)	SO2	159	109	104	101	97	97	95	94	92	91
	DATE	1/29/87	2/ 6/87	1/14/87	1/28/87	1/18/87	1/21/87	2/ 2/87	2/ 7/87	1/30/87	1/25/87
METEOROLOGICAL SITE	DIR (DEG)	350	220	200	310	10	270	240	300	360	280
NEWARK	VEL (MPH)	1.3	3.8	6.0	1.2	4.4	2.3	2.7	4.3	6.4	2.6
	SPD (MPH)	1.4	5.8	7.0	1.7	4.7	3.6	4.9	6.8	6.5	6.5
	RATIO	0.925	0.654	0.846	0.667	0.923	0.628	0.554	0.637	0.992	0.408
METEOROLOGICAL SITE	DIR (DEG)	260	240	220	290	30	270	220	290	50	280
BRADLEY	VEL (MPH)	3.3	6.9	9.3	2.2	7.2	7.6	6.5	4.7	2.1	3.8
	SPD (MPH)	4.7	8.6	9.9	5.0	7.9	8.6	7.3	7.6	5.8	5.8
	RATIO	0.699	0.801	0.942	0.442	0.906	0.886	0.892	0.616	0.368	0.662
METEOROLOGICAL SITE	DIR (DEG)	350	230	260	310	30	310	250	310	80	280
BRIDGEPORT	VEL (MPH)	5.7	7.0	6.8	1.8	8.0	4.8	6.3	1.9	7.2	3.5
	SPD (MPH)	6.5	7.6	7.2	5.3	8.8	5.9	7.2	5.8	9.6	4.7
	RATIO	0.881	0.915	0.940	0.334	0.908	0.817	0.875	0.329	0.746	0.728
METEOROLOGICAL SITE	DIR (DEG)	320	290	270	350	90	290	280	320	70	300
WORCESTER	VEL (MPH)	7.4	5.2	9.1	1.6	1.0	6.3	6.0	7.0	4.9	9.0
	SPD (MPH)	8.2	6.8	10.1	4.7	4.3	7.3	6.8	7.9	5.5	11.1
	RATIO	0.904	0.768	0.901	0.333	0.221	0.858	0.883	0.880	0.901	0.814
WATERBURY-008 (0343)	SO2	159	154	129	125	118	114	107	104	103	97
	DATE	1/29/87	1/28/87	2/ 6/87	2/ 3/87	12/23/87	1/21/87	1/30/87	1/ 6/87	2/ 7/87	12/19/87
METEOROLOGICAL SITE	DIR (DEG)	350	310	220	270	290	270	360	180	300	250
NEWARK	VEL (MPH)	1.3	1.2	3.8	3.2	5.8	2.3	6.4	2.4	4.3	4.1
	SPD (MPH)	1.4	1.7	5.8	4.7	6.9	3.6	6.5	5.3	6.8	5.6
	RATIO	0.925	0.667	0.654	0.679	0.843	0.628	0.992	0.450	0.637	0.735
METEOROLOGICAL SITE	DIR (DEG)	260	290	240	270	270	270	50	100	290	240
BRADLEY	VEL (MPH)	3.3	2.2	6.9	8.1	8.6	7.6	2.1	1.6	4.7	6.5
	SPD (MPH)	4.7	5.0	8.6	9.2	9.1	8.6	5.8	8.1	7.6	8.1
	RATIO	0.699	0.442	0.801	0.881	0.946	0.886	0.368	0.194	0.616	0.813
METEOROLOGICAL SITE	DIR (DEG)	350	310	230	280	280	310	80	240	310	270
BRIDGEPORT	VEL (MPH)	5.7	1.8	7.0	4.9	9.5	4.8	7.2	2.4	1.9	8.9
	SPD (MPH)	6.5	5.3	7.6	5.8	10.1	5.9	9.6	5.9	5.8	10.1
	RATIO	0.881	0.334	0.915	0.856	0.942	0.817	0.746	0.415	0.329	0.880
METEOROLOGICAL SITE	DIR (DEG)	320	350	290	290	290	290	70	240	320	280
WORCESTER	VEL (MPH)	7.4	1.6	5.2	5.8	6.2	6.3	4.9	3.4	7.0	6.7
	SPD (MPH)	8.2	4.7	6.8	6.6	6.6	7.3	5.5	5.5	7.9	8.1
	RATIO	0.904	0.333	0.768	0.876	0.942	0.858	0.901	0.631	0.880	0.834
WATERBURY-123 (0349)	SO2	99	99	94	87	87	83	79	76	73	72
	DATE	12/31/87	2/ 6/87	2/ 3/87	1/29/87	12/ 9/87	1/30/87	12/23/87	12/ 8/87	11/14/87	1/28/87
METEOROLOGICAL SITE	DIR (DEG)	200	220	270	350	190	360	290	170	270	310
NEWARK	VEL (MPH)	4.7	3.8	3.2	1.3	6.0	6.4	5.8	2.6	2.1	1.2
	SPD (MPH)	7.2	5.8	4.7	1.4	8.3	6.5	6.9	3.9	4.7	1.7
	RATIO	0.653	0.654	0.679	0.925	0.717	0.992	0.843	0.670	0.445	0.667
METEOROLOGICAL SITE	DIR (DEG)	220	240	270	260	210	50	270	200	260	290
BRADLEY	VEL (MPH)	4.6	6.9	8.1	3.3	8.3	2.1	8.6	3.2	5.5	2.2
	SPD (MPH)	5.9	8.6	9.2	4.7	8.5	5.8	9.1	4.9	7.2	5.0
	RATIO	0.785	0.801	0.881	0.699	0.983	0.368	0.946	0.657	0.769	0.442

TABLE 17, CONTINUED

1987 TEN HIGHEST 24-HOUR AVERAGE SO2 DAYS WITH WIND DATA

UNITS : MICROGRAMS PER CUBIC METER

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	280	230	280	350	250	80	280	250	310	310
BRIDGEPORT	VEL (MPH)	2.7	7.0	4.9	5.7	7.3	7.2	9.5	8.3	6.9	1.8
	SPD (MPH)	3.6	7.6	5.8	6.5	7.9	9.6	10.1	8.5	8.9	5.3
	RATIO	0.755	0.915	0.856	0.881	0.927	0.746	0.942	0.984	0.775	0.334
METEOROLOGICAL SITE	DIR (DEG)	260	290	290	320	260	70	290	270	300	350
WORCESTER	VEL (MPH)	8.6	5.2	5.8	7.4	9.5	4.9	6.2	8.0	6.6	1.6
	SPD (MPH)	11.2	6.8	6.6	8.2	11.5	5.5	6.6	9.5	7.6	4.7
	RATIO	0.766	0.768	0.876	0.904	0.828	0.901	0.942	0.848	0.860	0.333

IV. OZONE

HEALTH EFFECTS

Ozone is a poisonous form of oxygen and the principal component of modern smog. Until recently, EPA called this type of pollution "photochemical oxidants." The name has been changed to ozone because ozone is the only oxidant actually measured and is the most plentiful.

Ozone and other oxidants -- including peroxyacetal nitrates (PAN), formaldehyde and peroxides -- are not usually emitted into the air directly. They are formed by chemical reactions in the air from two other pollutants: hydrocarbons and nitrogen oxides. Energy from sunlight is needed for these chemical reactions. This accounts for the term photochemical smog and the daily variation in ozone levels, which increase during the day and decrease at night.

Ozone is a pungent gas with a faintly bluish color. It irritates the mucous membranes of the respiratory system, causing coughing, choking and impaired lung function. It aggravates chronic respiratory diseases like asthma and bronchitis and is believed capable of hastening the death, by pneumonia, of persons in already weakened health. PAN and the other oxidants that accompany ozone are powerful eye irritants.

NATIONAL AMBIENT AIR QUALITY STANDARD

On February 8, 1979 the EPA established a national ambient air quality standard (NAAQS) for ozone of 0.12 ppm for a one-hour average. Compliance with this standard is determined by summing the number of days at each monitoring site over a consecutive three-year period when the 1-hour standard is exceeded and then computing the average number of exceedances over this interval. If the resulting average value is less than or equal to 1.0 (that is, if the fourth highest daily value in a consecutive three-year period is less than or equal to 0.12 ppm) the ozone standard is considered attained at the site. This standard replaces the old photochemical oxidant Standard of 0.08 ppm. The definition of the pollutant was changed along with the numerical value of the standard, partly because the instruments used to measure photochemical oxidants in the air really measure only ozone. Ozone is one of a group of chemicals which are formed photochemically in the air and are called photochemical oxidants. In the past, the two terms have often been used interchangeably. This 1987 Air Quality Summary uses the term "ozone" in conjunction with the NAAQS to reflect the change in both the numerical value of the NAAQS and the definition of the pollutant.

The EPA defines the ozone standard to two decimal places. Therefore, the standard is considered exceeded when a level of 0.13 ppm is reached. However, since the DEP still measures ozone levels to three decimal places, any one-hour average ozone reading which equals or is greater than 0.125 ppm is considered an exceedance of the 0.12 ppm standard in Connecticut. This interpretation of the ozone standard differs from the one used by the DEP before 1982, when a one-hour ozone concentration of 0.121 ppm was considered an exceedance of the standard.

CONCLUSIONS

As in past years, Connecticut experienced very high concentrations of ozone in the summer months of 1987. Levels in excess of the one-hour NAAQS of 0.12 ppm were frequently recorded at nine of the ten monitored sites. One site experienced levels greater than 0.20 ppm in 1987, as opposed to no sites in 1986 and two sites in 1985. The highest one-hour concentrations increased at all but the

East Hartford and Greenwich sites in 1987, and all but the Bridgeport and East Hartford sites experienced higher second highest concentrations in 1987.

The incidence of ozone levels in excess of the 1-hour 0.12 ppm standard was higher in 1987 compared to 1986 (see Table 19). There was a total of 70 exceedances in 1986 and 184 in 1987 at those monitored sites that operated in both years. This represents a rise in the frequency of such exceedances from 1.5 per 1000 sampling hours in 1986 to 4.0 per 1000 sampling hours in 1987: a 167% increase. If one eliminates the duplication that results when two or more sites experience an exceedance in the same hour, then the number of exceedances increased from 37 to 123. On this basis, the state experienced a 240% increase in the frequency of hourly exceedances of the standard.

The number of days on which the ozone monitors experienced ozone levels in excess of the 1-hour standard increased from 33 in 1986 to 69 in 1987 at those monitoring sites that operated in both years (see Table 18). This represents a rise in the frequency of such occurrences from 1.7 per 100 sampling days in 1986 to 3.6 per 100 sampling days in 1987: a 112% increase. If the duplication that results when two or more sites experience an exceedance on the same day is eliminated, then the number of exceedances increased from 10 to 27. On this basis, the state experienced a 180% increase in the frequency of daily exceedances of the standard.

The yearly changes in ozone concentrations can usually be attributed to year-to-year variations in regional weather conditions, especially wind direction, temperature and the amount of sunlight. In addition, a large portion of the peak ozone concentrations in Connecticut is caused by the transport of ozone and/or precursors (i.e., hydrocarbons and nitrogen oxides) from the New York City area and other points to the west and southwest. An increase in the frequency of winds out of the southwest could help to explain the increase in the number of ozone exceedances from 1986 to 1987. However, the percentage of southwest winds during the "ozone season" decreased slightly from 1986 to 1987, as is shown by the wind roses from Newark (Figures 9 and 10) -- the wind roses from Bradley (Figures 7 and 8) are believed to be not as representative, since the airport is located in the Connecticut River Valley and the wind gets channeled up or down the valley. The magnitude of high ozone levels can be partly associated with yearly variations in temperature, since ozone production is greatest at high temperatures and in strong sunlight. The summer season's daily high temperatures were higher in 1987 than in 1986. This is demonstrated by the number of days exceeding 90° F which increased from three in 1986 to nine in 1987 at Sikorsky Airport in Bridgeport, and from seven in 1986 to twenty in 1987 at Bradley International Airport. The percentage of possible sunshine at Bradley decreased from 55% in 1986 to 52% in 1987 for the months June through September. The average for the summer months at Bradley is usually 61%. Clearly, when one considers the foregoing meteorological factors separately, only the daily high temperature can be invoked to explain the increase in ozone levels from 1986 to 1987.

A recent study (see publication no. 30 in section XIII. Publications) suggests that most of the increase in the ozone levels between 1986 and 1987 can be attributed to one factor: the increased incidence of ozone "exceedance conducive days." Such days reflect both high maximum daily temperatures and the frequency of winds out of the southwest.

METHOD OF MEASUREMENT

The DEP Air Monitoring Unit uses UV photometry to measure and record instantaneous concentrations of ozone continuously by means of a UV absorption technique. Properly calibrated, instruments of this type are shown to be remarkably reliable and stable.

DISCUSSION OF DATA

Monitoring Network - In order to gather information which will further the understanding of ozone production and transport, and to provide real-time data for the daily Pollutant Standards Index, DEP operated a state-wide ozone monitoring network consisting of four types of sites in 1987 (see Figure 6):

Urban	- Bridgeport, East Hartford, Middletown, New Haven
Advection from Southwest	- Danbury, Greenwich
Suburban	- Groton, Madison, Stratford
Rural	- Stafford

Precision and Accuracy - The ozone monitors had a total of 259 precision checks during 1987. The resulting 95% probability limits were -8% to +8%. Accuracy is determined by introducing a known amount of ozone into each of the monitors. Three different concentration levels are tested: low, medium, and high. The 95% probability limits, based on 11 audits conducted on the monitoring system, were: low, -8% to +6%; medium, -7% to +5%; and high, -9% to +3%.

1-Hour Average - The 1-hour ozone standard was exceeded at nine of the ten DEP monitoring sites in 1987. Moreover, the highest 1-hour average ozone concentrations were higher in 1987 than in 1986 at all the sites except East Hartford 003 and Greenwich 017. Madison 002 had the largest increase of 0.042 ppm.

The number of days on which the 1-hour standard was exceeded at each site during the summertime "ozone season" is presented in Table 18. The number of hours the ozone standard was exceeded is presented in Table 19 for each site. Table 20 shows the year's high and second high concentrations at each site.

10 High Days with Wind Data - Table 21 lists the ten highest 1-hour ozone averages and their dates of occurrence for each ozone site in 1987. The wind data associated with these high readings are also presented. (See the discussion of Table 11 in the TSP section for a description of the origin and use of these wind data.)

Many (i.e., 50%) of the high ozone levels occurred on days with southwesterly winds. This is due to the special features of a southwest wind blowing over Connecticut. The first aspect of a southwest wind is that, during the summer, it usually accompanies high temperatures and bright sunshine, which are important to the production of ozone. The second is that it will transport precursor emissions from New York City and other urban areas to the southwest of Connecticut. It is the combination of these factors that often produces unhealthful ozone levels in Connecticut.

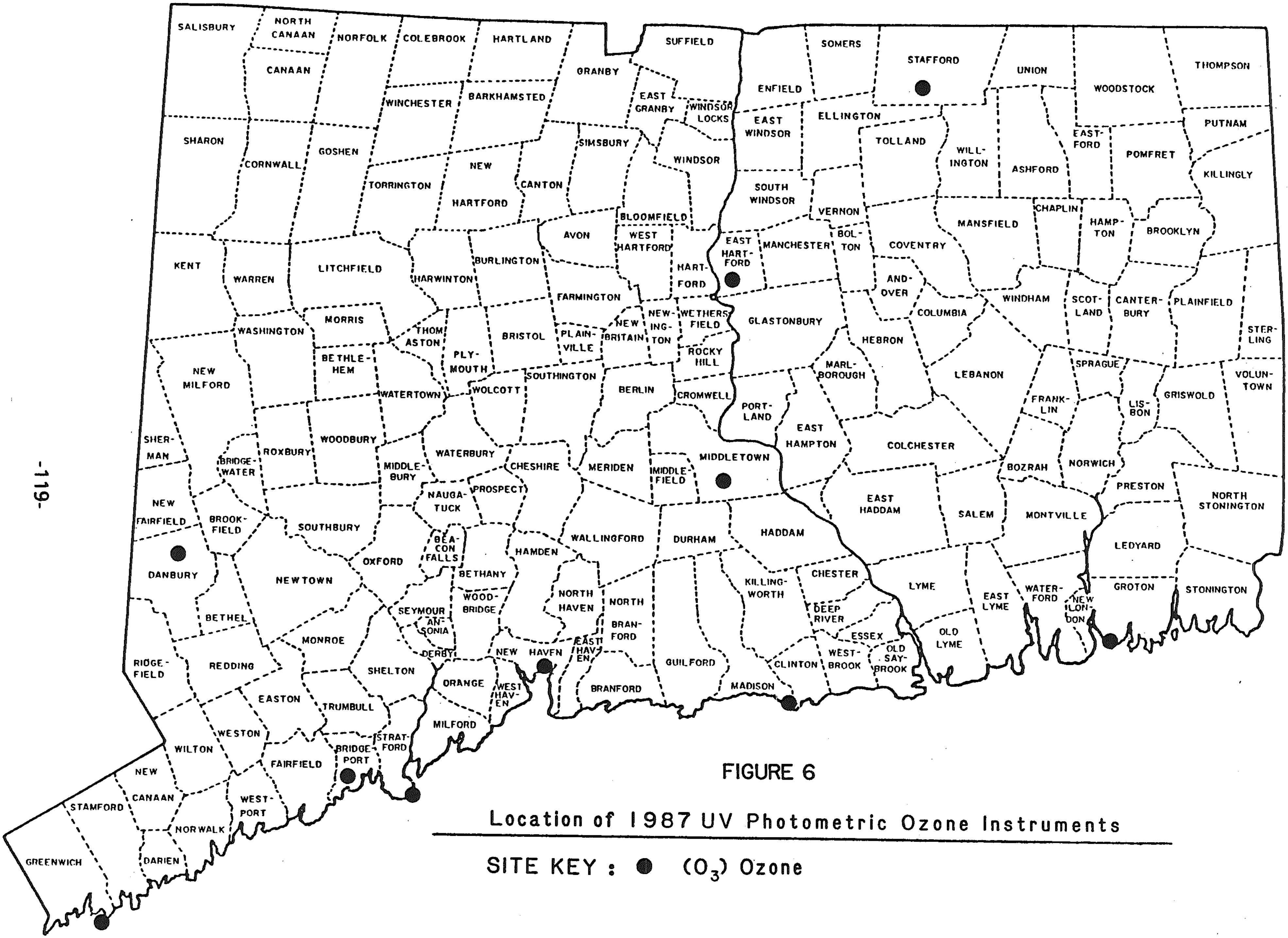


FIGURE 6

Location of 1987 UV Photometric Ozone Instruments

SITE KEY : ● (O_3) Ozone

TABLE 18

NUMBER OF DAYS WHEN THE 1-HOUR OZONE STANDARD WAS EXCEEDED IN 1987

SITE	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	THIS YEAR	LAST YEAR
Bridgeport-123	0	0	2	1	0	0	3	6
Danbury-123	0	0	2	3	1	0	6	1
E. Hartford-003	0	0	0	0	0	0	0	1
Greenwich-017	0	3	2	4	1	0	10	3
Groton-008	0	3	4	3	0	0	10	5
Madison-002	0	0	2	3	1	0	6	4
Middletown-007	0	0	4	1	0	0	5	2
New Haven-123	0	1	4	4	0	0	9	2
Stafford-001	0	0	0	1	1	0	2	1
Stratford-007	0	2	7	6	3	0	18	8
						TOTAL SITE DAYS	69	33
						TOTAL INDIVIDUAL DAYS	27	10

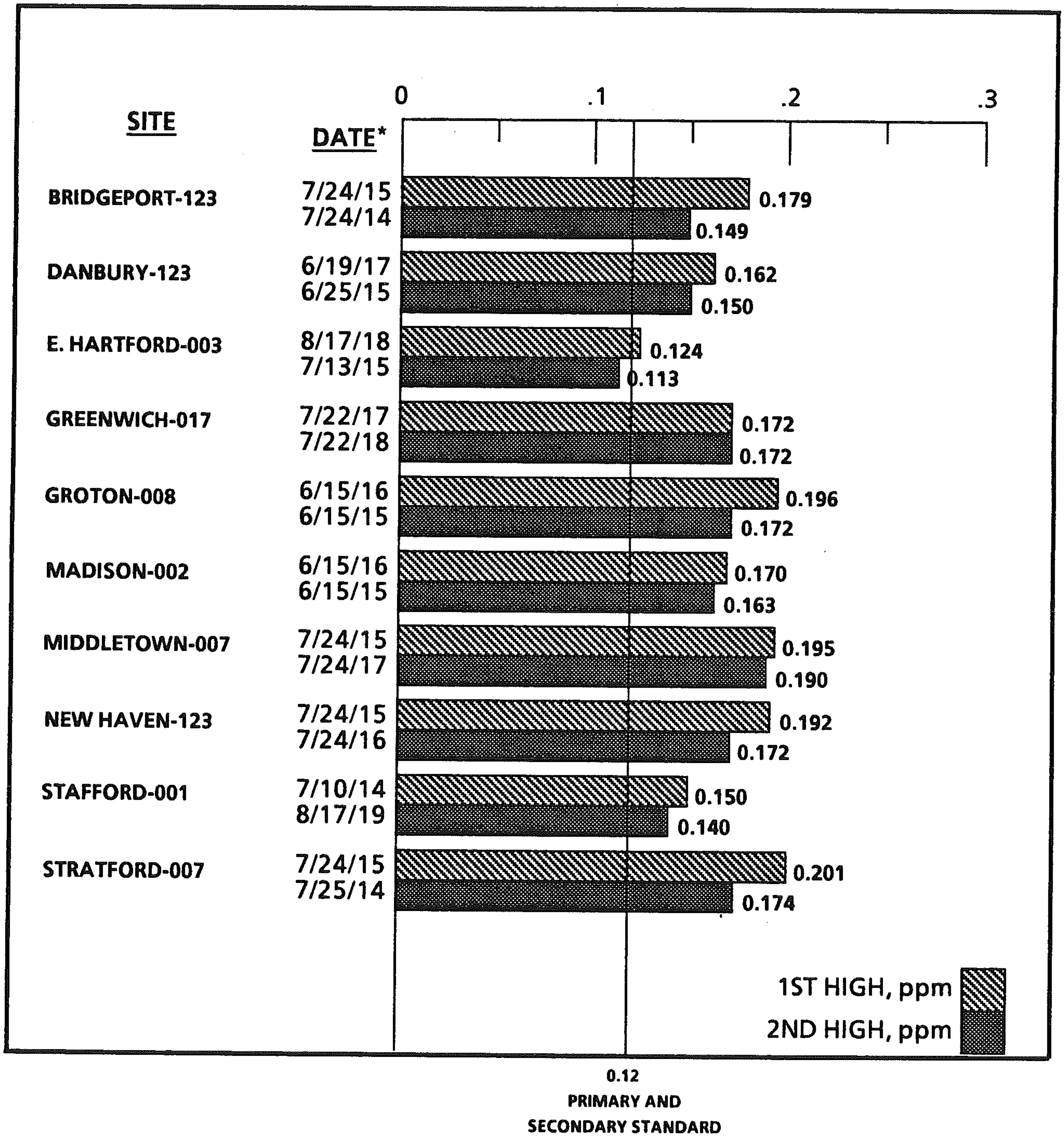
TABLE 19

NUMBER OF EXCEEDANCES OF THE 1-HOUR OZONE STANDARD IN 1987

SITE	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	THIS YEAR	LAST YEAR
Bridgeport-123	0	0	2	2	0	0	4	12
Danbury-123	0	0	5	12	2	0	19	2
E. Hartford-003	0	0	0	0	0	0	0	1
Greenwich-017	0	7	4	11	2	0	24	6
Groton-008	0	14	15	14	0	0	43	10
Madison-002	0	0	7	8	1	0	16	10
Middletown-007	0	0	6	6	0	0	12	5
New Haven-123	0	1	8	9	0	0	18	2
Stafford-001	0	0	0	1	1	0	2	2
Stratford-007	0	5	16	19	6	0	46	20
						TOTAL SITE HOURS	184	70
						TOTAL INDIVIDUAL HOURS	123	37

TABLE 20

1987 MAXIMUM 1-HOUR OZONE CONCENTRATIONS



* Date is month/day/ending hour of occurrence.

N.B. When a listed concentration occurs more than once at a site, the earliest date is given first.

TABLE 21

1987 TEN HIGHEST 1-HOUR AVERAGE OZONE DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
BRIDGEPORT-123 (0214)	OZONE	.179	.126	.126	.121	.120	.118	.113	.112	.112	.110
	DATE	7/24/87	6/14/87	6/25/87	6/13/87	7/11/87	8/ 8/87	8/17/87	6/ 8/87	6/15/87	7/13/87
METEOROLOGICAL SITE	DIR (DEG)	280	270	60	280	200	280	270	270	320	220
NEWARK	VEL (MPH)	6.7	6.3	7.7	3.3	1.1	7.9	6.0	5.9	6.7	3.8
	SPD (MPH)	8.2	8.2	8.6	6.8	4.2	9.6	7.6	7.8	7.9	5.2
	RATIO	0.813	0.774	0.898	0.496	0.263	0.817	0.792	0.758	0.853	0.742
METEOROLOGICAL SITE	DIR (DEG)	250	250	60	190	210	280	220	240	310	200
BRADLEY	VEL (MPH)	6.2	4.9	7.2	3.1	1.4	4.4	3.3	7.1	9.4	5.7
	SPD (MPH)	8.6	7.8	8.2	7.8	6.0	7.0	5.8	8.8	10.5	6.9
	RATIO	0.721	0.635	0.877	0.403	0.228	0.626	0.574	0.813	0.896	0.824
METEOROLOGICAL SITE	DIR (DEG)	240	230	140	240	100	240	230	240	270	210
BRIDGEPORT	VEL (MPH)	6.6	6.4	4.7	6.1	5.3	7.0	6.5	7.2	6.1	4.2
	SPD (MPH)	6.9	6.5	7.5	6.3	5.8	7.0	6.9	7.3	8.5	5.0
	RATIO	0.952	0.987	0.624	0.966	0.924	0.996	0.949	0.983	0.716	0.834
METEOROLOGICAL SITE	DIR (DEG)	220	240	140	250	290	240	220	250	260	170
WORCESTER	VEL (MPH)	7.6	9.8	6.3	7.5	.3	5.7	6.9	10.4	8.8	6.6
	SPD (MPH)	7.9	10.6	8.3	10.1	7.5	7.8	7.9	11.6	13.2	7.3
	RATIO	0.957	0.923	0.753	0.741	0.045	0.732	0.875	0.896	0.662	0.906
DANBURY-123 (0203)	OZONE	.162	.150	.150	.143	.140	.138	.122	.114	.110	.107
	DATE	6/19/87	6/25/87	7/13/87	8/17/87	7/23/87	7/24/87	8/19/87	7/30/87	6/29/87	8/16/87
METEOROLOGICAL SITE	DIR (DEG)	280	60	220	270	260	280	320	250	250	270
NEWARK	VEL (MPH)	8.1	7.7	3.8	6.0	3.7	6.7	1.6	6.1	9.0	7.0
	SPD (MPH)	9.1	8.6	5.2	7.6	4.9	8.2	5.0	7.2	10.2	8.5
	RATIO	0.891	0.898	0.742	0.792	0.767	0.813	0.327	0.843	0.881	0.825
METEOROLOGICAL SITE	DIR (DEG)	230	60	200	220	220	250	340	220	210	230
BRADLEY	VEL (MPH)	3.5	7.2	5.7	3.3	3.5	6.2	1.1	5.8	6.6	5.8
	SPD (MPH)	5.8	8.2	6.9	5.8	5.0	8.6	4.5	7.6	8.8	8.1
	RATIO	0.600	0.877	0.824	0.574	0.691	0.721	0.240	0.768	0.758	0.724
METEOROLOGICAL SITE	DIR (DEG)	230	140	210	230	190	240	210	180	240	240
BRIDGEPORT	VEL (MPH)	7.6	4.7	4.2	6.5	4.1	6.6	3.8	3.3	8.3	6.4
	SPD (MPH)	7.9	7.5	5.0	6.9	5.5	6.9	5.8	5.2	9.1	6.6
	RATIO	0.964	0.624	0.834	0.949	0.759	0.952	0.665	0.637	0.921	0.967
METEOROLOGICAL SITE	DIR (DEG)	220	140	170	220	90	220	230	200	210	190
WORCESTER	VEL (MPH)	12.1	6.3	6.6	6.9	3.5	7.6	3.3	4.3	11.1	5.9
	SPD (MPH)	12.2	8.3	7.3	7.9	6.3	7.9	6.8	6.0	11.4	7.8
	RATIO	0.993	0.753	0.906	0.875	0.555	0.957	0.493	0.717	0.974	0.761
EAST HARTFORD-003 (0214)	OZONE	.124	.113	.111	.102	.097	.095	.094	.092	.091	.090
	DATE	8/17/87	7/13/87	6/19/87	6/29/87	6/14/87	7/24/87	7/30/87	6/13/87	7/11/87	7/23/87
METEOROLOGICAL SITE	DIR (DEG)	270	220	280	250	270	280	250	280	200	260
NEWARK	VEL (MPH)	6.0	3.8	8.1	9.0	6.3	6.7	6.1	3.3	1.1	3.7
	SPD (MPH)	7.6	5.2	9.1	10.2	8.2	8.2	7.2	6.8	4.2	4.9
	RATIO	0.792	0.742	0.891	0.881	0.774	0.813	0.843	0.496	0.263	0.767
METEOROLOGICAL SITE	DIR (DEG)	220	200	230	210	250	250	220	190	210	220
BRADLEY	VEL (MPH)	3.3	5.7	3.5	6.6	4.9	6.2	5.8	3.1	1.4	3.5
	SPD (MPH)	5.8	6.9	5.8	8.8	7.8	8.6	7.6	7.8	6.0	5.0
	RATIO	0.574	0.824	0.600	0.758	0.635	0.721	0.768	0.403	0.228	0.691

TABLE 21, CONTINUED

1987 TEN HIGHEST 1-HOUR AVERAGE OZONE DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	230	210	230	240	230	240	180	240	100	190
BRIDGEPORT	VEL (MPH)	6.5	4.2	7.6	8.3	6.4	6.6	3.3	6.1	5.3	4.1
	SPD (MPH)	6.9	5.0	7.9	9.1	6.5	6.9	5.2	6.3	5.8	5.5
	RATIO	0.949	0.834	0.964	0.921	0.987	0.952	0.637	0.966	0.924	0.759
METEOROLOGICAL SITE	DIR (DEG)	220	170	220	210	240	220	200	250	290	90
WORCESTER	VEL (MPH)	6.9	6.6	12.1	11.1	9.8	7.6	4.3	7.5	.3	3.5
	SPD (MPH)	7.9	7.3	12.2	11.4	10.6	7.9	6.0	10.1	7.5	6.3
	RATIO	0.875	0.906	0.993	0.974	0.923	0.957	0.717	0.741	0.045	0.555
GREENWICH-017 (0211)	OZONE	.172	.167	.148	.145	.140	.138	.133	.130	.129	.129
	DATE	7/22/87	7/10/87	5/31/87	7/24/87	8/ 4/87	6/25/87	5/30/87	5/29/87	7/23/87	6/15/87
METEOROLOGICAL SITE	DIR (DEG)	300	90	280	280	290	60	300	310	260	320
NEWARK	VEL (MPH)	1.2	.8	6.2	6.7	4.1	7.7	8.3	3.5	3.7	6.7
	SPD (MPH)	4.3	2.2	7.3	8.2	5.8	8.6	9.1	6.5	4.9	7.9
	RATIO	0.286	0.365	0.840	0.813	0.716	0.898	0.920	0.540	0.767	0.853
METEOROLOGICAL SITE	DIR (DEG)	280	360	250	250	290	60	300	50	220	310
BRADLEY	VEL (MPH)	.7	2.3	4.6	6.2	3.0	7.2	4.5	2.3	3.5	9.4
	SPD (MPH)	6.0	4.7	6.2	8.6	5.3	8.2	6.6	6.3	5.0	10.5
	RATIO	0.108	0.487	0.743	0.721	0.558	0.877	0.676	0.364	0.691	0.896
METEOROLOGICAL SITE	DIR (DEG)	230	220	250	240	210	140	240	290	190	270
BRIDGEPORT	VEL (MPH)	3.5	3.2	5.7	6.6	4.1	4.7	5.8	4.2	4.1	6.1
	SPD (MPH)	5.0	5.5	5.8	6.9	5.6	7.5	5.8	7.0	5.5	8.5
	RATIO	0.701	0.578	0.987	0.952	0.723	0.624	0****	0.596	0.759	0.716
METEOROLOGICAL SITE	DIR (DEG)	130	290	250	220	240	140	270	290	90	260
WORCESTER	VEL (MPH)	2.9	4.8	9.4	7.6	3.2	6.3	4.9	8.0	3.5	8.8
	SPD (MPH)	4.9	6.6	10.2	7.9	6.5	8.3	6.9	9.8	6.3	13.2
	RATIO	0.584	0.721	0.921	0.957	0.490	0.753	0.710	0.815	0.555	0.662
GROTON-008 (0206)	OZONE	.196	.159	.155	.149	.146	.143	.143	.134	.130	.125
	DATE	6/15/87	5/30/87	7/25/87	6/ 8/87	6/ 1/87	7/10/87	6/30/87	7/18/87	5/29/87	5/10/87
METEOROLOGICAL SITE	DIR (DEG)	320	300	310	270	310	90	270	300	310	300
NEWARK	VEL (MPH)	6.7	8.3	4.7	5.9	6.7	.8	9.1	8.6	3.5	11.2
	SPD (MPH)	7.9	9.1	6.3	7.8	7.5	2.2	11.5	9.2	6.5	12.5
	RATIO	0.853	0.920	0.751	0.758	0.897	0.365	0.791	0.936	0.540	0.899
METEOROLOGICAL SITE	DIR (DEG)	310	300	330	240	320	360	230	290	50	300
BRADLEY	VEL (MPH)	9.4	4.5	2.8	7.1	5.0	2.3	5.8	5.1	2.3	8.4
	SPD (MPH)	10.5	6.6	5.2	8.8	5.8	4.7	9.1	6.2	6.3	10.8
	RATIO	0.896	0.676	0.547	0.813	0.873	0.487	0.642	0.830	0.364	0.776
METEOROLOGICAL SITE	DIR (DEG)	270	240	240	240	230	220	260	250	290	270
BRIDGEPORT	VEL (MPH)	6.1	5.8	6.2	7.2	6.1	3.2	6.9	6.5	4.2	6.6
	SPD (MPH)	8.5	5.8	6.3	7.3	6.5	5.5	7.8	6.8	7.0	8.6
	RATIO	0.716	0****	0.988	0.983	0.938	0.578	0.887	0.965	0.596	0.767
METEOROLOGICAL SITE	DIR (DEG)	260	270	250	250	260	290	230	250	290	250
WORCESTER	VEL (MPH)	8.8	4.9	7.1	10.4	6.5	4.8	12.7	8.3	8.0	8.5
	SPD (MPH)	13.2	6.9	7.8	11.6	8.8	6.6	13.5	8.9	9.8	11.2
	RATIO	0.662	0.710	0.920	0.896	0.736	0.721	0.939	0.930	0.815	0.758

TABLE 21, CONTINUED

1987 TEN HIGHEST 1-HOUR AVERAGE OZONE DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
MADISON-002 (0209)	OZONE	.170	.156	.154	.145	.136	.129	.122	.121	.120	.119
	DATE	6/15/87	7/25/87	8/ 8/87	6/30/87	7/ 9/87	7/10/87	6/ 8/87	5/30/87	6/20/87	5/17/87
METEOROLOGICAL SITE	DIR (DEG)	320	310	280	270	290	90	270	300	340	320
NEWARK	VEL (MPH)	6.7	4.7	7.9	9.1	4.3	.8	5.9	8.3	4.7	5.8
	SPD (MPH)	7.9	6.3	9.6	11.5	6.0	2.2	7.8	9.1	5.6	8.5
	RATIO	0.853	0.751	0.817	0.791	0.710	0.365	0.758	0.920	0.836	0.687
METEOROLOGICAL SITE	DIR (DEG)	310	330	280	230	290	360	240	300	360	270
BRADLEY	VEL (MPH)	9.4	2.8	4.4	5.8	4.4	2.3	7.1	4.5	4.5	4.3
	SPD (MPH)	10.5	5.2	7.0	9.1	6.8	4.7	8.8	6.6	4.6	7.0
	RATIO	0.896	0.547	0.626	0.642	0.656	0.487	0.813	0.676	0.987	0.605
METEOROLOGICAL SITE	DIR (DEG)	270	240	240	260	210	220	240	240	130	240
BRIDGEPORT	VEL (MPH)	6.1	6.2	7.0	6.9	4.2	3.2	7.2	5.8	1.7	8.5
	SPD (MPH)	8.5	6.3	7.0	7.8	4.9	5.5	7.3	5.8	4.2	8.6
	RATIO	0.716	0.988	0.996	0.887	0.858	0.578	0.983	0****	0.413	0.988
METEOROLOGICAL SITE	DIR (DEG)	260	250	240	230	240	290	250	270	170	230
WORCESTER	VEL (MPH)	8.8	7.1	5.7	12.7	4.2	4.8	10.4	4.9	4.4	12.3
	SPD (MPH)	13.2	7.8	7.8	13.5	5.0	6.6	11.6	6.9	6.9	12.7
	RATIO	0.662	0.920	0.732	0.939	0.841	0.721	0.896	0.710	0.632	0.972
MIDDLETOWN-007 (0212)	OZONE	.195	.167	.134	.130	.125	.123	.123	.120	.120	.119
	DATE	7/24/87	6/19/87	6/13/87	6/14/87	6/29/87	7/10/87	7/13/87	8/ 8/87	5/31/87	5/17/87
METEOROLOGICAL SITE	DIR (DEG)	280	280	280	270	250	90	220	280	280	320
NEWARK	VEL (MPH)	6.7	8.1	3.3	6.3	9.0	.8	3.8	7.9	6.2	5.8
	SPD (MPH)	8.2	9.1	6.8	8.2	10.2	2.2	5.2	9.6	7.3	8.5
	RATIO	0.813	0.891	0.496	0.774	0.881	0.365	0.742	0.817	0.840	0.687
METEOROLOGICAL SITE	DIR (DEG)	250	230	190	250	210	360	200	280	250	270
BRADLEY	VEL (MPH)	6.2	3.5	3.1	4.9	6.6	2.3	5.7	4.4	4.6	4.3
	SPD (MPH)	8.6	5.8	7.8	7.8	8.8	4.7	6.9	7.0	6.2	7.0
	RATIO	0.721	0.600	0.403	0.635	0.758	0.487	0.824	0.626	0.743	0.605
METEOROLOGICAL SITE	DIR (DEG)	240	230	240	230	240	220	210	240	250	240
BRIDGEPORT	VEL (MPH)	6.6	7.6	6.1	6.4	8.3	3.2	4.2	7.0	5.7	8.5
	SPD (MPH)	6.9	7.9	6.3	6.5	9.1	5.5	5.0	7.0	5.8	8.6
	RATIO	0.952	0.964	0.966	0.987	0.921	0.578	0.834	0.996	0.987	0.988
METEOROLOGICAL SITE	DIR (DEG)	220	220	250	240	210	290	170	240	250	230
WORCESTER	VEL (MPH)	7.6	12.1	7.5	9.8	11.1	4.8	6.6	5.7	9.4	12.3
	SPD (MPH)	7.9	12.2	10.1	10.6	11.4	6.6	7.3	7.8	10.2	12.7
	RATIO	0.957	0.993	0.741	0.923	0.974	0.721	0.906	0.732	0.921	0.972
NEW HAVEN-123 (0207)	OZONE	.192	.145	.145	.143	.142	.141	.135	.132	.128	.124
	DATE	7/24/87	6/20/87	6/19/87	5/31/87	7/13/87	7/11/87	6/14/87	6/25/87	7/ 9/87	5/17/87
METEOROLOGICAL SITE	DIR (DEG)	280	340	280	280	220	200	270	60	290	320
NEWARK	VEL (MPH)	6.7	4.7	8.1	6.2	3.8	1.1	6.3	7.7	4.3	5.8
	SPD (MPH)	8.2	5.6	9.1	7.3	5.2	4.2	8.2	8.6	6.0	8.5
	RATIO	0.813	0.836	0.891	0.840	0.742	0.263	0.774	0.898	0.710	0.687
METEOROLOGICAL SITE	DIR (DEG)	250	360	230	250	200	210	250	60	290	270
BRADLEY	VEL (MPH)	6.2	4.5	3.5	4.6	5.7	1.4	4.9	7.2	4.4	4.3
	SPD (MPH)	8.6	4.6	5.8	6.2	6.9	6.0	7.8	8.2	6.8	7.0
	RATIO	0.721	0.987	0.600	0.743	0.824	0.228	0.635	0.877	0.656	0.605

TABLE 21, CONTINUED

1987 TEN HIGHEST 1-HOUR AVERAGE OZONE DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	240	130	230	250	210	100	230	140	210	240
BRIDGEPORT	VEL (MPH)	6.6	1.7	7.6	5.7	4.2	5.3	6.4	4.7	4.2	8.5
	SPD (MPH)	6.9	4.2	7.9	5.8	5.0	5.8	6.5	7.5	4.9	8.6
	RATIO	0.952	0.413	0.964	0.987	0.834	0.924	0.987	0.624	0.858	0.988
METEOROLOGICAL SITE	DIR (DEG)	220	170	220	250	170	290	240	140	240	230
WORCESTER	VEL (MPH)	7.6	4.4	12.1	9.4	6.6	.3	9.8	6.3	4.2	12.3
	SPD (MPH)	7.9	6.9	12.2	10.2	7.3	7.5	10.6	8.3	5.0	12.7
	RATIO	0.957	0.632	0.993	0.921	0.906	0.045	0.923	0.753	0.841	0.972
STAFFORD-001 (0214)	OZONE	.150	.140	.124	.117	.116	.114	.097	.096	.094	.094
	DATE	7/10/87	8/17/87	7/13/87	7/24/87	6/29/87	6/19/87	6/24/87	7/ 4/87	7/28/87	7/18/87
METEOROLOGICAL SITE	DIR (DEG)	90	270	220	280	250	280	260	270	300	300
NEWARK	VEL (MPH)	.8	6.0	3.8	6.7	9.0	8.1	4.6	7.5	4.4	8.6
	SPD (MPH)	2.2	7.6	5.2	8.2	10.2	9.1	6.0	8.8	6.0	9.2
	RATIO	0.365	0.792	0.742	0.813	0.881	0.891	0.768	0.853	0.726	0.936
METEOROLOGICAL SITE	DIR (DEG)	360	220	200	250	210	230	200	290	340	290
BRADLEY	VEL (MPH)	2.3	3.3	5.7	6.2	6.6	3.5	4.7	5.1	5.6	5.1
	SPD (MPH)	4.7	5.8	6.9	8.6	8.8	5.8	6.0	9.1	6.5	6.2
	RATIO	0.487	0.574	0.824	0.721	0.758	0.600	0.773	0.568	0.862	0.830
METEOROLOGICAL SITE	DIR (DEG)	220	230	210	240	240	230	210	250	230	250
BRIDGEPORT	VEL (MPH)	3.2	6.5	4.2	6.6	8.3	7.6	2.3	4.6	1.5	6.5
	SPD (MPH)	5.5	6.9	5.0	6.9	9.1	7.9	5.0	5.9	5.3	6.8
	RATIO	0.578	0.949	0.834	0.952	0.921	0.964	0.452	0.783	0.281	0.965
METEOROLOGICAL SITE	DIR (DEG)	290	220	170	220	210	220	100	250	360	250
WORCESTER	VEL (MPH)	4.8	6.9	6.6	7.6	11.1	12.1	4.2	8.7	4.3	8.3
	SPD (MPH)	6.6	7.9	7.3	7.9	11.4	12.2	7.2	9.8	6.5	8.9
	RATIO	0.721	0.875	0.906	0.957	0.974	0.993	0.578	0.895	0.658	0.930
STRATFORD-007 (0211)	OZONE	.201	.174	.169	.152	.147	.146	.144	.143	.142	.140
	DATE	7/24/87	7/25/87	6/15/87	7/18/87	8/ 8/87	7/11/87	8/17/87	7/ 9/87	6/20/87	6/25/87
METEOROLOGICAL SITE	DIR (DEG)	280	310	320	300	280	200	270	290	340	60
NEWARK	VEL (MPH)	6.7	4.7	6.7	8.6	7.9	1.1	6.0	4.3	4.7	7.7
	SPD (MPH)	8.2	6.3	7.9	9.2	9.6	4.2	7.6	6.0	5.6	8.6
	RATIO	0.813	0.751	0.853	0.936	0.817	0.263	0.792	0.710	0.836	0.898
METEOROLOGICAL SITE	DIR (DEG)	250	330	310	290	280	210	220	290	360	60
BRADLEY	VEL (MPH)	6.2	2.8	9.4	5.1	4.4	1.4	3.3	4.4	4.5	7.2
	SPD (MPH)	8.6	5.2	10.5	6.2	7.0	6.0	5.8	6.8	4.6	8.2
	RATIO	0.721	0.547	0.896	0.830	0.626	0.228	0.574	0.656	0.987	0.877
METEOROLOGICAL SITE	DIR (DEG)	240	240	270	250	240	100	230	210	130	140
BRIDGEPORT	VEL (MPH)	6.6	6.2	6.1	6.5	7.0	5.3	6.5	4.2	1.7	4.7
	SPD (MPH)	6.9	6.3	8.5	6.8	7.0	5.8	6.9	4.9	4.2	7.5
	RATIO	0.952	0.988	0.716	0.965	0.996	0.924	0.949	0.858	0.413	0.624
METEOROLOGICAL SITE	DIR (DEG)	220	250	260	250	240	290	220	240	170	140
WORCESTER	VEL (MPH)	7.6	7.1	8.8	8.3	5.7	.3	6.9	4.2	4.4	6.3
	SPD (MPH)	7.9	7.8	13.2	8.9	7.8	7.5	7.9	5.0	6.9	8.3
	RATIO	0.957	0.920	0.662	0.930	0.732	0.045	0.875	0.841	0.632	0.753

FIGURE 7

WIND ROSE FOR APRIL - ~~SEPTEMBER~~ OCTOBER 1986
BRADLEY INTERNATIONAL AIRPORT
WINDSOR LOCKS, CONNECTICUT

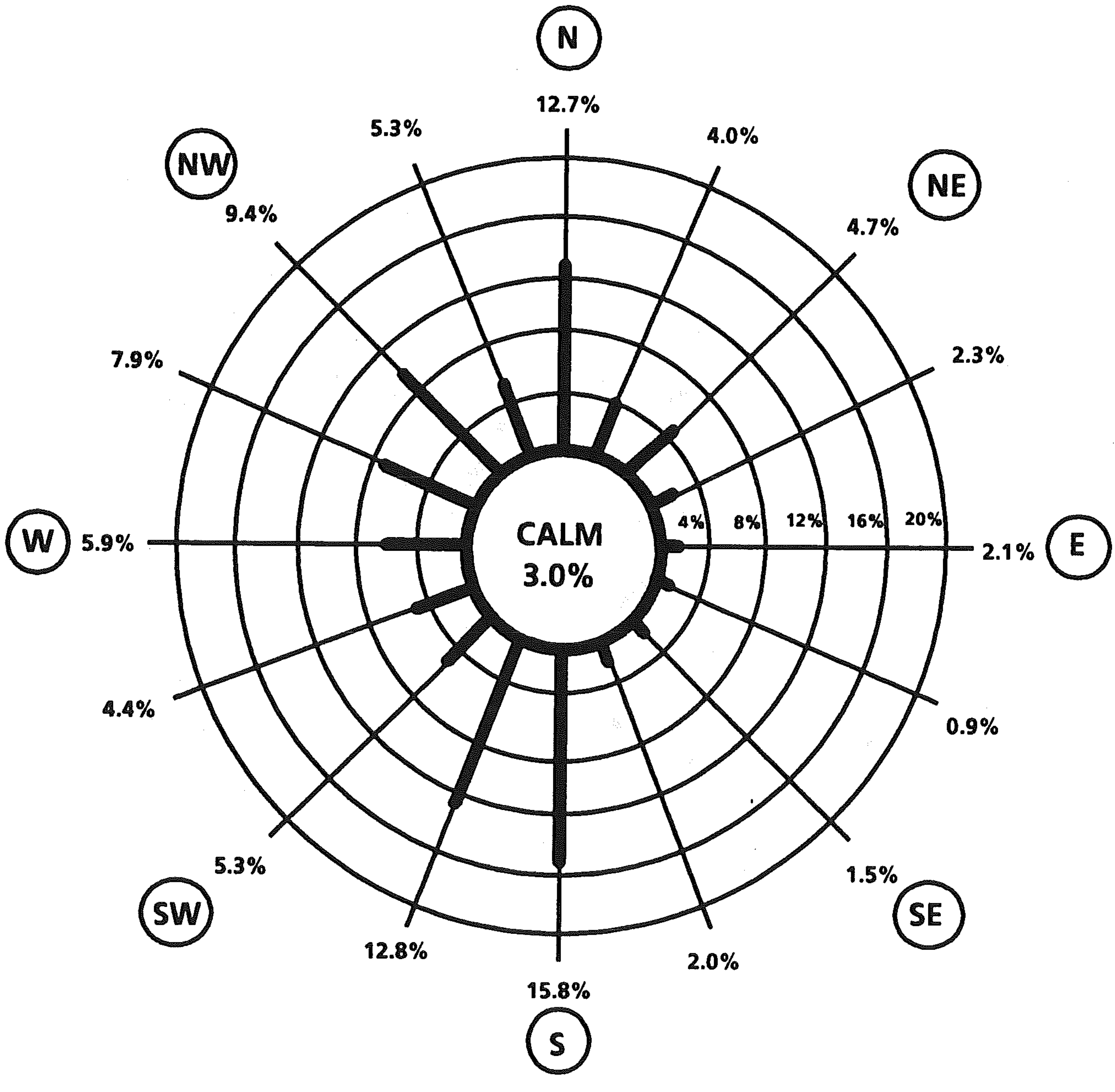


FIGURE 8

WIND ROSE FOR APRIL - ~~SEPTEMBER~~ OCTOBER 1987
BRADLEY INTERNATIONAL AIRPORT
WINDSOR LOCKS, CONNECTICUT

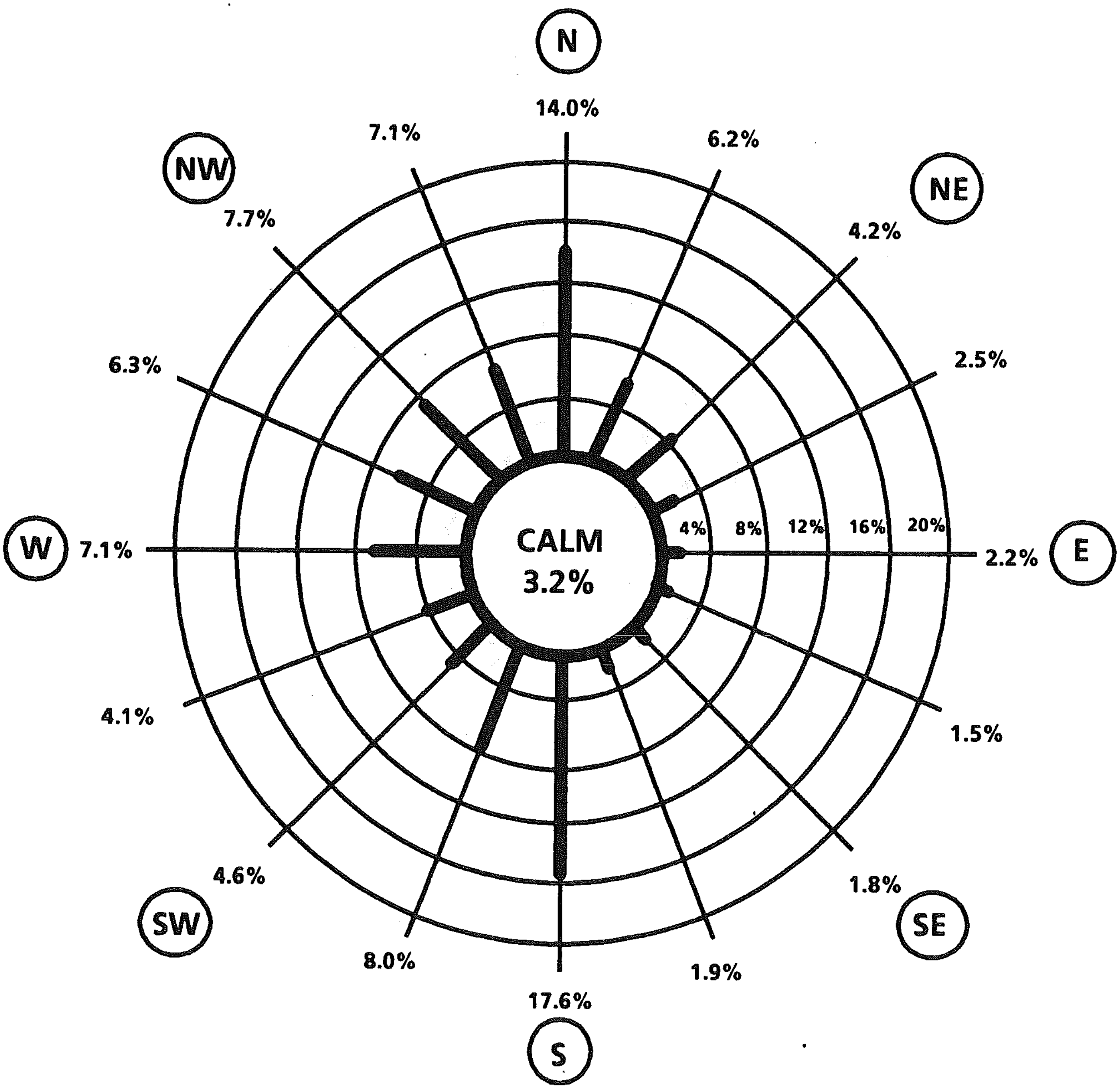


FIGURE 9

WIND ROSE FOR APRIL - ~~SEPTEMBER~~ OCTOBER 1986
NEWARK INTERNATIONAL AIRPORT
NEWARK, NEW JERSEY

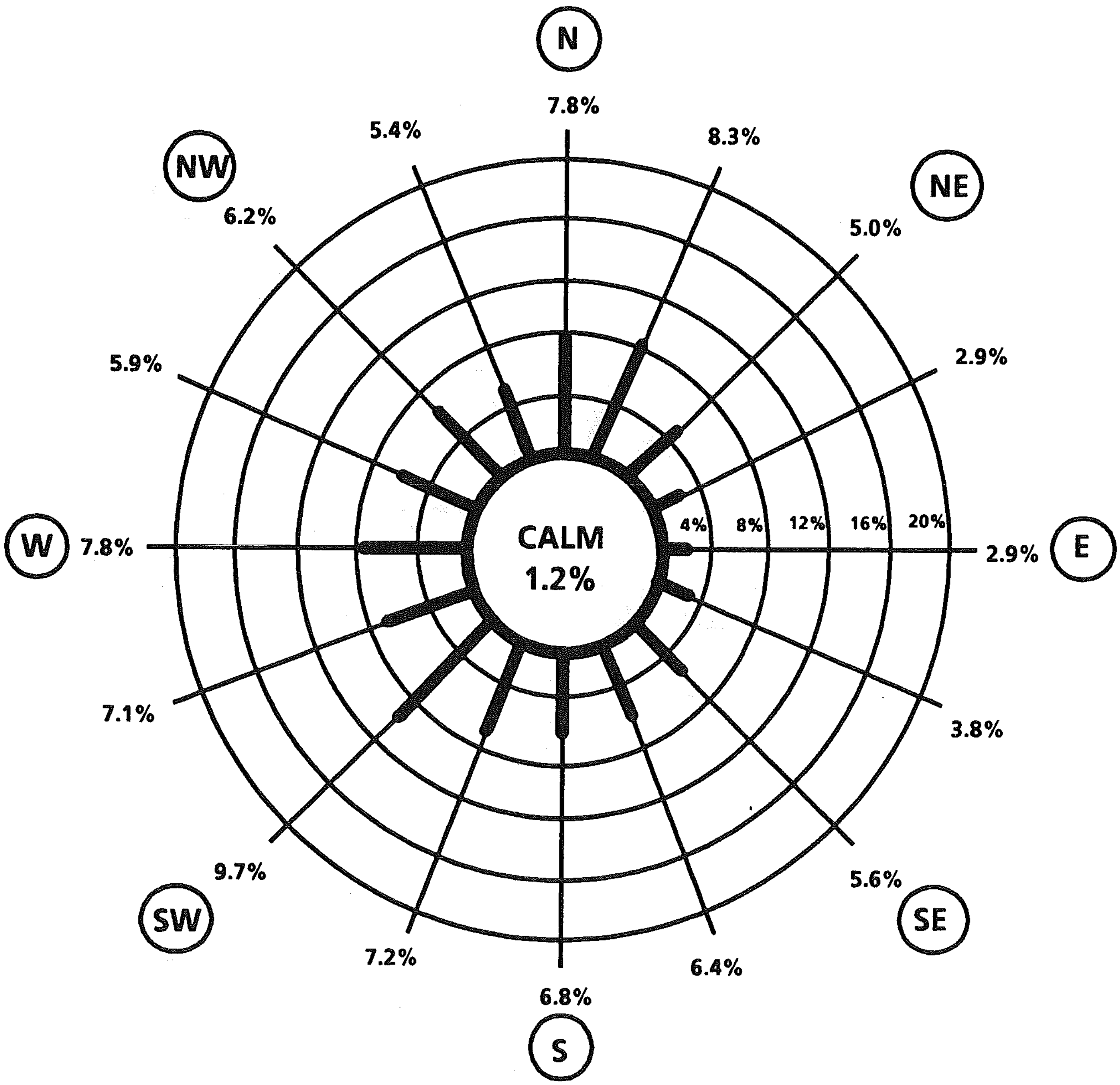
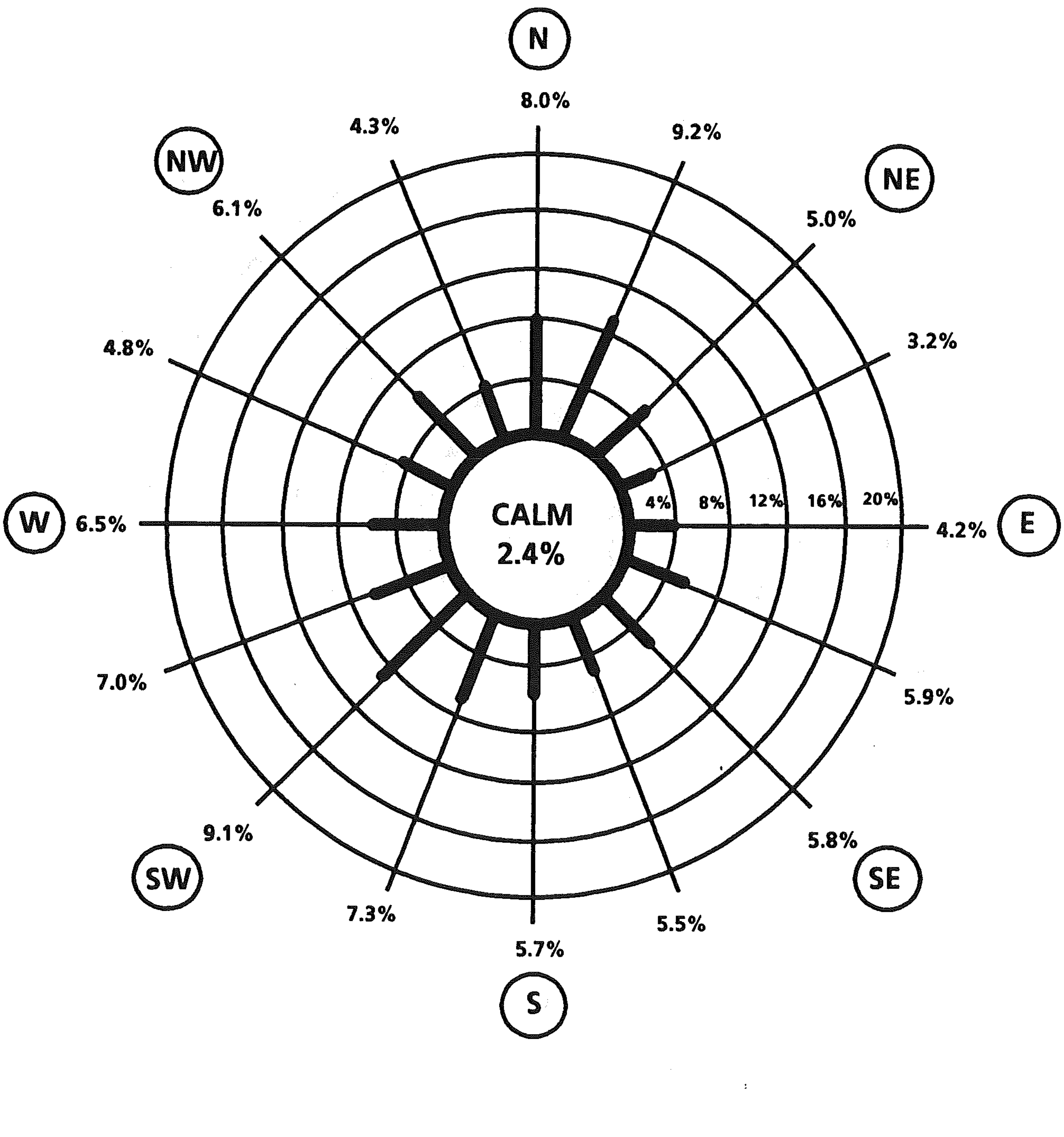


FIGURE 10

WIND ROSE FOR APRIL - ~~SEPTEMBER~~ OCTOBER 1987
NEWARK INTERNATIONAL AIRPORT
NEWARK, NEW JERSEY



V. NITROGEN DIOXIDE

HEALTH EFFECTS

Nitrogen dioxide (NO_2) is a toxic gas with a characteristic pungent odor and a reddish-orange-brown color. It is highly oxidizing and extremely corrosive.

Nitrogen dioxide is not emitted into the atmosphere to any great extent by man-made sources. However, its presence in the atmosphere is accounted for by the photochemical oxidation of nitric oxide (NO), large amounts of which are emitted into the air by high temperature combustion processes. Industrial furnaces, power plants and motor vehicles are the primary sources of nitric oxide emissions.

Exposure to NO_2 is believed to increase the risks of acute respiratory disease and susceptibility to chronic respiratory infection. NO_2 also contributes to heart, lung, liver and kidney damage. At high concentrations, this pollutant can be fatal. At lower levels of 25 to 100 parts per million, it can cause acute bronchitis and pneumonia. Occasional exposure to low levels of NO_2 can irritate the eyes and skin.

Other effects of nitrogen dioxide are its toxicity to vegetation and its ability to combine with water vapor to form nitric acid. Furthermore, NO_2 is an essential ingredient, along with hydrocarbons, in the formation of ozone.

CONCLUSIONS

Nitrogen dioxide (NO_2) concentrations at all monitoring sites did not violate the NAAQS for NO_2 in 1987. The annual arithmetic mean NO_2 concentration at each site was well below the federal standard of 100 $\mu g/m^3$.

SAMPLE COLLECTION AND ANALYSIS

The DEP Air Monitoring Unit used continuous electronic analyzers employing the chemiluminescent reference method to continuously measure NO_2 levels.

DISCUSSION OF DATA

Monitoring Network - There were three nitrogen dioxide monitoring sites in 1987 (see Figure 11). The sites -- Bridgeport 123, East Hartford 003 and New Haven 123 -- were located in three urban areas in order to obtain data alongside ozone monitors.

Precision and Accuracy - Sixty-nine precision checks were made on the NO_2 monitors in 1987, yielding 95% probability limits ranging from -10% to +11%. Accuracy is determined by introducing a known amount of NO_2 into each of the monitors. Two audits for accuracy were conducted on the monitoring network in 1987. Four different concentration levels were tested on each monitor: low, low/medium, medium/high and high. The 95% probability limits for the low level test ranged from -6% to +7%; those for the low/medium level test ranged from -6% to +3%; those for the medium/high level test ranged from -7% to +3%; and those for the high level test ranged from -8% to +1%.

Historical Data - The DEP's historical file of annual average nitrogen dioxide data from gas bubblers for 1973-1980 is available in the 1980 Air Quality Summary. Data from continuous electronic analyzers for the years 1981 through 1986 can be found in each respective year's Air Quality Summary.

Annual Averages - The annual average NO_2 standard of 100 µg/m^3 was not exceeded in 1987 at any site in Connecticut (see Table 22). In 1987, all three sites had sufficient data to compute valid arithmetic means. This permits comparisons with the 1985 and 1986 annual averages. Decreases in the annual average NO_2 concentrations are evident at all three sites between 1986 and 1987.

Statistical Projections - The format of Table 22 is the same as that used to present the TSP and sulfur dioxide data, except that for NO_2 there are no 24-hour standards and, therefore, no projections of violations are possible. However, Table 22 gives the annual arithmetic mean of the hourly NO_2 concentrations in order to allow direct comparison to the annual NO_2 standard. The 95% confidence limits about the arithmetic mean for each site demonstrate that it is unlikely that any site exceeded the primary annual standard of 100 µg/m^3 in 1987.

10-High Days with Wind Data - Table 23 presents for each site the ten days in 1987 when the highest hourly NO_2 readings occurred, along with the associated wind conditions for each day. (See the discussion of Table 11 in the TSP section for a description of the original use of the wind data.)

According to National Weather Service local climatological data recorded at Bradley Airport, 14 of the 24 days listed in the table had at least 50% of the possible sunshine. Of the ten remaining days, six followed days when the percent of possible sunshine was at least 50%. This is interpreted to confirm the importance of photochemical oxidation in the formation of NO_2.

Four of the high NO_2 days occurred at 2 or more of the sites, and three of these days had relatively persistent winds out of the southwest quadrant. Such winds were also characteristic of 57% of the days listed in Table 23.

Given the above observations and the fact that two of the three NO_2 sites are located on the coast of Connecticut, it appears that a combination of pollutant transport and a high percent of possible sunshine (both of which occur on days with relatively persistent southwest winds) tend to produce high NO_2 levels in Connecticut.

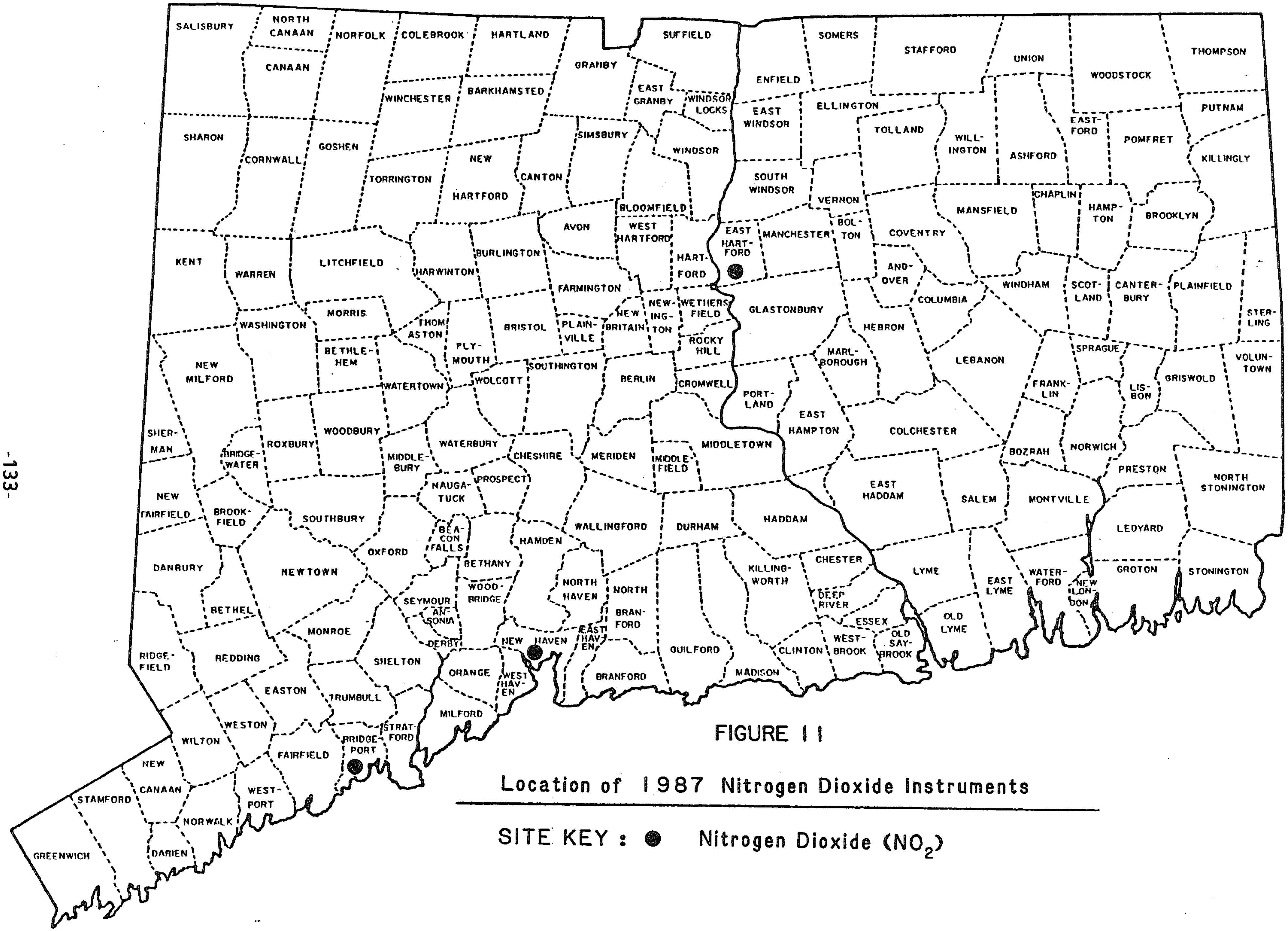


FIGURE 11

Location of 1987 Nitrogen Dioxide Instruments

SITE KEY : ● Nitrogen Dioxide (NO_2)

TABLE 22

1985 -1987 NITROGEN DIOXIDE ANNUAL AVERAGES

Town Name	Site	Year	Samples	Arithmetic Mean	95-Percent-Limits Lower	95-Percent-Limits Upper	Standard Deviation
Bridgeport	123	1985	8602	50.3	50.2	50.4	26.8
Bridgeport	123	1986	8093	49.7	49.6	49.9	26.3
Bridgeport	123	1987	7701	48.0	47.9	48.2	28.5
East Hartford	003	1985	8461	39.6	39.5	39.7	23.3
East Hartford	003	1986	8272	40.2	40.1	40.3	23.3
East Hartford	003	1987	8522	38.0	37.9	38.1	24.5
New Haven	123	1985	8566	57.6	57.5	57.7	26.6
New Haven	123	1986	8057	54.2	54.0	54.4	26.7
New Haven	123	1987	7887	53.5	53.4	53.6	27.7

N.B. The arithmetic mean and standard deviation have units of $\mu g/m^3$.

TABLE 23

1987 TEN HIGHEST 1-HOUR AVERAGE NO2 DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
BRIDGEPORT-123 (7701)	NO2	.123	.121	.109	.106	.104	.096	.090	.089	.089	.087
	DATE	8/ 7/87	5/28/87	11/ 4/87	5/30/87	9/28/87	5/17/87	6/ 8/87	7/24/87	5/ 7/87	6/19/87
METEOROLOGICAL SITE	DIR (DEG)	160	230	220	270	220	230	250	220	270	220
NEWARK	VEL (MPH)	4.6	10.3	8.8	4.9	6.4	12.3	10.4	7.6	6.5	12.1
	SPD (MPH)	6.6	10.9	9.1	6.9	6.8	12.7	11.6	7.9	10.6	12.2
	RATIO	0.698	0.942	0.974	0.710	0.953	0.972	0.896	0.957	0.607	0.993
METEOROLOGICAL SITE	DIR (DEG)	210	250	220	300	220	270	240	250	320	230
BRADLEY	VEL (MPH)	5.9	4.2	9.4	4.5	4.3	4.3	7.1	6.2	5.0	3.5
	SPD (MPH)	7.2	6.5	10.8	6.6	6.6	7.0	8.8	8.6	9.6	5.8
	RATIO	0.823	0.649	0.876	0.676	0.649	0.605	0.813	0.721	0.523	0.600
METEOROLOGICAL SITE	DIR (DEG)	150	240	250	240	240	240	240	240	240	230
BRIDGEPORT	VEL (MPH)	3.8	5.9	6.8	5.8	7.6	8.5	7.2	6.6	6.1	7.6
	SPD (MPH)	4.9	6.0	7.0	5.8	7.6	8.6	7.3	6.9	8.8	7.9
	RATIO	0.783	0.978	0.967	0.999	0.993	0.988	0.983	0.952	0.695	0.964
METEOROLOGICAL SITE	DIR (DEG)	230	300	250	300	270	320	270	280	310	280
WORCESTER	VEL (MPH)	3.9	10.2	8.4	8.3	9.9	5.8	5.9	6.7	7.6	8.1
	SPD (MPH)	4.5	11.6	10.4	9.1	11.2	8.5	7.8	8.2	10.4	9.1
	RATIO	0.876	0.875	0.812	0.920	0.882	0.687	0.758	0.813	0.736	0.891
EAST HARTFORD-003 (8522)	NO2	.097	.091	.091	.085	.079	.079	.079	.078	.072	.070
	DATE	1/30/87	1/29/87	11/ 4/87	9/28/87	11/ 5/87	1/14/87	11/ 8/87	1/28/87	11/ 3/87	3/ 9/87
METEOROLOGICAL SITE	DIR (DEG)	50	260	220	220	290	220	220	290	230	10
NEWARK	VEL (MPH)	2.1	3.3	8.8	6.4	11.7	9.3	8.8	2.2	9.4	11.2
	SPD (MPH)	5.8	4.7	9.1	6.8	13.5	9.9	8.9	5.0	9.8	15.5
	RATIO	0.368	0.699	0.974	0.953	0.867	0.942	0.988	0.442	0.965	0.724
METEOROLOGICAL SITE	DIR (DEG)	360	350	220	220	310	200	200	310	200	10
BRADLEY	VEL (MPH)	6.4	1.3	9.4	4.3	10.5	6.0	6.5	1.2	7.5	12.8
	SPD (MPH)	6.5	1.4	10.8	6.6	12.9	7.0	7.6	1.7	10.1	12.9
	RATIO	0.992	0.925	0.876	0.649	0.808	0.846	0.854	0.667	0.750	0.990
METEOROLOGICAL SITE	DIR (DEG)	80	350	250	240	310	260	250	310	260	20
BRIDGEPORT	VEL (MPH)	7.2	5.7	6.8	7.6	7.6	6.8	5.8	1.8	9.2	10.4
	SPD (MPH)	9.6	6.5	7.0	7.6	8.9	7.2	6.3	5.3	9.5	11.6
	RATIO	0.746	0.881	0.967	0.993	0.853	0.940	0.914	0.334	0.969	0.897
METEOROLOGICAL SITE	DIR (DEG)	70	320	250	270	300	270	260	350	270	20
WORCESTER	VEL (MPH)	4.9	7.4	8.4	9.9	11.1	9.1	10.4	1.6	13.6	7.8
	SPD (MPH)	5.5	8.2	10.4	11.2	12.5	10.1	11.9	4.7	16.1	8.6
	RATIO	0.901	0.904	0.812	0.882	0.886	0.901	0.876	0.333	0.843	0.904
NEW HAVEN-123 (7887)	NO2	.141	.131	.117	.105	.103	.100	.098	.094	.092	.090
	DATE	5/28/87	2/ 2/87	2/ 3/87	5/30/87	11/ 4/87	9/28/87	5/ 2/87	12/ 8/87	5/31/87	3/25/87
METEOROLOGICAL SITE	DIR (DEG)	230	220	270	270	220	220	210	200	250	200
NEWARK	VEL (MPH)	10.3	6.5	8.1	4.9	8.8	6.4	6.4	3.2	9.4	7.1
	SPD (MPH)	10.9	7.3	9.2	6.9	9.1	6.8	7.2	4.9	10.2	8.2
	RATIO	0.942	0.892	0.881	0.710	0.974	0.953	0.893	0.657	0.921	0.868
METEOROLOGICAL SITE	DIR (DEG)	250	240	270	300	220	220	200	170	250	190
BRADLEY	VEL (MPH)	4.2	2.7	3.2	4.5	9.4	4.3	5.2	2.6	4.6	5.4
	SPD (MPH)	6.5	4.9	4.7	6.6	10.8	6.6	5.9	3.9	6.2	8.1
	RATIO	0.649	0.554	0.679	0.676	0.876	0.649	0.881	0.670	0.743	0.666

TABLE 23, CONTINUED

1987 TEN HIGHEST 1-HOUR AVERAGE NO2 DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	240	250	280	240	250	240	230	250	250	210
BRIDGEPORT	VEL (MPH)	5.9	6.3	4.9	5.8	6.8	7.6	4.5	8.3	5.7	5.5
	SPD (MPH)	6.0	7.2	5.8	5.8	7.0	7.6	5.0	8.5	5.8	6.3
	RATIO	0.978	0.875	0.856	0.999	0.967	0.993	0.891	0.984	0.987	0.877
METEOROLOGICAL SITE	DIR (DEG)	300	280	290	300	250	270	260	270	280	250
WORCESTER	VEL (MPH)	10.2	6.0	5.8	8.3	8.4	9.9	7.2	8.0	6.2	5.6
	SPD (MPH)	11.6	6.8	6.6	9.1	10.4	11.2	8.2	9.5	7.3	8.8
	RATIO	0.875	0.883	0.876	0.920	0.812	0.882	0.875	0.848	0.840	0.634

VI. CARBON MONOXIDE

HEALTH EFFECTS

Carbon monoxide (CO) is a colorless, odorless, poison gas formed when carbon-containing fuel is not burned completely. It is by far the most plentiful air pollutant. Fortunately, this deadly gas does not persist in the atmosphere. It is apparently converted by natural processes to harmless carbon dioxide in ways not yet understood, and this is done quickly enough to prevent any general buildup. However, CO can reach dangerous levels in local areas, such as city-street canyons with heavy auto traffic and little wind.

Clinical experience with accidental CO poisoning has shown clearly how it affects the body. When the gas is breathed, CO replaces oxygen in the red blood cells, reducing the amount of oxygen that can reach the body cells and maintain life. Lack of oxygen affects the brain, and the first symptoms are impaired perception and thinking. Reflexes are slowed, judgement weakened, and drowsiness ensues. An auto driver breathing high levels of CO is more likely to have an accident; an athlete's performance and skill drop suddenly. Lack of oxygen then affects the heart. Death can come from heart failure or general asphyxiation, if a person is exposed to very high levels of CO.

CONCLUSIONS

The eight-hour National Ambient Air Quality Standard of 9 parts per million (ppm) was exceeded at one of the five carbon monoxide monitoring sites in Connecticut during 1987. The standard was exceeded eight times at Hartford 017. No exceedance of the 35 ppm one-hour standard was measured at any site in 1987.

In order to put the monitoring data into proper perspective, it must be realized that carbon monoxide concentrations vary greatly from place-to-place. More than 95% of the CO emissions in Connecticut come from motor vehicles. Therefore, concentrations are greatest in areas of traffic congestion. The magnitude and frequency of high concentrations observed at any monitoring site are not necessarily indicative of widespread CO levels.

The CO standards are likely to be exceeded in any city in the state where there are areas of traffic congestion. However, as Connecticut's SIP control strategies are implemented, there should continue to be a decrease in the number of congested areas. Also, as federally - mandated controls which reduce emissions from new motor vehicles are implemented, a reduction in ambient CO levels should be achieved.

Unlike SO_2, TSP and O_3, elevated CO levels are not often associated with southwesterly winds, indicating that this pollutant is more of a local-scale (not regional-scale) problem.

METHOD OF MEASUREMENT

The DEP Air Monitoring Unit uses instruments employing a non-dispersive infrared technique to continuously measure carbon monoxide levels. The instantaneous concentrations are electronically recorded at the site, averaged for each hour, and stored for transmission to the central computer in Hartford . Due to the relative inertness of CO, a long sampling line can be used without the danger of CO being depleted by chemical reactions within the lines. The most important consideration in the measurement of CO is the placement of the sampling probe inlet; that is, its proximity to traffic lanes.

DISCUSSION OF DATA

Monitoring Network - The network in 1987 consisted of five carbon monoxide monitors: Bridgeport 004, Hartford 013, Hartford 017, New Haven 019, and Stamford 020. They are all located in urban areas. All the sites are located west of the Connecticut River, with three of them in coastal towns (see Figure 12). Hartford 013 is a new site, and it operated in the last ten months of 1987. It replaces the New Britain 002 site. New Haven 019 is a relatively new site and has been in existence for two years.

Precision and Accuracy - The carbon monoxide monitors had a total of 130 precision checks during 1987. The resulting 95% probability limits were -8% to +6%. Accuracy is determined by introducing a known amount of CO into each of the monitors. Five audits for accuracy were conducted on the monitoring network in 1987. Three different concentration levels were tested on each monitor: low, medium and high. The 95% probability limits ranged from -9% to +9% for the low level test; -5% to +3% for the medium level test; and -6% to +4% for the high level test.

8-Hour and 1-Hour Averages - Hartford 017 had a second high CO concentration exceeding the 8-hour standard of 9 ppm, which means that the standard was violated at this site in 1987 (see Table 24). This was also the case in 1985 and 1986. Regarding the maximum 8-hour running average at each site, there were decreases from 1986 to 1987 at Bridgeport 004, New Haven 019 and Stamford 020. An increase occurred at Hartford 017. The second highest 8-hour running average increased from 1986 to 1987 at Hartford 017 and New Haven 019 and decreased at Bridgeport 004 and Stamford 020.

As for 1-hour averages, no site in the state recorded a value exceeding the primary 1-hour standard of 35 ppm. Both Hartford 017 and New Haven recorded maximum 1-hour values greater than the year before. Second high 1-hour values were also higher in 1987 at these sites.

The maximum and second high CO concentrations at each site are presented in Table 24. Table 25 presents monthly highs and a monthly tally of the number of times the standards were exceeded at each site. Seasonal variations in CO levels can be observed using this table.

10-High Days with Wind Data - Table 26 lists for each site the ten days in 1987 when the 1-hour CO averages were highest. The wind data associated with these high readings are also presented. (See the discussion of Table 11 in the TSP section for a description of the origin and use of these wind data.)

The high CO levels tended to occur during the colder months at all five CO sites. Low atmospheric mixing heights and stable atmospheric conditions are two reasons CO levels are high during the fall and winter. Also, cold starts and warmups (rich mixtures) contribute to an increase in CO. A noteworthy feature of the high CO days is that the persistence of a wind is more important than the direction to which or from which it is blowing. Since 95% of the CO emissions in Connecticut come from motor vehicles, it is likely that the high CO levels are caused when relatively persistent winds are blowing CO emissions from the direction of nearby roads toward the monitors.

Trends - Due to the local nature of CO emissions, it is not appropriate to give an estimate of widespread CO trends. However, local CO trends can be addressed in a number of ways. Exceedances of the 8-hour standard can be tracked in order to determine if a CO problem is worsening or abating at a site. This is illustrated in Table 26a and in Figure 13. One can see that over the past five years the number of exceedances remained low and relatively unchanged at the Bridgeport and Stamford sites. The Hartford-017 site has shown a higher frequency of exceedances relative to the other sites. The frequency of exceedances at this site decreased initially for two years, but then increased significantly in 1987. The Hartford 013 site has been operating for one year and the New Haven 019 site for two years. They are included in Table 26a but not in Figure 13 because they have no history of exceedances.

Another way of illustrating local CO trends is to use running averages. Running averages have the advantage of smoothing out the abrupt, transitory changes in pollutant levels that are often evident in consecutive sampling periods and from one season to the next. Figure 14 shows the 36-month running averages of the hourly CO concentrations at Bridgeport 004, Hartford 017 and Stamford 020. The Hartford 013 and the New Haven 019 sites are not included because they lack sufficient data. CO levels seem to be trending downward at the three included sites.

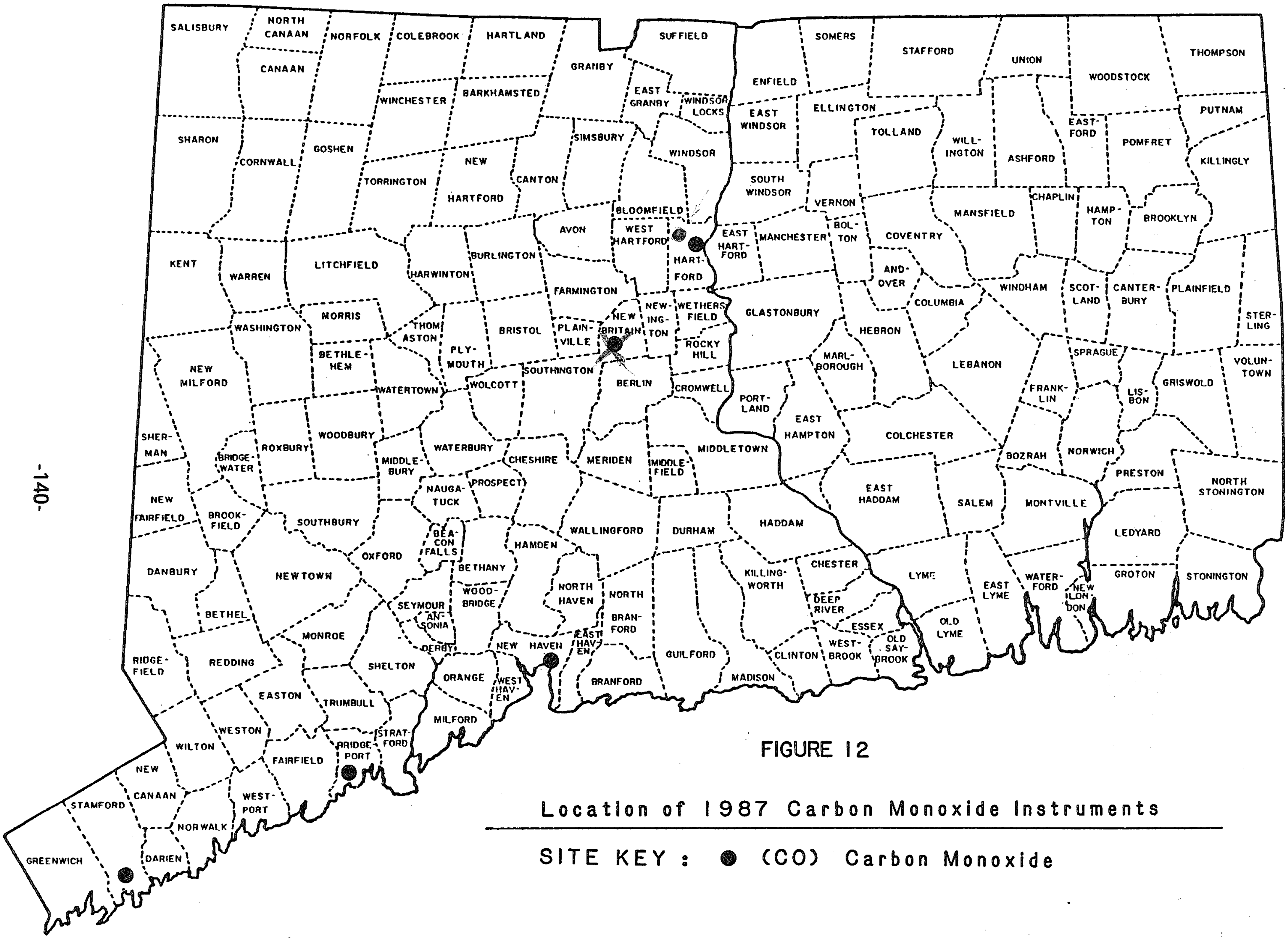


FIGURE 12

Location of 1987 Carbon Monoxide Instruments

SITE KEY : ● (CO) Carbon Monoxide

TABLE 24

1987 CARBON MONOXIDE STANDARDS ASSESSMENT SUMMARY

TOWN-SITE	MAXIMUM 8-HOUR RUNNING AVERAGE	TIME OF MAXIMUM 8-HOUR RUNNING AVERAGE[1]	2ND HIGH 8-HOUR RUNNING AVERAGE	TIME OF 2ND HIGH 8-HOUR RUNNING AVERAGE[1]	MAXIMUM 1-HOUR AVERAGE	TIME OF MAXIMUM 1-HOUR AVERAGE[2]	2ND HIGH 1-HOUR AVERAGE	TIME OF ~~MAXIMUM~~ 2nd High 1-HOUR AVERAGE[2]
Bridgeport-004	6.3	2/3/3	5.3	12/12/22	10.5	12/12/21	8.5	12/12/20
Hartford-013[3]	3.9	11/16/3	3.6	11/16/9	6.0	11/24/19	5.6	12/10/8
Hartford-017~~3~~	15.8	2/2/23	11.4	1/29/23	30.0	2/2/19	23.0	2/2/20
New Haven-019	7.8	12/31/21	7.5	2/2/23	12.8	2/2/18	12.1	12/31/17
Stamford-020	6.4	1/29/23	6.3	2/2/24	10.5	12/22/9	10.2	10/26/19

[1] The time of the 8-hour average is reported as follows: month/day/hour (EST), specifying the end of the 8-hour period.
[2] The time of the 1-hour average is reported as follows: month/day/hour (EST), specifying the end of the 1-hour period.
[3] The site did not operate in January or February.

N.B. The CO averages are expressed in terms of parts per million (ppm).

TABLE 25

1987 CARBON MONOXIDE SEASONAL FEATURES

TOWN-SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bridgeport-004	Max. 1-Hour	7.4	8.8	5.0	4.8	4.0	4.8	5.3	3.5	5.6	7.7	5.3	10.5
	Max. Running 8-Hour	5.1	6.3	2.7	3.2	3.1	3.7	3.6	2.6	3.5	4.6	3.8	5.3
	No. of 8-Hour Exceedances	0	0	0	0	0	0	0	0	0	0	0	0
Hartford-013	Max. 1-Hour	-	-	3.3	3.5	3.3	1.4	2.6	2.3	2.9	4.2	6.0	5.6
	Max. Running 8-Hour	-	-	2.9	2.6	2.5	0.9	1.2	1.7	2.0	2.5	3.9	3.3
	No. of 8-Hour Exceedances	-	-	0	0	0	0	0	0	0	0	0	0
Hartford-017	Max. 1-Hour	19.8	30.0	10.8	10.6	9.1	8.4	7.4	6.8	10.2	17.1	11.8	16.7
	Max. Running 8-Hour	11.4	15.8	6.9	6.9	6.0	5.5	6.4 5	4.8	6.1	11.1	7.5	9.5
	No. of 8-Hour Exceedances	3	3	0	0	0	0	0	0	0	1	0	1
New Haven-019	Max. 1-Hour	10.8	12.8	9.9	4.7	7.2	6.2	6.6	3.6	5.4	9.4	10.1	12.1
	Max. Running 8-Hour	5.9	7.5	6.3	3.3	5.2	4.4	4.0	2.5	3.9	5.4	6.5	7.8
	No. of 8-Hour Exceedances	0	0	0	0	0	0	0	0	0	0	0	0
Stamford-020	Max. 1-Hour	9.2	8.2	6.7	5.8	5.6	4.4	6.3	5.1	6.3	10.2	10.2	10.5
	Max. Running 8-Hour	6.4	6.3	4.7	3.7	4.2	3.7	4.4	4.1	4.1	5.0	6.1	5.7
	No. of 8-Hour Exceedances	0	0	0	0	0	0	0	0	0	0	0	0

N.B. The CO concentrations are in terms of parts per million (ppm).

TABLE 26

1987 TEN HIGHEST 1-HOUR AVERAGE CO DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
BRIDGEPORT-004 (8355)	CO	10.5	8.8	7.7	7.7	7.4	7.2	6.7	6.6	6.1	5.9
	DATE	12/12/87	2/ 2/87	2/ 7/87	10/ 2/87	1/29/87	10/26/87	10/ 6/87	2/21/87	12/24/87	2/ 3/87
METEOROLOGICAL SITE	DIR (DEG)	250	220	290	190	260	260	150	300	160	270
NEWARK	VEL (MPH)	5.7	6.5	4.7	9.6	3.3	1.5	6.1	7.7	3.2	8.1
	SPD (MPH)	6.2	7.3	7.6	10.6	4.7	6.0	6.9	8.3	5.3	9.2
	RATIO	0.927	0.892	0.616	0.904	0.699	0.254	0.891	0.925	0.608	0.881
METEOROLOGICAL SITE	DIR (DEG)	20	240	300	190	350	30	170	330	180	270
BRADLEY	VEL (MPH)	2.6	2.7	4.3	9.1	1.3	.4	4.7	7.5	4.0	3.2
	SPD (MPH)	2.9	4.9	6.8	10.6	1.4	4.9	7.3	9.1	5.2	4.7
	RATIO	0.906	0.554	0.637	0.853	0.925	0.080	0.638	0.832	0.777	0.679
METEOROLOGICAL SITE	DIR (DEG)	330	250	310	210	350	220	190	350	190	280
BRIDGEPORT	VEL (MPH)	4.0	6.3	1.9	9.0	5.7	1.6	4.8	7.5	4.6	4.9
	SPD (MPH)	6.3	7.2	5.8	9.9	6.5	5.2	6.6	7.6	4.6	5.8
	RATIO	0.632	0.875	0.329	0.909	0.881	0.306	0.732	0.982	0.992	0.856
METEOROLOGICAL SITE	DIR (DEG)	20	280	320	210	320	320	210	330	230	290
WORCESTER	VEL (MPH)	.3	6.0	7.0	7.8	7.4	6.0	4.3	11.0	2.5	5.8
	SPD (MPH)	3.6	6.8	7.9	10.2	8.2	7.6	7.2	11.5	5.2	6.6
	RATIO	0.081	0.883	0.880	0.766	0.904	0.786	0.600	0.958	0.491	0.876
HARTFORD-013 (6478)	CO	6.0	5.6	5.0	5.0	4.9	4.7	4.7	4.5	4.2	4.2
	DATE	11/24/87	12/10/87	11/14/87	12/14/87	11/ 1/87	12/23/87	11/16/87	11/15/87	12/20/87	10/20/87
METEOROLOGICAL SITE	DIR (DEG)	240	260	260	300	140	270	90	170	180	140
NEWARK	VEL (MPH)	5.5	3.1	5.5	6.6	1.0	8.6	3.3	.9	4.3	5.0
	SPD (MPH)	6.5	6.9	7.2	8.3	4.7	9.1	5.2	3.9	4.9	5.0
	RATIO	0.849	0.449	0.769	0.794	0.204	0.946	0.640	0.236	0.875	0.990
METEOROLOGICAL SITE	DIR (DEG)	240	360	270	320	100	290	160	10	100	170
BRADLEY	VEL (MPH)	3.9	3.8	2.1	6.4	.2	5.8	3.5	1.9	.7	3.1
	SPD (MPH)	7.3	5.3	4.7	7.6	5.0	6.9	4.7	4.3	3.0	6.6
	RATIO	0.532	0.722	0.445	0.837	0.048	0.843	0.747	0.440	0.226	0.465
METEOROLOGICAL SITE	DIR (DEG)	260	280	310	310	220	280	120	210	170	120
BRIDGEPORT	VEL (MPH)	6.0	3.9	6.9	6.8	.8	9.5	5.0	.4	5.8	3.7
	SPD (MPH)	6.2	6.3	8.9	7.9	5.0	10.1	6.9	4.7	7.9	4.7
	RATIO	0.974	0.614	0.775	0.863	0.167	0.942	0.728	0.081	0.737	0.777
METEOROLOGICAL SITE	DIR (DEG)	280	320	300	310	300	290	210	350	170	200
WORCESTER	VEL (MPH)	5.3	6.9	6.6	10.0	4.9	6.2	1.5	3.6	1.3	3.6
	SPD (MPH)	7.5	7.8	7.6	10.4	6.0	6.6	4.5	4.3	5.3	5.0
	RATIO	0.714	0.887	0.860	0.968	0.805	0.942	0.347	0.825	0.253	0.710
HARTFORD-017 (8228)	CO	30.0	20.0	19.8	18.3	17.1	16.7	15.6	15.6	15.6	14.3
	DATE	2/ 2/87	2/ 3/87	1/27/87	1/28/87	10/15/87	12/31/87	12/12/87	1/29/87	2/16/87	10/16/87
METEOROLOGICAL SITE	DIR (DEG)	220	270	10	290	10	220	250	260	360	60
NEWARK	VEL (MPH)	6.5	8.1	9.4	2.2	3.0	4.6	5.7	3.3	9.8	3.6
	SPD (MPH)	7.3	9.2	9.6	5.0	4.0	5.9	6.2	4.7	10.8	5.3
	RATIO	0.892	0.881	0.975	0.442	0.743	0.785	0.927	0.699	0.912	0.676
METEOROLOGICAL SITE	DIR (DEG)	240	270	10	310	330	200	20	350	360	340
BRADLEY	VEL (MPH)	2.7	3.2	3.8	1.2	2.0	4.7	2.6	1.3	5.2	1.6
	SPD (MPH)	4.9	4.7	4.3	1.7	3.6	7.2	2.9	1.4	7.3	4.3
	RATIO	0.554	0.679	0.880	0.667	0.550	0.653	0.906	0.925	0.706	0.362

TABLE 26, CONTINUED

1987 TEN HIGHEST 1-HOUR AVERAGE CO DAYS WITH WIND DATA

UNITS : PARTS PER MILLION

TOWN-SITE (SAMPLES)	RANK	1	2	3	4	5	6	7	8	9	10
METEOROLOGICAL SITE	DIR (DEG)	250	280	30	310	210	280	330	350	330	80
BRIDGEPORT	VEL (MPH)	6.3	4.9	6.3	1.8	2.4	2.7	4.0	5.7	9.1	4.2
	SPD (MPH)	7.2	5.8	6.8	5.3	4.6	3.6	6.3	6.5	9.5	4.7
	RATIO	0.875	0.856	0.937	0.334	0.515	0.755	0.632	0.881	0.962	0.878
METEOROLOGICAL SITE	DIR (DEG)	280	290	360	350	20	260	20	320	330	70
WORCESTER	VEL (MPH)	6.0	5.8	3.4	1.6	2.1	8.6	.3	7.4	13.4	4.1
	SPD (MPH)	6.8	6.6	3.9	4.7	3.6	11.2	3.6	8.2	14.1	5.6
	RATIO	0.883	0.876	0.872	0.333	0.595	0.766	0.081	0.904	0.954	0.740
NEW HAVEN-019 (8445)	CO	12.8	12.1	11.0	10.8	10.1	10.1	9.9	9.7	9.4	8.8
	DATE	2/ 2/87	12/31/87	2/ 3/87	1/29/87	11/24/87	12/ 9/87	3/ 6/87	2/10/87	10/ 6/87	11/13/87
METEOROLOGICAL SITE	DIR (DEG)	220	220	270	260	240	210	240	300	150	230
NEWARK	VEL (MPH)	6.5	4.6	8.1	3.3	5.5	8.3	10.3	13.5	6.1	8.4
	SPD (MPH)	7.3	5.9	9.2	4.7	6.5	8.5	10.8	14.1	6.9	8.9
	RATIO	0.892	0.785	0.881	0.699	0.849	0.983	0.952	0.956	0.891	0.942
METEOROLOGICAL SITE	DIR (DEG)	240	200	270	350	240	190	210	320	170	210
BRADLEY	VEL (MPH)	2.7	4.7	3.2	1.3	3.9	6.0	5.3	12.7	4.7	5.0
	SPD (MPH)	4.9	7.2	4.7	1.4	7.3	8.3	7.9	13.7	7.3	8.3
	RATIO	0.554	0.653	0.679	0.925	0.532	0.717	0.667	0.932	0.638	0.606
METEOROLOGICAL SITE	DIR (DEG)	250	280	280	350	260	250	250	310	190	260
BRIDGEPORT	VEL (MPH)	6.3	2.7	4.9	5.7	6.0	7.3	9.2	9.9	4.8	9.3
	SPD (MPH)	7.2	3.6	5.8	6.5	6.2	7.9	9.3	10.2	6.6	9.3
	RATIO	0.875	0.755	0.856	0.881	0.974	0.927	0.987	0.974	0.732	0.993
METEOROLOGICAL SITE	DIR (DEG)	280	260	290	320	280	260	280	320	210	260
WORCESTER	VEL (MPH)	6.0	8.6	5.8	7.4	5.3	9.5	11.2	19.5	4.3	6.6
	SPD (MPH)	6.8	11.2	6.6	8.2	7.5	11.5	12.4	20.4	7.2	7.6
	RATIO	0.883	0.766	0.876	0.904	0.714	0.828	0.907	0.956	0.600	0.863
STAMFORD-020 (8686)	CO	10.5	10.2	10.2	9.9	9.5	9.3	9.2	8.8	8.7	8.4
	DATE	12/22/87	11/ 8/87	10/26/87	11/24/87	12/12/87	10/ 6/87	1/29/87	12/31/87	10/30/87	1/ 9/87
METEOROLOGICAL SITE	DIR (DEG)	190	220	260	240	250	150	260	220	200	260
NEWARK	VEL (MPH)	3.7	8.8	1.5	5.5	5.7	6.1	3.3	4.6	4.8	6.2
	SPD (MPH)	4.3	8.9	6.0	6.5	6.2	6.9	4.7	5.9	5.2	8.2
	RATIO	0.867	0.988	0.254	0.849	0.927	0.891	0.699	0.785	0.934	0.754
METEOROLOGICAL SITE	DIR (DEG)	180	200	30	240	20	170	350	200	190	310
BRADLEY	VEL (MPH)	4.3	6.5	.4	3.9	2.6	4.7	1.3	4.7	5.9	5.7
	SPD (MPH)	7.6	7.6	4.9	7.3	2.9	7.3	1.4	7.2	7.0	6.3
	RATIO	0.567	0.854	0.080	0.532	0.906	0.638	0.925	0.653	0.835	0.903
METEOROLOGICAL SITE	DIR (DEG)	220	250	220	260	330	190	350	280	240	310
BRIDGEPORT	VEL (MPH)	1.7	5.8	1.6	6.0	4.0	4.8	5.7	2.7	7.8	5.6
	SPD (MPH)	3.7	6.3	5.2	6.2	6.3	6.6	6.5	3.6	8.5	6.0
	RATIO	0.462	0.914	0.306	0.974	0.632	0.732	0.881	0.755	0.920	0.920
METEOROLOGICAL SITE	DIR (DEG)	270	260	320	280	20	210	320	260	260	310
WORCESTER	VEL (MPH)	4.1	10.4	6.0	5.3	.3	4.3	7.4	8.6	7.0	7.8
	SPD (MPH)	6.0	11.9	7.6	7.5	3.6	7.2	8.2	11.2	8.9	9.1
	RATIO	0.687	0.876	0.786	0.714	0.081	0.600	0.904	0.766	0.785	0.861

TABLE 26a

EXCEEDANCES OF THE 8-HOUR CO STANDARD FOR 1983 -1987

SITE	1983	1984	1985	1986	1987
Bridgeport-004	1	0	0	0	0
Hartford-013[a]	-	-	-	-	0
Hartford-017	-	7	5	3	8
New Haven-019	-	-	-	0[b]	0
Stamford-020	1	2	1	1	0

[a] Data is missing for January and February.
[b] Data is missing for January through March.

FIGURE 13

EXCEEDANCES OF THE 8-HOUR CO STANDARD FOR 1983-1987

SITE: BRIDGEPORT-004

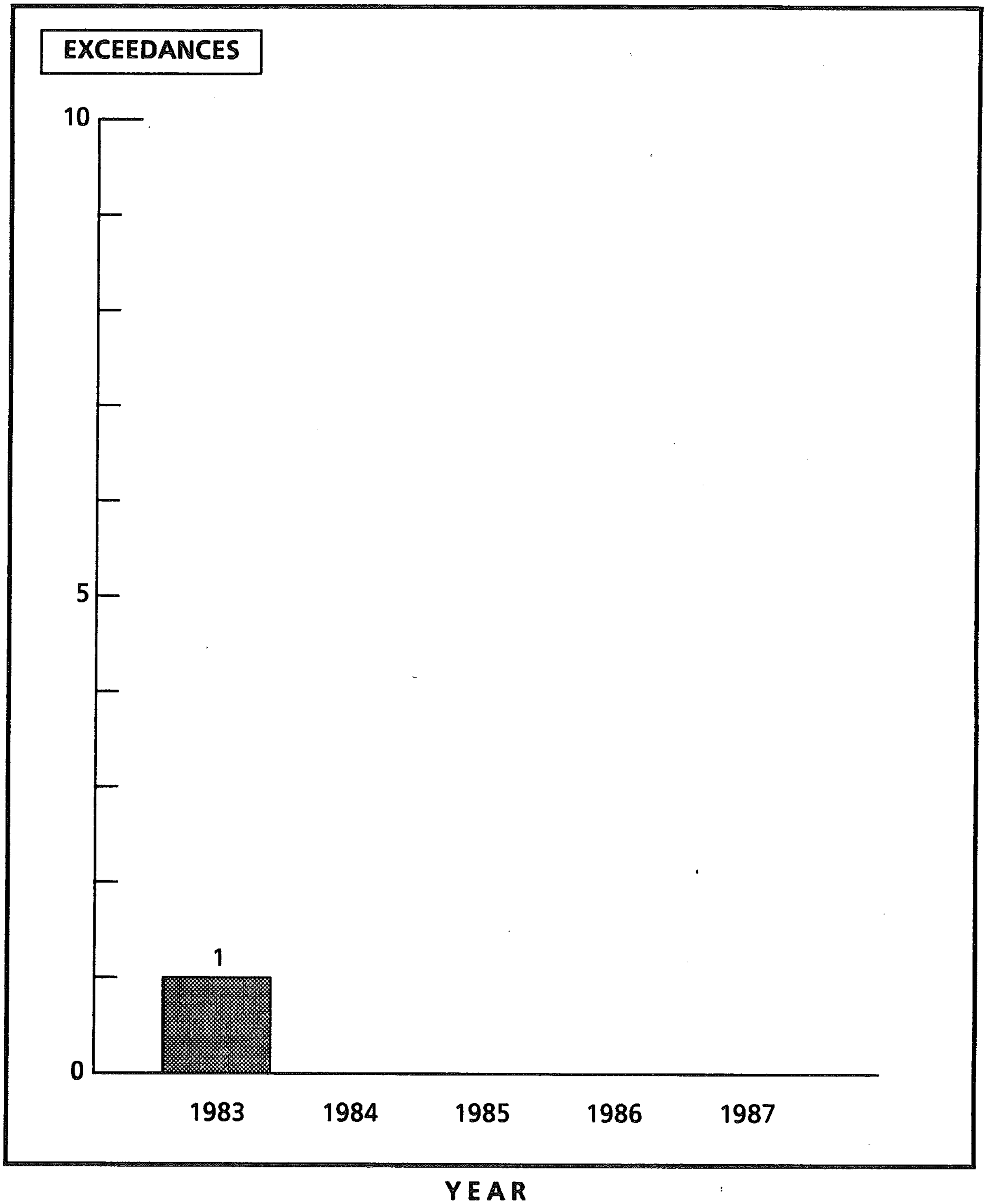


FIGURE 13, CONTINUED

EXCEEDANCES OF THE 8-HOUR CO STANDARD FOR 1983-1987

SITE: HARTFORD-017

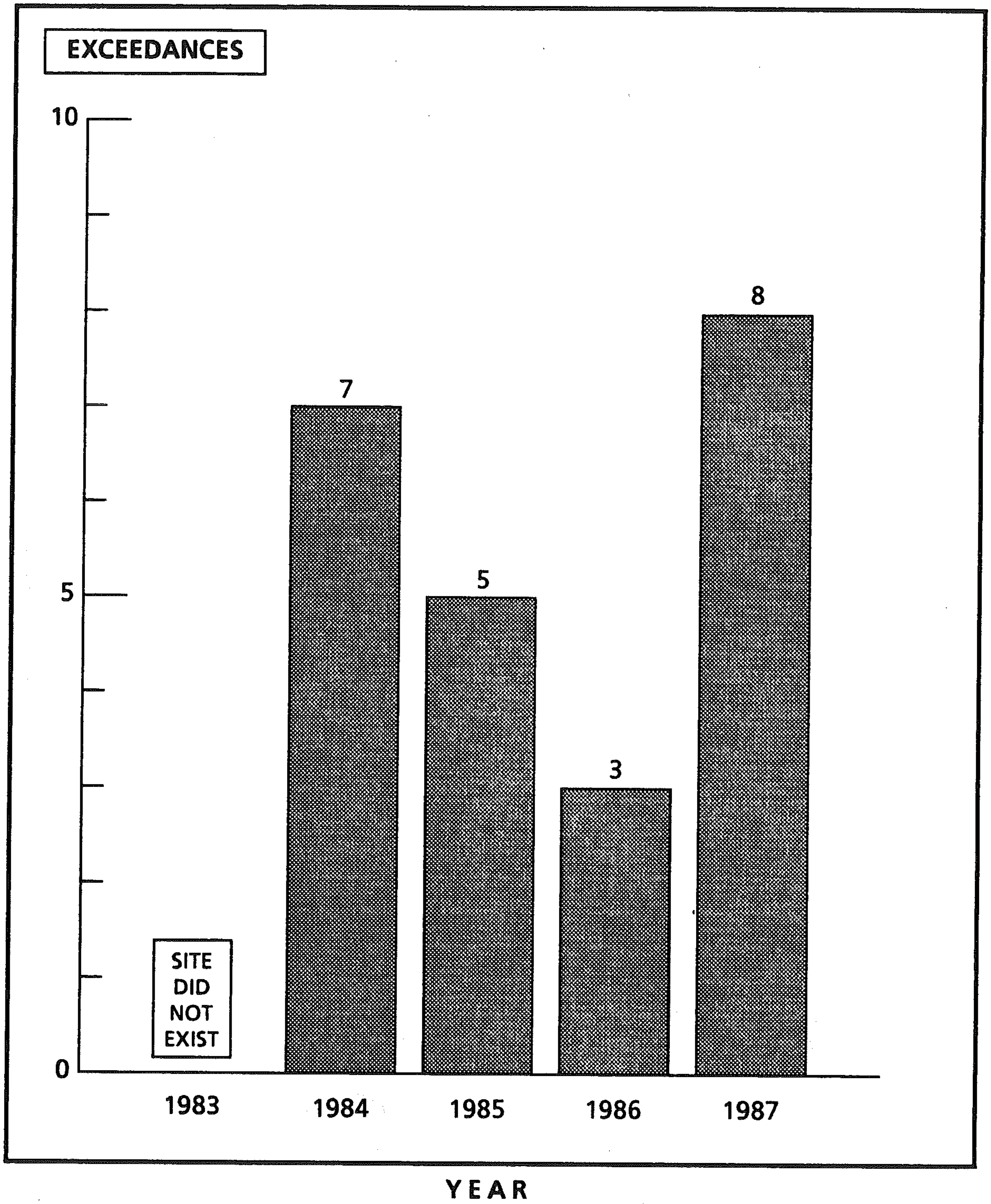
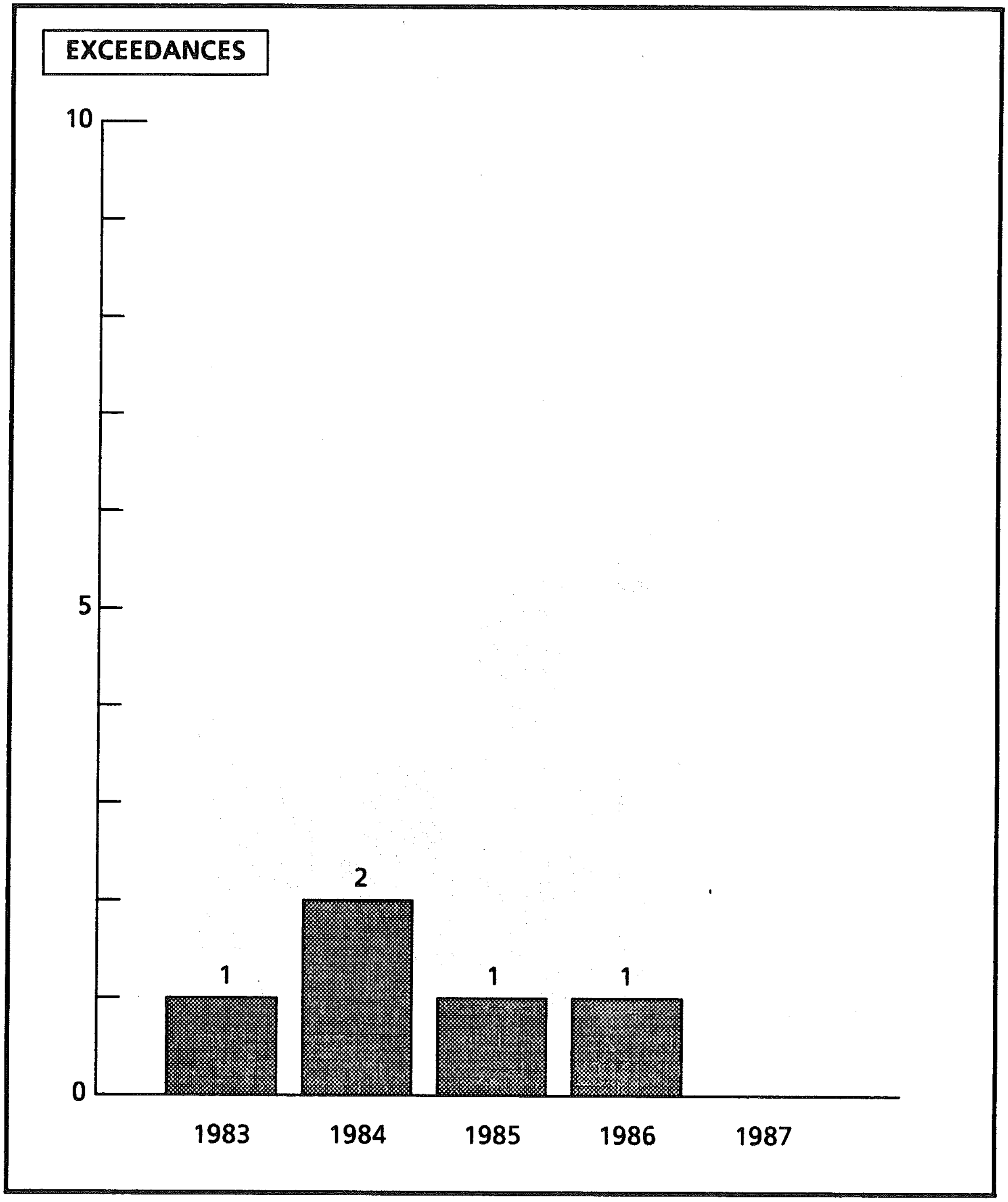


FIGURE 13, CONTINUED

EXCEEDANCES OF THE 8-HOUR CO STANDARD FOR 1983-1987

SITE: STAMFORD-020

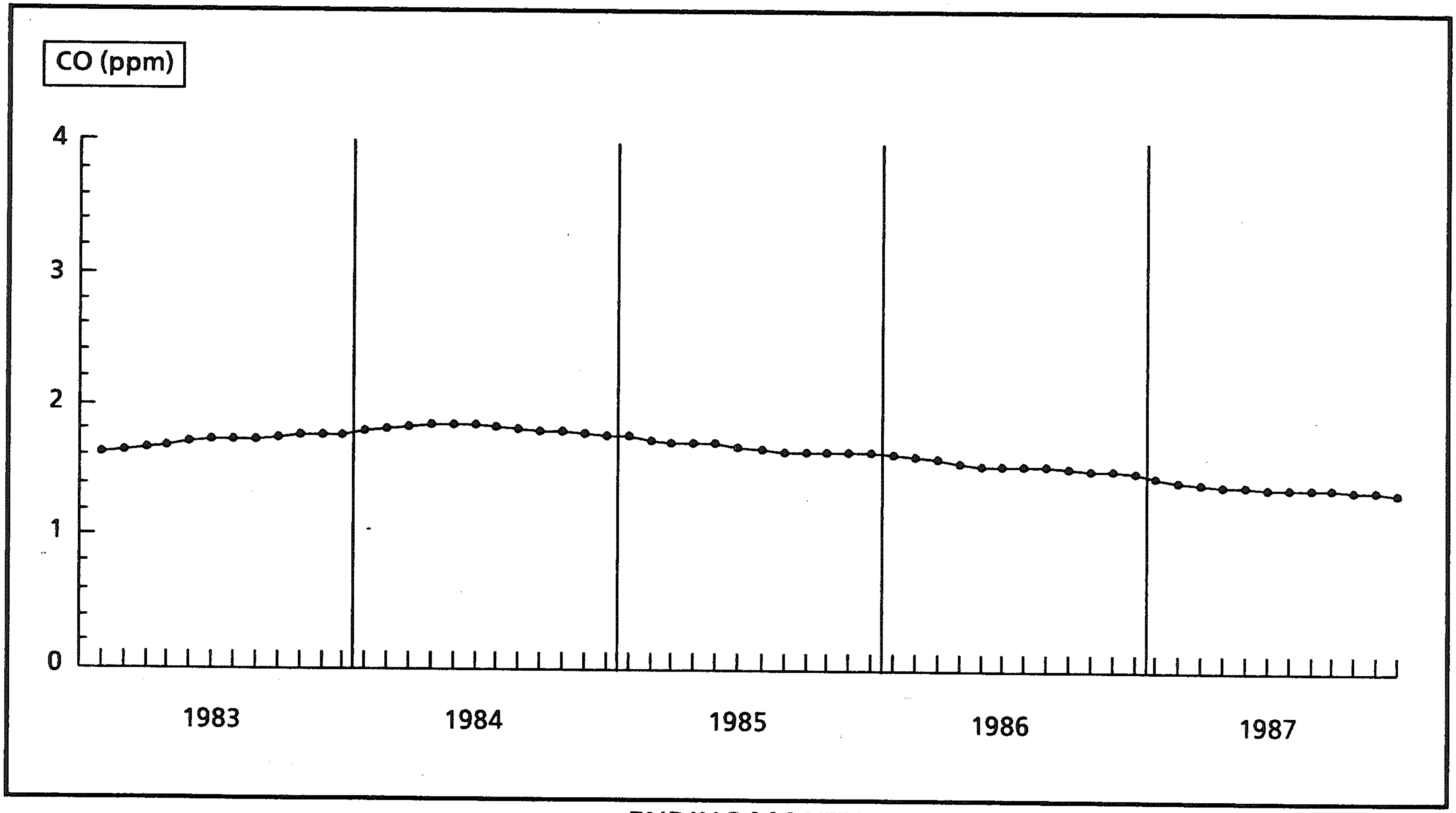


YEAR

FIGURE 14

36-MONTH RUNNING AVERAGES OF THE HOURLY CO CONCENTRATIONS

SITE: BRIDGEPORT-004



ENDING MONTH

FIGURE 14, CONTINUED

36-MONTH RUNNING AVERAGES OF THE HOURLY CO CONCENTRATIONS

SITE: HARTFORD-017

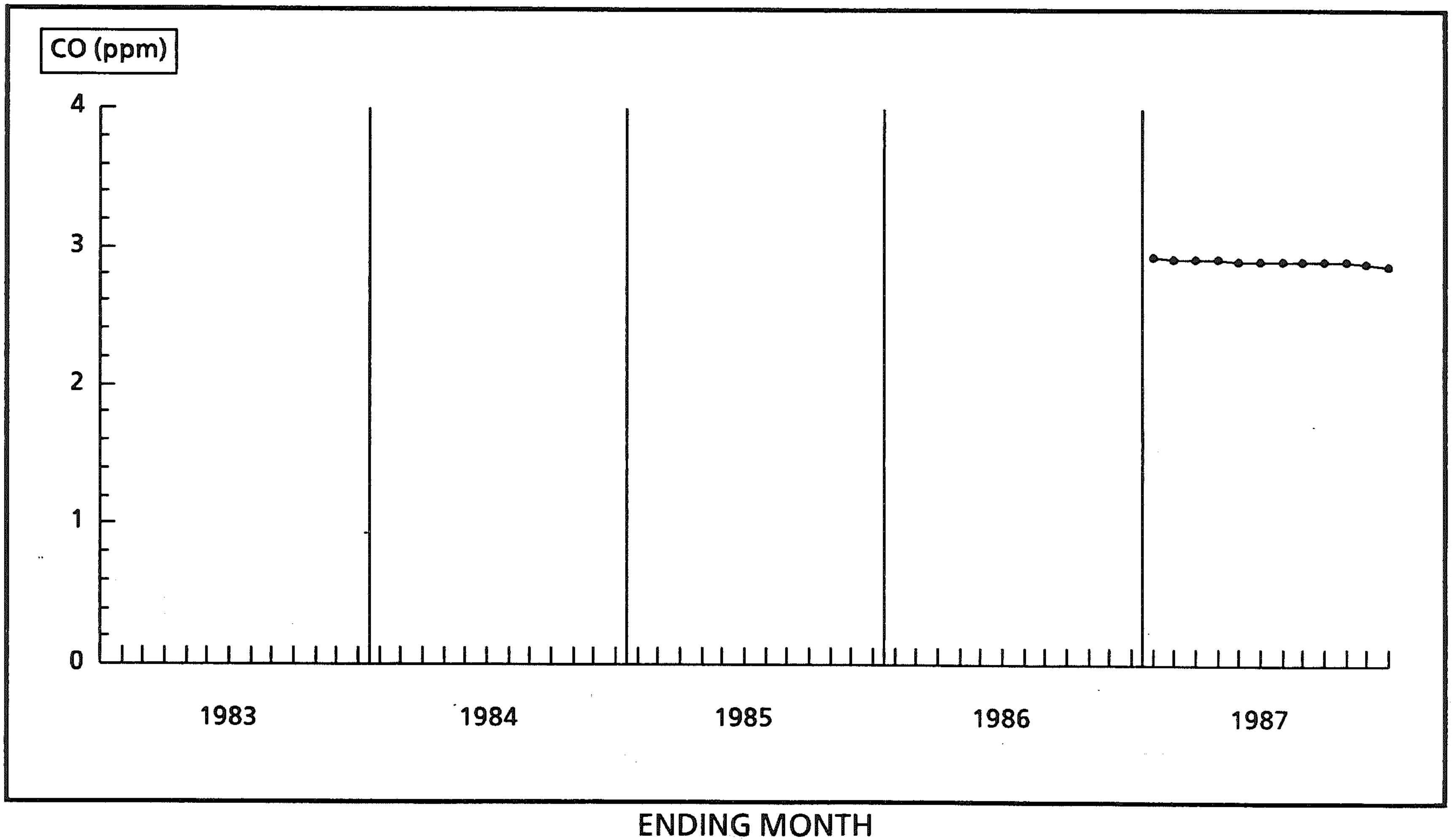
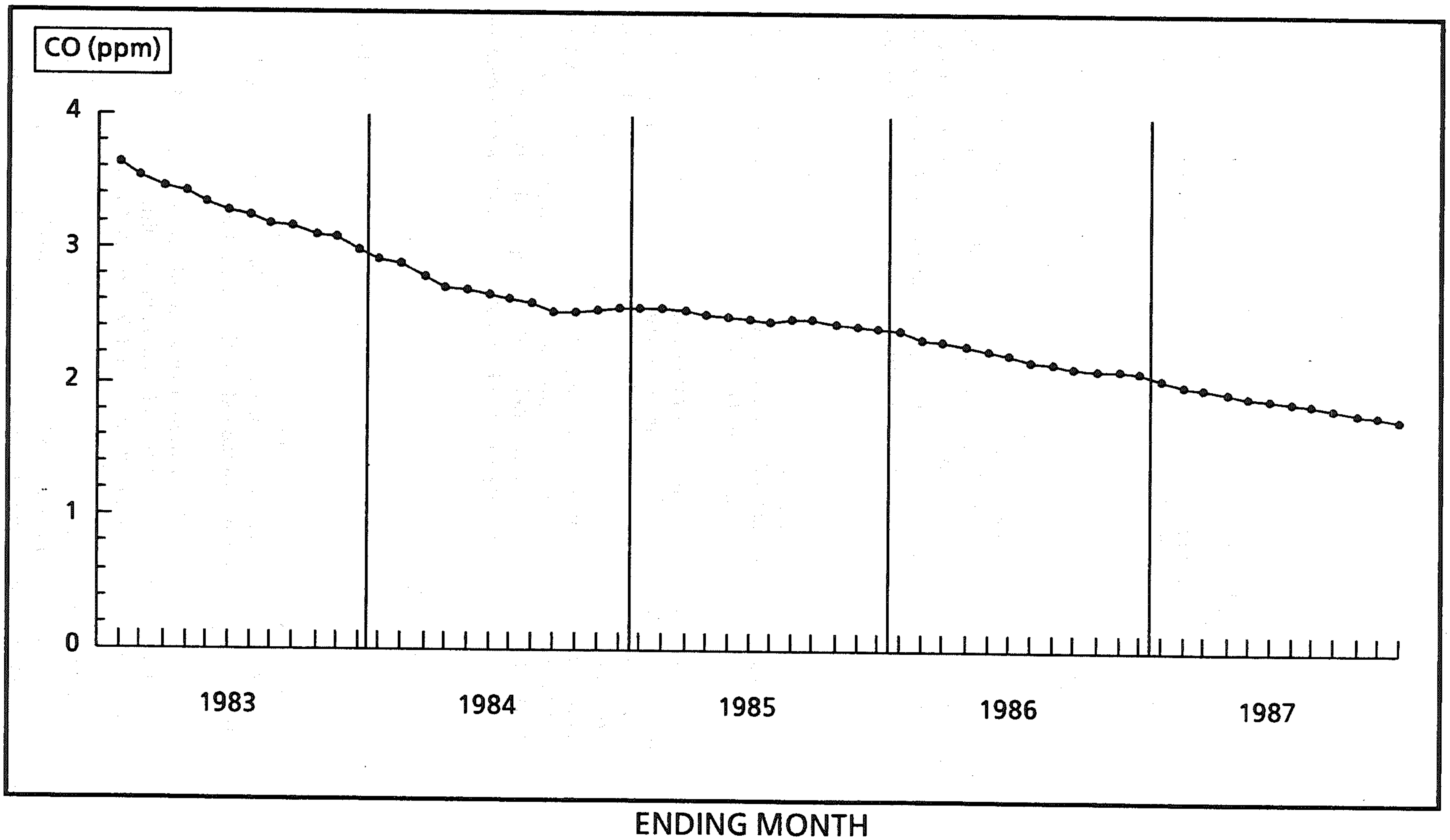


FIGURE 14, CONTINUED

36-MONTH RUNNING AVERAGES OF THE HOURLY CO CONCENTRATIONS

SITE: STAMFORD-020



VII. LEAD

HEALTH EFFECTS

Lead (Pb) is a soft, dull gray, odorless and tasteless heavy metal. It is a ubiquitous element that is widely distributed in small amounts, particularly in soil and in all living things. Although the metallic form of lead is reactive and rarely occurs in nature, lead is prevalent in the environment in the form of various inorganic compounds, and occasional concentrated deposits of lead compounds occur in the earth's crust.

The presence of lead in the atmosphere is primarily accounted for by the emissions of lead compounds from man-made processes, such as the extraction and processing of metallic ores, the incineration of solid wastes, and the operation of motor vehicles. The combustion of lead-containing gasoline by motor vehicles is the largest source of airborne lead emissions and is responsible for approximately 37% of the national total in 1987 -- down from 41% in 1986 and 71% in 1985. These emissions are in the form of fine-to-course particulate matter and are comprised of lead sulfate, ammonium lead halides, and lead halides, of which the chief component is lead bromochloride. The halide compounds appear to undergo chemical changes over a period of hours and are converted to lead carbonate, oxide and oxycarbonate.

The most important sources of lead in humans and other animals are ingestion of foods and beverages, inhalation of airborne lead, and the eating of non-food substances. From the standpoint of the general population, the intake of lead into the body is primarily through ingestion. The direct intake of lead from the ambient air is relatively small.

Overexposure to lead in the United States is primarily a problem in children. Age, pica, diet, nutritional status, and multiple sources of exposure serve to increase the risk of lead poisoning in children. This is especially true in the inner cities where the prevalence of lead poisoning is greatest. Overexposure to lead compounds may result in undesirable biologic effects. These effects range from reversible clinical or metabolic symptoms that disappear after cessation of exposure to permanent damage or death from a single extreme dose or prolonged overexposure. Clinical lead poisoning is accompanied by symptoms of intestinal cramps, peripheral nerve paralysis, anemia, and severe fatigue. Very severe exposure results in permanent neurological, renal, or cardiovascular damage or death.

CONCLUSIONS

The Connecticut primary and secondary ambient air quality standard for lead and its compounds was not exceeded at any site in Connecticut during 1987.

The monitoring sites where the lead levels were highest were generally in urban locations with moderate to heavy traffic. In Connecticut, this is due to the fact that the primary source of lead to the atmosphere is the combustion of leaded gasoline in motor vehicles.

A downward trend in measured concentrations of lead has been observed since 1978. This is probably due to the increasing use of unleaded gasoline. Figure A shows that the decrease in lead emissions from gasoline combustion from 1978 to 1987 has been commensurate with a decrease in statewide ambient average lead concentrations. In fact, this relationship is so close, it has a correlation coefficient of 0.968 (see Figure B). Regarding Figures A and B, the reader should note that after 1978 and again after 1981 a change occurred in the way in which lead concentrations were determined. Before 1979, lead concentrations were determined by analysis of quarterly composite samples from existing TSP monitors. From 1979 through 1981, lead concentrations were determined by analysis of individual daily samples from existing TSP monitors. Beginning in 1982, lead concentrations were determined by analysis of monthly composite samples from only approved lead monitors. Both the single sample and monthly composite data points are depicted in Figure A for 1982. The discontinued method gives a lower average lead concentration in 1982 than the new method. The higher average lead concentration is used in Figure B.

SAMPLE COLLECTION AND ANALYSIS

The Air Monitoring Unit uses hi-vol and lo-vol samplers to obtain ambient concentrations of lead. These samplers are used to collect particulate matter onto fiberglass filters. The particulate matter collected on the filters is subsequently analyzed for its chemical composition. Wet chemistry techniques are used to separate the particulate matter into various components. The lead content of the TSP is determined using an atomic absorption spectrophotometer. (The use of these sampling devices and the chemical analysis techniques were fully described in the TSP section.)

Unlike hi-vol TSP samples which are analyzed separately, the hi-vol lead sample is a composite of all the individual samples obtained at a site in a single month. That is, a cutting is taken from each filter during the month and these cuttings are collectively chemically analyzed for lead. The lo-vol sampler is similar to the hi-vol sampler, except that it operates continuously, at a reduced flow rate, for an entire month. Because this results in a one month integrated sample, compositing is not required.

DISCUSSION OF DATA

Monitoring Network - In 1987, both hi-vol and lo-vol samplers were operated in Connecticut to monitor lead levels (see Figure 15). There were 14 hi-vol sites and 6 lo-vol sites operated throughout the State (see Table 35) as part of the State and Local Air Monitoring Stations (SLAMS) network. The DEP operated the six lo-vol monitors in areas with populations of 200,000 or more. They are Bridgeport 010, Hartford 015 and 016, New Haven 018, Stamford 022, and West Haven 003. These "micro-scale" lead sites are situated near some of the busiest city streets and highways in order to monitor "worst-case" lead concentrations. EPA approval for these lo-vol monitors was granted in February, 1984.

Precision and Accuracy - The hi-vol lead monitors had a total of 39 precision checks in 1987. The resulting 95% probability limits were too low to calculate. Accuracy for lead in 1987 was assessed by auditing the air flow through the monitors. There were 18 audits for accuracy conducted on the monitoring network in 1987. The 95% probability limits ranged from -6% to +6%.

NAAQS - Connecticut's ambient air quality standard for lead and its compounds, measured as elemental lead, is: 1.5 micrograms per cubic meter ($\mu g/m^3$), maximum arithmetic mean averaged over three consecutive calendar months. This standard was enacted on November 2, 1981. Previously, Connecticut's lead standard was substantially identical to the national standard: 1.5 $\mu g/m^3$ for a calendar quarter-year average. The change to a 3-month running average means that a more stringent standard now applies, since there are three times as many data blocks within a calendar year which must be below the limiting concentration of 1.5 $\mu g/m^3$.

3-Month Running Averages - Three-month running average lead concentrations for 1987 are given in Table 27. These values are also presented in graphical form in Figure 16 for the period 1985-87.

Trends - As was mentioned above, airborne concentrations of lead have been trending steadily downward. This was demonstrated on a statewide level in Figure A. The trend in lead levels can also be shown on a regional or a site-specific basis. Figure C shows the trend in annual average lead concentrations at each of six monitoring sites that have been in existence long enough to be able to demonstrate a long term trend. Figure D shows the trends in the 3-year running average lead concentrations at the same six sites. A downward trend in lead levels is apparent at all the sites. This decrease in lead levels is commensurate with the decrease in lead emissions from gasoline combustion.

FIGURE A

STATEWIDE ANNUAL LEAD EMISSIONS FROM GASOLINE

AND

STATEWIDE ANNUAL AVERAGE LEAD CONCENTRATIONS

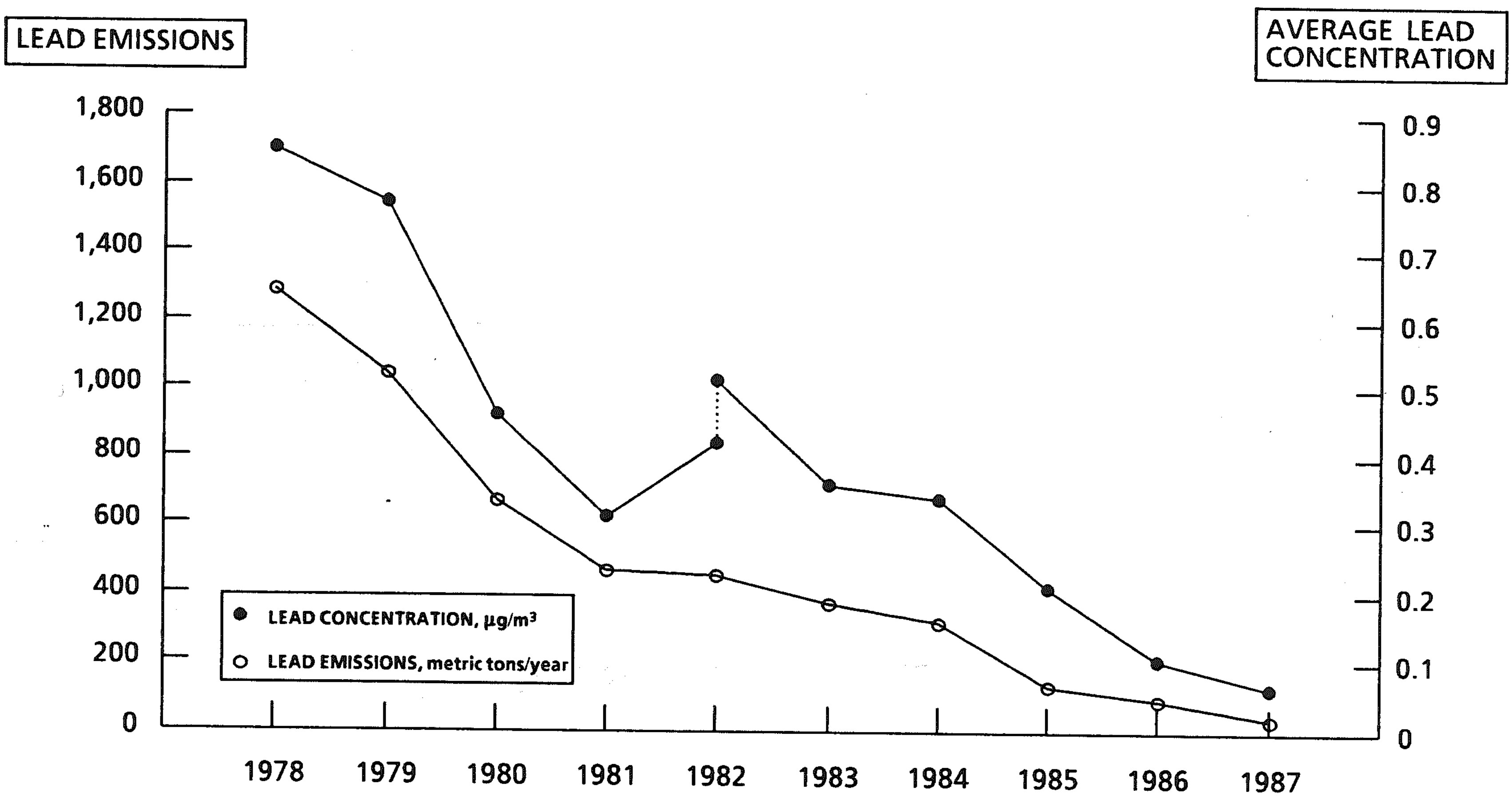
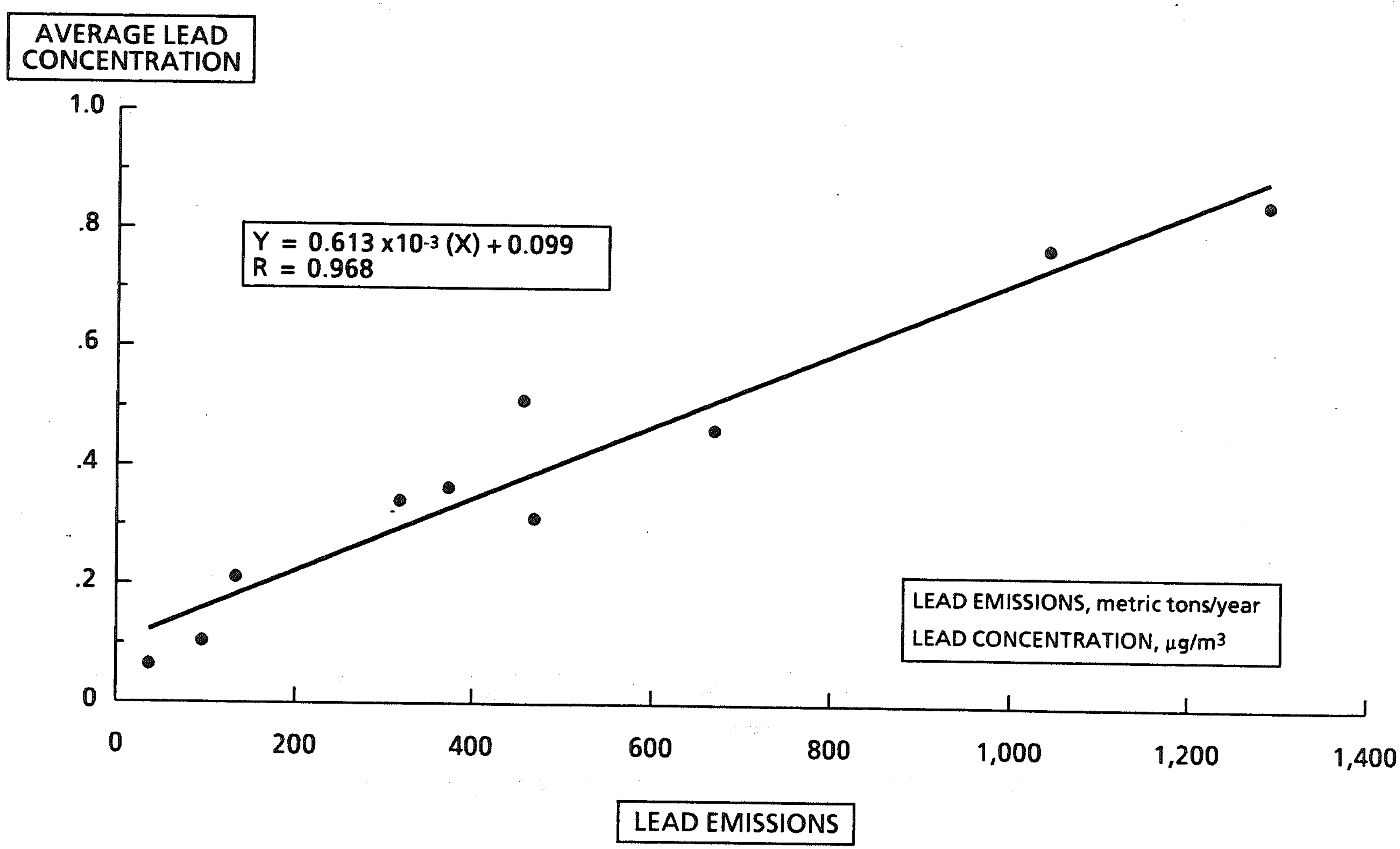


FIGURE B

STATEWIDE ANNUAL AVERAGE LEAD CONCENTRATIONS

VS.

STATEWIDE ANNUAL LEAD EMISSIONS FROM GASOLINE



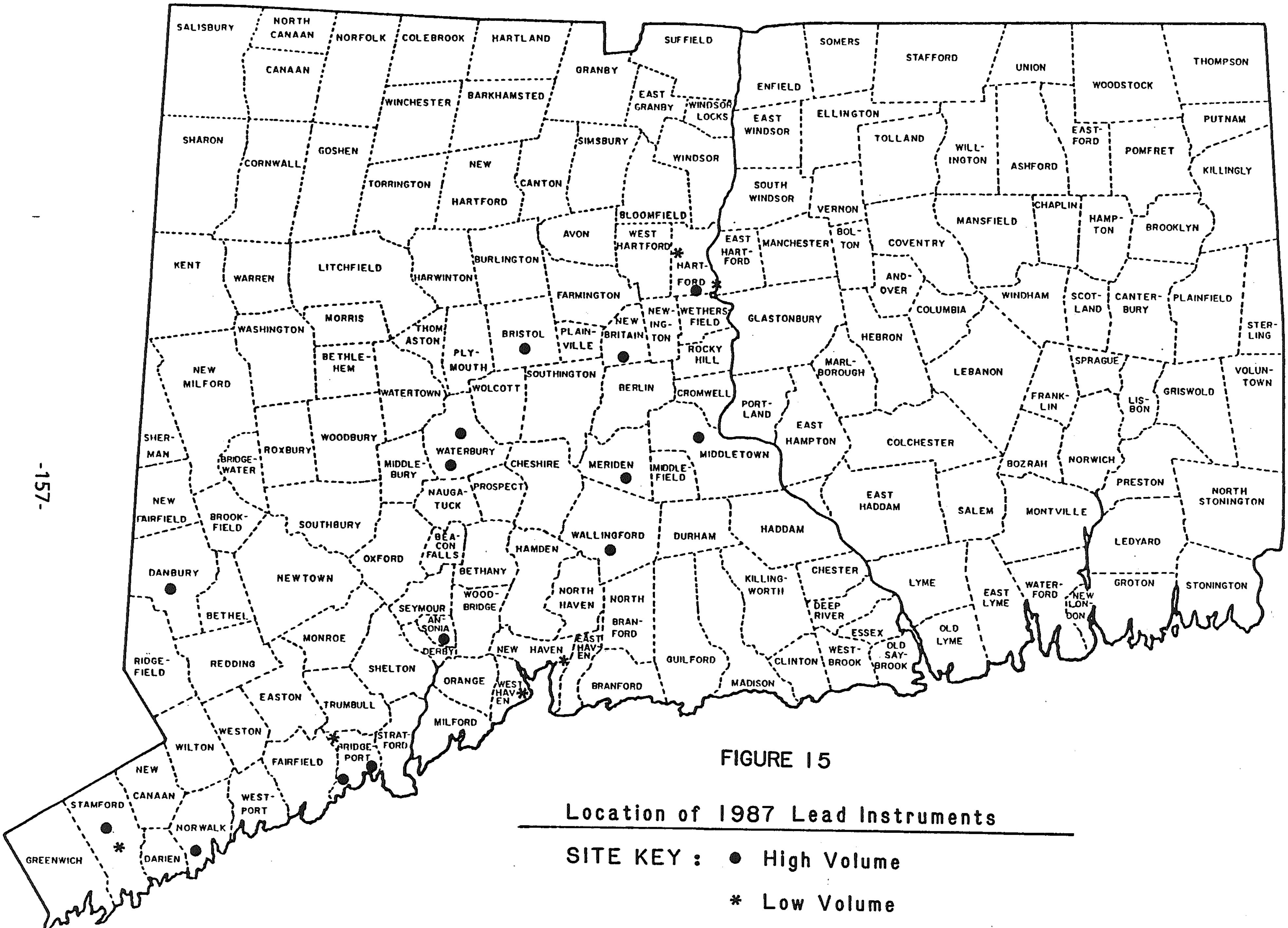


FIGURE 15

Location of 1987 Lead Instruments

SITE KEY : ● High Volume

* Low Volume

TABLE 27

1987 3-MONTH RUNNING AVERAGE LEAD CONCENTRATIONS

TOWN-SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Ansonia-004	0.11	0.10	0.06	0.04	0.03	0.04	0.03	0.04	0.04	0.05	0.05	0.05
Bridgeport-009	0.06	0.05	0.05	0.05	0.04	0.05	-----	-----	-----	-----	-----	-----
Bridgeport-010	0.09	0.08	0.08	-----	-----	-----	0.08	-----	-----	-----	0.05	0.06
Bridgeport-123	0.12	0.10	0.08	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.06
Bristol-001	0.09	0.08	0.06	0.04	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03
Danbury-002	-----	0.05	0.05	0.11	0.11	0.10	0.07	0.06	0.06	0.03	0.03	0.04
Hartford-014	0.11	0.09	0.08	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Hartford-015	-----	-----	0.11	0.11	0.10	0.08	0.08	0.08	0.08	0.07	0.07	0.08
Hartford-016	0.12	0.10	0.10	0.11	0.11	0.10	0.10	0.09	0.08	0.09	0.09	0.10
Meriden-002	0.13	0.11	0.08	0.07	0.06	0.06	0.05	0.07	0.05	0.05	0.04	0.04
Middletown-003	0.10	0.08	0.07	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.04
New Britain-007	0.08	0.07	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
New Haven-018	0.17	0.17	0.20	0.21	0.20	0.18	0.17	0.15	0.14	0.14	0.13	0.13
Norwalk-012	-----	0.06	0.05	0.05	0.04	0.05	0.05	0.05	0.04	0.05	0.04	0.04
Stamford-001	0.08	0.07	0.05	0.04	0.05	0.06	0.07	0.06	0.05	0.05	0.04	0.04
Stamford-022	0.07	0.05	0.05	0.07	0.10	0.11	-----	-----	-----	0.06	0.06	0.06
Wallingford-001	0.10	0.09	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.04
Waterbury-007	0.17	0.14	0.10	0.07	0.06	0.07	0.07	0.07	0.09	0.09	0.09	0.08
Waterbury-123	0.19	0.18	0.14	0.10	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.07
West Haven-003	0.08	0.10	0.09	0.08	0.06	0.06	0.06	0.06	0.05	0.05	0.06	0.06

N.B. The lead concentrations are in terms of micrograms per cubic meter ($\mu g/m^3$).

FIGURE 16

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=ANSONIA 004

BAR CHART OF AVG

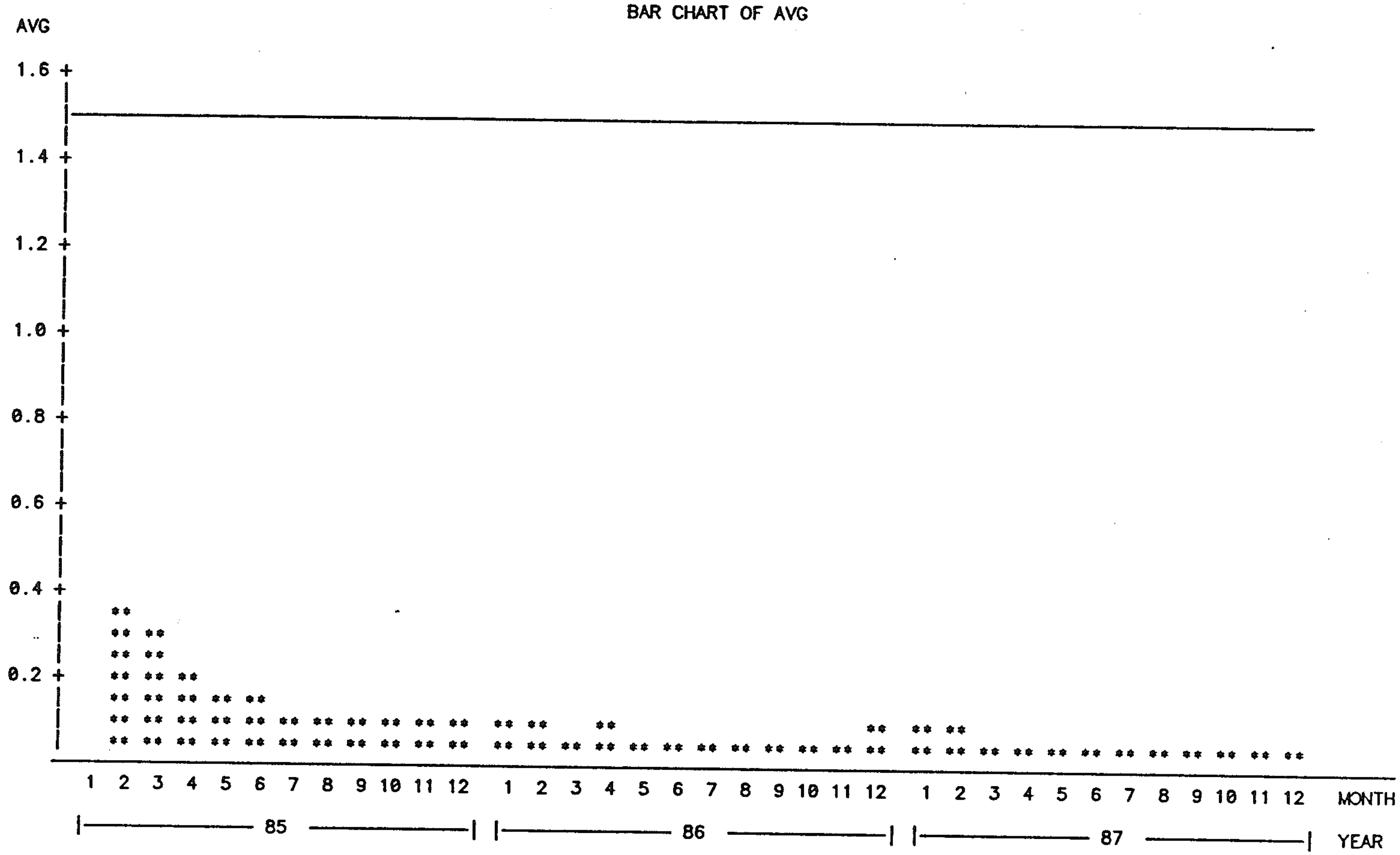


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=BRIDGEPORT 009

BAR CHART OF AVG

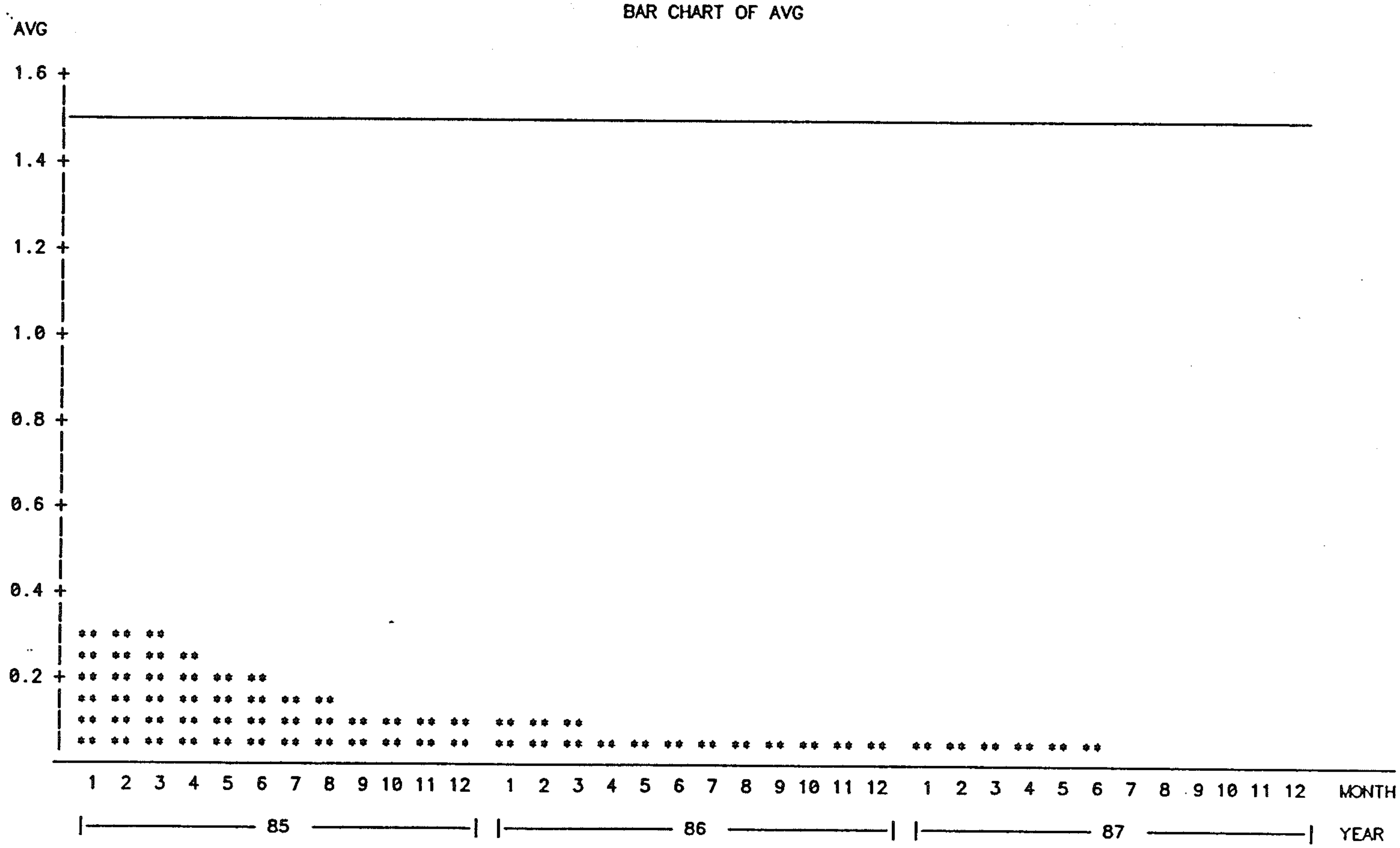


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=BRIDGEPORT 010

BAR CHART OF AVG

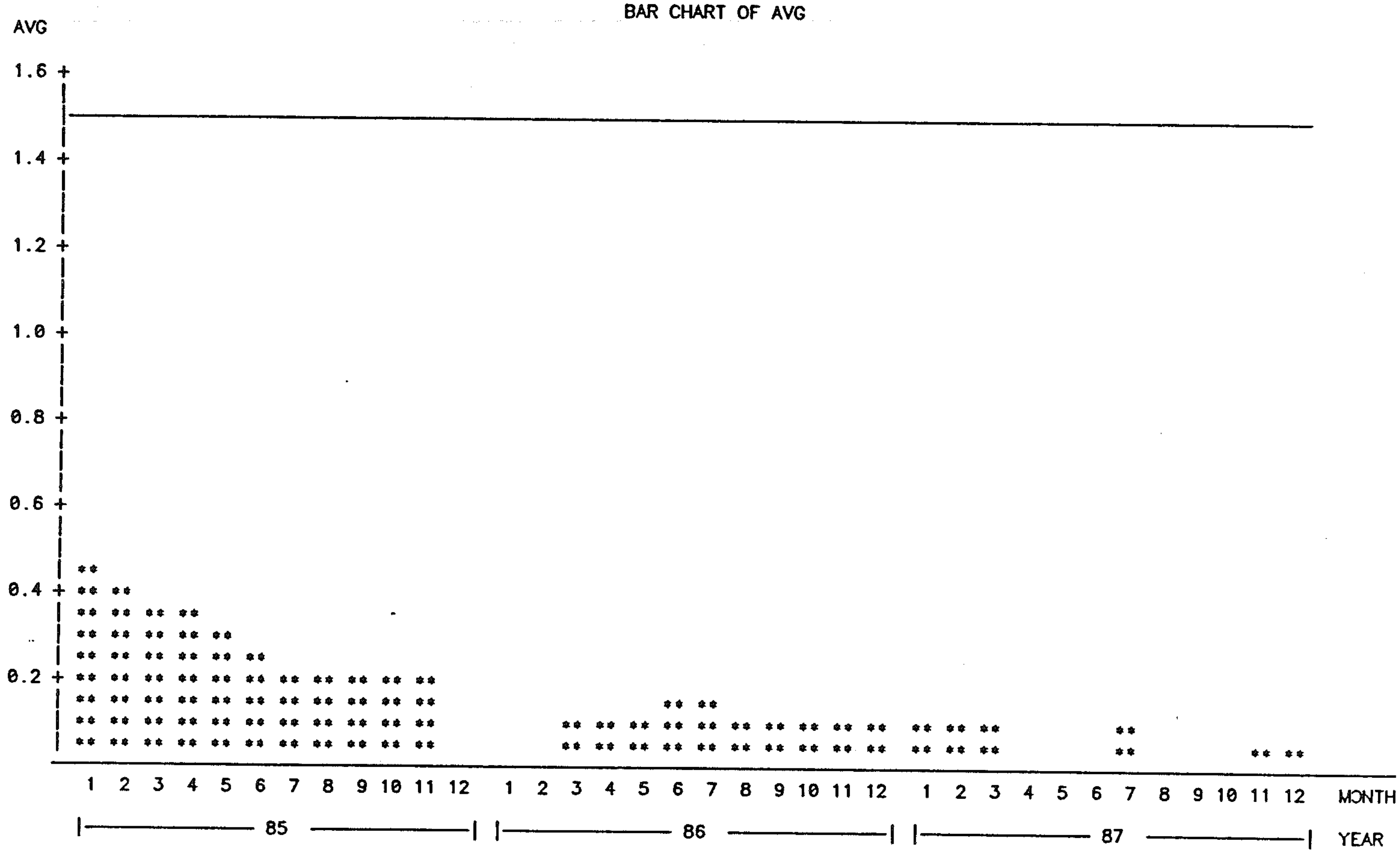


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=BRIDGEPORT 123

BAR CHART OF AVG

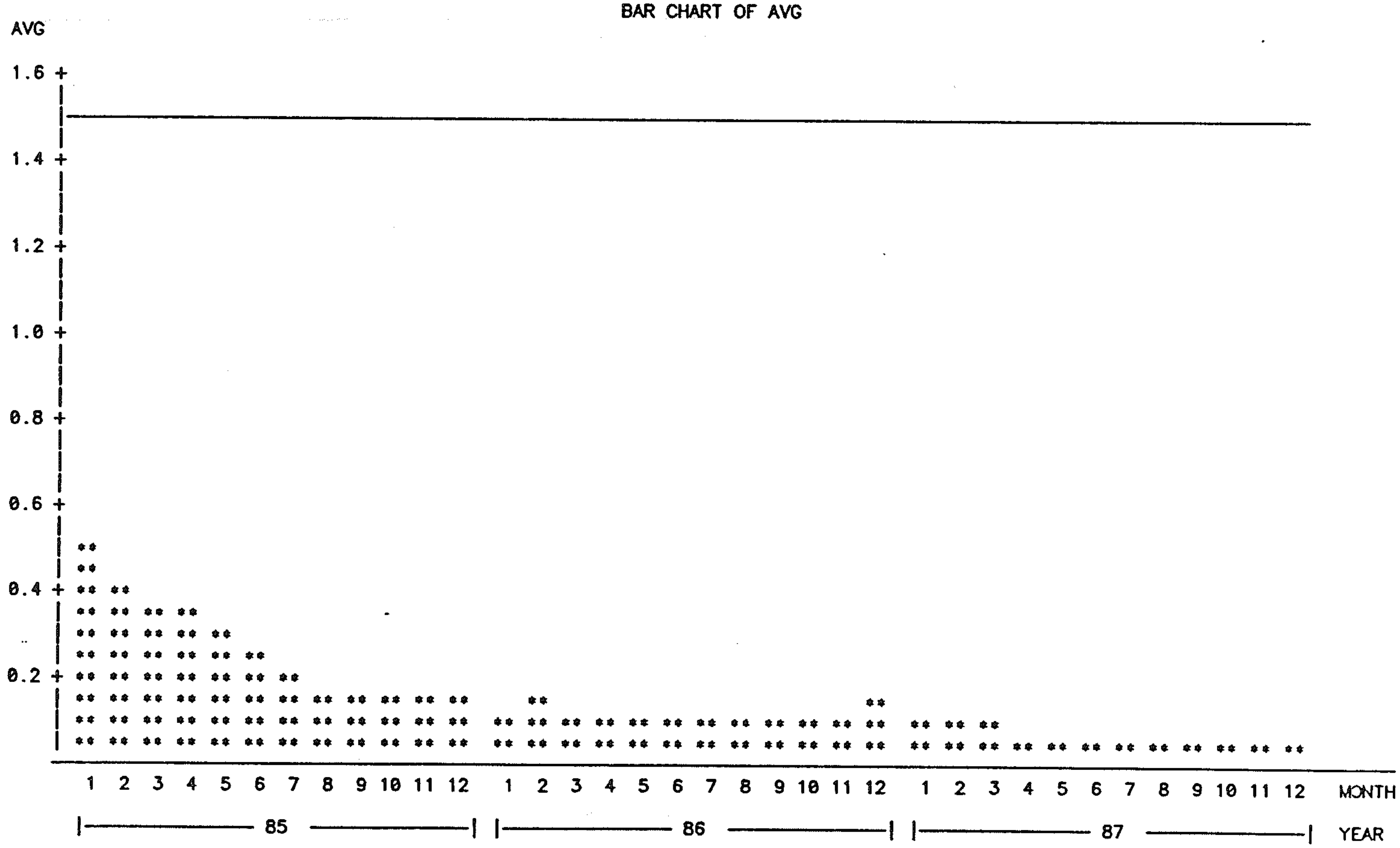


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=BRISTOL 001

BAR CHART OF AVG

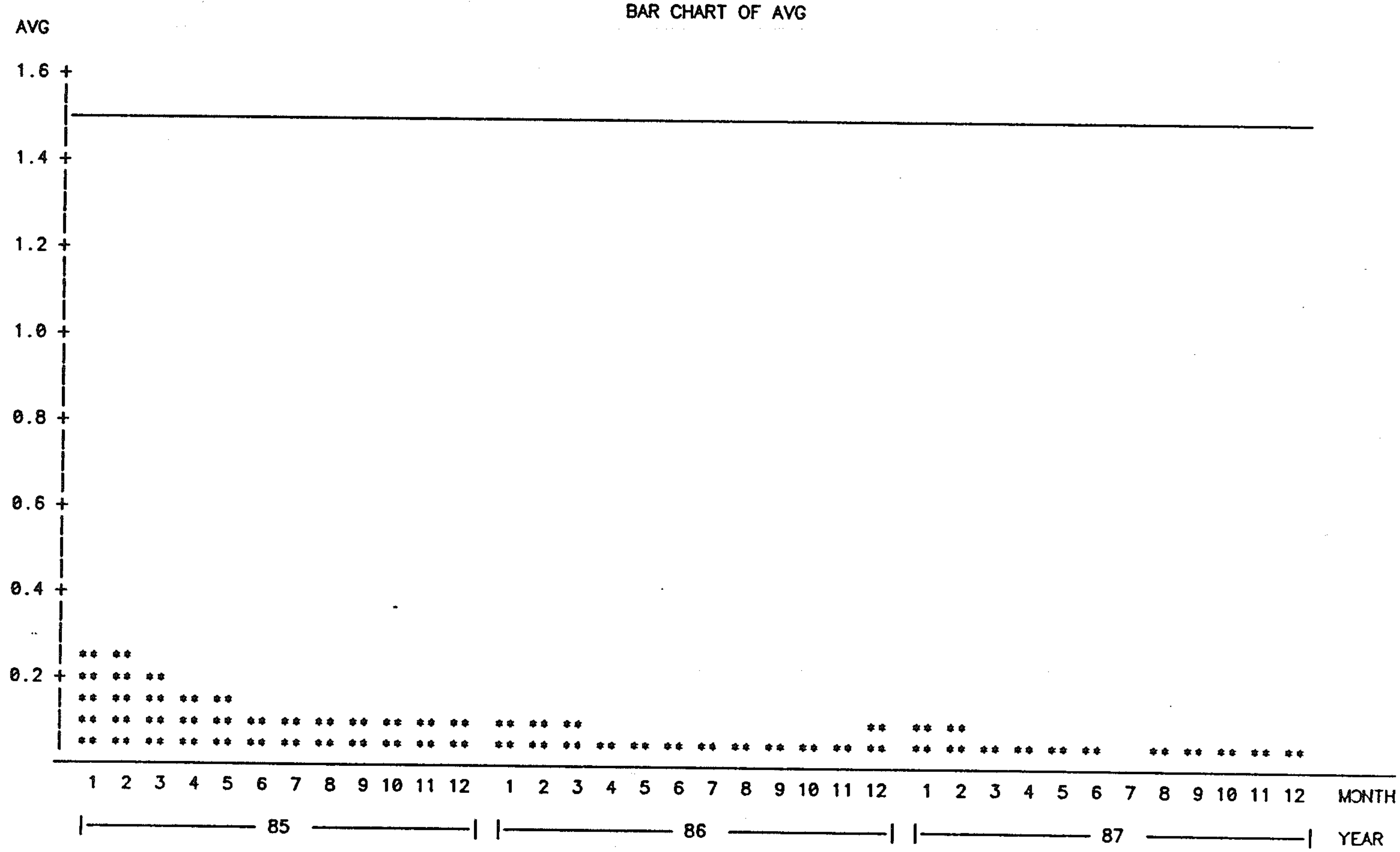


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=DANBURY 002

BAR CHART OF AVG

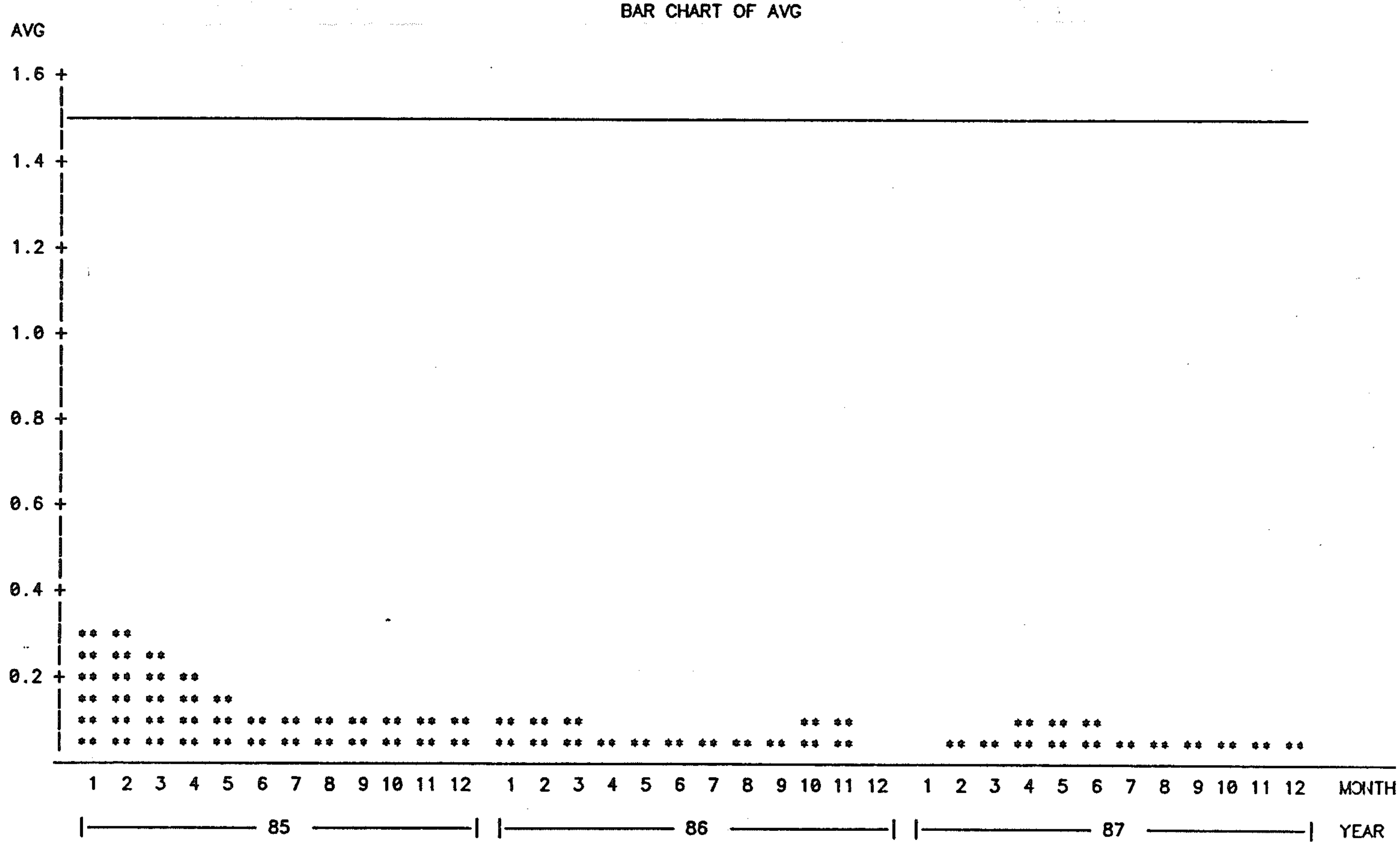


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=HARTFORD 014

BAR CHART OF AVG

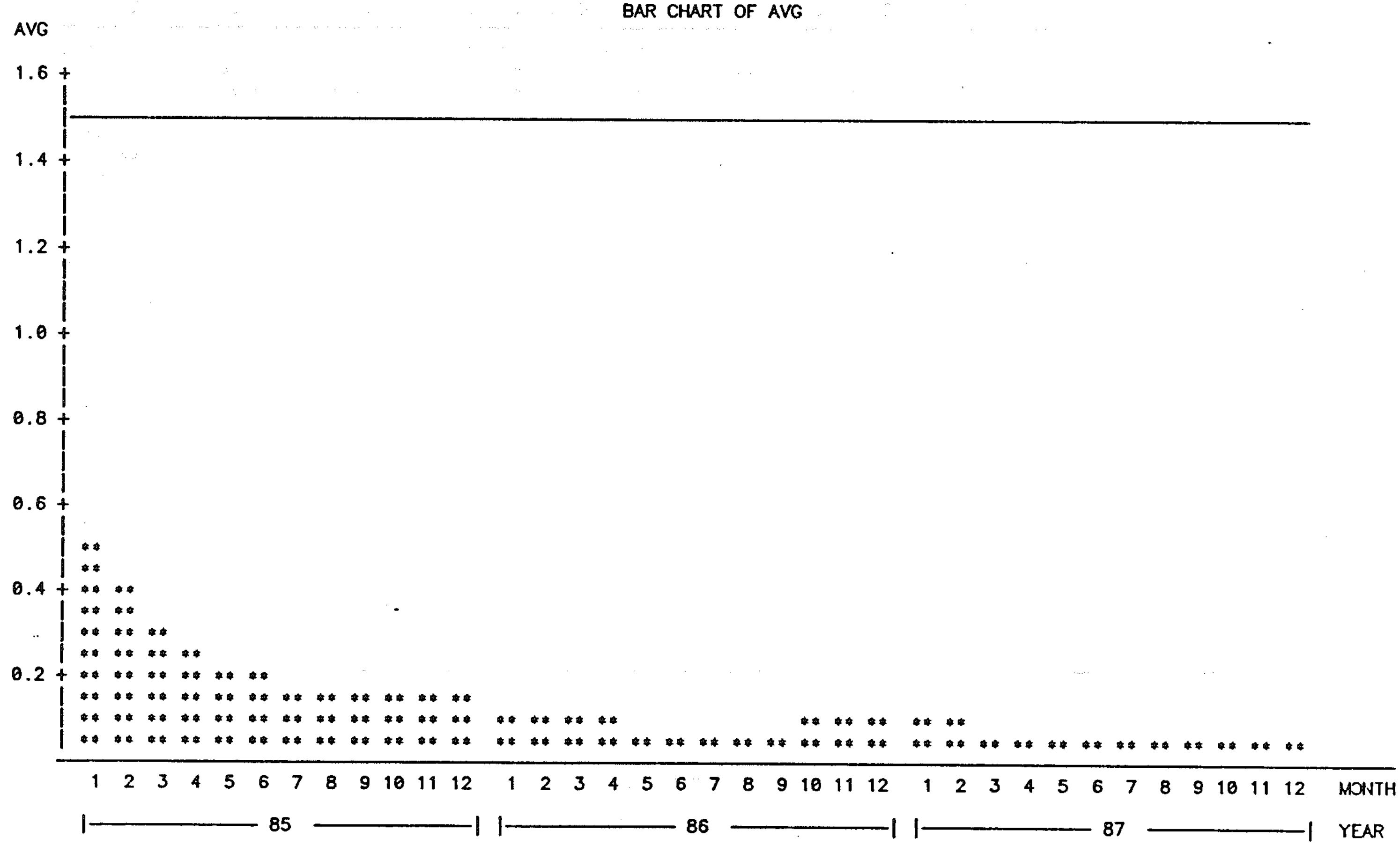


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=HARTFORD 015

BAR CHART OF AVG

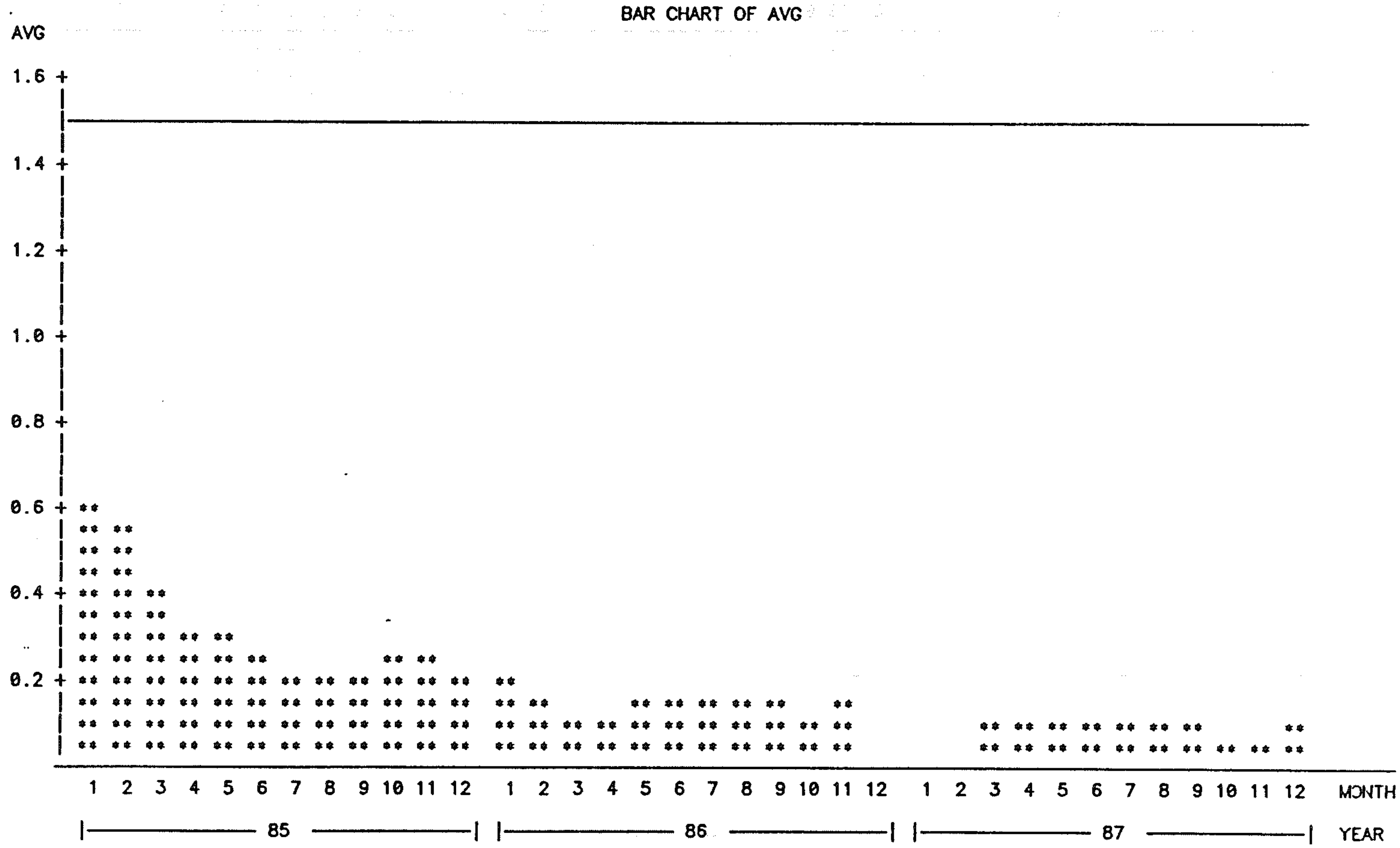


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=HARTFORD 016

BAR CHART OF AVG

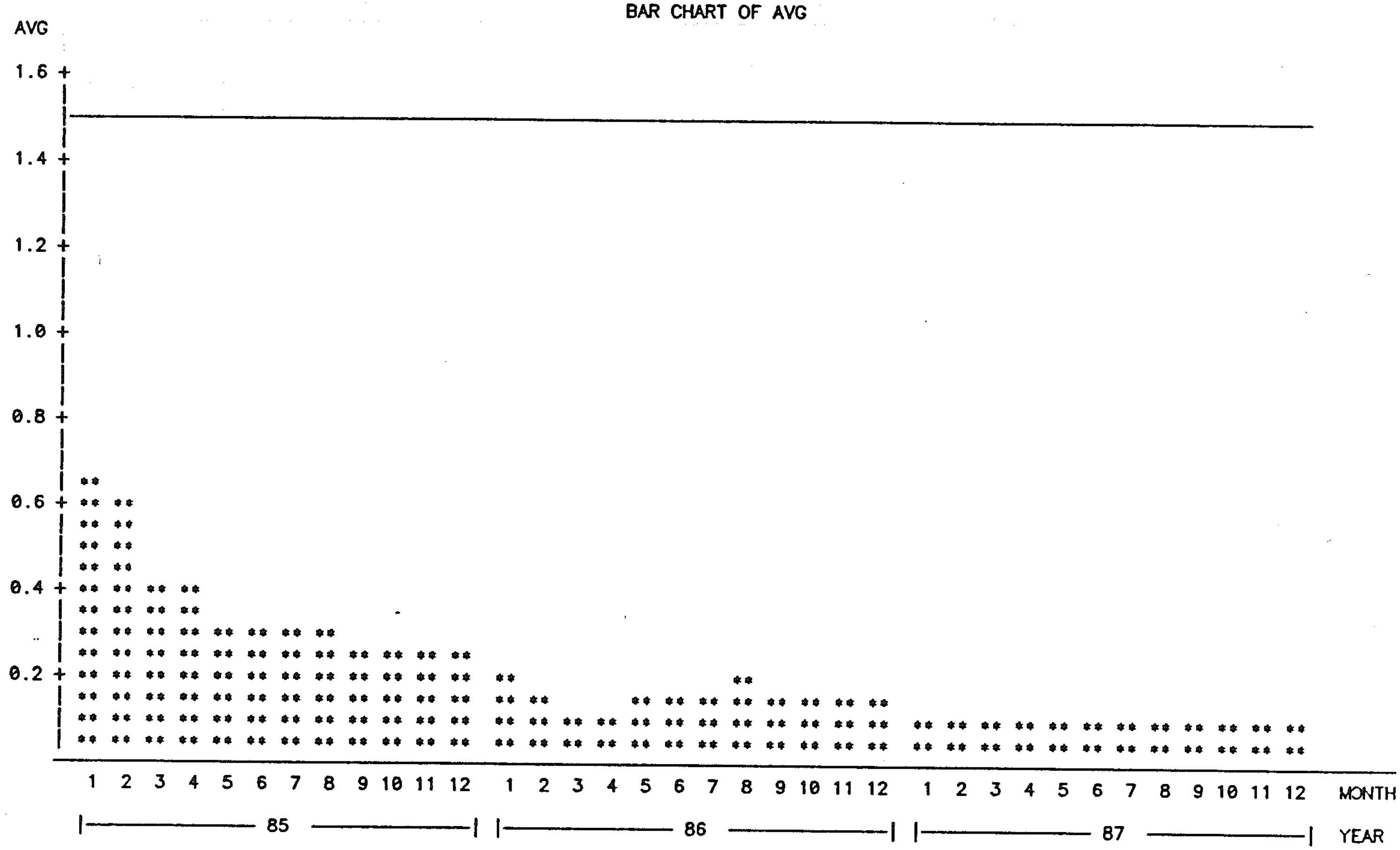


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=MERIDEN 002

BAR CHART OF AVG

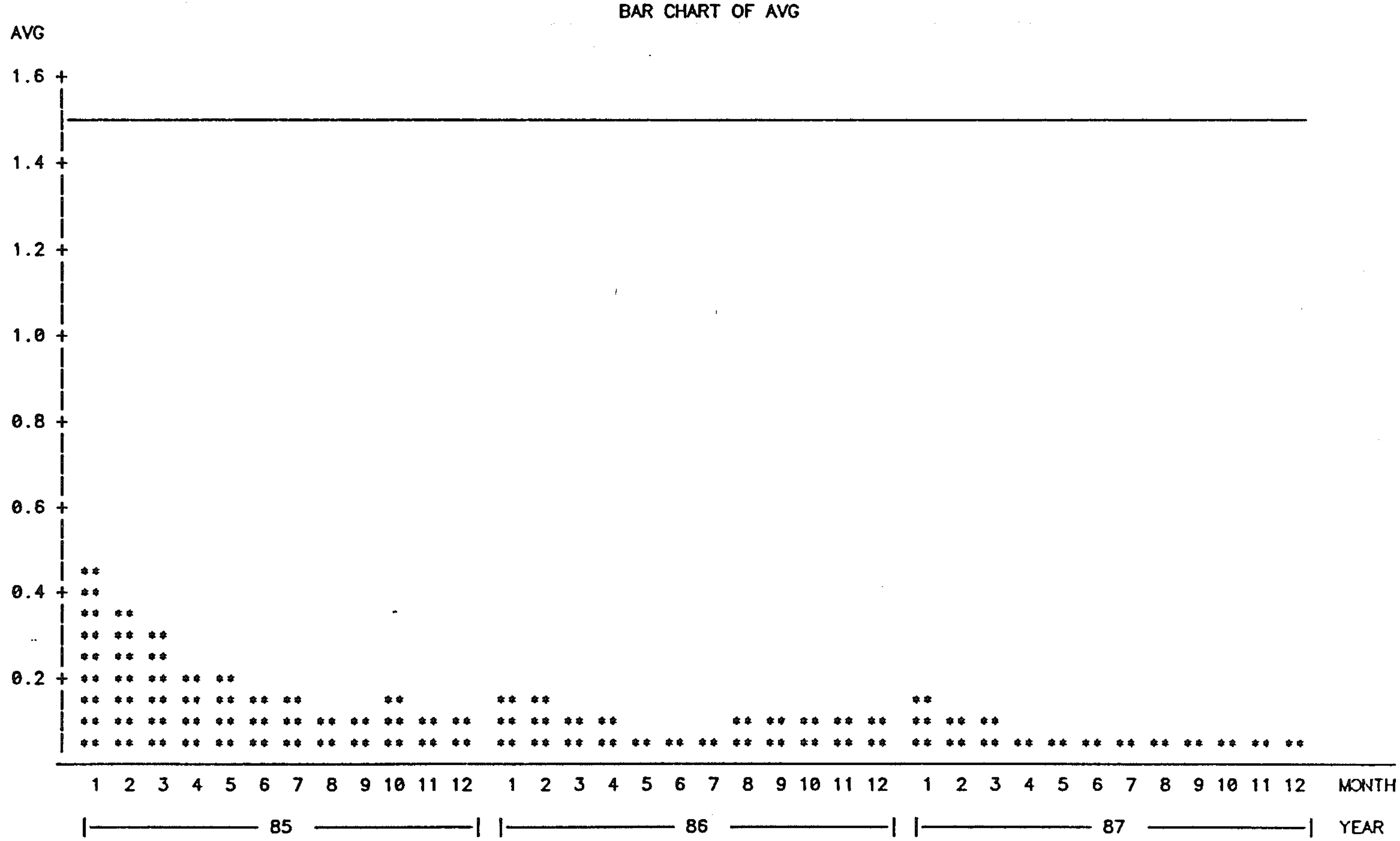


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=MIDDLETOWN 003

BAR CHART OF AVG

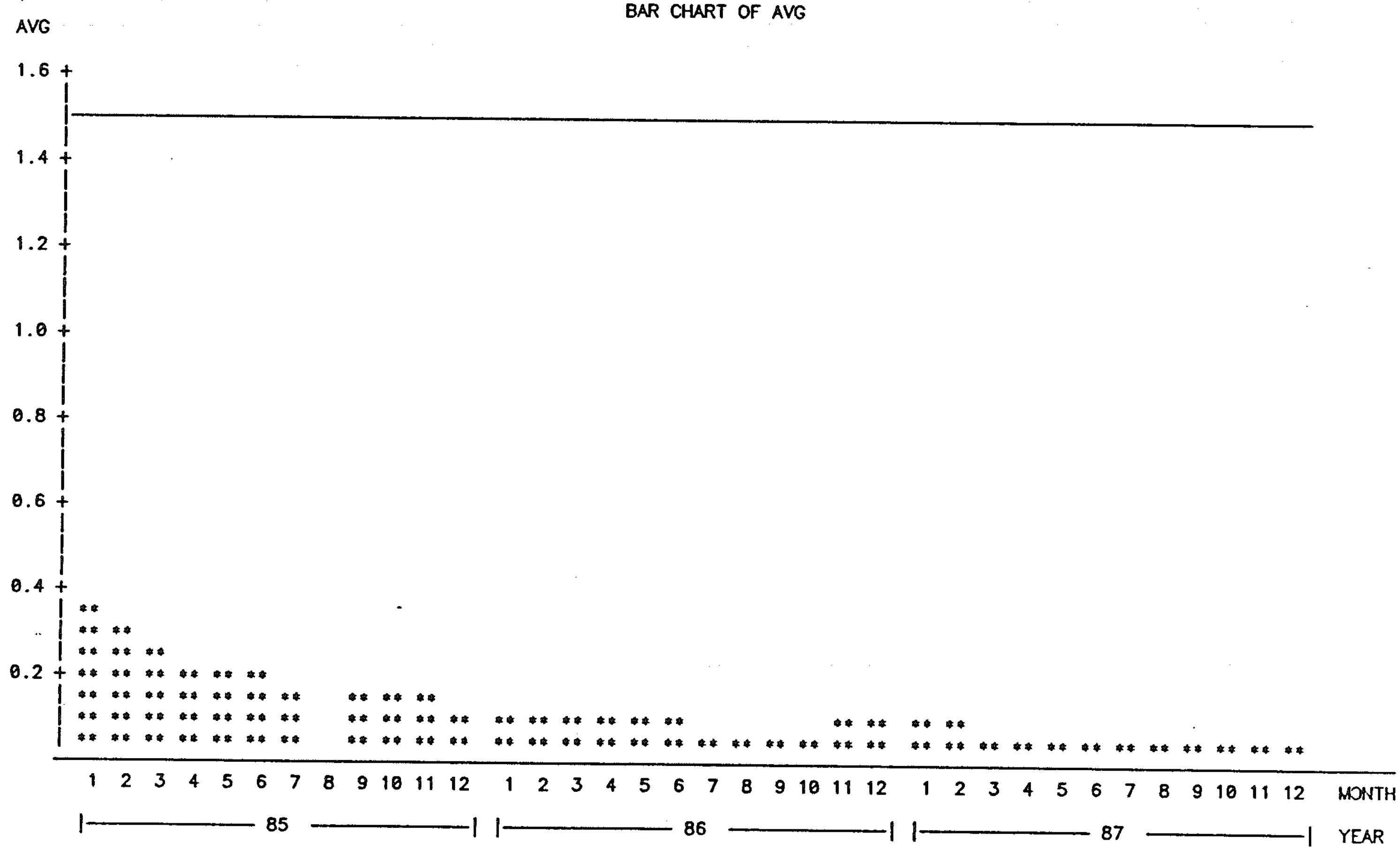


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=NEW BRITAIN 007

BAR CHART OF AVG

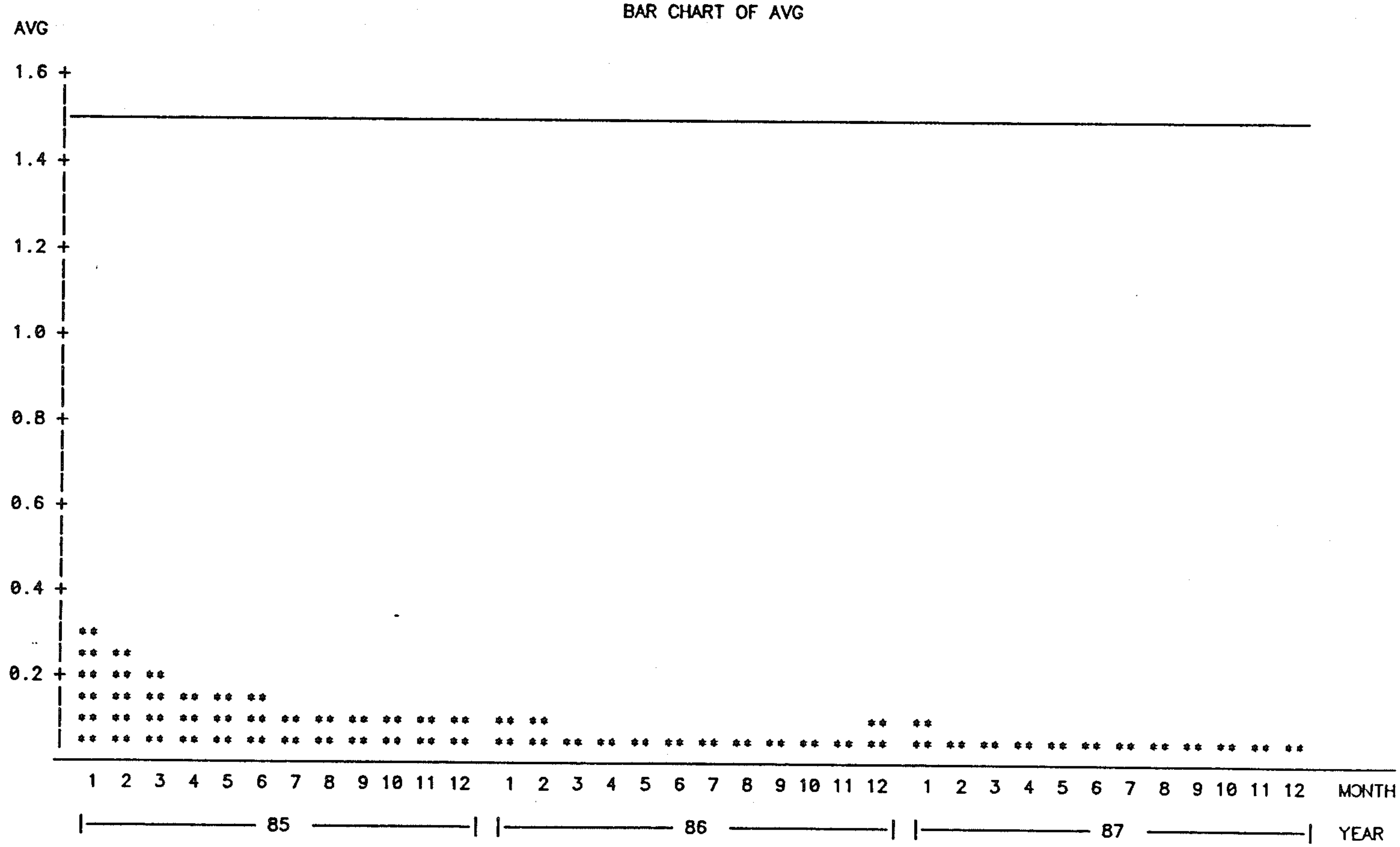


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=NEW HAVEN 018

BAR CHART OF AVG

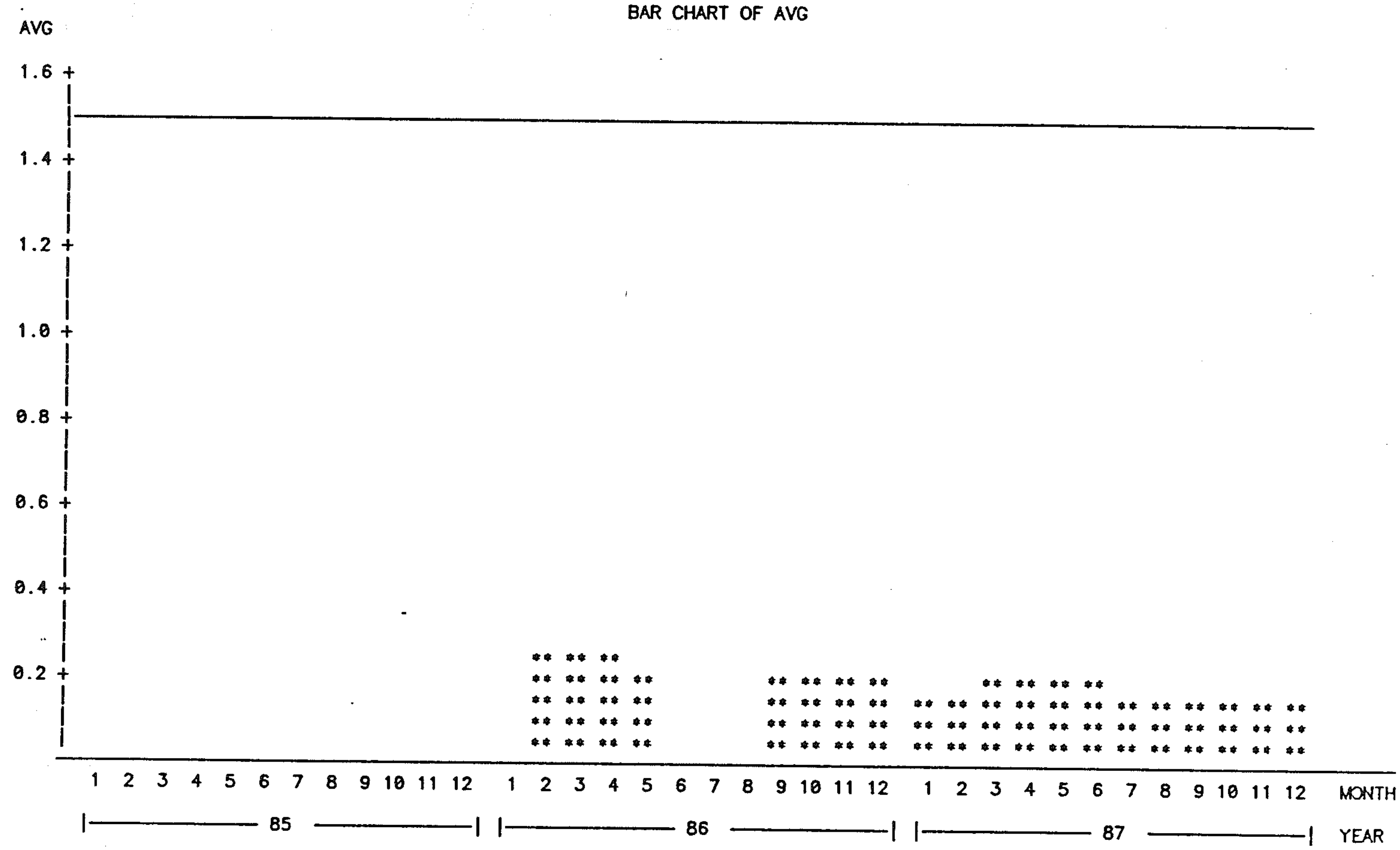


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=NORWALK 012

BAR CHART OF AVG

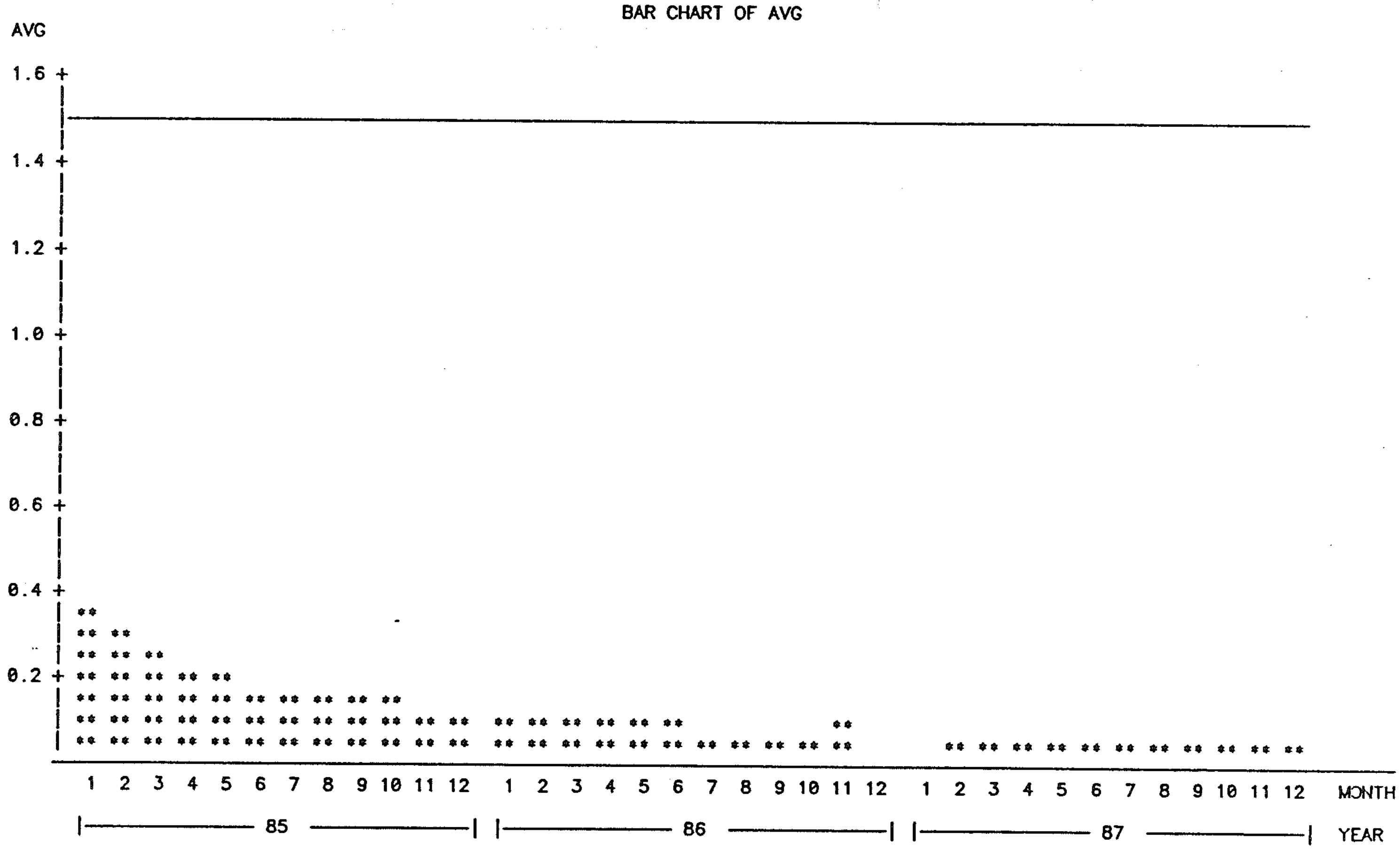


FIGURE 16. CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=STAMFORD 001

BAR CHART OF AVG

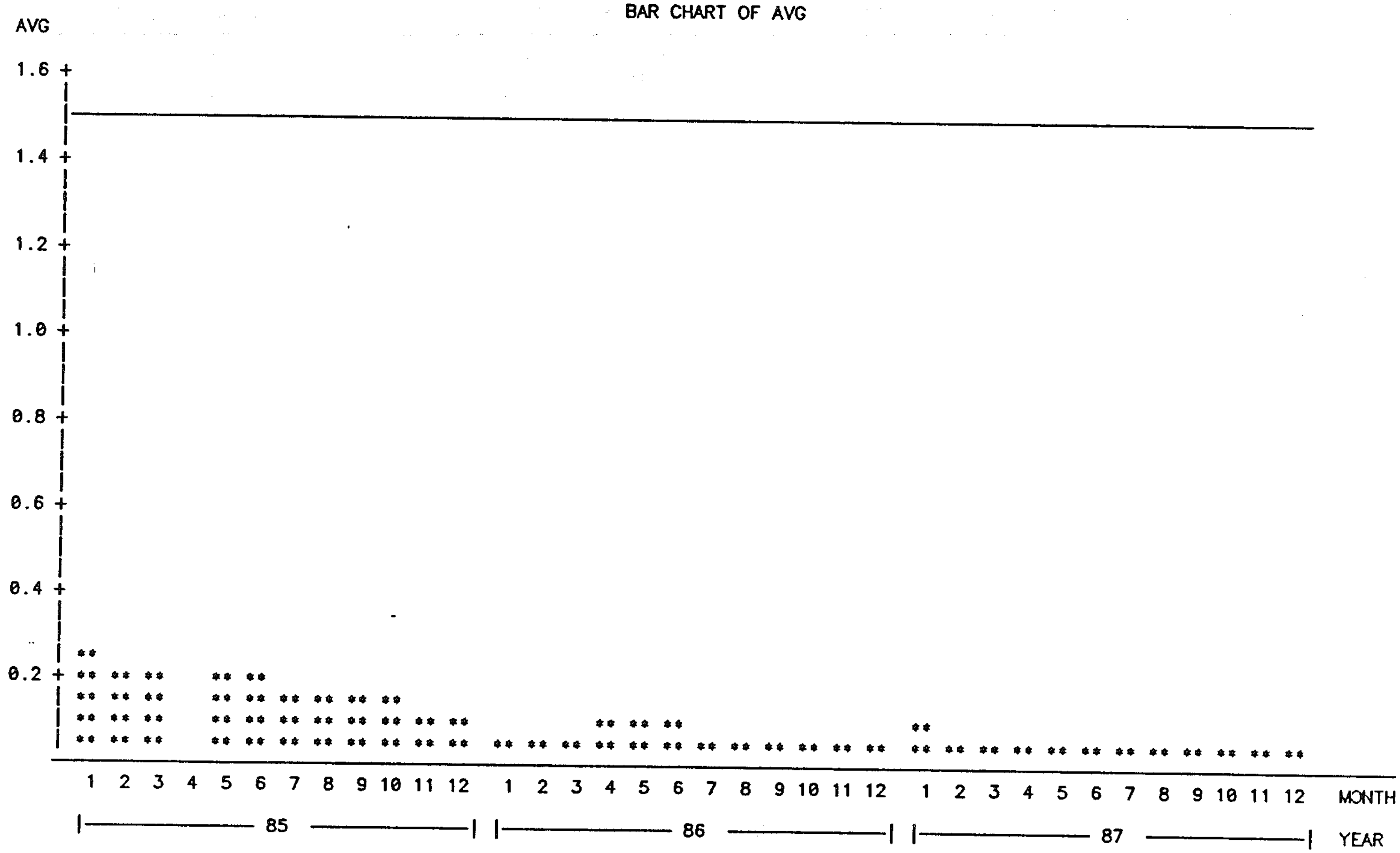


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=STAMFORD 022

BAR CHART OF AVG

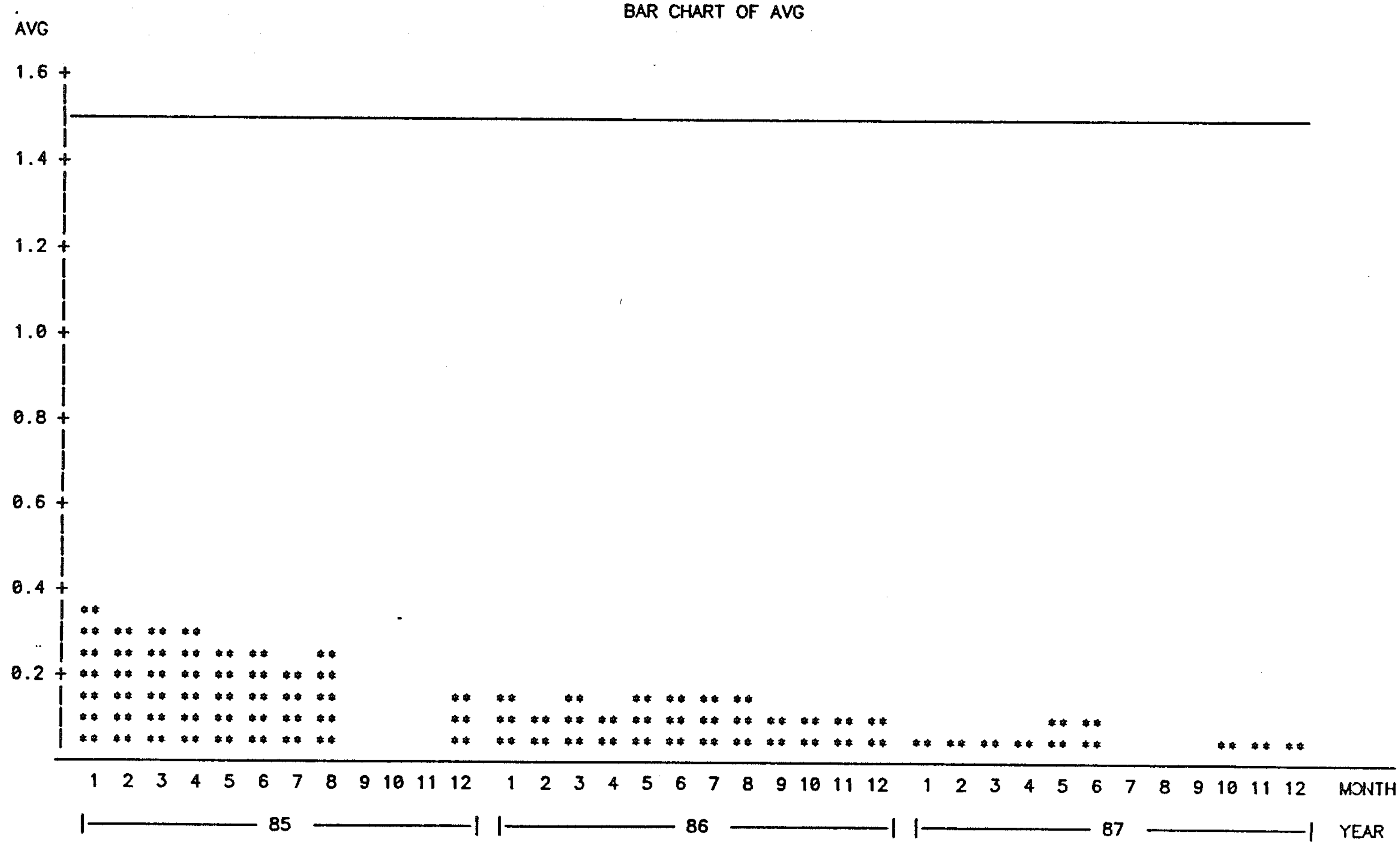


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=WALLINGFORD 001

BAR CHART OF AVG

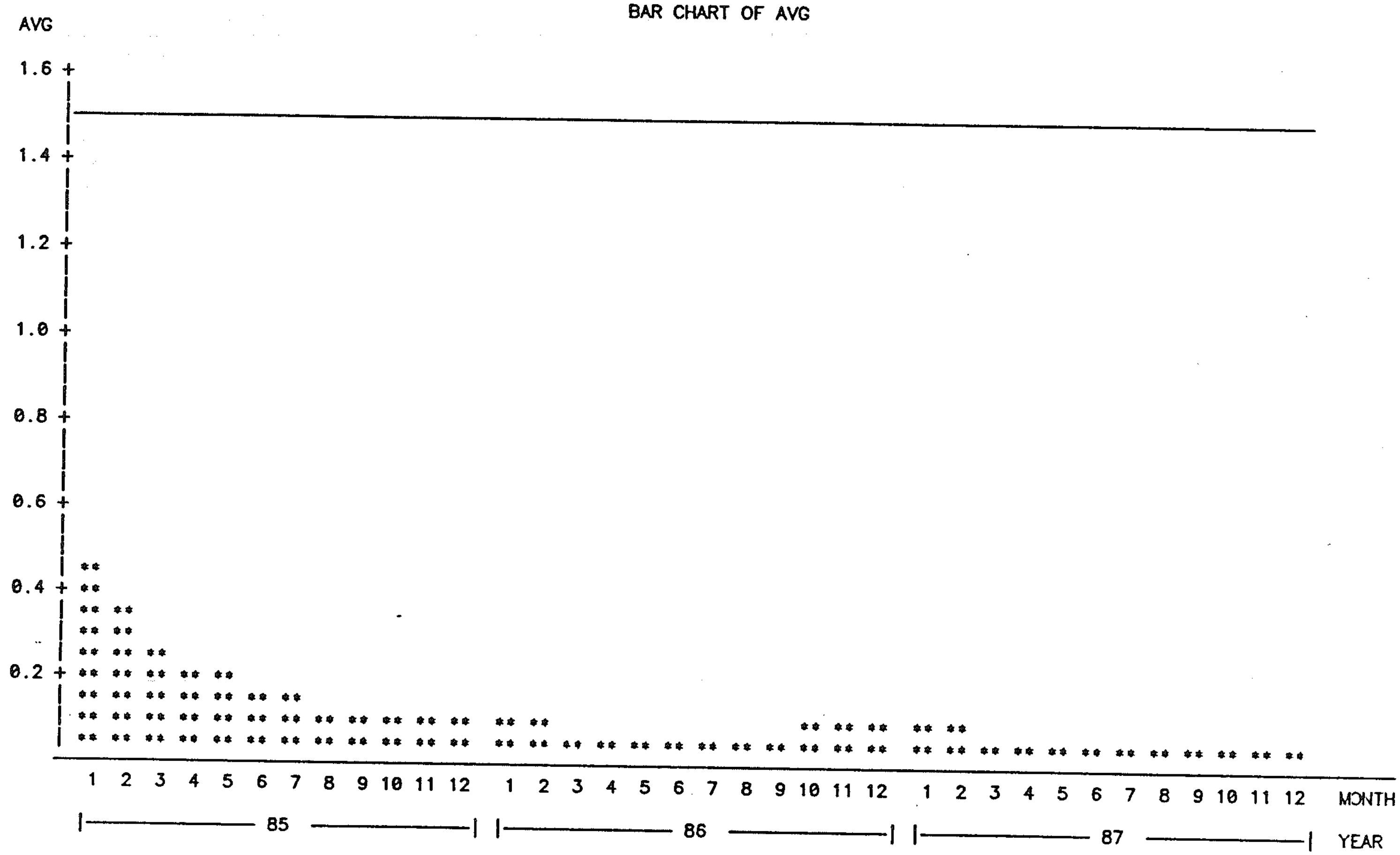


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=WATERBURY 007

BAR CHART OF AVG

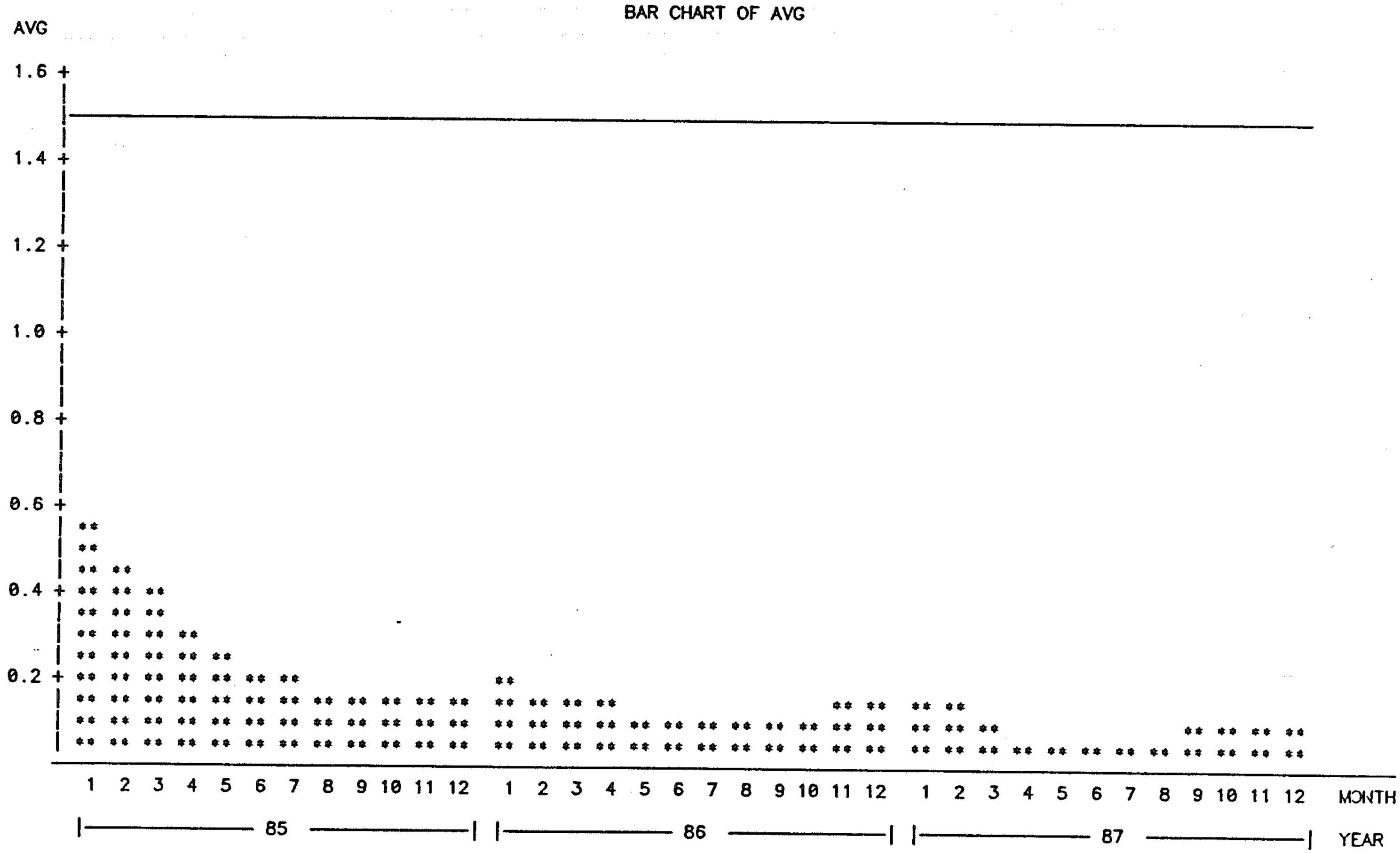


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=WATERBURY 123

BAR CHART OF AVG

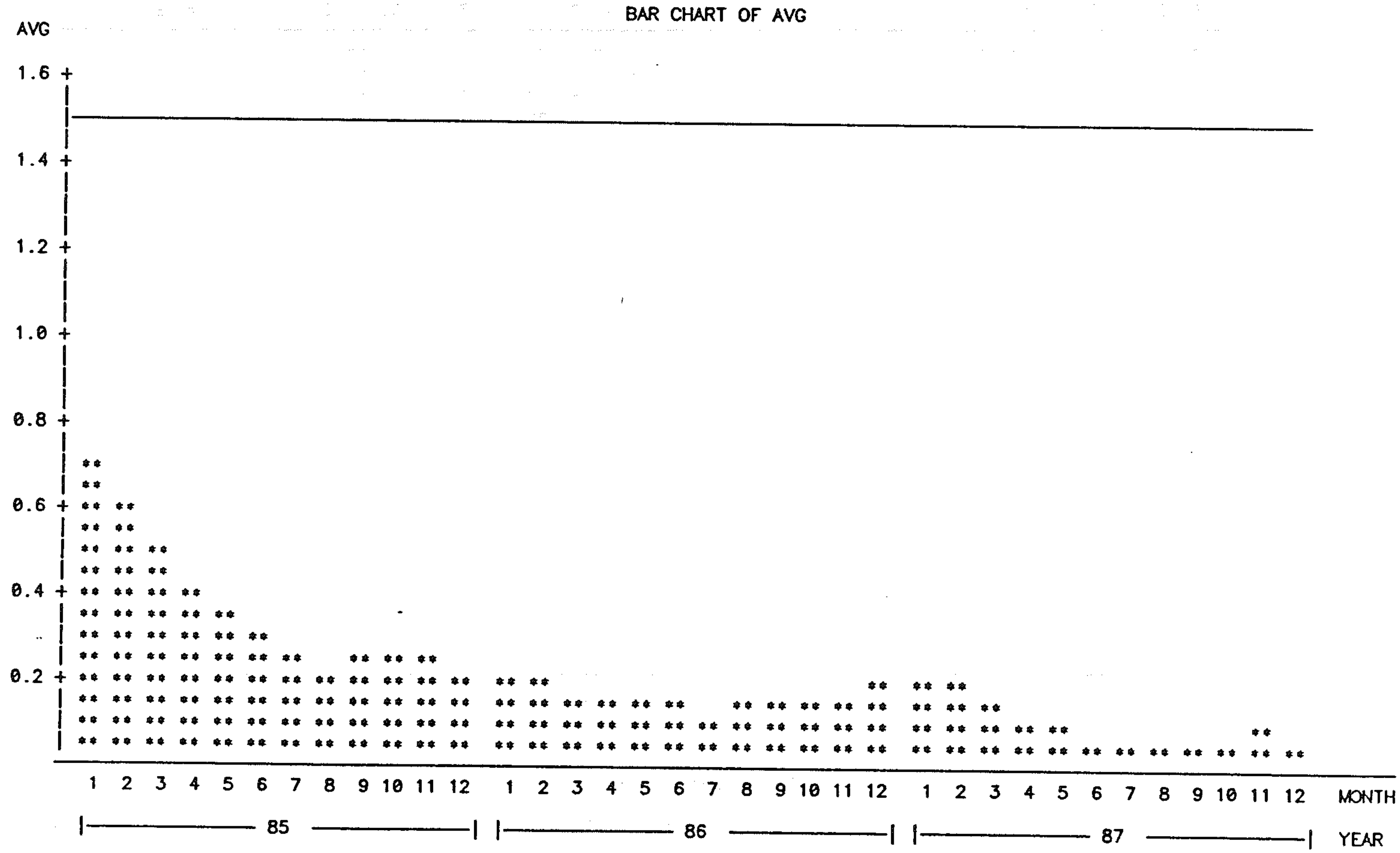


FIGURE 16, CONTINUED

3-MONTH RUNNING AVERAGES FOR LEAD

STATION=WEST HAVEN 003

BAR CHART OF AVG

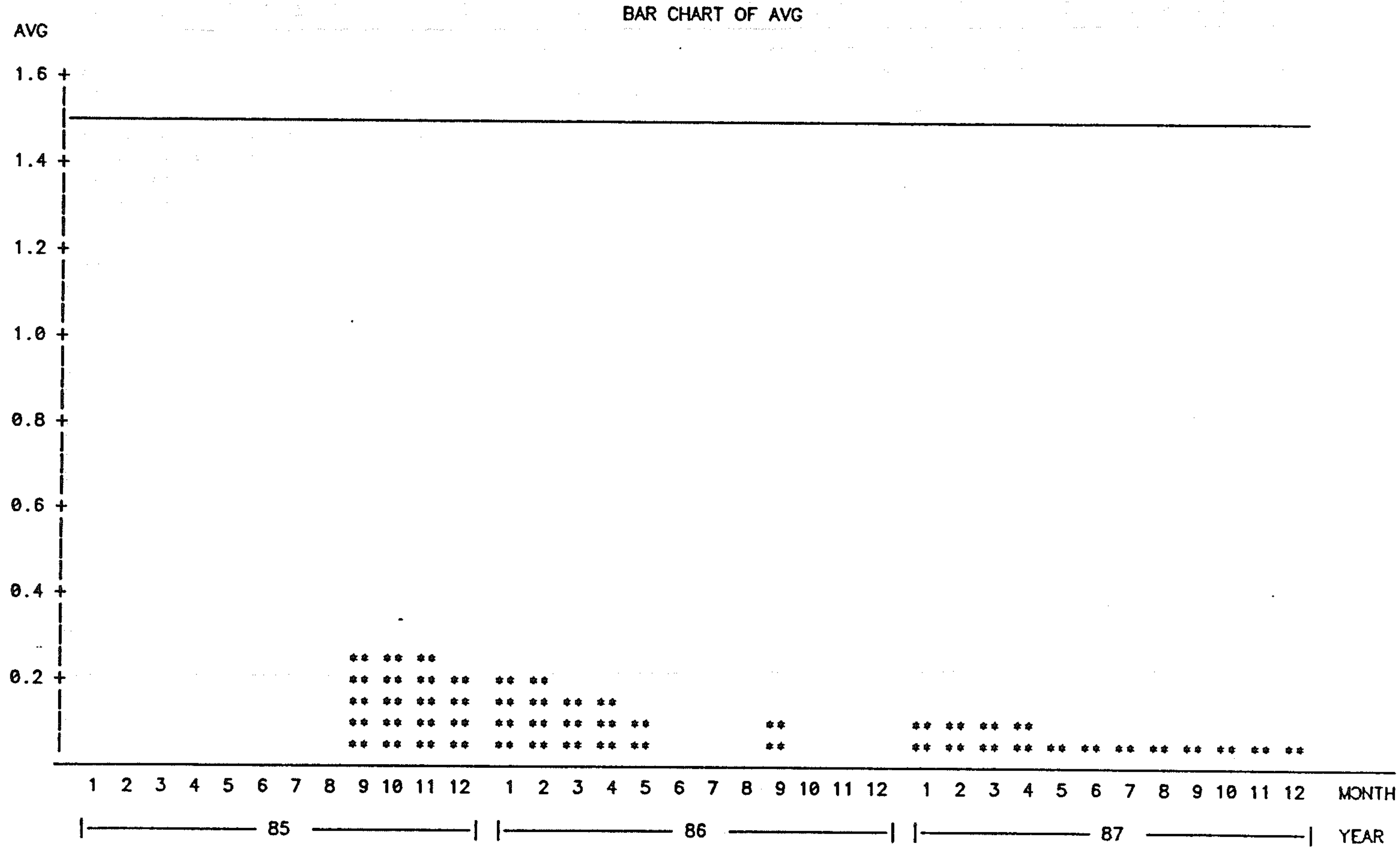


FIGURE C

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: BRIDGEPORT-123

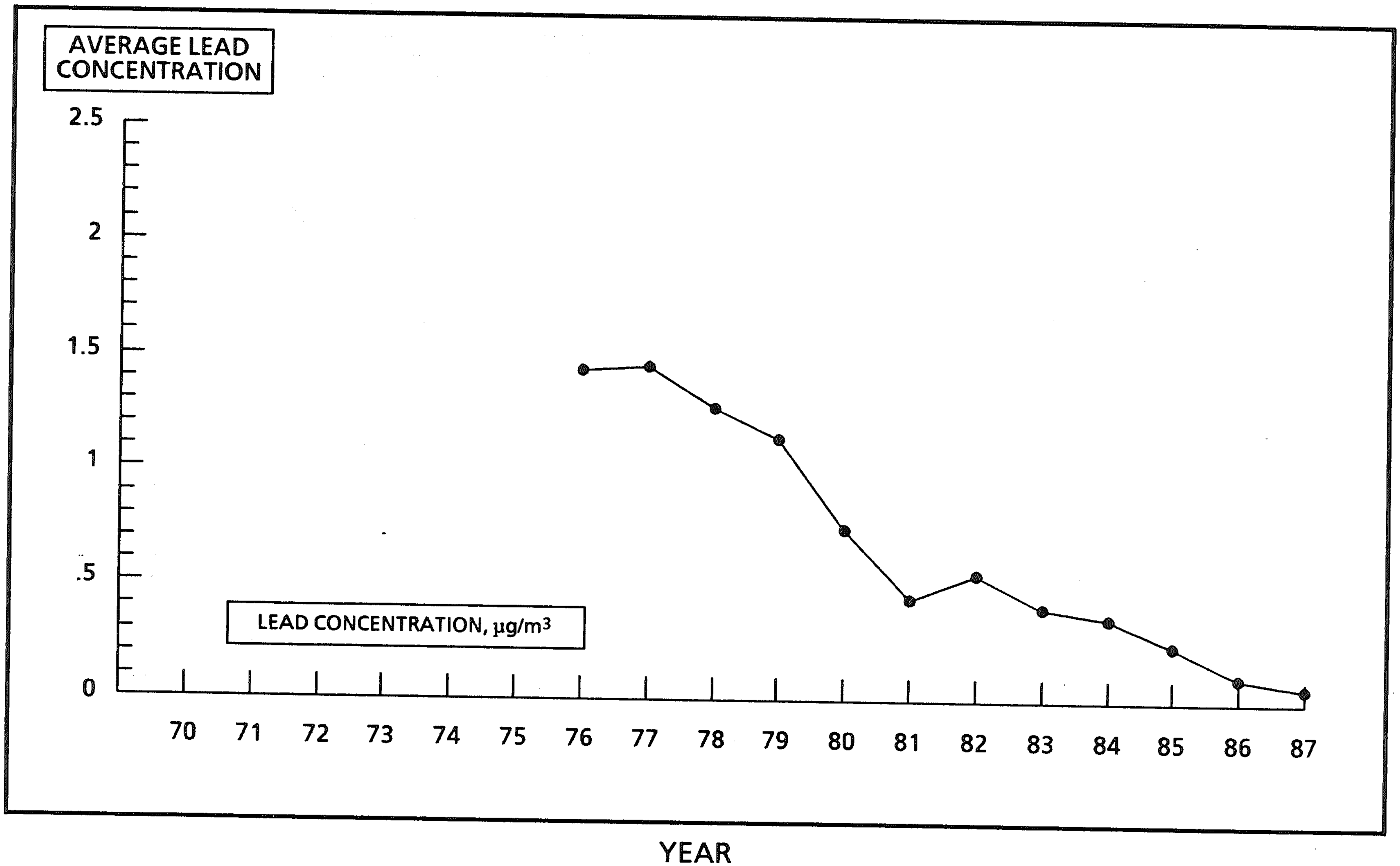


FIGURE C, CONTINUED

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: BRISTOL-001

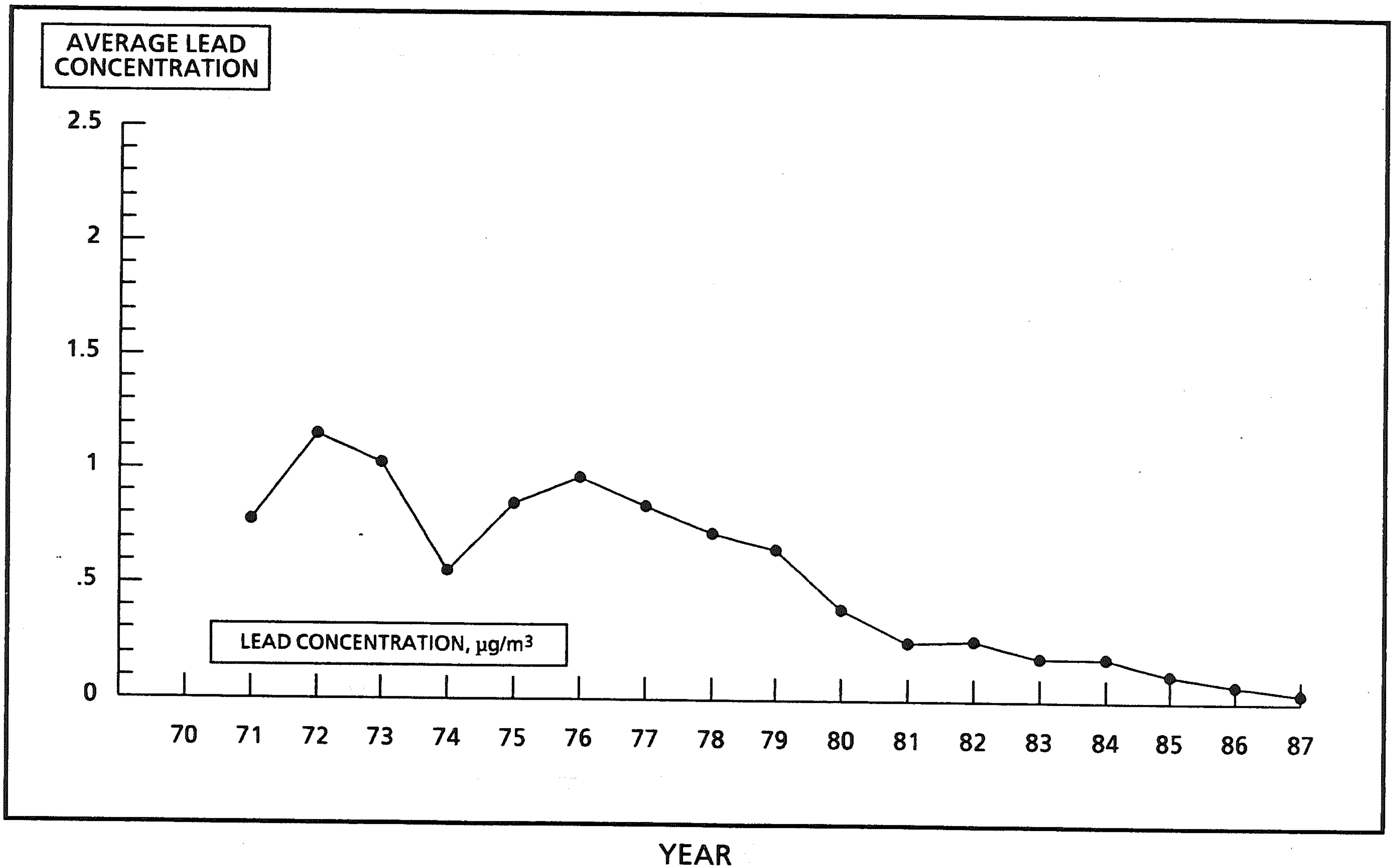


FIGURE C, CONTINUED

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: MERIDEN-002

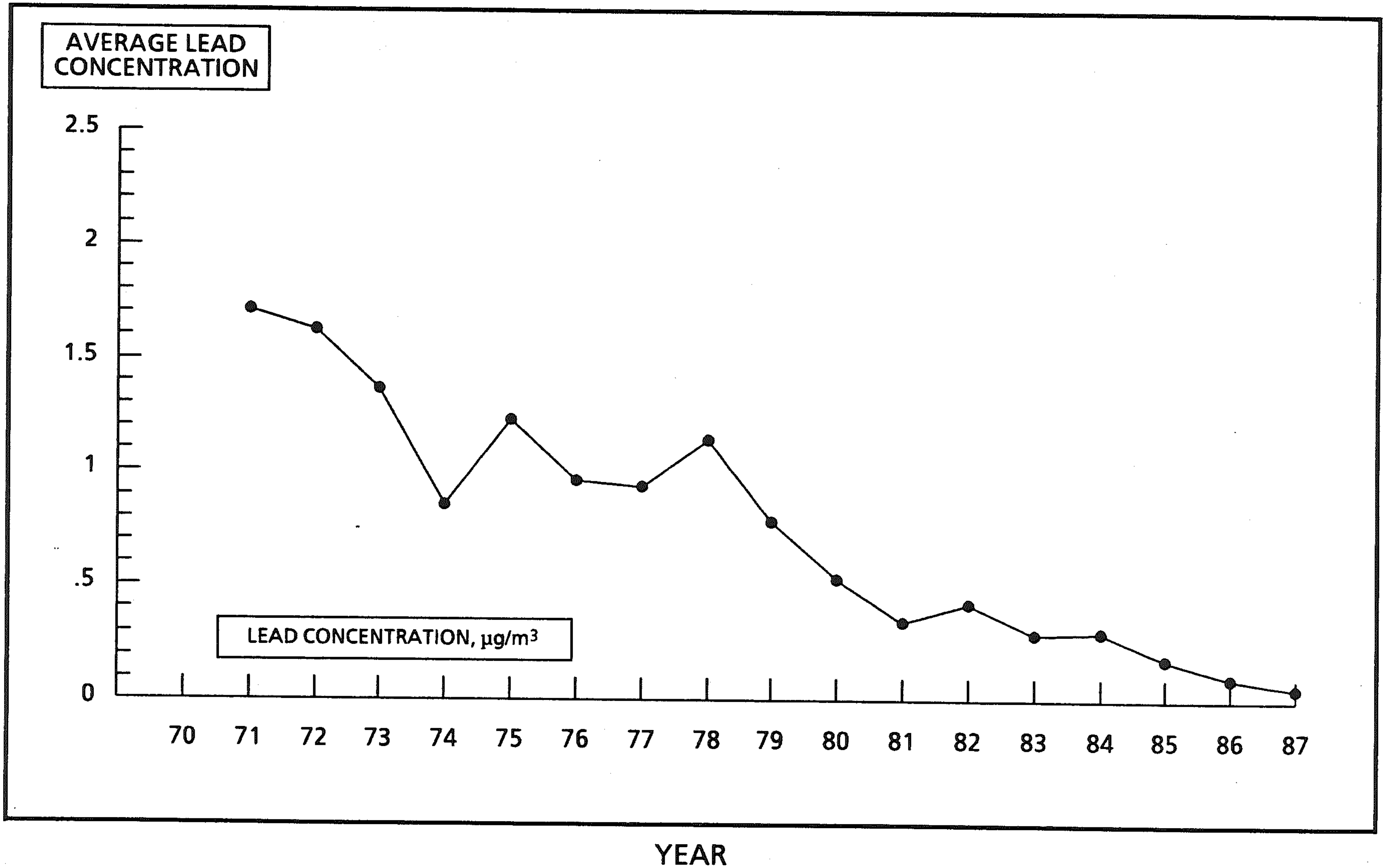


FIGURE C, CONTINUED

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: MIDDLETOWN-003

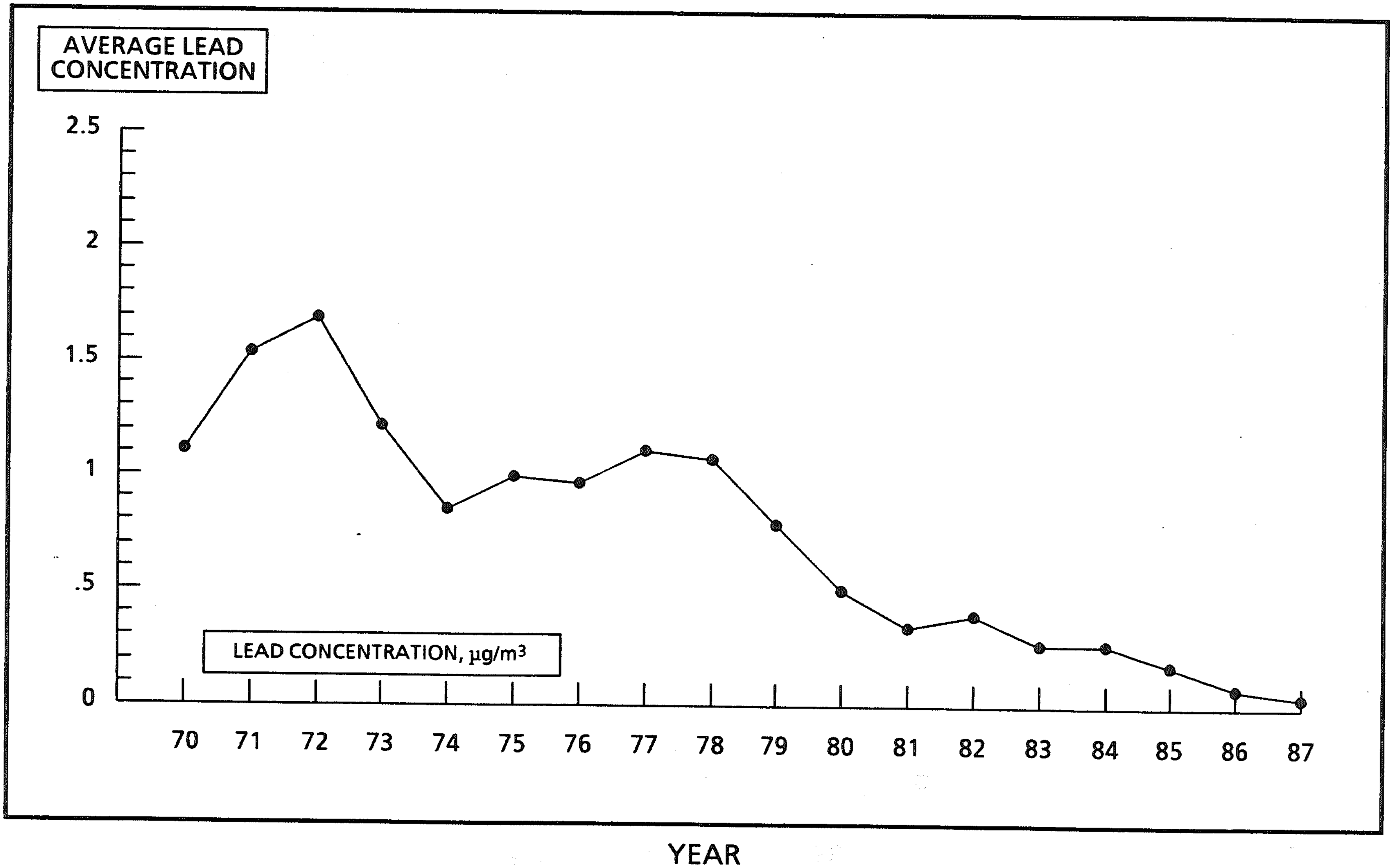


FIGURE C, CONTINUED

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: WALLINGFORD-001

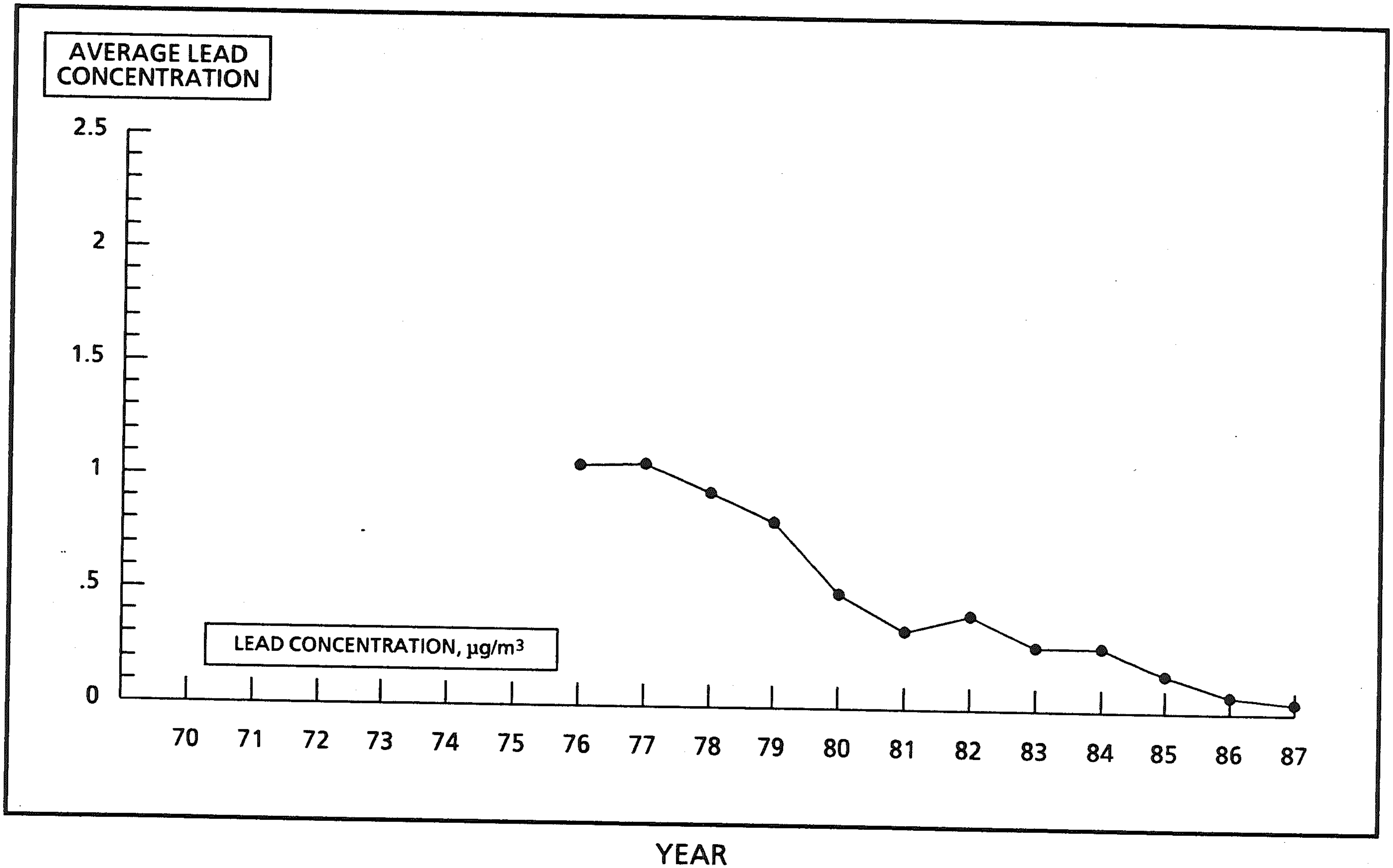


FIGURE C, CONTINUED

ANNUAL AVERAGE LEAD CONCENTRATIONS

SITE: WATERBURY-123

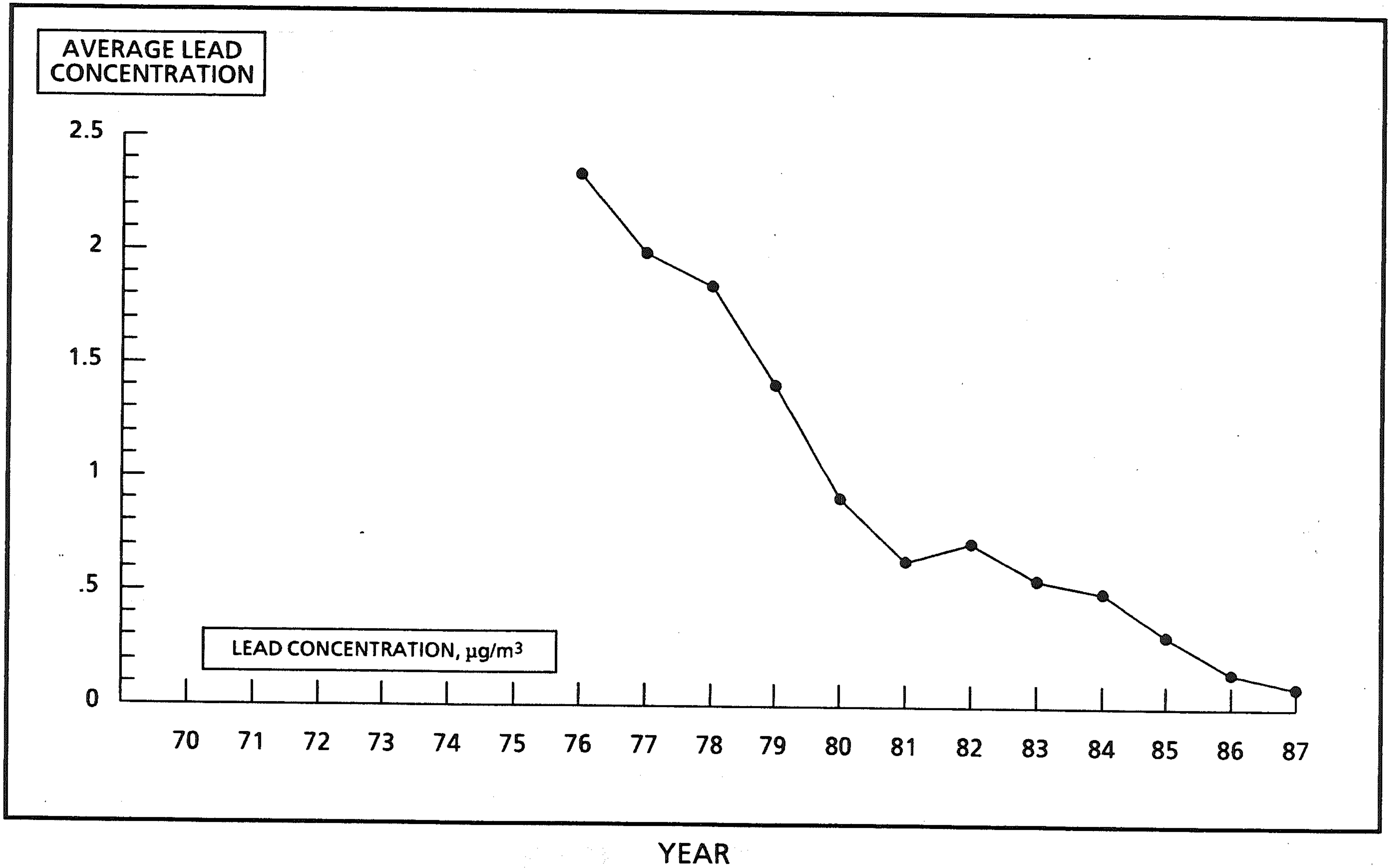


FIGURE D

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: BRIDGEPORT-123

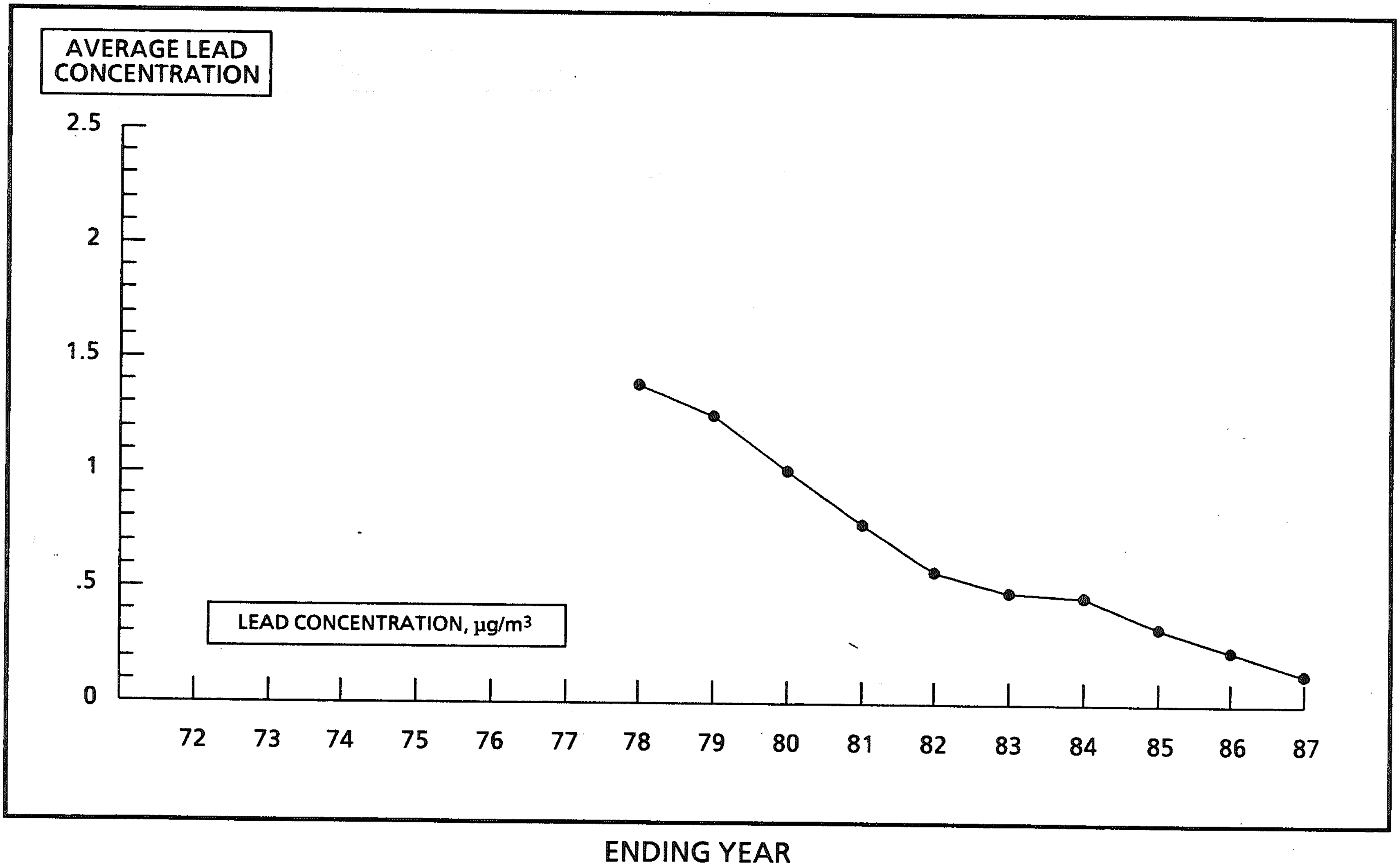


FIGURE D, CONTINUED

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: BRISTOL-001

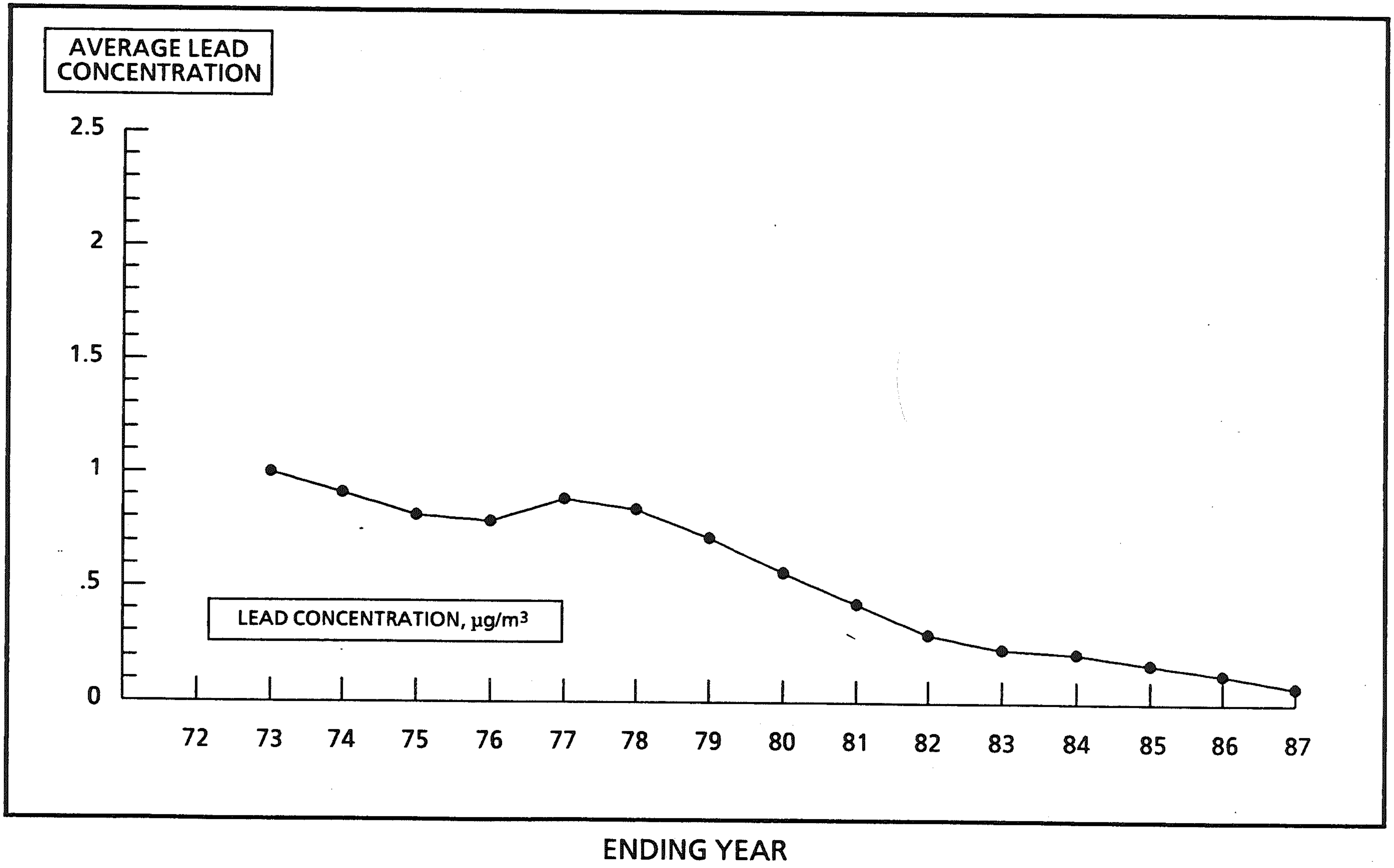


FIGURE D, CONTINUED

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: MERIDEN-002

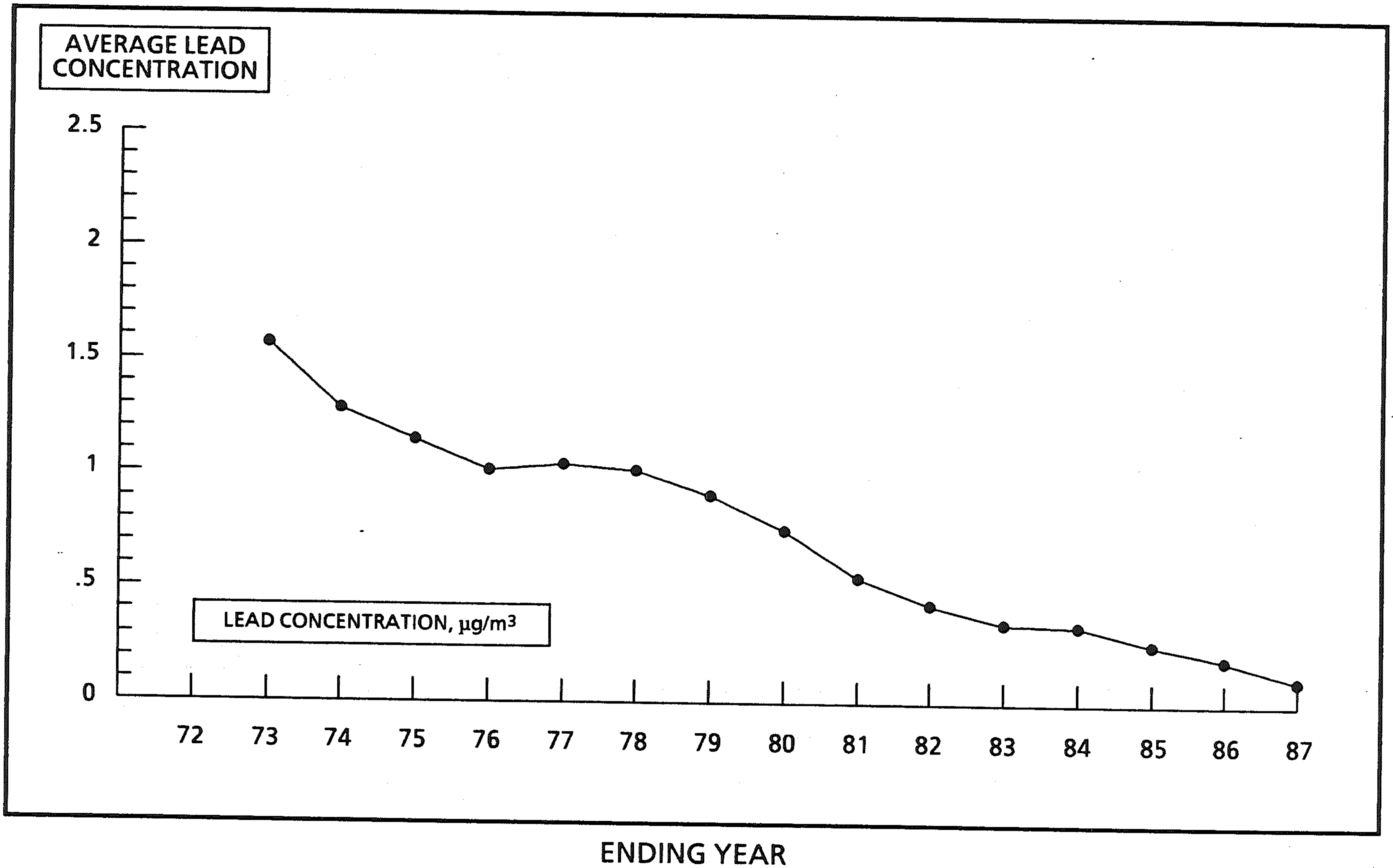


FIGURE D, CONTINUED

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: MIDDLETOWN-003

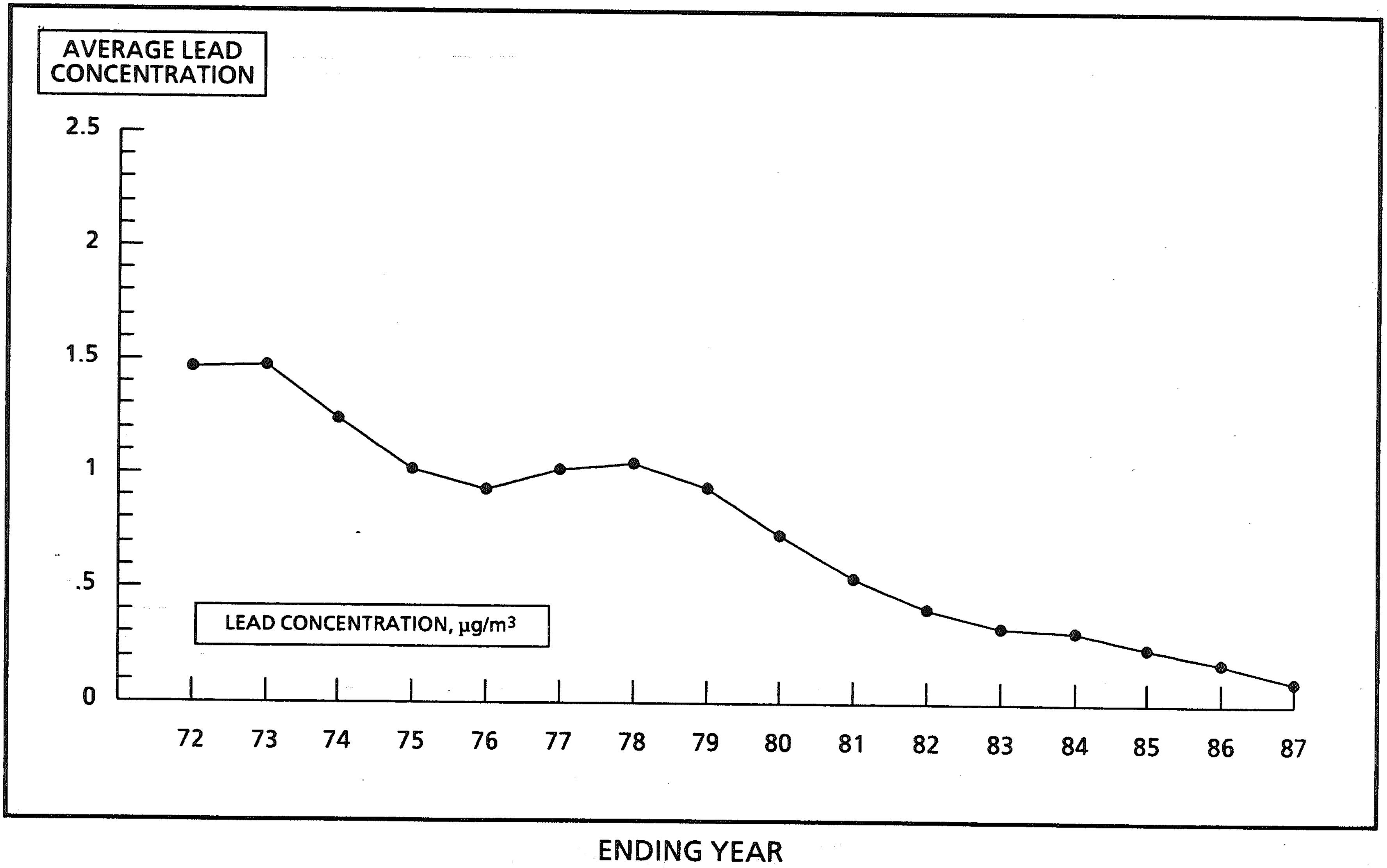


FIGURE D, CONTINUED

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: WALLINGFORD-001

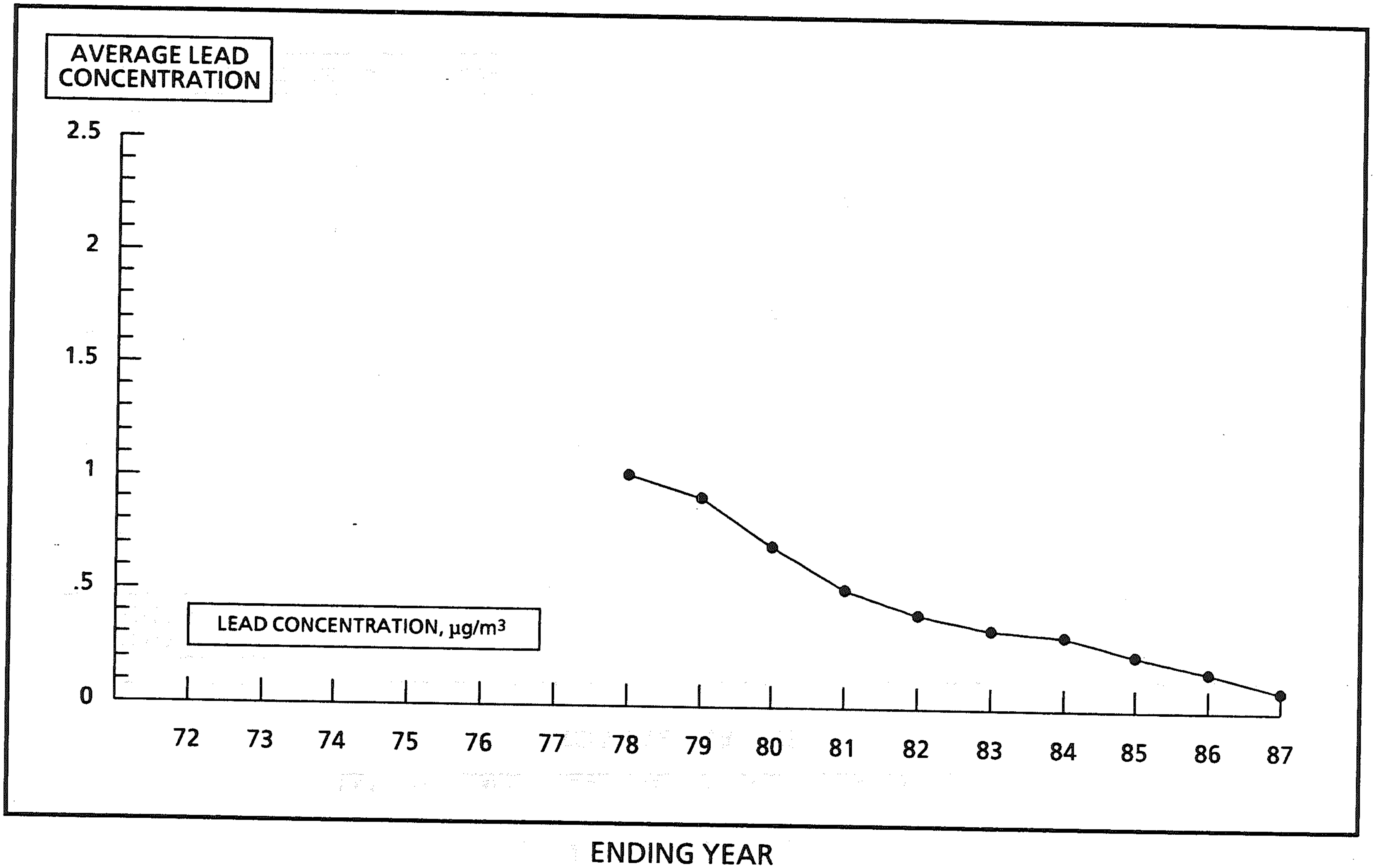
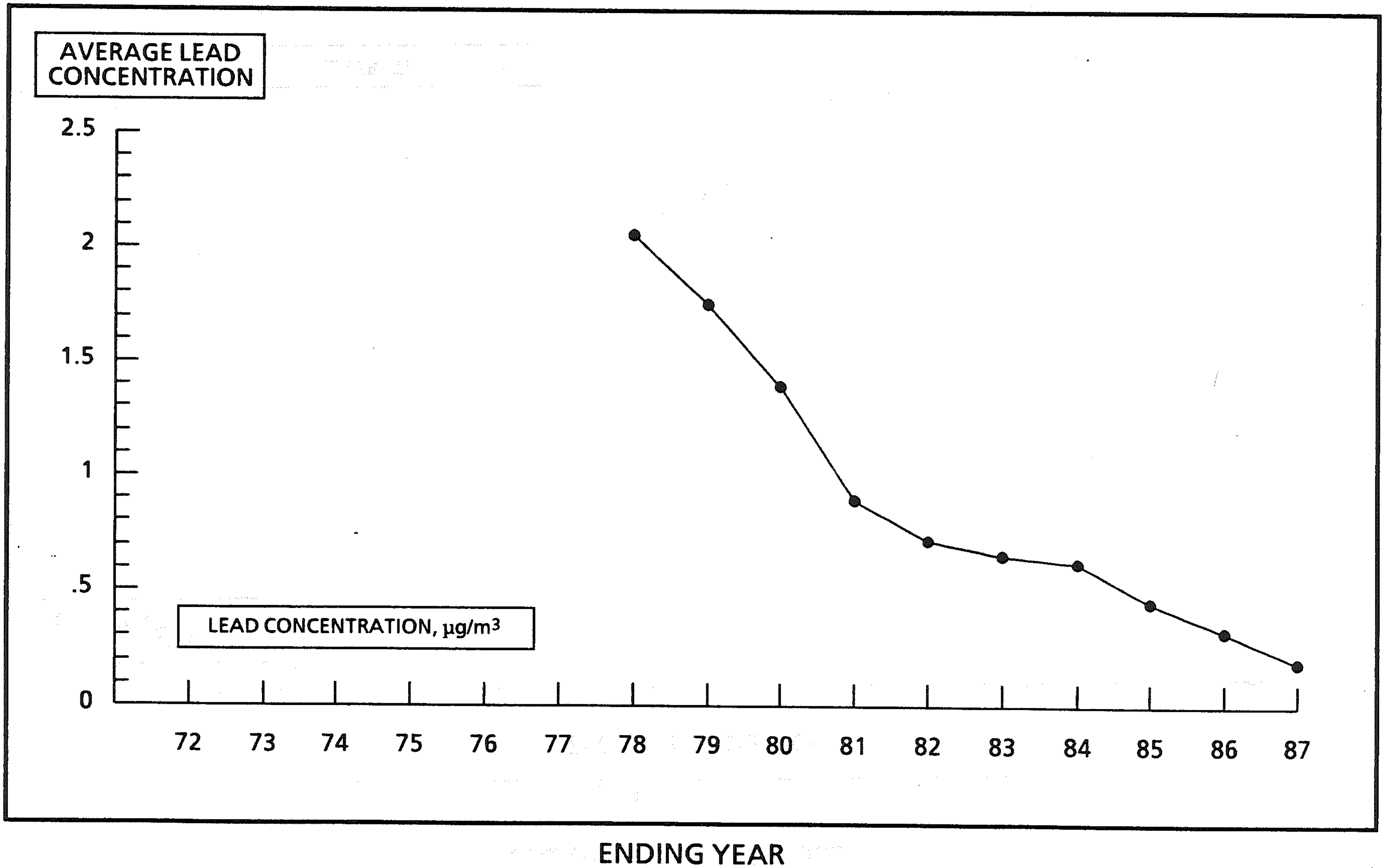


FIGURE D, CONTINUED

3-YEAR RUNNING AVERAGE LEAD CONCENTRATIONS

SITE: WATERBURY-123



VIII. ACID PRECIPITATION

MONITORING PROGRAM

Recently, there has been a growing public concern about the occurrence and effects of atmospheric deposition, most notably acid precipitation or "acid rain." It has become apparent that, in order to address this concern, basic data need to be collected on the chemical properties of precipitation. Recognizing this, the State of Connecticut, through the Department of Environmental Protection, has agreed to cooperate with the Water Resources Division of the United States Geological Survey (USGS) to establish the Connecticut Atmospheric Deposition Monitoring Program.

PROGRAM OBJECTIVES

The program is designed to collect and analyze precipitation on an event basis and has the following objectives:

(1) to determine selected chemical and physical properties of precipitation in Connecticut;

(2) to determine the spatial and temporal distribution of precipitation chemistry in the State;

(3) to determine the relationships between precipitation chemistry and meteorological conditions, such as storm track and air mass movement;

(4) to provide baseline information that can be used to determine trends and estimate loads; and

(5) to use techniques and methodologies consistent with those of the national monitoring networks in order to provide comparative information.

DATA COLLECTION SITES

Data collection sites have been established according to siting criteria used in the National Atmospheric Deposition Program (NADP). Use of these criteria ensures the validity of comparisons made between data which are collected through Connecticut's program and data from other atmospheric deposition programs. Other objectives considered during the siting process were the collection of samples representative of different geographic areas of the State, and the sampling of precipitation representative of long-range transport and not merely local sources. Using these criteria, precipitation sampling sites were established in the towns of Plainfield, Marlborough and Litchfield (Morris Dam). The locations of these sites are shown in Figure 17.

EQUIPMENT

Each site is equipped with an automatic wet-dry sensing type of precipitation collector -- the same type used by the NADP and the National Trends Network (NTN). The collector operates when precipitation wets an electronic sensor, completing an electrical circuit. This activates a motor that opens a lid over the sample container when the precipitation event begins and closes the lid when the precipitation ceases. The purpose of the lid is to retard the loss of samples through evaporation and to prevent contamination by dry fallout.

Each site is also equipped with an automatic rain gage which provides a record of the quantity of rain at 15-minute intervals.

DATA COLLECTION

Samples of precipitation are gathered from the automatic collectors as soon as possible following the end of a precipitation event, in most cases within 24 hours. The samples are immediately tested for acidity through pH measurements. The samples are also tested for specific conductance. This is a measure of the ions (i.e., the dissolved solids) in solution and, therefore, of the pollutant load. The results of this testing for the three precipitation sampling sites are tabulated from 1981 in Tables 28, 29 and 30. Where relevant, the inches of precipitation for certain events in these tables is reported as the water-equivalent. The results of the sample analyses for 1987 are illustrated in Figures 18 through 26.

Samples from selected precipitation events are also sent to a USGS laboratory for further analyses to determine the concentrations of additional chemical constituents, including major anions, cations, nutrients and trace metals.

Through the Connecticut Atmospheric Deposition Monitoring Program, a network capable of providing uninterrupted baseline data on precipitation quality within the State has been developed. Data collected through the program is currently being published monthly by the USGS in its report, Water Resources Conditions in Connecticut. When using the data, one should note that it is specific only to the time and place of its collection.

DISCUSSION OF DATA

Presently, data that has been collected in the initial stages of the study is being analyzed to determine, on a preliminary basis, the distribution and magnitude of atmospheric deposition in Connecticut. Because precipitation chemistry is a function of air quality and climate, both of which fluctuate over time and space, several more years of continuous data collection will be necessary to develop an adequate baseline to determine trends accurately and to more fully define the controlling processes. However, a preliminary evaluation of the data indicates that the precipitation occurring within Connecticut has been chemically affected by man-made contaminants. The data show that 32 percent of all the precipitation events studied to date have had a pH of 4.0 or below. The yearly percentages of these low pH occurrences for the years 1983 through 1987 are 23%, 28%, 42%, 32%, and 33%, respectively. Further evaluation of the data may provide more information on the source of the contaminants and the effects upon the environment.

It is important to stress that it is presently difficult to forecast statewide trends in the chemical properties of precipitation, or to perform comparative analyses, because of a lack of a large long-term data base. Generally, a 20-year or greater period of record is an acceptable statistical data base. When performing comparative analyses, some hydrologic data bases use 60 years or more of record keeping. Therefore, it should be apparent that data collection under the Connecticut Atmospheric Deposition Monitoring Program must continue until a sufficient period of record has been obtained.

Further information is available from the Water Resources Division, United States Geological Survey, 450 Main Street, Hartford, Connecticut 06103 at (203) 240-3060, or from the Natural Resources Center, Department of Environmental Protection, 165 Capitol Avenue, Hartford, Connecticut 06106 at (203) 566-3540.

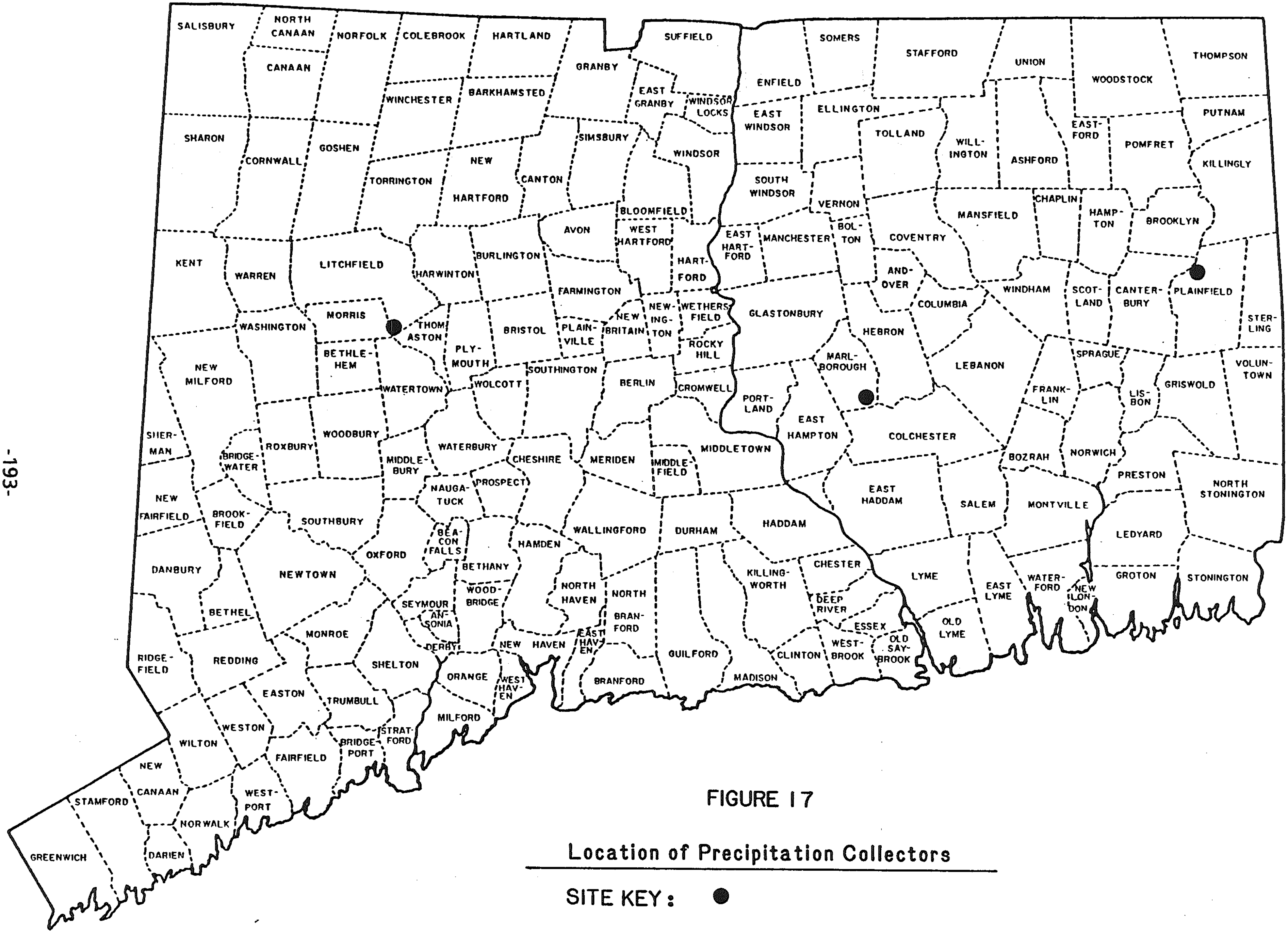


FIGURE 17

Location of Precipitation Collectors

SITE KEY: ●

TABLE 28

ATMOSPHERIC DEPOSITION DATA FOR THE PLAINFIELD SITE

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
1	10/23/81 - 10/27/81	15	4.5	2.30
2	11/14/81 - 11/16/81	15	4.5	1.01
3	12/01/81 - 12/02/81	14	4.5	2.68
4	12/14/81	12	4.4	0.58
5	12/15/81 - 12/16/81	12	4.6	2.90
6	12/27/81 - 12/28/81	51	4.0	0.20
1	01/04/82 - 01/05/82	15	4.8	2.70
2	04/26/82 - 04/27/82	11	4.8	0.99
3	05/29/82 - 05/31/82	18	4.4	1.43
4	06/02/82	5	5.0	2.86
5	06/04/82 - 06/06/82	10	5.1	4.28
6	07/28/82 - 07/29/82	18	4.4	0.11
7	08/09/82	25	4.4	0.96
8	08/09/82 - 08/10/82	31	4.2	0.71
9	11/28/82 - 11/29/82	8	4.8	0.98
10	12/16/82	16	4.9	0.85
1	01/05/83 - 01/06/83	15	4.4	0.49
2	01/13/83	18	4.7	0.78
3	01/22/83 - 01/24/83	8	4.9	1.17
4	01/29/83 - 01/31/83	26	4.2	0.36
5	02/03/83	14	4.7	1.21
6	02/06/83 - 02/07/83	13	4.7	0.44
7	02/11/83 - 02/12/83	6	4.9	0.04
8	02/17/83	17	4.5	1.09
9	03/02/83	26	4.2	0.37
10	03/06/83 - 03/09/83	47	4.0	1.37
11	03/19/83 - 03/21/83	20	4.5	1.91
12	03/27/83 - 03/28/83	22	4.4	1.11
13	04/03/83	32	4.2	0.02
14	04/10/83	13	4.6	2.37
15	04/16/83 - 04/17/83	16	4.4	0.96
16	04/19/83 - 04/20/83	13	4.5	2.84
17	04/24/83	15	4.9	2.42
18	05/31/83	30	4.2	1.47
19	06/04/83	41	4.0	0.99
20	06/27/83 - 06/28/83	68	3.8	1.22
21	07/06/83	27	4.3	0.38
22	07/22/83	79	3.8	0.25
23	07/25/83	38	4.0	0.29
24	08/11/83 - 08/12/83	39	4.0	1.60
25	09/12/83	87	3.7	0.54

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
26	09/23/83	14	4.7	0.95
27	10/01/83 - 10/02/83	17	4.4	1.33
28	10/12/83 - 10/13/83	4	5.4	1.10
29	10/18/83	45	4.0	0.28
30	10/23/83 - 10/25/83	8	4.8	1.15
31	11/03/83 - 11/04/83	30	4.2	0.60
32	11/10/83	17	4.4	1.08
33	11/15/83 - 11/16/83	8	4.8	2.46
34	11/21/83	14	4.6	0.69
35	11/24/83 - 11/26/83	5	5.2	2.89
36	11/28/83 - 11/29/83	25	4.3	0.97
1	01/10/84 - 01/11/84	24	4.2	0.81*
2	01/18/84 - 01/19/84	52	4.1	0.30*
3	01/24/84	25	4.3	0.32
4	02/03/84 - 02/05/84	24	4.3	1.47
5	02/11/84	37	4.1	0.30
6	02/14/84 - 02/18/84	37	4.9	1.58
7	02/24/84 - 02/25/84	25	4.4	0.81
8	02/28/84 - 03/01/84	11	4.6	1.88
9	03/05/84	54	3.9	0.40
10	03/13/84 - 03/14/84	20	4.2	1.24
11	03/18/84 - 03/19/84	11	4.5	0.42
12	03/21/84	22	4.3	0.58
13	03/28/84 - 03/30/84	10	4.8	1.03
14	04/05/84	17	4.6	1.96
15	04/14/84 - 04/15/84	21	4.5	0.07
16	04/23/84 - 04/24/84	62	3.9	0.12
17	05/03/84 - 05/04/84	48	4.0	1.65
18	05/08/84	40	4.1	0.42
19	05/12/84 - 05/14/84	62	3.9	0.88
20	05/19/84 - 05/21/84	69	3.9	1.05
21	05/27/84 - 05/31/84	21	4.3	5.85
22	05/31/84 - 06/03/84	8	4.8	0.88
23	06/19/84	71	3.8	0.49
24	06/24/84	16	4.5	0.52
25	06/27/84 - 06/29/84	51	4.0	0.75
26	07/09/84	14	4.5	3.50
27	07/16/84	54	3.9	0.62
28	07/19/84	36	4.0	1.07
29	07/23/84	8	5.0	1.08
30	07/27/84	45	4.0	0.41
31	09/04/84	50	3.9	0.66
32	09/12/84	39	4.1	0.19

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
33	09/15/84	31	4.2	1.07
34	10/01/84 - 10/02/84	12	4.6	2.31
35	10/22/84 - 10/23/84	17	4.5	1.67
36	10/23/84 - 10/24/84	25	4.4	0.15
37	10/26/84 - 10/29/84	38	4.0	1.22
38	11/05/84	6	5.0	0.55
39	11/11/84	8	4.8	1.79
40	11/15/84	55	4.0	0.18
41	11/29/84	17	4.7	0.42
42	12/03/84	21	4.4	0.65
43	12/05/84 - 12/06/84	10	4.7	1.19*
44	12/19/84	40	4.1	0.33
45	12/21/84 - 12/22/84	47	4.0	0.91*
1	01/01/85 - 01/02/85	32	4.1	0.40
2	01/04/85 - 01/05/85	73	4.1	0.23*
3	01/08/85	34	4.2	0.99*
4	01/17/85	40	4.4	0.19*
5	01/19/85 - 01/20/85	54	4.0	0.06*
6	02/01/85 - 02/02/85	31	4.2	1.88*
7	02/05/85 - 02/06/85	23	4.3	2.01*
8	03/04/85 - 03/05/85	53	4.0	3.67*
9	03/07/85 - 03/08/85	35	4.1	0.39
10	03/12/85	32	4.2	1.09
11	03/18/85 - 03/19/85	82	3.9	0.11
12	03/31/85 - 04/01/85	32	4.2	0.53
13	04/07/85 - 04/08/85	32	4.3	0.32
14	04/14/85 - 04/15/85	96	3.8	0.03
15	04/22/85	70	3.8	0.05
16	04/26/85 - 04/28/85	135	3.6	0.10
17	05/02/85 - 05/06/85	25	4.4	2.31
18	05/18/85 - 05/19/85	11	5.1	0.06
19	05/27/85 - 05/28/85	20	4.4	1.31
20	06/01/85	14	4.6	0.39
21	06/05/85	24	4.3	0.80
22	06/08/85	98	3.7	0.06
23	06/16/85 - 06/17/85	37	4.1	1.15
24	06/24/85	36	4.1	0.39
25	06/25/85 - 06/29/85	15	4.5	1.15
26	07/03/85	93	3.7	0.16
27	07/06/85 - 07/07/85	41	4.1	0.25
28	07/09/85	74	3.7	0.33
29	07/12/85 - 07/14/85	113	3.6	0.35
30	07/15/85	59	3.9	0.35

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
31	07/21/85	80	3.8	1.62
32	07/26/85 - 07/27/85	20	4.3	1.30
33	07/31/85 - 08/01/85	65	3.8	2.19
34	08/07/85 - 08/08/85	29	4.1	0.24
35	08/15/85	74	3.8	0.11
36	08/25/85 - 08/26/85	13	4.4	1.51
37	08/30/85 - 08/31/85	49	3.9	1.30
38	09/04/85 - 09/05/85	58	3.9	0.66
39	09/06/85 - 09/08/85	43	4.0	0.99
40	09/09/85 - 09/10/85	77	3.8	0.44
41	09/24/85	6	5.4	0.41
42	10/03/85 - 10/04/85	87	3.9	0.26
43	10/05/85	21	4.4	0.53
44	10/13/85 - 10/15/85	51	4.1	0.41
45	10/19/85	99	3.6	0.19
46	10/25/85	13	4.6	0.22
47	11/05/85 - 11/06/85	9	4.7	2.61
48	11/11/85 - 11/12/85	44	4.0	0.75
49	11/14/85	50	4.0	0.19
50	11/16/85 - 11/17/85	6	4.8	1.23
51	11/22/85 - 11/24/85	29	4.2	0.56
52	11/26/85 - 11/27/85	35	4.1	0.68
53	11/28/85 - 11/30/85	28	4.2	0.82
54	12/11/85	54	3.9	0.50
55	12/13/85	29	4.3	0.14
56	12/20/85 - 12/23/85	46	4.0	0.70*
1	01/03/86	16	4.8	0.70
2	01/05/86	28	4.4	0.40
3	01/19/86 - 01/20/86	11	4.9	0.60
4	01/25/86 - 01/27/86	13	5.1	3.11*
5	02/01/86 - 02/02/86	47	4.0	0.78*
6	02/04/86 - 02/05/86	38	4.6	0.42*
7	02/07/86 - 02/08/86	39	4.4	0.21*
8	02/11/86	23	4.3	0.14*
9	02/14/86 - 02/18/86	69	3.8	1.07
10	02/21/86	45	4.1	0.55
11	03/08/86 - 03/09/86	66	3.9	0.22
12	03/13/86 - 03/15/86	22	4.4	2.41
13	03/19/86	103	3.8	0.18
14	03/27/86	42	4.2	0.30
15	04/06/86 - 04/08/86	60	4.0	0.63
16	04/14/86 - 04/16/86	67	4.1	0.07
17	04/21/86	34	4.3	0.25

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
18	04/22/86 - 04/23/86	44	4.1	0.23
19	04/25/86 - 04/27/86	17	4.8	0.31
20	05/07/86 - 05/08/86	79	3.7	0.13
21	05/17/86	75	3.9	0.21
22	05/20/86	15	6.1	0.11
23	05/21/86 - 05/22/86	9	5.3	0.31
24	05/23/86 - 05/24/86	35	4.1	1.77
25	05/29/86	52	4.2	0.14
26	06/01/86	62	4.0	0.25
27	06/09/86	46	4.0	1.83
28	06/12/86 - 06/13/86	37	4.1	0.99
29	06/19/86 - 06/20/86	71	3.9	0.08
30	06/24/86	139	3.6	0.16
31	07/02/86	12	4.6	1.44
32	07/12/86 - 07/13/86	37	4.1	1.55
33	07/26/86 - 07/27/86	22	4.3	1.28*
34	07/29/86 - 07/30/86	138	3.5	0.10
35	08/01/86 - 08/02/86	16	4.5	0.42
36	08/07/86 - 08/08/86	35	4.1	1.35
37	08/08/86 - 08/09/86	105	3.7	0.17
38	08/11/86	13	4.6	0.90
39	08/17/86 - 08/18/86	22	4.4	0.40
40	08/21/86	5	4.9	0.60
41	08/23/86 - 08/24/86	46	4.0	0.18
42	08/28/86	39	4.1	0.23
43	09/16/86	56	4.0	0.55
44	09/21/86 - 09/24/86	150	3.6	0.22
45	10/02/86	32	4.2	0.25
46	10/03/86 - 10/05/86	38	4.1	0.98
47	10/14/86	9	4.7	0.75
48	10/26/86 - 10/27/86	22	4.4	0.73
49	11/05/86 - 11/06/86	18	4.5	0.60
50	11/08/86 - 11/09/86	11	4.7	1.27
51	11/11/86	10	4.9	0.56
52	11/19/86 - 11/20/86	14	4.9	0.65*
53	11/20/86 - 11/21/86	7	5.2	1.74
54	11/26/86 - 11/27/86	18	4.6	1.18
55	12/02/86 - 12/03/86	11	5.0	1.90
56	12/08/86 - 12/09/86	20	4.5	0.46
57	12/12/86	15	4.7	0.36*
58	12/18/86 - 12/19/86	10	4.9	2.37
59	12/24/86 - 12/25/86	14	4.6	0.86
60	12/30/86	48	4.1	0.27*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
1	01/01/87 - 01/02/87	8	4.8	1.88*
2	01/10/87 - 01/11/87	22	4.3	0.52*
3	01/17/87 - 01/20/87	20	4.6	1.41*
4	01/22/87	7	4.5	1.06*
5	01/26/87	11	5.5	0.08*
6	02/08/87 - 02/09/87	110	3.80	0.37*
7	02/28/87 - 03/01/87	11	4.59	1.34
8	03/26/87	34	4.19	0.03
9	03/28/87	41	4.03	0.33
10	03/30/87 - 03/31/87	11	4.85	3.52
11	04/04/87 - 04/07/87	17	4.54	3.42
12	04/12/87 - 04/13/87	33	4.28	1.22
13	04/17/87 - 04/18/87	39	4.17	0.61
14	04/24/87 - 04/25/87	25	4.24	0.72
15	04/28/87	12	4.60	0.01*
16	05/03/87 - 05/04/87	37	4.04	1.20
17	05/05/87 - 05/06/87	27	4.21	0.10
18	05/15/87	81	3.79	0.18
19	05/27/87 - 05/28/87	38	4.16	0.24
20	06/04/87 - 06/05/87	50	4.03	0.10
21	06/07/87 - 06/08/87	82	3.78	0.28
22	06/12/87 - 06/13/87	102	3.65	0.14
23	06/26/87 - 06/27/87	20	4.45	1.51
24	07/02/87 - 07/04/87	98	3.66	0.49
25	07/07/87	27	4.22	0.34
26	08/03/87	58	3.91	0.33
27	08/08/87 - 08/10/87	85	3.77	0.57
28	08/19/87 - 08/20/87	102	3.71	0.22
29	08/22/87	48	4.02	0.28
30	08/27/87 - 08/29/87	35	4.24	2.56
31	09/01/87	29	4.23	0.58
32	09/07/87	18	4.84	0.22
33	09/08/87 - 09/09/87	9	5.14	0.33
34	09/12/87 - 09/13/87	12	4.68	1.45
35	09/17/87 - 09/19/87	56	3.95	1.74
36	09/30/87	18	4.58	0.15
37	10/03/87 - 10/04/87	21	4.50	2.44
38	10/11/87	55	3.96	0.28
39	10/21/87	55	4.01	0.21
40	10/27/87 - 10/28/87	8	4.98	1.25
41	11/09/87 - 11/10/87	55	3.94	0.13
42	11/11/87 - 11/12/87	10	4.69	2.37*
43	11/17/87 - 11/18/87	12	4.88	0.40
44	11/30/87 - 12/01/87	8	4.96	1.30
45	12/06/87	48	4.12	0.11*
46	12/10/87 - 12/11/87	19	4.49	0.47

TABLE 28, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
47	12/15/87	7	5.06	0.78*
48	12/20/87	65	3.94	0.38*
49	12/28/87 - 12/29/87	20	4.93	0.33*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29

ATMOSPHERIC DEPOSITION DATA FOR THE MORRIS DAM SITE

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
1	12/16/82	22	4.5	1.18
1	01/05/83 - 01/06/83	18	4.4	0.64
2	01/10/83 - 01/11/83	6	4.9	2.39
3	01/23/83	13	4.5	1.45
4	02/02/83 - 02/03/83	19	4.4	1.89
5	02/06/83 - 02/07/83	50	4.0	0.45*
6	02/11/83 - 02/12/83	9	4.9	1.30*
7	02/17/83	46	4.0	0.21
8	03/02/83	22	4.3	0.27
9	03/07/83 - 03/09/83	37	4.1	1.22
10	03/19/83 - 03/21/83	14	4.5	1.29
11	03/27/83 - 03/28/83	18	4.4	1.29
12	04/03/83	11	4.7	1.07
13	04/10/83	9	4.6	2.70
14	04/16/83 - 04/17/83	10	4.5	2.61
15	04/19/83 - 04/20/83	23	4.3	1.27
16	04/24/83	16	4.5	1.35
17	05/15/83 - 05/16/83	35	4.1	0.87
18	05/29/83 - 05/30/83	39	4.1	0.81
19	06/04/83	49	3.9	1.39
20	06/28/83	58	3.9	1.71
21	07/05/83	67	3.9	1.54
22	07/25/83	46	4.1	0.75
23	08/11/83 - 08/12/83	49	3.9	1.60
24	09/12/83	65	3.8	0.24
25	09/23/83	20	4.5	0.94
26	10/01/83 - 10/02/83	9	4.6	1.18
27	10/12/83 - 10/13/83	6	4.9	3.34
28	10/18/83	30	4.1	0.33
29	10/23/83 - 10/25/83	9	4.8	2.32
30	11/03/83 - 11/04/83	80	3.8	0.11
31	11/10/83	40	4.2	0.94
32	11/15/83 - 11/16/83	10	4.6	1.64
33	11/21/83	14	4.6	0.57
34	11/24/83 - 11/25/83	21	4.5	1.45
35	11/28/83 - 11/29/83	24	4.3	0.71
36	12/06/83	32	4.2	1.04
37	12/12/83 - 12/14/83	26	4.5	3.41
1	01/10/84 - 01/11/84	12	4.5	0.47*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
2	01/18/84 - 01/19/84	45	4.0	0.21*
3	01/24/84	34	4.2	0.45
4	01/30/84 - 01/31/84	22	4.3	0.38*
5	02/03/84 - 02/05/84	41	4.0	0.69
6	02/11/84	43	4.0	0.48
7	02/14/84 - 02/16/84	23	4.7	1.53
8	02/24/84 - 02/25/84	80	3.8	0.86
9	02/28/84 - 03/01/84	10	4.6	1.34
10	03/05/84 - 03/06/84	25	4.2	0.53
11	03/18/84 - 03/19/84	30	4.1	0.52
12	03/21/84	24	4.3	0.65
13	03/28/84 - 03/30/84	10	4.8	1.61*
14	04/05/84	25	4.4	2.79
15	04/13/84 - 04/16/84	32	4.2	1.25
16	04/23/84 - 04/24/84	17	4.6	0.55
17	05/03/84 - 05/04/84	28	4.2	1.24
18	05/08/84	34	4.2	0.99
19	05/12/84 - 05/14/84	55	3.9	0.77
20	05/19/84 - 05/21/84	78	3.8	0.21
21	05/25/84	19	4.4	0.88
22	05/27/84 - 05/31/84	13	4.5	6.11
23	05/31/84 - 06/03/84	5	5.0	0.74
24	06/24/84 - 06/25/84	20	4.3	0.87
25	06/27/84 - 07/01/84	39	4.0	0.60
26	07/09/84	24	4.2	0.23
27	07/16/84	62	3.9	0.71
28	07/19/84	52	4.0	0.53
29	07/27/84	18	4.4	0.70
30	09/04/84	50	3.9	0.80
31	09/12/84	20	4.4	0.22
32	10/01/84 - 10/02/84	8	4.8	0.51
33	10/22/84 - 10/23/84	20	4.4	0.91
34	10/23/84 - 10/24/84	55	4.4	0.07
35	10/26/84 - 10/29/84	61	3.8	0.63
36	11/05/84	6	5.0	0.96
37	11/29/84	15	4.6	0.54
38	12/03/84	33	4.4	0.54
39	12/05/84 - 12/06/84	10	5.0	0.46
40	12/19/84	39	4.1	0.32
41	12/21/84 - 12/22/84	46	3.9	0.33
1	01/01/85 - 01/02/85	31	4.1	0.28
2	01/08/85	24	4.3	0.10*
3	01/17/85	11	4.7	0.29*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
4	01/19/85 - 01/20/85	66	4.1	0.13*
5	01/31/85	57	3.9	0.05*
6	02/01/85 - 02/02/85	31	4.2	0.30*
7	02/05/85 - 02/06/85	28	4.2	0.64*
8	02/12/85	14	4.5	1.38
9	03/04/85 - 03/05/85	60	3.9	0.69*
10	03/12/85	30	4.2	1.23
11	03/31/85 - 04/01/85	38	4.1	0.30
12	04/07/85 - 04/08/85	45	4.1	0.30
13	04/14/85 - 04/15/85	50	4.1	0.06
14	04/19/85	27	4.2	0.10
15	04/22/85	53	4.0	0.65
16	04/26/85 - 04/28/85	38	3.6	0.04
17	05/02/85 - 05/06/85	25	4.3	2.37
18	05/18/85 - 05/19/85	16	4.6	0.30
19	05/27/85 - 05/28/85	21	4.4	1.56
20	06/01/85	16	4.5	1.20
21	06/05/85	25	4.3	0.77
22	06/08/85	71	3.9	0.22
23	06/12/85	55	3.9	0.21
24	06/16/85 - 06/17/85	28	4.2	1.02
25	06/18/85	59	3.9	0.07
26	06/24/85	96	3.7	0.11
27	06/25/85 - 06/29/85	27	4.2	0.96
28	07/03/85	80	3.7	0.25
29	07/06/85 - 07/07/85	30	4.2	0.47
30	07/09/85	65	3.8	0.29
31	07/12/85 - 07/14/85	67	3.8	0.77
32	07/15/85	83	3.8	0.15
33	07/21/85	108	3.7	1.44
34	07/26/85 - 07/27/85	21	4.3	1.27
35	07/31/85 - 08/01/85	90	3.7	1.35
36	08/11/85	70	3.8	0.19
37	08/25/85 - 08/26/85	17	4.2	2.48
38	08/30/85 - 08/31/85	65	3.8	0.54
39	09/04/85 - 09/05/85	22	4.3	1.03
40	09/06/85 - 09/08/85	23	4.3	0.50
41	09/09/85 - 09/10/85	33	4.1	1.36
42	09/24/85	8	4.9	0.54
43	09/27/85	12	5.0	3.68
44	10/03/85 - 10/04/85	35	4.1	0.47
45	10/05/85	32	4.1	1.30
46	10/13/85 - 10/15/85	68	3.8	0.36
47	10/19/85	89	3.7	0.11

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
48	10/25/85	19	4.4	0.27
49	11/05/85 - 11/06/85	6	4.9	1.06
50	11/11/85 - 11/12/85	43	4.0	1.01
51	11/14/85	54	4.0	0.41
52	11/16/85 - 11/17/85	7	4.7	1.40
53	11/22/85 - 11/24/85	13	4.5	0.31
54	11/26/85 - 11/27/85	53	3.9	0.70
55	11/28/85 - 11/30/85	19	4.3	0.97
56	12/13/85	24	4.3	0.21
57	12/20/85 - 12/23/85	41	4.1	0.39*
1	01/03/86 - 01/05/86	29	4.2	0.62
2	01/19/86 - 01/20/86	18	4.7	0.53
3	01/25/86 - 01/27/86	23	4.6	3.74
4	02/01/86 - 02/02/86	73	3.8	0.54*
5	02/04/86 - 02/05/86	51	4.3	0.35*
6	02/07/86 - 02/08/86	46	4.2	0.34*
7	02/14/86 - 02/18/86	46	4.1	1.26
8	02/19/86 - 02/20/86	35	4.1	0.47*
9	02/21/86	42	4.1	0.54
10	03/13/86 - 03/15/86	22	4.4	2.17
11	03/19/86	74	4.0	0.44
12	03/27/86	34	4.2	0.35
13	04/06/86 - 04/08/86	70	3.9	0.70
14	04/14/86 - 04/16/86	43	4.1	0.22
15	04/21/86	45	4.0	0.47
16	04/22/86 - 04/23/86	48	4.1	0.32
17	04/25/86 - 04/27/86	11	5.5	0.17
18	05/07/86 - 05/08/86	112	3.6	0.16
19	05/17/86	81	3.8	0.37
20	05/20/86 - 05/22/86	34	4.3	0.60
21	05/23/86 - 05/24/86	80	3.9	0.23
22	05/29/86 - 06/02/86	24	4.4	0.68
23	06/09/86	57	3.9	2.14
24	06/12/86 - 06/13/86	19	4.4	1.74
25	06/17/86	59	3.9	0.16
26	06/19/86 - 06/20/86	131	3.6	0.12
27	06/24/86	67	3.9	0.27
28	06/27/86	44	4.0	0.20
29	07/02/86	17	4.4	1.46
30	07/12/86 - 07/13/86	45	4.1	1.72
31	07/26/86 - 07/27/86	44	4.0	0.84
32	07/29/86 - 07/30/86	65	3.9	0.95
33	08/01/86 - 08/02/86	64	3.9	0.94

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
34	08/07/86 - 08/08/86	109	3.6	0.05
35	08/08/86 - 08/11/86	87	3.8	1.10
36	08/16/86 - 08/17/86	62	3.8	0.46
37	08/22/86	13	4.6	0.48
38	08/23/86 - 08/24/86	59	3.9	0.50
39	09/04/86 - 09/05/86	78	3.8	0.27
40	09/16/86	83	3.8	0.31
41	09/21/86 - 09/24/86	97	3.7	0.42
42	09/25/86	32	4.6	0.08
43	10/02/86	25	4.3	0.50
44	10/03/86 - 10/05/86	38	4.1	1.49
45	10/14/86	17	4.5	0.20
46	10/26/86 - 10/27/86	22	4.4	0.59
47	11/05/86 - 11/06/86	24	4.4	0.40
48	11/08/86 - 11/09/86	14	4.6	0.92
49	11/11/86	12	4.7	0.38
50	11/19/86 - 11/20/86	15	4.7	0.40*
51	11/20/86 - 11/21/86	9	5.1	1.68
52	11/23/86 - 11/24/86	30	4.2	0.17
53	11/26/86 - 11/27/86	19	4.4	1.20
54	12/02/86 - 12/03/86	7	4.9	1.72
55	12/08/86 - 12/09/86	15	4.6	0.27
56	12/12/86	14	5.5	0.19*
57	12/18/86 - 12/19/86	8	4.9	1.26
58	12/24/86 - 12/25/86	15	4.6	1.50
1	01/02/87 - 01/03/87	6	5.0	1.46*
2	01/10/87 - 01/11/87	24	4.4	0.83*
3	01/17/87 - 01/20/87	7	5.0	1.22*
4	01/22/87	14	4.6	1.02*
5	01/30/87 - 01/31/87	36	4.1	0.47*
6	02/08/87 - 02/09/87	78	4.01	0.15*
7	02/28/87 - 03/01/87	13	4.58	1.43
8	03/20/87 - 03/22/87	12	4.55	0.46*
9	03/26/87	43	4.03	0.07
10	03/28/87	36	4.11	0.11
11	03/30/87 - 03/31/87	8	4.92	3.17
12	04/04/87 - 04/07/87	9	4.74	4.36
13	04/12/87 - 04/13/87	44	4.17	0.91
14	04/17/87 - 04/18/87	16	4.57	1.09
15	04/24/87 - 04/25/87	11	4.57	0.87
16	04/28/87	22	4.40	0.20*
17	05/03/87 - 05/04/87	17	4.35	1.13
18	05/15/87	45	4.17	0.12

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 29, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
19	05/18/87 - 05/19/87	84	3.74	0.41
20	05/27/87 - 05/28/87	43	4.03	0.52
21	05/31/87	84	3.76	0.62
22	06/02/87	67	3.86	1.55
23	06/04/87 - 06/05/87	48	3.97	0.60
24	06/07/87 - 06/08/87	41	4.12	0.29
25	06/12/87 - 06/13/87	46	3.97	0.42
26	06/26/87 - 06/27/87	21	4.44	0.48
27	07/02/87 - 07/04/87	41	4.03	1.26
28	07/07/87 - 07/12/87	60	3.87	1.37
29	07/25/87 - 07/26/87	17	5.36	0.19
30	08/03/87	54	3.96	1.02
31	08/05/87 - 08/06/87	56	3.96	0.22
32	08/19/87 - 08/20/87	8	3.90	0.22
33	08/27/87 - 08/29/87	44	4.06	2.54
34	09/01/87	35	4.32	0.37
35	09/07/87	63	3.95	0.30
36	09/12/87 - 09/13/87	9	4.97	3.01
37	09/17/87 - 09/19/87	52	3.92	2.34
38	10/03/87 - 10/04/87	8	4.97	1.06
39	10/11/87	15	4.62	0.31
40	11/11/87 - 11/12/87	33	4.48	1.19*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30

ATMOSPHERIC DEPOSITION DATA FOR THE MARLBOROUGH SITE

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
1	05/29/83 - 05/31/83	36	4.1	1.39
2	06/04/83	42	4.1	0.99
3	06/27/83 - 06/28/83	75	3.8	2.63
4	07/05/83 - 07/06/83	89	3.7	0.27
5	07/21/83	46	4.0	0.39
6	07/24/83	40	4.0	0.91
7	08/11/83 - 08/12/83	27	4.2	1.75
8	09/23/83	11	4.7	1.18
9	10/01/83 - 10/02/83	5	4.8	2.22
10	10/12/83 - 10/13/83	10	4.8	1.22
11	10/18/83	32	4.2	0.19
12	10/23/83 - 10/24/83	4	5.3	1.97
13	11/03/83 - 11/04/83	38	4.0	0.75
14	11/10/83	20	4.4	1.27
15	11/15/83 - 11/16/83	6	4.9	1.73
16	11/21/83	12	4.7	0.49
17	11/24/83 - 11/25/83	7	4.9	2.43
18	11/28/83 - 11/29/83	21	4.4	1.04
19	12/06/83	30	4.3	0.68
20	12/12/83 - 12/14/83	40	4.6	1.89
1	01/10/84 - 01/11/84	7	4.7	0.77*
2	01/18/84 - 01/19/84	38	4.1	0.62*
3	01/24/84	23	4.4	0.18
4	01/30/84 - 01/31/84	36	4.1	0.64*
5	02/03/84 - 02/05/84	28	4.2	0.83
6	02/11/84	50	3.9	0.20
7	02/14/84 - 02/16/84	22	4.9	0.83
8	02/24/84 - 02/25/84	16	4.5	1.20
9	02/28/84 - 03/01/84	7	4.8	1.57
10	03/04/84 - 03/06/84	26	4.2	0.28
11	03/13/84 - 03/14/84	10	4.5	3.14*
12	03/18/84 - 03/19/84	48	3.9	0.27
13	03/21/84	15	4.4	0.47
14	03/28/84 - 03/30/84	6	5.0	0.44*
15	04/05/84	25	4.4	2.47
16	04/13/84 - 04/16/84	20	4.4	2.12
17	04/23/84 - 04/24/84	15	4.6	0.52
18	05/03/84 - 05/04/84	34	4.1	1.37
19	05/08/84	35	4.1	0.48
20	05/12/84 - 05/14/84	44	4.0	0.57

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
21	05/19/84 - 05/21/84	60	3.9	0.41
22	05/25/84	18	4.4	0.50
23	05/27/84 - 05/31/84	16	4.5	6.35*
24	05/31/84 - 06/02/84	7	4.8	1.46
25	06/19/84	57	3.9	0.12
26	06/25/84	11	4.9	1.73
27	06/28/84 - 06/29/84	63	3.9	0.21
28	07/07/84	13	4.5	4.18
29	07/16/84	88	3.8	0.15
30	07/18/84 - 07/19/84	26	4.3	1.09
31	07/21/84 - 07/22/84	4	5.1	1.35
32	07/27/84	32	4.2	0.57
33	09/04/84	39	4.1	3.91
34	09/15/84	30	4.3	1.04
35	10/01/84 - 10/02/84	7	4.8	1.96
36	10/22/84 - 10/23/84	18	4.4	2.41
37	10/23/84 - 10/24/84	33	4.3	0.13
38	10/26/84 - 10/29/84	39	4.0	1.32
39	11/05/84	8	4.9	0.52
40	11/11/84	6	5.0	1.93
41	11/15/84	64	3.9	0.10
42	12/03/84	22	4.5	0.56
43	12/05/84 - 12/06/84	6	4.9	1.19*
44	12/19/84	42	4.0	0.30
45	12/21/84 - 12/22/84	59	3.8	0.94*
1	01/01/85 - 01/02/85	28	4.1	0.33
2	01/04/85 - 01/05/85	38	4.1	0.20*
3	01/08/85	28	4.2	0.12*
4	01/17/85	11	4.7	0.11*
5	01/19/85 - 01/20/85	70	3.8	0.41*
6	01/31/85	50	4.0	0.10*
7	02/01/85 - 02/02/85	22	4.3	0.45*
8	02/05/85 - 02/06/85	18	4.3	0.59*
9	02/12/85	13	4.6	1.27
10	03/04/85 - 03/05/85	53	4.0	0.83*
11	03/07/85 - 03/08/85	41	4.0	0.34
12	03/12/85	26	4.2	1.19
13	03/18/85 - 03/19/85	49	4.0	0.15
14	03/31/85 - 04/01/85	28	4.3	0.60
15	04/07/85 - 04/08/85	41	4.2	0.33
16	04/14/85 - 04/15/85	68	3.9	0.05
17	04/19/85	68	3.9	0.10
18	04/22/85	42	4.1	0.70

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
19	04/26/85 - 04/28/85	59	3.5	0.13
20	05/02/85 - 05/06/85	26	4.3	2.55
21	05/18/85 - 05/19/85	17	4.6	0.11
22	05/27/85 - 05/28/85	26	4.3	1.95
23	06/01/85	23	4.4	0.51
24	06/05/85	31	4.2	0.85
25	06/08/85	73	3.8	0.29
26	06/12/85	60	3.9	0.27
27	06/16/85 - 06/17/85	18	4.4	1.67
28	06/18/85	48	4.0	0.84
29	06/24/85	86	3.8	0.24
30	06/25/85 - 06/29/85	38	4.1	0.80
31	07/03/85	80	3.7	0.25
32	07/12/85 - 07/14/85	95	3.7	0.40
33	07/15/85	51	4.0	0.19
34	07/21/85	103	3.7	0.94
35	07/26/85 - 07/27/85	12	4.6	2.57
36	07/31/85 - 08/01/85	69	3.8	2.30
37	08/25/85 - 08/26/85	16	4.4	3.20
38	08/30/85 - 08/31/85	46	4.0	1.00
39	09/04/85 - 09/05/85	70	3.9	0.26
40	09/06/85 - 09/08/85	22	4.3	1.34
41	09/09/85 - 09/10/85	95	3.7	0.17
42	09/24/85	8	5.1	0.54
43	09/27/85	85	4.9	0.77
44	10/03/85 - 10/04/85	35	4.2	0.31
45	10/05/85	19	4.4	0.71
46	10/13/85 - 10/15/85	56	4.0	0.61
47	10/19/85	91	3.7	0.14
48	10/25/85	11	4.6	0.29
49	11/05/85 - 11/06/85	10	4.7	1.79
50	11/11/85 - 11/12/85	40	4.0	1.09
51	11/14/85	56	4.0	0.23
52	11/16/85 - 11/17/85	6	4.9	1.60
53	11/22/85 - 11/24/85	11	4.6	0.35
54	11/26/85 - 11/29/85	47	4.0	0.55
55	11/28/85 - 11/30/85	19	4.4	1.06
56	12/11/85	56	3.9	0.56
57	12/13/85	29	4.3	0.27
58	12/20/85 - 12/23/85	46	4.0	0.13*
1	01/03/86 - 01/05/86	20	4.4	1.20
2	01/19/86 - 01/20/86	10	4.9	0.47
3	01/25/86 - 01/27/86	16	5.1	3.03

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
4	02/01/86 - 02/02/86	63	3.9	0.62*
5	02/04/86 - 02/05/86	16	4.5	0.52*
6	02/07/86 - 02/08/86	28	4.6	0.53*
7	02/11/86	21	4.6	0.24*
8	02/14/86 - 02/18/86	51	4.0	0.98
9	02/21/86	49	4.0	0.62
10	03/08/86 - 03/09/86	92	3.8	0.19
11	03/13/86 - 03/15/86	16	4.6	2.58
12	03/19/86	106	3.8	0.17
13	03/27/86	38	4.3	0.33
14	04/14/86 - 04/16/86	72	4.3	0.07
15	04/21/86	36	4.3	0.21
16	04/22/86 - 04/23/86	46	4.1	0.45
17	04/25/86 - 04/27/86	25	5.9	0.33
18	05/07/86 - 05/08/86	78	3.7	0.12
19	05/17/86	95	3.8	0.11
20	05/20/86 - 05/22/86	10	5.2	0.50
21	05/29/86 - 06/02/86	32	4.2	0.35
22	06/12/86 - 06/13/86	39	4.1	1.26
23	06/19/86 - 06/20/86	87	3.7	0.08
24	06/24/86	116	3.7	0.24
25	06/27/86	111	3.6	0.18
26	07/02/86	14	4.5	1.49
27	07/12/86 - 07/13/86	39	4.1	1.60
28	07/26/86 - 07/27/86	42	4.1	0.75
29	07/29/86 - 07/30/86	108	3.6	0.36
30	08/01/86 - 08/02/86	38	4.1	0.28
31	08/06/86 - 08/08/86	84	3.7	0.58
32	08/11/86	21	4.4	0.58
33	08/16/86 - 08/17/86	38	4.1	0.24
34	08/20/86	52	3.9	0.24
35	08/21/86	5	5.0	0.68
36	08/23/86 - 08/24/86	56	3.9	0.16
37	08/28/86	66	3.9	0.02
38	09/16/86	51	4.0	0.56
39	09/21/86 - 09/24/86	136	3.6	0.28
40	09/25/86	49	4.0	0.36
41	10/02/86	31	4.2	0.41
42	10/03/86 - 10/05/86	29	4.2	1.04
43	10/14/86	22	4.3	0.48
44	10/26/86 - 10/27/86	27	4.4	0.51
45	11/05/86 - 11/06/86	19	4.5	0.50
46	11/08/86 - 11/09/86	18	4.5	1.42
47	11/11/86	11	4.7	0.90

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
48	11/19/86 - 11/20/86	12	4.7	4.02*
49	11/20/86 - 11/21/86	6	5.1	1.63
50	11/23/86 - 11/24/86	34	4.2	0.47
51	11/26/86 - 11/27/86	14	4.6	1.73
52	12/02/86 - 12/03/86	6	5.0	3.09
53	12/08/86 - 12/09/86	14	4.5	0.55
54	12/12/86	13	6.0	0.23*
55	12/18/86 - 12/19/86	5	5.2	4.29
56	12/24/86 - 12/25/86	13	4.7	1.58
57	12/30/86	33	4.2	0.22*
1	01/01/87 - 01/02/87	6	5.0	1.99*
2	01/10/87 - 01/11/87	27	4.4	0.62*
3	01/17/87 - 01/20/87	8	6.3	1.25*
4	01/22/87	7	5.5	2.14*
5	01/26/87	20	4.7	0.35*
6	01/30/87 - 01/31/87	32	4.2	0.46*
7	02/08/87 - 02/09/87	70	3.98	0.69*
8	02/28/87 - 03/01/87	9	4.74	0.61
9	03/20/87 - 03/22/87	21	4.34	0.18*
10	03/26/87	30	4.15	0.12
11	03/28/87	25	4.25	0.31
12	03/30/87 - 03/31/87	9	4.94	3.46
13	04/04/87 - 04/07/87	12	4.67	5.02
14	04/12/87 - 04/13/87	36	4.25	1.14
15	04/17/87 - 04/18/87	29	4.29	0.49
16	04/24/87 - 04/25/87	15	4.45	0.72
17	04/28/87	15	4.48	0.30*
18	05/03/87 - 05/04/87	38	4.06	1.24
19	05/05/87 - 05/06/87	34	4.06	0.11
20	05/15/87	59	3.85	0.21
21	05/18/87 - 05/19/87	64	3.84	0.14
22	05/27/87 - 05/28/87	55	4.11	0.33
23	06/02/87	69	3.86	0.54
24	06/04/87 - 06/05/87	48	4.07	0.23
25	06/12/87 - 06/13/87	100	3.64	0.24
26	06/26/87 - 06/27/87	30	4.25	1.37
27	07/02/87 - 07/04/87	92	3.70	0.35
28	07/22/87	39	4.06	0.11
29	07/25/87 - 07/26/87	81	3.91	0.18
30	08/03/87	51	3.96	0.83
31	08/05/87 - 08/06/87	49	3.96	0.13
32	08/08/87 - 08/10/87	137	3.55	0.42
33	08/19/87 - 08/20/87	87	3.82	0.16

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

TABLE 30, CONTINUED

Event Number	Period of Collection	Specific Conductance	pH	Inches of Precipitation
34	08/22/87	85	3.86	0.18
35	08/27/87 - 08/29/87	29	4.21	3.09
36	09/01/87	41	4.13	0.47
37	09/07/87	11	5.28	0.27
38	09/08/87 - 09/09/87	22	5.27	0.46
39	09/12/87 - 09/13/87	13	4.97	1.18
40	09/17/87 - 09/19/87	60	3.87	1.31
41	09/30/87	22	4.54	0.19
42	10/03/87 - 10/04/87	8	4.95	2.46
43	10/21/87	118	3.64	0.20
44	10/27/87 - 10/28/87	11	4.76	1.57
45	11/09/87 - 11/10/87	91	3.68	0.27
46	11/11/87 - 11/12/87	11	4.79	2.29*
47	11/17/87 - 11/18/87	28	4.56	0.26
48	11/30/87 - 12/01/87	16	4.88	1.42
49	12/06/87	108	4.18	0.19*
50	12/10/87 - 12/11/87	20	4.46	0.53
51	12/12/87	50	4.06	0.18
52	12/15/87	11	4.74	0.84*
53	12/20/87	50	4.08	0.27*
54	12/28/87 - 12/29/87	25	4.38	0.21*

* Due to equipment failure or snowfall, datum is from nearby National Weather Service sites.

FIGURE 18

INCHES OF PRECIPITATION

PLAINFIELD SITE, 1987

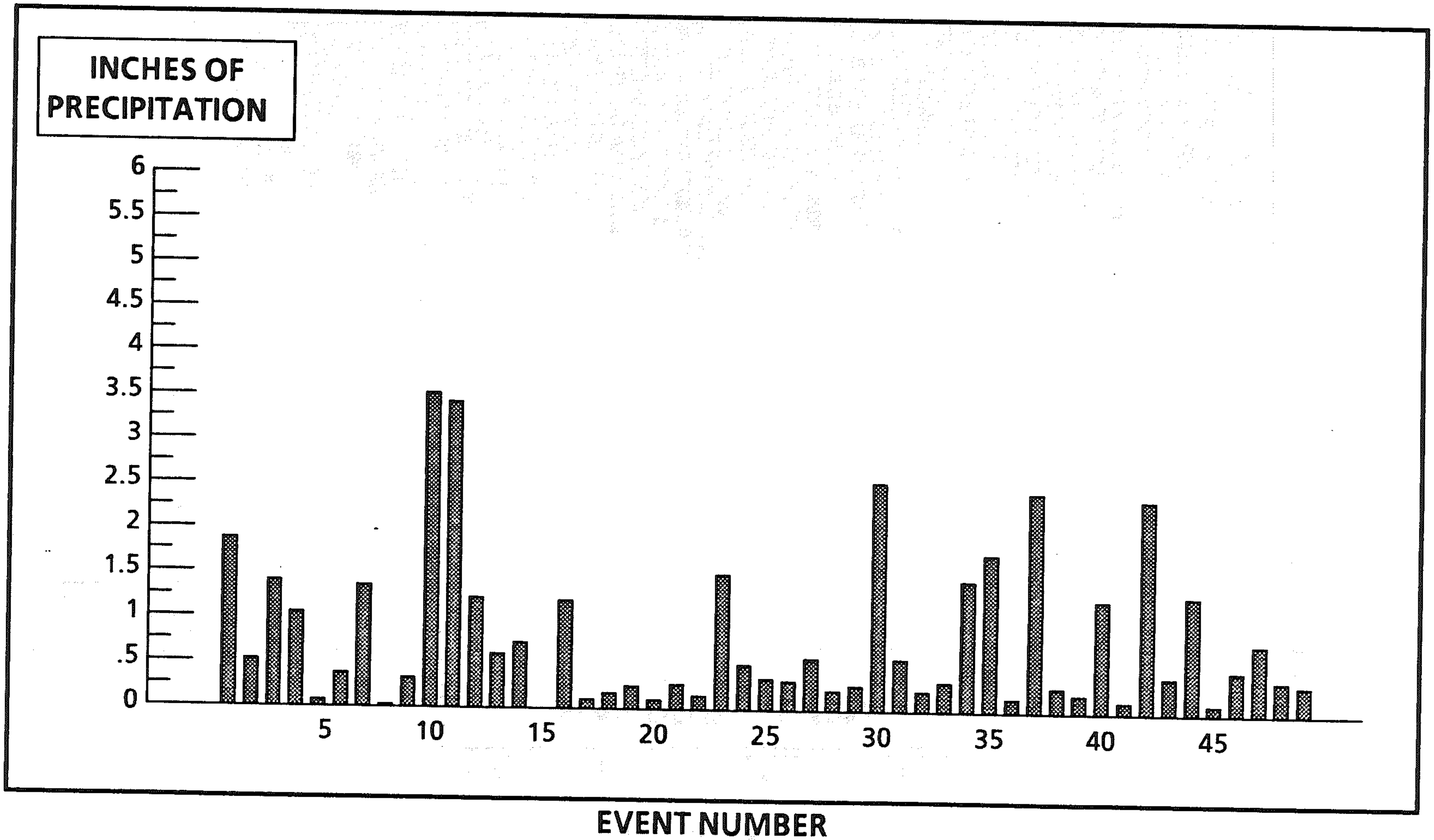
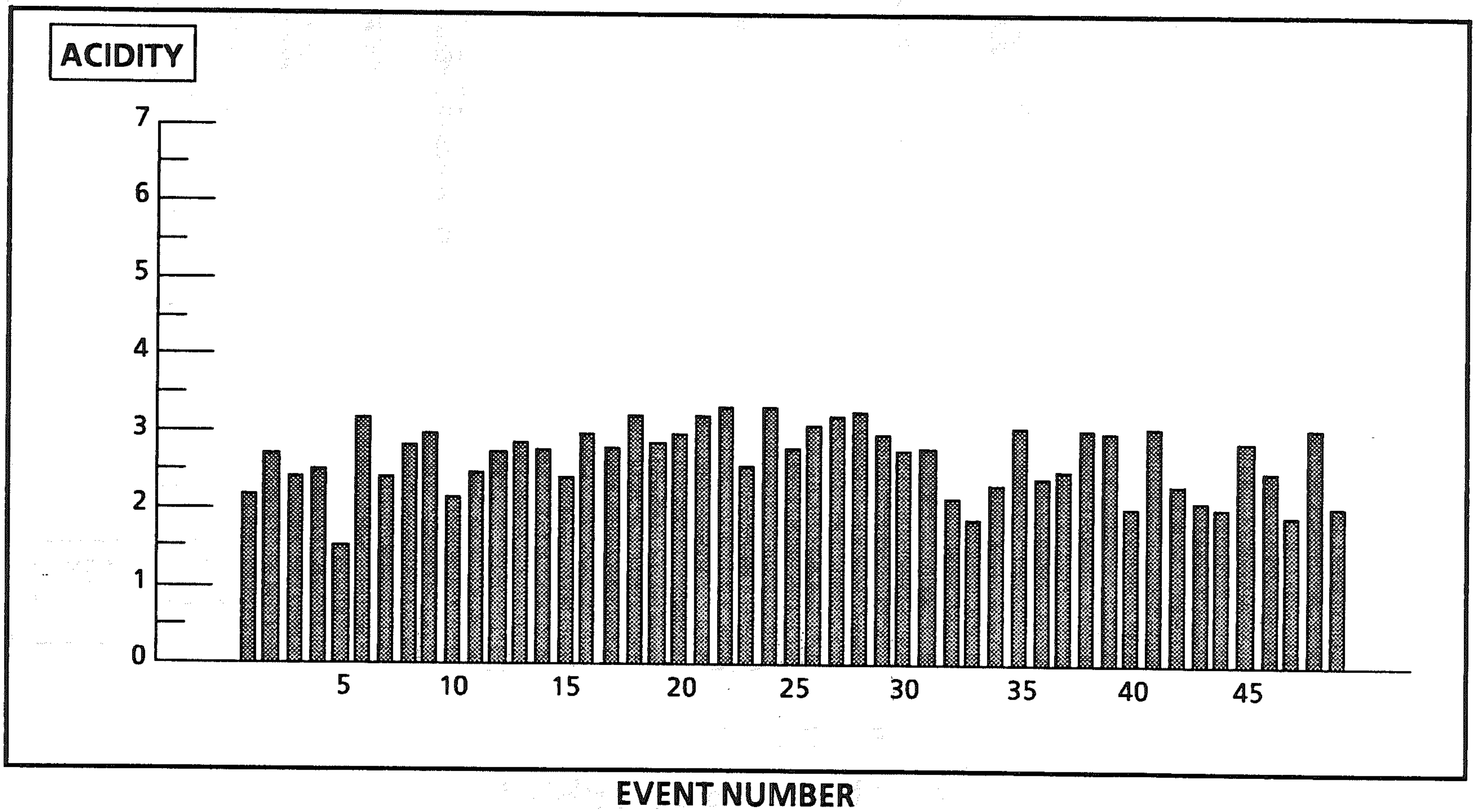


FIGURE 19

ACIDITY OF PRECIPITATION

PLAINFIELD SITE, 1987



ACIDITY = 7 - pH

FIGURE 20

SPECIFIC CONDUCTANCE OF PRECIPITATION

PLAINFIELD SITE, 1987

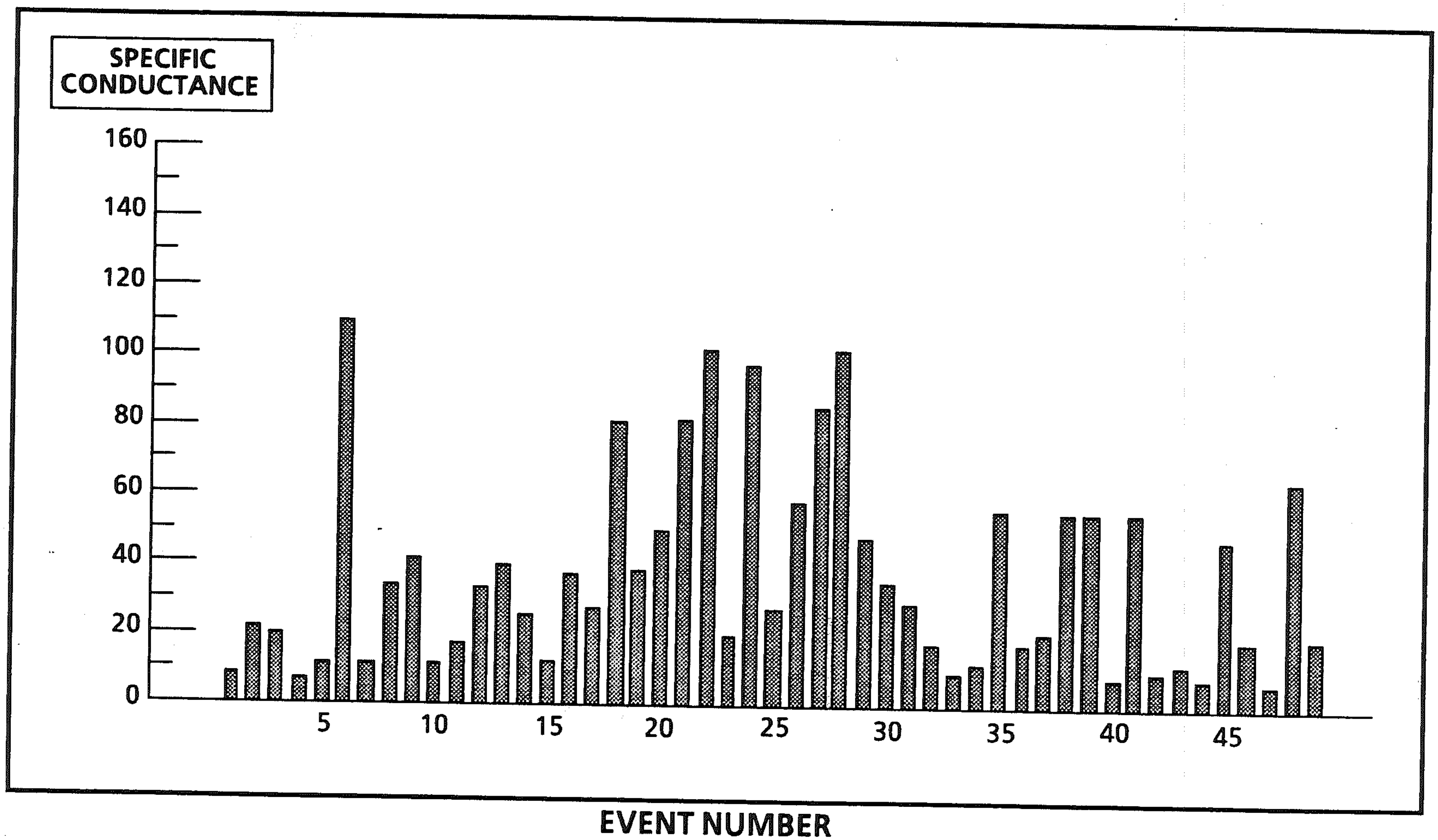


FIGURE 21

INCHES OF PRECIPITATION

MORRIS DAM SITE, 1987

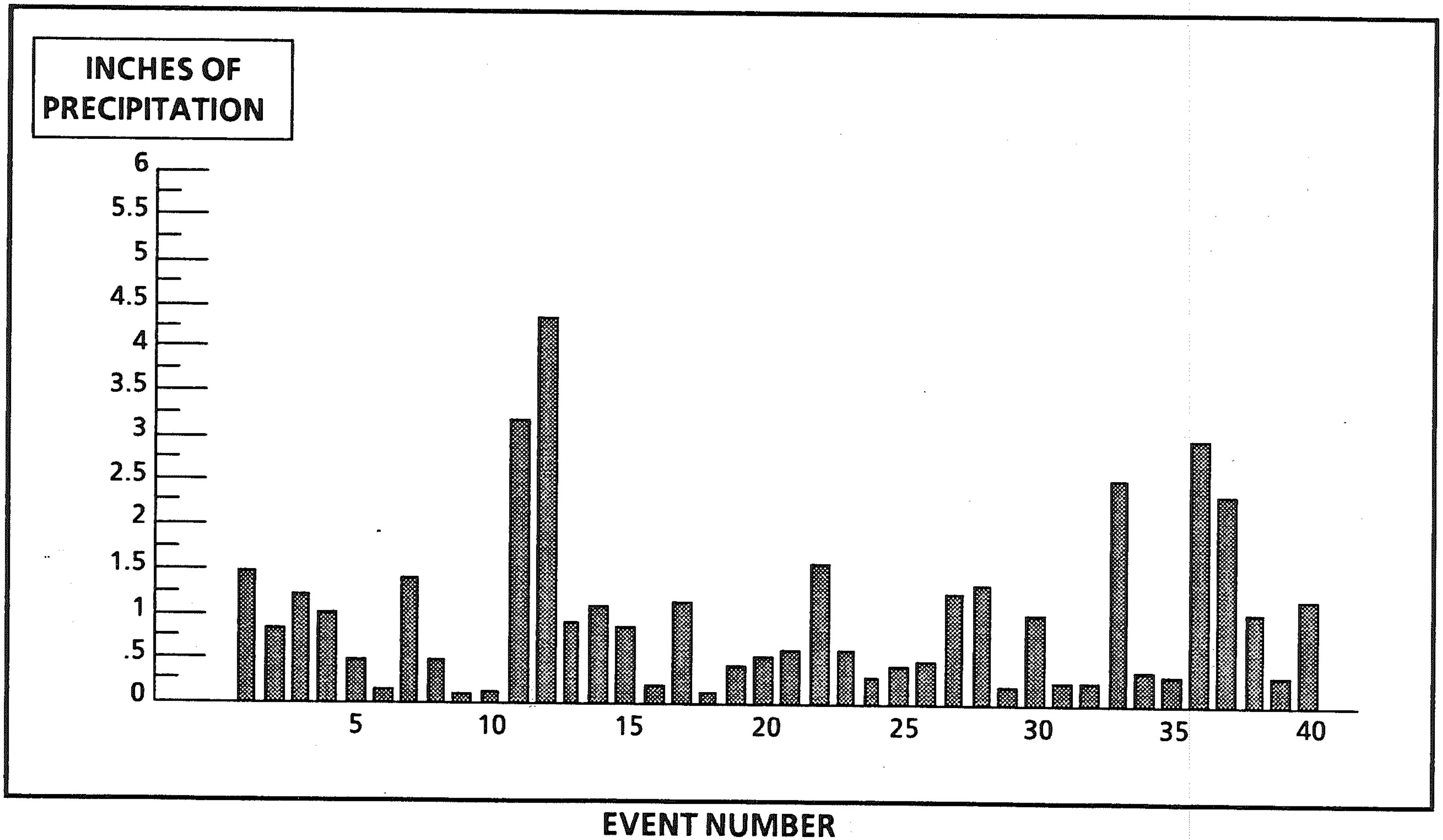
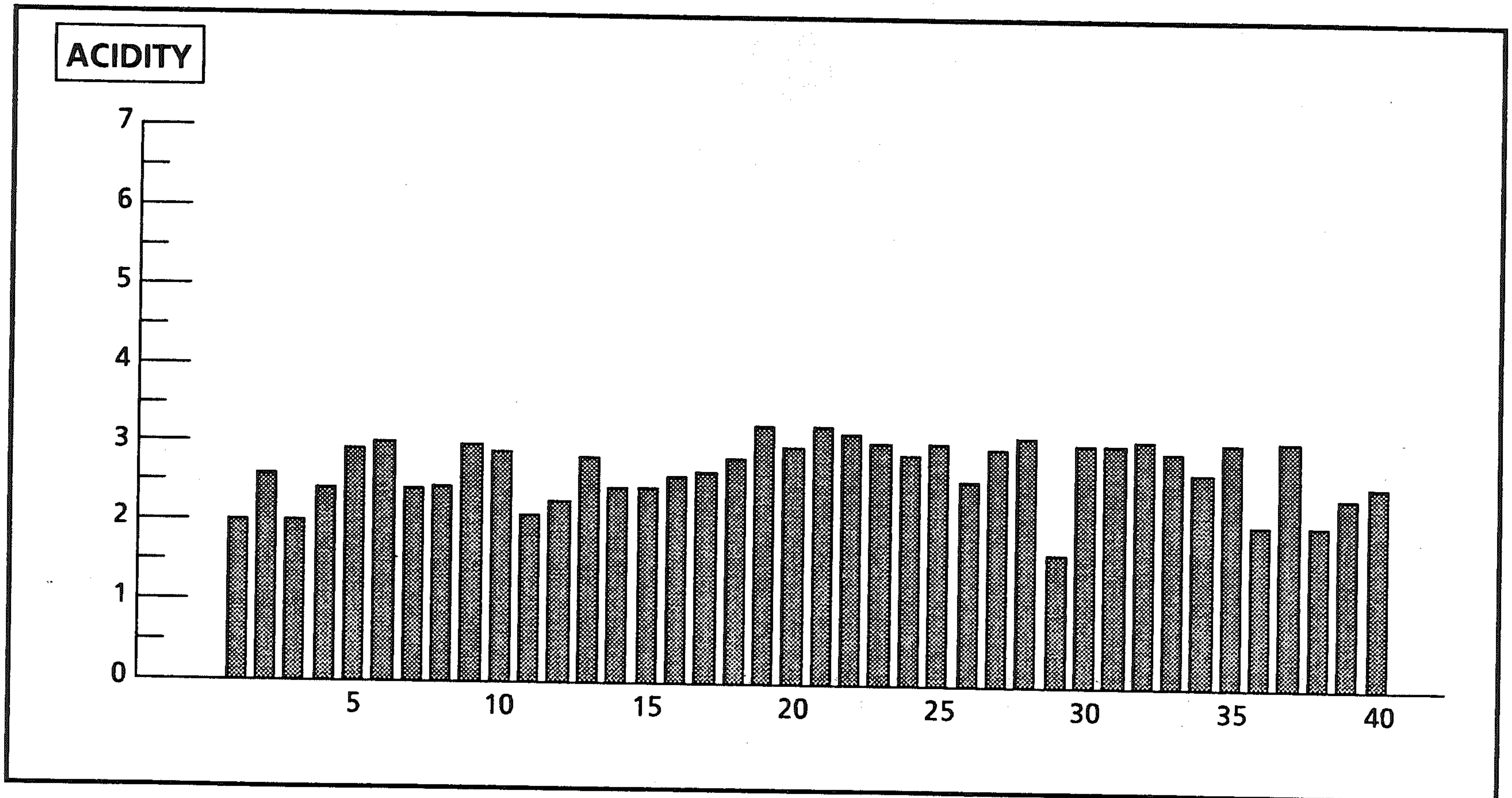


FIGURE 22

ACIDITY OF PRECIPITATION

MORRIS DAM SITE, 1987



EVENT NUMBER

ACIDITY = 7 - pH

FIGURE 23

SPECIFIC CONDUCTANCE OF PRECIPITATION

MORRIS DAM SITE, 1987

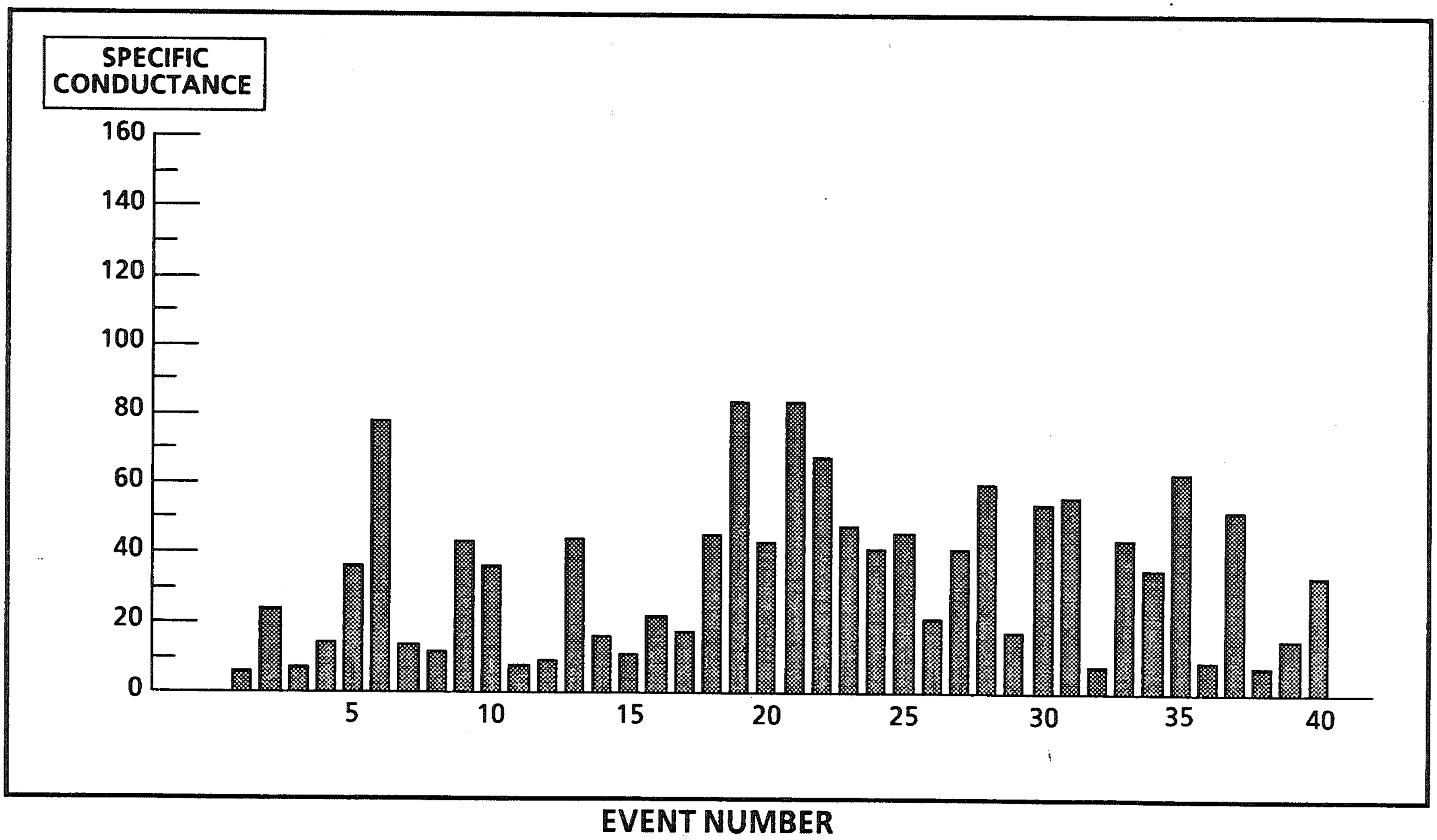


FIGURE 24

INCHES OF PRECIPITATION

MARLBOROUGH SITE, 1987

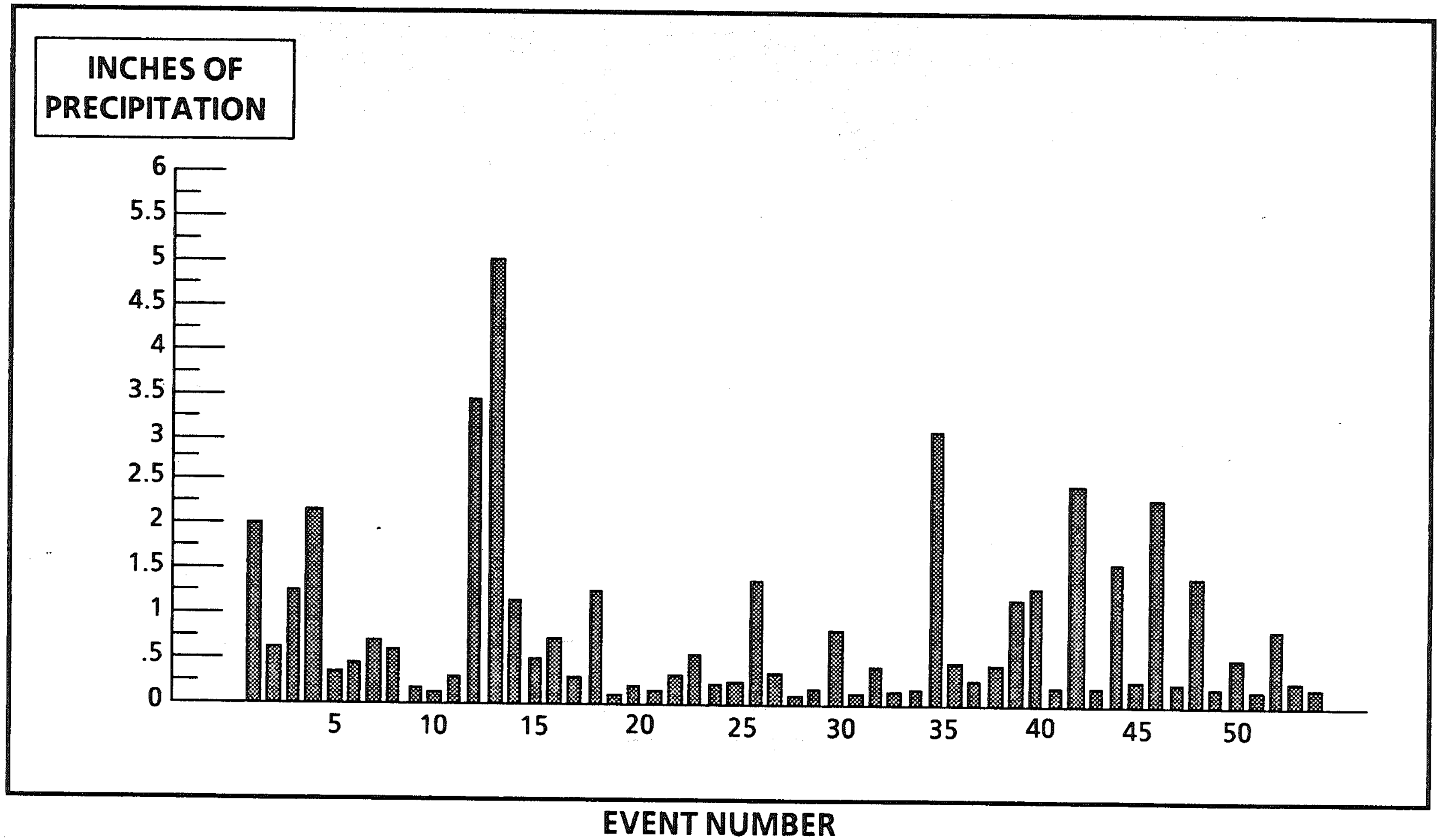
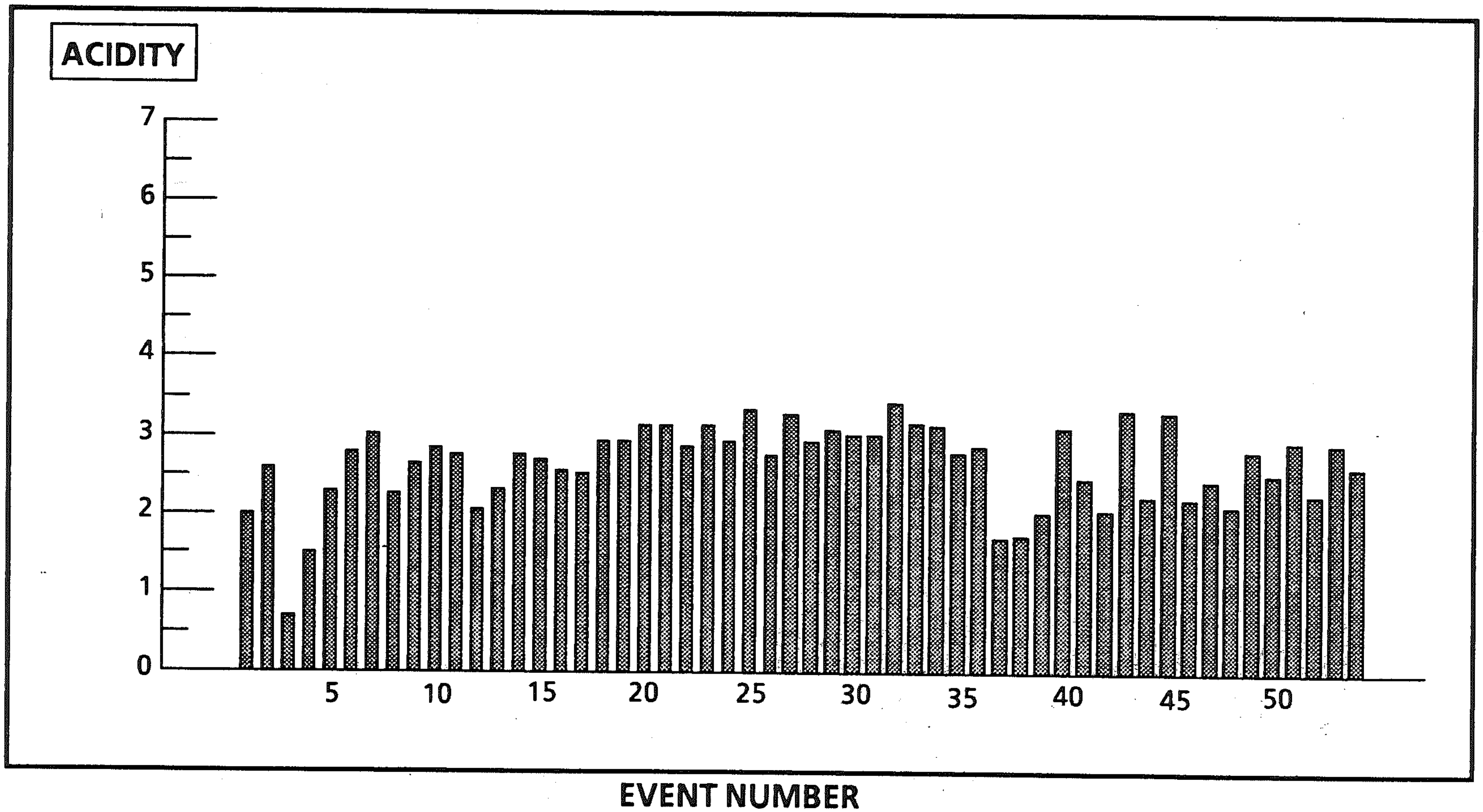


FIGURE 25

ACIDITY OF PRECIPITATION

MARLBOROUGH SITE, 1987

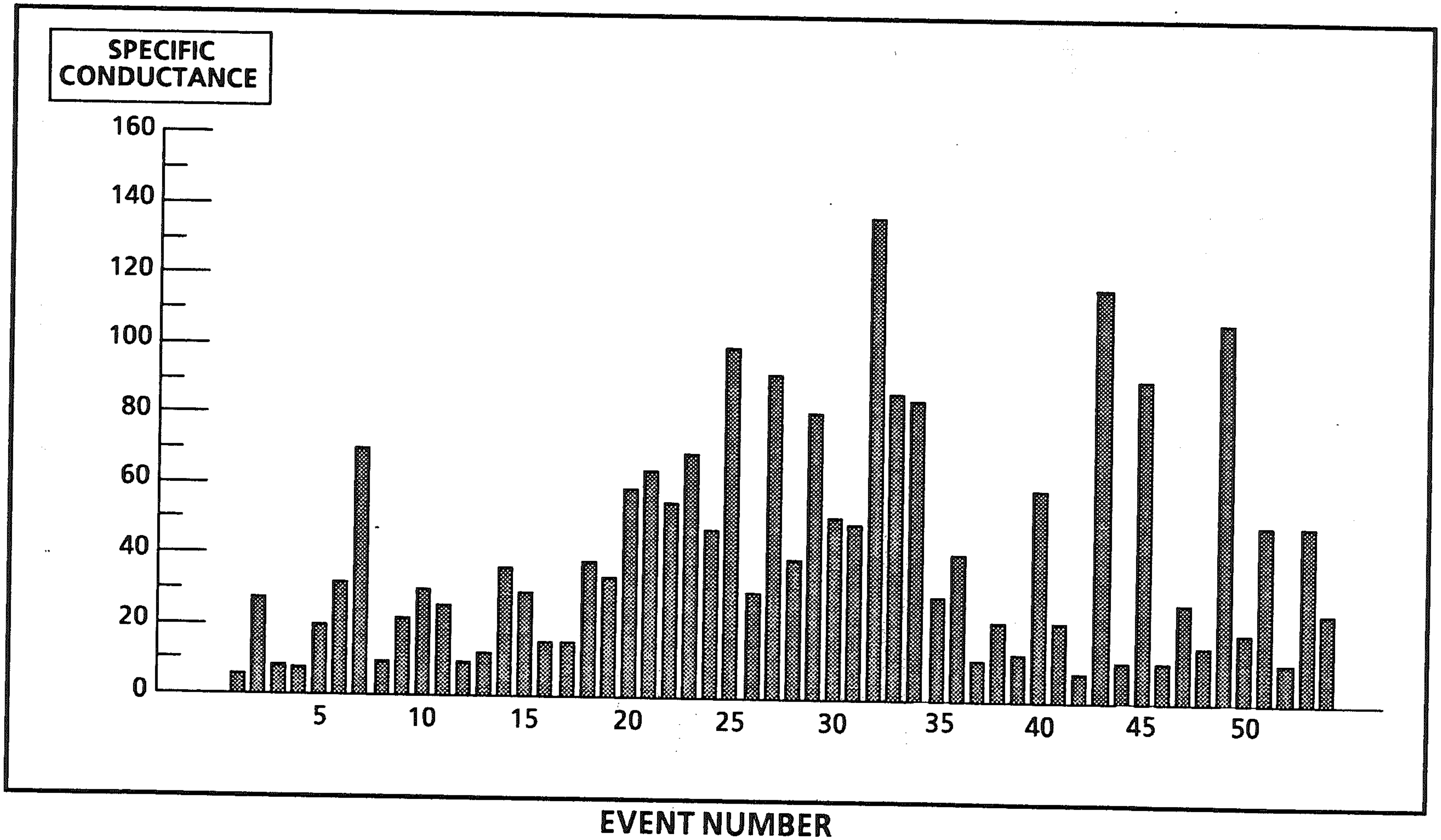


ACIDITY = 7 - pH

FIGURE 26

SPECIFIC CONDUCTANCE OF PRECIPITATION

MARLBOROUGH SITE, 1987



IX. CLIMATOLOGICAL DATA

Weather is often the most significant factor influencing short-term changes in air quality. It also has an affect on long-term trends. Climatological information from the National Weather Service station at Bradley International Airport in Windsor Locks is shown in Table 31 for the years 1986 and 1987. Table 32 contains information from the National Weather Service station located at Sikorsky Memorial Airport near Bridgeport. All data are compared to "mean" or "normal" values. Wind speeds* and temperatures are shown as monthly and yearly averages. Precipitation data includes both the number of days with more than 0.01 inches of precipitation and the total water equivalent. Also shown are degree days** (heating requirement) and the number of days with temperatures exceeding 90°F.

Wind roses for Bradley Airport and Newark Airport have been developed from 1987 National Weather Service surface observations and are shown in Figures 28 and 30, respectively. Wind roses from these stations for 1986 are shown in Figures 27 and 29, respectively.

* The mean wind speed for a month or year is calculated from all the hourly wind speeds, regardless of the wind directions.

** The degree day value for each day is arrived at by subtracting the average temperature of the day from 65°F. This number (65) is used as a base value because it is assumed that there is no heating requirement when the outside temperature is 65°F.

TABLE 31

1986 AND 1987 CLIMATOLOGICAL DATA
BRADLEY INTERNATIONAL AIRPORT, WINDSOR LOCKS

	AVERAGE TEMPERATURE °F			NO. OF DAYS WHEN MAX. TEMP. EXCEEDED 90 °F			DEGREE DAYS			PRECIPITATION IN EQUIVALENT INCHES OF WATER			NO. OF DAYS WITH MORE THAN 0.01 INCHES OF PRECIPITATION			AVERAGE WIND SPEED (MPH)		
	1986	1987	Mean[a]	1986	1987	Mean[b]	1986	1987	Normal[c]	1986	1987	Mean[a]	1986	1987	Mean[d]	1986	1987	Mean[d]
Jan	27.4	25.0	26.5	0	0	0.0	1159	1230	1234	5.34	6.20	3.56	10	12	10.7	8.8	8.7	9.0
Feb	26.2	26.7	27.7	0	0	0.0	1081	1065	1047	3.02	0.45	3.21	12	4	10.2	8.4	9.6	9.4
Mar	38.7	39.8	37.1	0	0	0.0	809	773	874	2.72	4.44	3.73	10	9	11.4	6.0	9.8	9.9
Apr	51.0	49.7	48.2	0	0	0.3	413	452	486	1.55	5.23	3.77	12	15	11.1	9.2	10.1	10.1
May	61.7	60.8	59.1	2	3	1.2	174	191	197	2.28	2.18	3.59	12	10	11.5	9.0	8.7	8.9
Jun	66.0	68.8	67.9	1	3	3.5	63	29	20	6.79	3.66	3.58	14	13	11.5	9.3	7.8	8.1
Jul	72.3	74.2	73.2	3	10	7.9	14	1	0	4.44	2.27	3.52	10	7	9.5	7.9	7.5	7.5
Aug	69.5	69.0	70.9	0	4	4.5	32	31	8	3.44	4.25	3.81	11	11	9.9	7.4	7.6	7.1
Sep	61.8	62.9	63.5	1	0	1.4	135	100	102	0.84	7.19	3.62	9	12	9.5	7.3	7.8	7.3
Oct	51.4	49.2	53.0	0	0	*	422	481	391	2.18	3.67	3.16	8	8	8.2	7.4	8.2	7.7
Nov	38.3	41.4	42.0	0	0	0.0	793	700	702	5.57	3.66	3.79	12	10	11.2	8.0	9.6	8.4
Dec	33.1	33.2	30.4	0	0	0.0	981	981	1113	6.15	1.57	3.74	10	11	12.2	8.4	8.9	8.6
YEAR	49.8	50.1	50.0	7	20	18.8	6076	6034	6174	44.32	44.77	43.09	130	122	127.0	8.4	8.7	8.5

* Less than 0.05
[a] 1905-1987
[b] 1960-1987
[c] 1951-1980
[d] 1955-1987

Extracted From: Local Climatological Data Charts
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Environmental Data Service

TABLE 32

1986 AND 1987 CLIMATOLOGICAL DATA
SIKORSKY INTERNATIONAL AIRPORT, STRATFORD

	AVERAGE TEMPERATURE °F			NO. OF DAYS WHEN MAX. TEMP. EXCEEDED 90 °F			DEGREE DAYS			PRECIPITATION IN EQUIVALENT INCHES OF WATER			NO. OF DAYS WITH MORE THAN 0.01 INCHES OF PRECIPITATION			AVERAGE WIND SPEED (MPH)		
	1986	1987	Mean[a]	1986	1987	Mean[b]	1986	1987	Normal[c]	1986	1987	Mean[d]	1986	1987	Mean[e]	1986	1987	Mean[f]
Jan	30.6	30.1	28.4	0	0	0.0	1060	1077	1101	2.66	4.78	3.59	8	13	10.6	---	---	13.2
Feb	29.2	30.0	30.5	0	0	0.0	997	975	963	3.05	0.43	3.26	13	4	9.5	---	---	13.6
Mar	39.9	41.3	38.0	0	0	0.0	772	727	831	2.32	4.77	3.95	9	10	11.2	---	---	13.5
Apr	50.6	50.2	48.0	0	0	0.0	425	434	492	1.65	4.73	3.88	12	11	10.5	---	---	13.0
May	61.1	58.8	58.5	0	2	0.1	174	232	220	0.41	1.20	3.68	9	7	10.9	---	---	11.6
Jun	66.8	68.6	67.8	0	1	0.8	41	23	20	3.16	1.55	3.36	14	9	9.5	---	---	10.5
Jul	73.1	74.9	73.3	3	4	3.0	3	0	0	5.74	1.78	3.69	9	9	8.3	---	---	10.0
Aug	70.7	71.0	71.9	0	2	1.5	23	10	0	2.43	3.89	3.96	13	11	9.3	---	---	10.1
Sep	64.7	65.2	65.2	0	0	0.4	68	53	49	0.85	4.09	3.47	10	12	8.5	---	---	11.2
Oct	54.3	51.3	54.7	0	0	0.0	345	417	285	2.14	2.20	3.31	8	7	7.1	---	---	11.9
Nov	42.3	44.9	44.2	0	0	0.0	673	596	585	4.91	2.87	3.79	11	9	10.1	---	---	12.7
Dec	35.5	36.8	33.3	0	0	0.0	908	867	955	4.41	2.08	3.67	12	10	11.4	---	---	13.0
YEAR	51.6	51.9	51.1	3	9	5.9	5489	5411	5501	33.73	34.37	43.60	128	112	117.2	---	---	12.0

[a] 1903-1987
[b] 1966-1987
[c] 1951-1980
[d] 1894-1987
[e] 1949-1987
[f] 1958-1980

Extracted From: Local Climatological Data Charts
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Environmental Data Service

FIGURE 27

ANNUAL WIND ROSE FOR 1986
BRADLEY INTERNATIONAL AIRPORT
WINDSOR LOCKS, CONNECTICUT

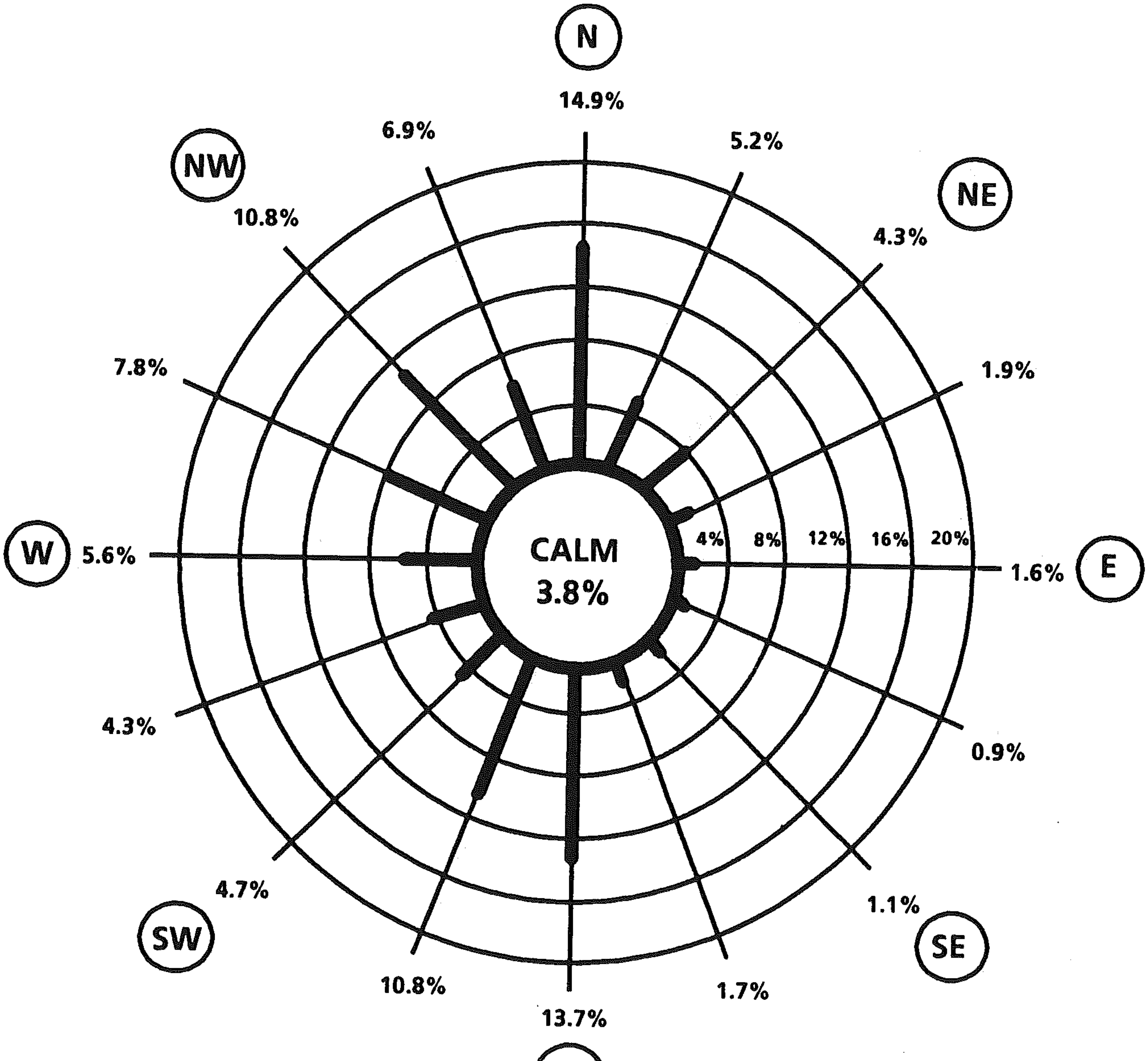


FIGURE 28

ANNUAL WIND ROSE FOR 1987
BRADLEY INTERNATIONAL AIRPORT
WINDSOR LOCKS, CONNECTICUT

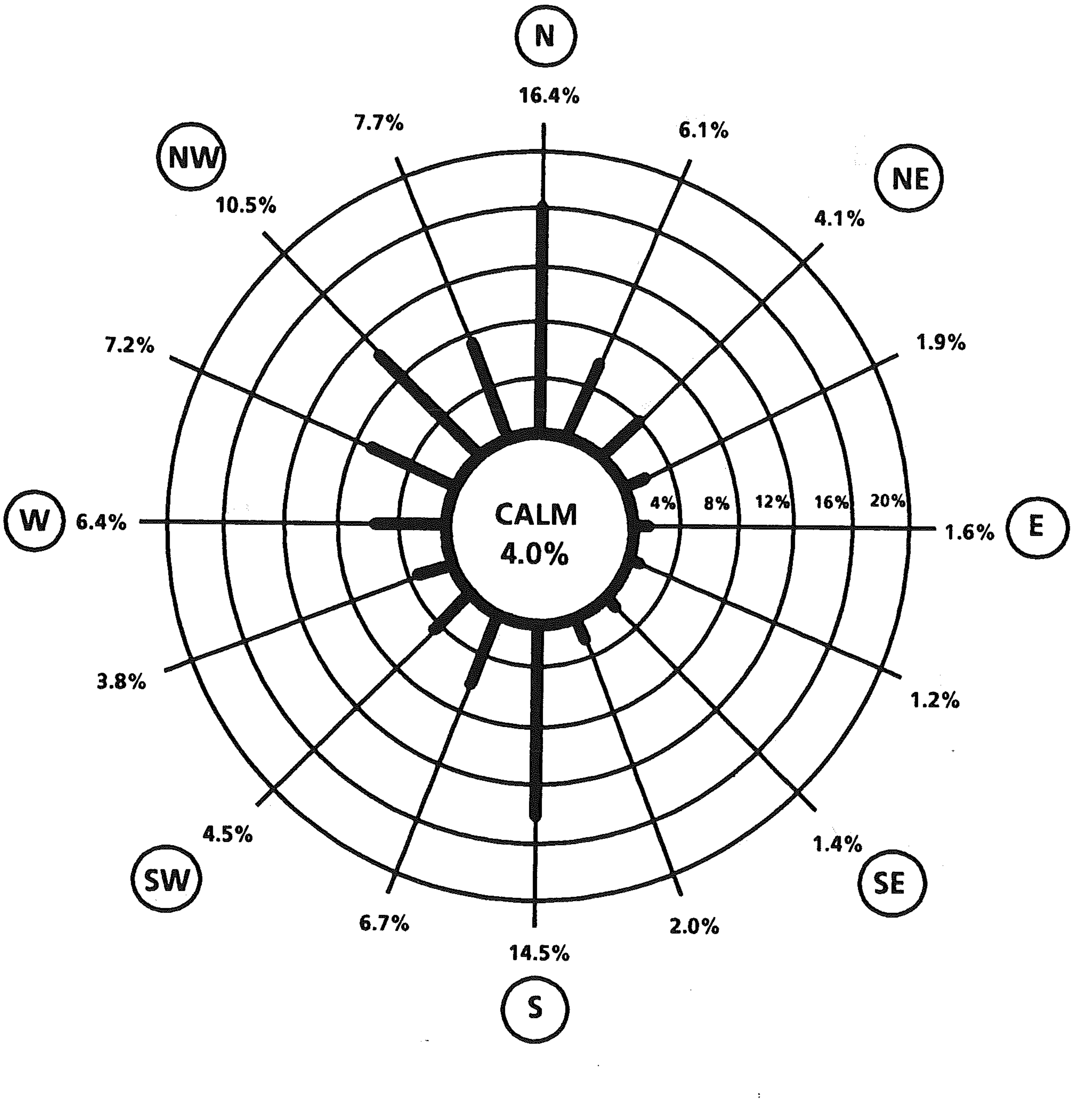


FIGURE 29

ANNUAL WIND ROSE FOR 1986
NEWARK INTERNATIONAL AIRPORT
NEWARK, NEW JERSEY

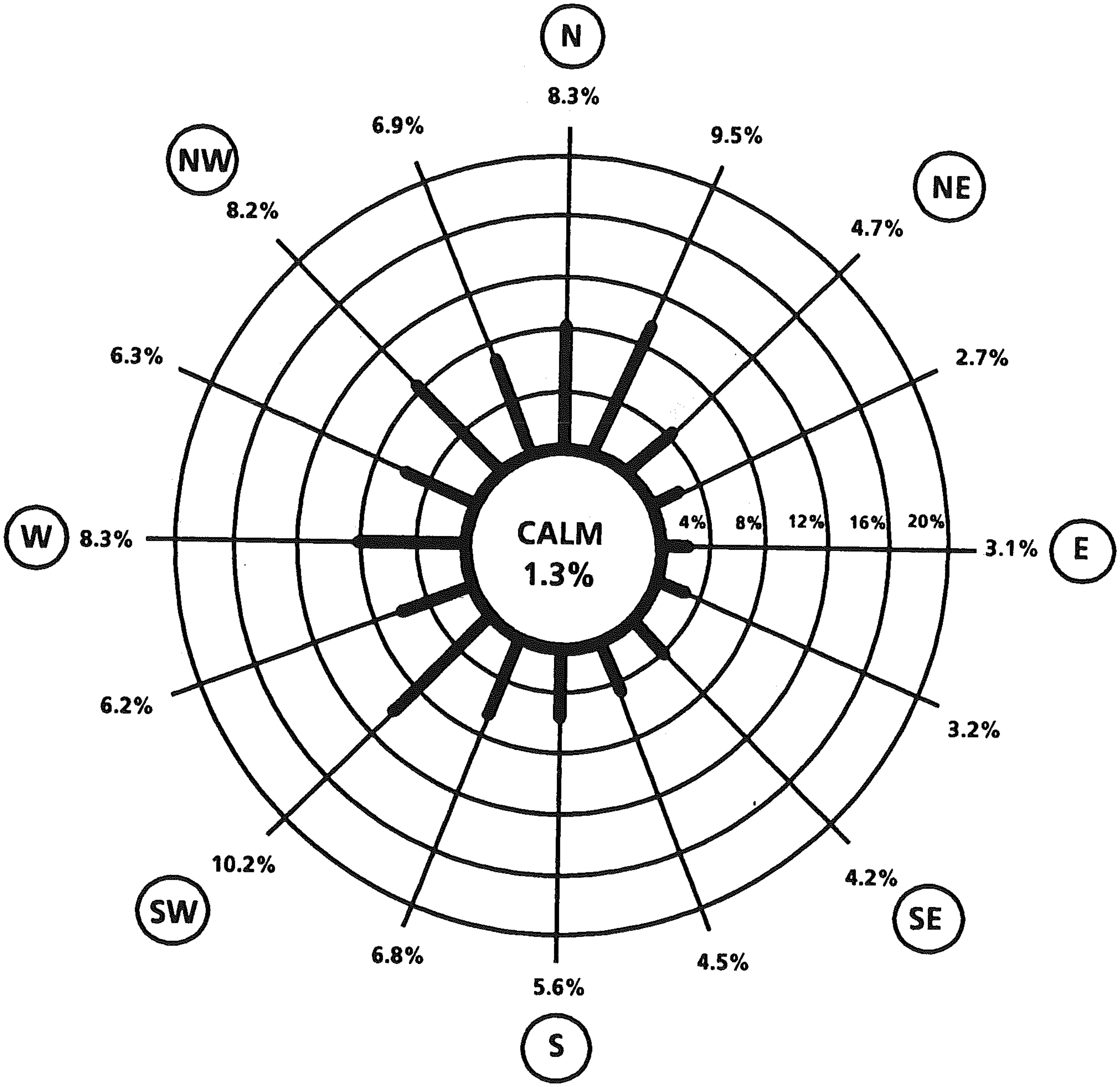
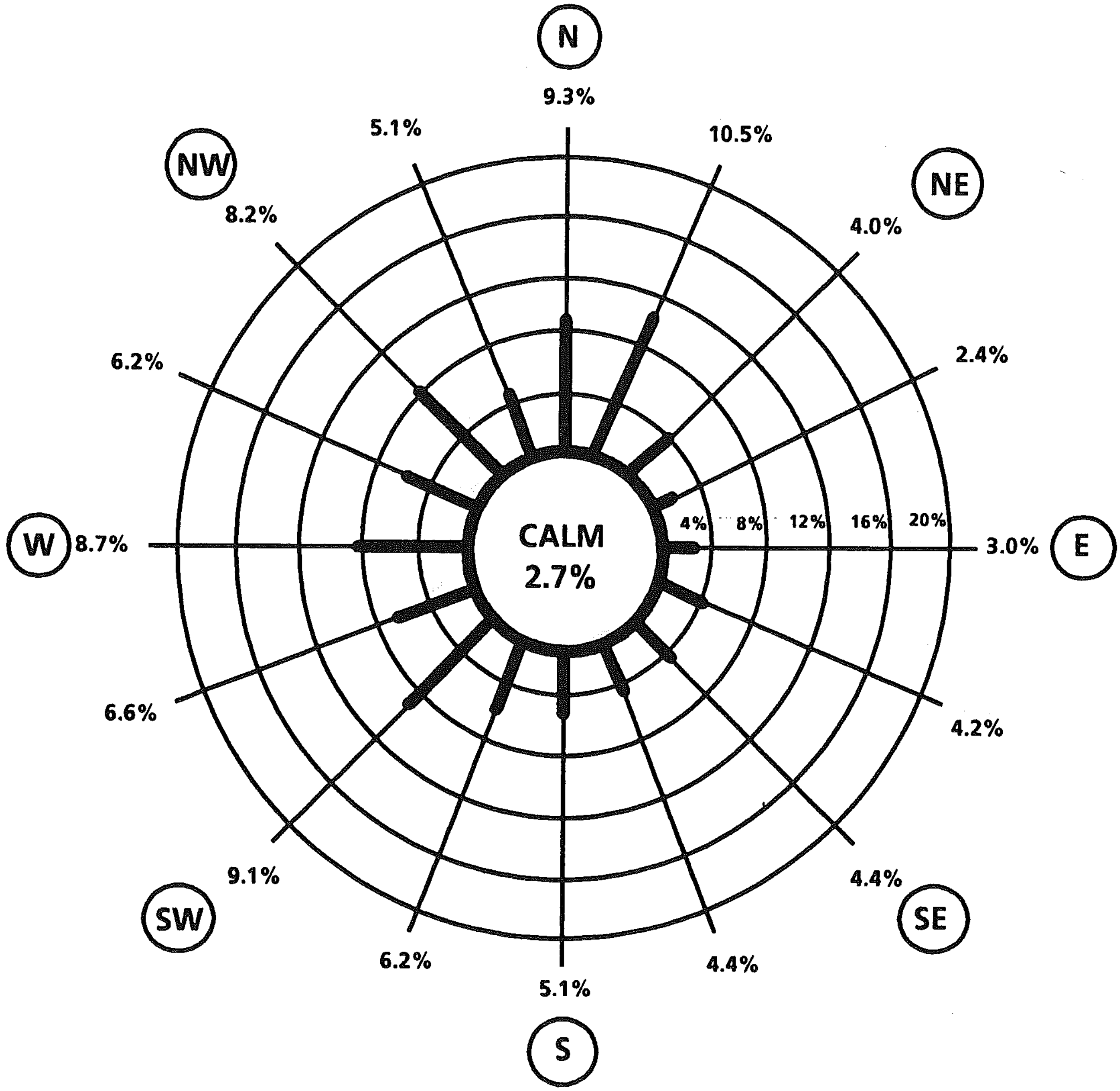


FIGURE 30

ANNUAL WIND ROSE FOR 1987
NEWARK INTERNATIONAL AIRPORT
NEWARK, NEW JERSEY



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

The attainment status designations for Connecticut's four Air Quality Control Regions (AQCR's, see Figure 31) with regard to the National Ambient Air Quality Standards (NAAQS) have been determined for 1987 for the following pollutants: total suspended particulates (TSP); sulfur dioxide (SO_2); ozone (O_3); nitrogen dioxide (NO_2); carbon monoxide (CO) ; and lead (Pb). Table 33 shows the attainment status of each AQCR by pollutant. The AQCR's are classified as attainment, non-attainment or unclassifiable. These classifications conform to federal EPA guidelines and were applied in each case only after federal approval was granted. The federal EPA classifies an AQCR as attainment for a particular pollutant when all standards are attained (i.e., short term, long term, primary and secondary, wherever applicable). This notwithstanding, Table 33 contains the AQCR classifications with respect to all relevant short-term and long-term standards.

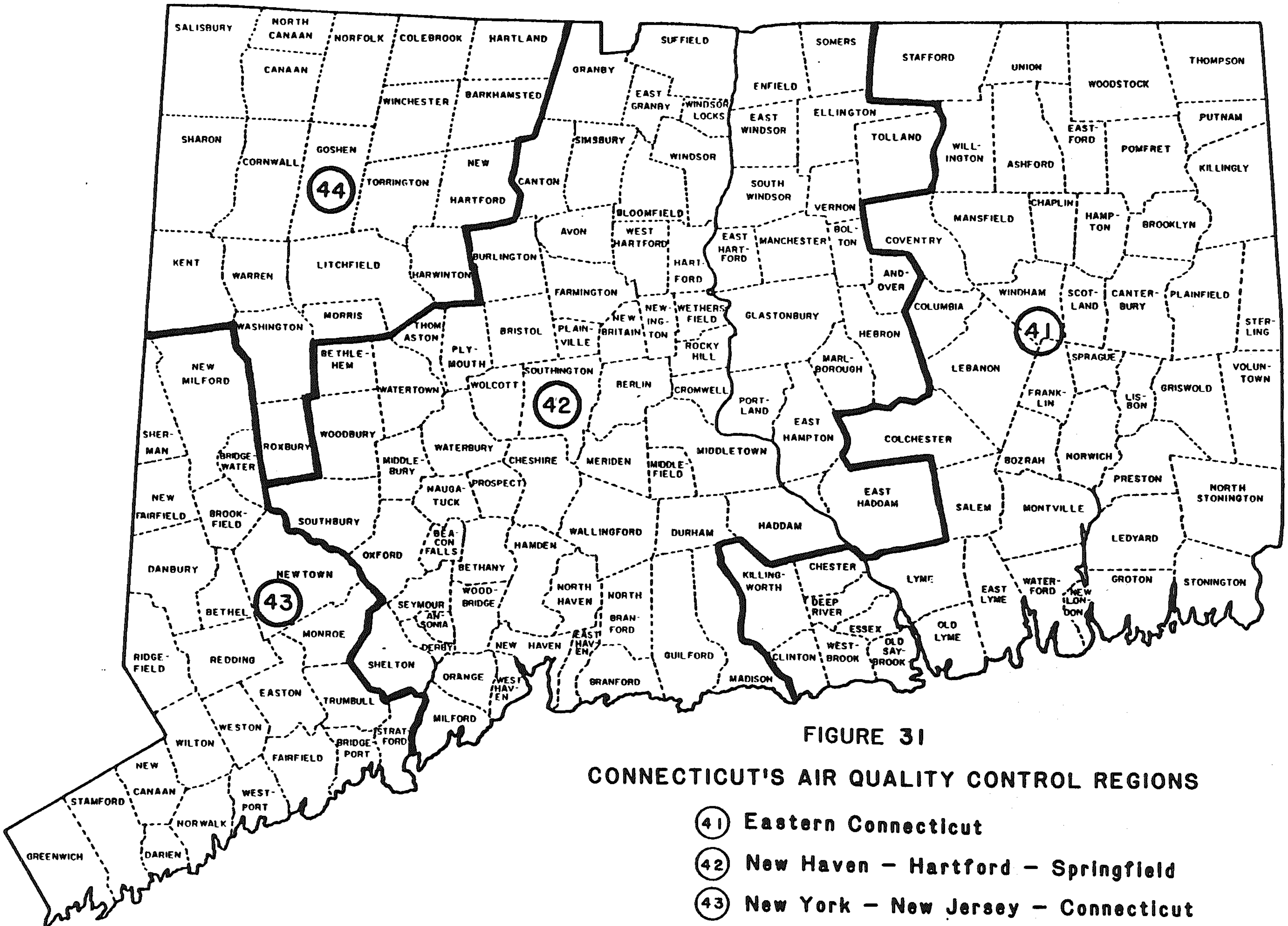


FIGURE 31

CONNECTICUT'S AIR QUALITY CONTROL REGIONS

(41) Eastern Connecticut

(42) New Haven - Hartford - Springfield

(43) New York - New Jersey - Connecticut

(44) Northwestern Connecticut

TABLE 33

CONNECTICUT'S COMPLIANCE BY AQCR WITH THE NAAQS IN 1987

Pollutant	Primary or Secondary	NAAQS	AQCR 41	AQCR 42	AQCR 43	AQCR 44
TSP	Primary	Annual	A	A	A	A
		24-Hour	A	A	A	A
	Secondary	Annual	A	A	A	A
		24-Hour	A	A	A	A
SO_2	Primary	Annual	A	A	A	A
		24-Hour	A	A	A	A
	Secondary	3-Hour	A	A	A	A
Ozone	Both	1-Hour	X	X	X	X
NO_2	Both	Annual	A	A	A	A
CO	Both	1-Hour	A	A	A	A
		8-Hour	U	X	X	U
Lead	Both	3-Month	A	A	A	A

X = Non-Attainment
U = Unclassifiable
A = Attainment

XI. CONNECTICUT SLAMS AND NAMS NETWORK

On May 10, 1979, the U.S. Environmental Protection Agency made public its final rulemaking for ambient air monitoring and data reporting requirements in the "Federal Register" (Vol. 44, No. 92). These regulations are meant to ensure the acceptability of air measurement data, the comparability of data from all monitoring stations, the cost-effectiveness of monitoring networks, and timely data submission for assessment purposes. The regulations address a number of key areas including quality assurance, monitoring methodologies, network design and probe siting. Detailed requirements and specific criteria are provided which form the framework for ambient air quality monitoring. These regulations apply to all parties conducting ambient air quality monitoring for the purpose of supporting or complying with environmental regulations. In particular, state/local control agencies and industrial/private concerns involved in air monitoring are directly influenced by specific requirements, compliance dates and recommended guidelines.

QUALITY ASSURANCE

The regulations specify the minimum quality assurance requirements for State and Local Air Monitoring Stations (SLAMS) networks, National Air Monitoring Stations (NAMS) networks, and Prevention of Significant Deterioration (PSD) air monitoring. Two distinct and equally important functions make up the quality assurance program: assessment of the quality of monitoring data by estimating their precision and accuracy, and control of the quality of the data by implementation of quality control policies, procedures, and corrective actions. (See Part E of Section I, Quality Assurance).

The data assessment requirements entail the determination of precision and accuracy for both continuous and manual methods. A one-point precision check must be carried out at least once every other week on each automated analyzer used to measure SO_2, NO_2, CO and O_3. Standards from which the precision check test data are derived must meet specifications detailed in the regulations. For manual methods, precision checks are to be accomplished by operating co-located duplicate samplers. In addition, precision checks for lead are also accomplished by analysis of duplicate strips. In 1987, Connecticut maintained three co-located TSP monitors (Bridgeport 123, Hartford 003, and Waterbury 007) and three co-located lead monitors (Bridgeport 123, Waterbury 007, and Waterbury 123). In addition, duplicate strip analyses were performed at two sites (Hartford 016 and New Haven 018).

Accuracy determinations for automated analyzers (SO_2, NO_2, CO, O_3) are accomplished by audits performed by an independent auditor utilizing equipment and gases which are disassociated from the normal network operations. Accuracy determinations are accomplished via traceable standard flow devices for hi-vols and via spiked strip analyses for lead. For SLAMS analyzers, accuracy audits must be performed on each analyzer at least once per calendar year. Each PSD analyzer must be audited at least once each calendar quarter.

All precision and accuracy data are derived through calculation methods specified by the regulations, with the results reported quarterly on Data Assessment Report Forms. The NAMS network is actually part of the SLAMS network; so the SLAMS accuracy determinations also apply to the NAMS network. The distinguishing characteristics of NAMS are: 1) the sites are located in high population, high pollution areas (i.e., urban areas); 2) only continuous instruments are used to monitor gaseous pollutants; 3) the regulations specify a minimum number and locations for them; and 4) the data, in addition to being included in the annual report, are required to be reported quarterly to EPA.

In order to control the quality of data, the monitoring program must have operational procedures for each of the following activities:

1. Installation of equipment,
2. Selection of methods, analyzers, or samplers,
3. Zero/span checks and analyzer adjustments,
4. Calibration,
5. Control limits for zero/span and other control checks, and respective corrective actions when such limits are exceeded,
6. Control checks and their frequency,
7. Preventive and remedial maintenance,
8. Calibration and zero/span checks for multi-range analyzers,
9. Recording and validating data, and
10. Documentation of quality control information.

MONITORING METHODOLOGIES

Except as otherwise stated within the regulations, the monitoring methods used must be "reference" or "equivalent," as designated by the EPA. Table 34 lists methods used in Connecticut's network in 1987 which were on the EPA-approved list as of September 18, 1980. Additional updates to these approved methods are provided through the "Federal Register."

NETWORK DESIGN

The regulations also describe monitoring objectives and general criteria to be applied in establishing the SLAMS networks and for choosing general locations for new monitors. Criteria are also presented for determining the location and number of monitors. These criteria serve as the framework for all State Implementation Plan (SIP) monitoring networks that were to be complete and in operation by January 1, 1984.

The SLAMS network must be designed to meet four basic monitoring objectives: (1) to determine the highest pollutant concentration in the area; (2) to determine representative concentrations in areas of high population density; (3) to determine the ambient impact of significant sources or source categories; and (4) to determine general background concentration levels. Proper siting of a monitor requires precise specification of the monitoring objectives, which usually includes a desired spatial scale of representativeness. The spatial scales of representativeness are specified in the regulations for all pollutants and monitoring objectives. The 1987 SLAMS and NAMS networks in Connecticut are presented and described in Table 35.

PROBE SITING

Location and exposure of monitoring probes have been an area of confusion for a number of years because of conflicting guidelines and a lack of guidance or recommended criteria. The probe siting criteria promulgated in the regulations are specific. They are also sufficiently comprehensive to define the requirements for ensuring the uniform collection of compatible and comparable air quality data.

These criteria are detailed by pollutant and include vertical and horizontal probe placement, spacing from obstructions and trees, spacing from roadways, probe material and sample residence time, and various other considerations. A summary of the probe siting criteria is presented in Table 36. The siting criteria generally apply to all spatial scales except where noted. The most notable exception is spacing from roadways which is dependent on traffic volume.

For the chemically reactive gases SO_2, NO_2, and O_3,the regulations specify borosilicate glass, FEP teflon or their equivalent as the only acceptable probe materials. Additionally, in order to minimize the effects of particulate deposition on probe walls, sampling probes for reactive gases must have residence times of less than 20 seconds.

TABLE 34

U. S. EPA-APPROVED MONITORING METHODS USED IN CONNECTICUT IN 1987

Pollutant	Monitoring Methods		
	Reference Manual	Reference Automated	Equivalent Automated
TSP	High Volume Method		
SO_2			Thermo Electron 43 (0.5)
O_3			DASIBI 1008-RS (0.5)
CO		Bendix 8501-5CA (50)	
NO_2		Thermo Electron 14 B/E (0.5)	
Lead	High Volume Method Low Volume Method*		

* This is a modified reference method approved by EPA on 2/29/84.

( ) = Approved range in ppm

TABLE 35

1987 SLAMS AND NAMS SITES IN CONNECTICUT

Town	Urban Area	Site	SLAMS or NAMS	Sampling & Analytic Method	Operating Schedule	Monitoring Objective	Spatial Scale of Representativeness
				SULFUR DIOXIDE			
Bridgeport	Bridgeport	012	S	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
Bridgeport	Bridgeport	123	N	Pulsed Fluorescence	Continuous	Population	Neighborhood
Danbury	Danbury	123	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
E. Hartford	Hartford	005	N	Pulsed Fluorescence	Continuous	Population	Neighborhood
East Haven	New Haven	003	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
Enfield	MA - CT*	005	S	Pulsed Fluorescence	Continuous	Background	Regional
Greenwich	Stamford	017	S	Pulsed Fluorescence	Continuous	Background	Urban
Groton	New London/ Norwich	007	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
Hartford	Hartford	123	N	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
Milford	Bridgeport	010	S	Pulsed Fluorescence	Continuous	Source	Neighborhood
New Britain	New Britain	011	S	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
New Haven	New Haven	017	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
New Haven	New Haven	123	N	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
Norwalk	Norwalk	013	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
Stamford	Stamford	025	S	Pulsed Fluorescence	Continuous	Population	Neighborhood
Stamford	Stamford	123	S	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
Waterbury	Waterbury	008	S	Pulsed Fluorescence	Continuous	High Concentration	Neighborhood
Waterbury	Waterbury	123	S	Pulsed Fluorescence	Continuous	Population	Neighborhood

* Includes Springfield, Chicopee, Holyoke in MA; East Windsor, Enfield, Suffield, Windsor Locks in CT.

TABLE 35, CONTINUED

1987 SLAMS AND NAMS SITES IN CONNECTICUT

Town	Urban Area	Site	SLAMS or NAMS	Sampling & Analytic Method	Operating Schedule	Monitoring Objective	Spatial Scale of Representativeness
				NITROGEN OXIDES			
Bridgeport	Bridgeport	123	S	Chemiluminescent	Continuous	High Concentration	Neighborhood
E. Hartford	Hartford	003	S	Chemiluminescent	Continuous	High Concentration	Neighborhhod
New Haven	New Haven	123	S	Chemiluminescent	Continuous	High Concentration	Neighborhood
				OZONE			
				UV Photometry			
Bridgeport	Bridgeport	123	N	Chemiluminescent	Continuous	Population	Neighborhood
Danbury	Danbury	123	S	Chemiluminescent	Continuous	Population	Urban
E. Hartford	Hartford	003	N	Chemiluminescent	Continuous	Population	Neighborhood
Greenwich	Stamford	017	S	Chemiluminescent	Continuous	Background	Regional
Groton	New London/ Norwich	008	S	Chemiluminescent	Continuous	High Concentration	Urban
Middletown	Hartford	007	N	Chemiluminescent	Continuous	High Concentration	Urban
New Haven	New Haven	123	N	Chemiluminescent	Continuous	Population	Neighborhood
Stafford	Hartford	001	N	Chemiluminescent	Continuous	High Concentration	Urban
Stratford	Bridgeport	007	N	Chemiluminescent	Continuous	High Concentration	Urban
				CARBON MONOXIDE			
Bridgeport	Bridgeport	004	S	NDIR	Continuous	High Concentration	Micro
Hartford	Hartford	013	N	NDIR	Continuous	Population	Neighborhood
Hartford	Hartford	017	N	NDIR	Continuous	High Concentration	Micro
New Haven	New Haven	019	S	NDIR	Continuous	High Concentration	Micro
Stamford	Stamford	020	S	NDIR	Continuous	High Concentration	Micro

TABLE 35, CONTINUED

1987 SLAMS AND NAMS SITES IN CONNECTICUT

Town	Urban Area	Site	SLAMS or NAMS	Sampling Method	Analytic Method	Operating Schedule	Monitoring Objective	Spatial Scale of Representativeness
				TOTAL SUSPENDED PARTICULATES				
Ansonia	Bridgeport	004	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Bridgeport	Bridgeport	001	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Bridgeport	Bridgeport	009	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Bridgeport	Bridgeport	123	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Bristol	Bristol	001	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Burlington	NONE	001	S	Hi-Vol	Gravimetric	6th day	Background	Regional
Danbury	Danbury	002	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Danbury	Danbury	123	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
E. Hartford	Hartford	004	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Greenwich	Stamford	008	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Groton	New London/ Norwich	006	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Hartford	Hartford	003	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Hartford	Hartford	013	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Hartford	Hartford	014	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Manchester	Hartford	001	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Meriden	Meriden	002	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Middletown	Hartford	003	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Milford	Bridgeport	002	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Morris	NONE	001	S	Hi-Vol	Gravimetric	6th day	Background	Regional
Naugatuck	Waterbury	001	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
New Britain	New Britain	007	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
New Britain	New Britain	008	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
New Britain	New Britain	009	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
New Haven	New Haven	002	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
New Haven	New Haven	013	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood

TABLE 35, CONTINUED

1987 SLAMS AND NAMS SITES IN CONNECTICUT

Town	Urban Area	Site	SLAMS or NAMS	Sampling Method	Analytic Method	Operating Schedule	Monitoring Objective	Spatial Scale of Representativeness
				TOTAL SUSPENDED PARTICULATES				
Norwalk	Norwalk	001	S	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Norwalk	Norwalk	005	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Norwalk	Norwalk	012	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Norwich	New London/ Norwich	002	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Stamford	Stamford	001	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Stamford	Stamford	007	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Stamford	Stamford	021	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Stratford	Bridgeport	005	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Torrington	NONE	001	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Voluntown	NONE	001	S	Hi-Vol	Gravimetric	6th day	Background	Regional
Wallingford	New Haven	001	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Waterbury	Waterbury	005	N	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Waterbury	Waterbury	006	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
Waterbury	Waterbury	007	N	Hi-Vol	Gravimetric	6th day	High Concentration	Neighborhood
Willimantic	NONE	002	S	Hi-Vol	Gravimetric	6th day	Population	Neighborhood
				LEAD				
Ansonia	Bridgeport	004	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Bridgeport	Bridgeport	009	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Bridgeport	Bridgeport	010	S	Lo-Vol	Atomic Abs.	1 month	High Concentration	Middle
Bridgeport	Bridgeport	123	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Bristol	Bristol	001	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Danbury	Danbury	002	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Hartford	Hartford	014	N	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood

TABLE 35, CONTINUED

1987 SLAMS AND NAMS SITES IN CONNECTICUT

Town	Urban Area	Site	SLAMS or NAMS	Sampling Method	Analytic Method	Operating Schedule	Monitoring Objective	Spatial Scale of Representativeness
					LEAD			
Hartford	Hartford	015	S	Lo-Vol	Atomic Abs.	1 month	High Concentration	Micro
Hartford	Hartford	016	N	Lo-Vol	Atomic Abs.	1 month	High Concentration	Micro
Meriden	Meriden	002	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Middletown	Hartford	003	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
New Britain	New Britain	007	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
New Haven	New Haven	018	S	Lo-Vol	Atomic Abs.	1 month	High Concentration	Middle
Norwalk	Norwalk	012	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Stamford	Stamford	001	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Stamford	Stamford	022	S	Lo-Vol	Atomic Abs.	1 month	High Concentration	Neighborhood
Wallingford	New Haven	001	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Waterbury	Waterbury	007	S	Hi-Vol	Atomic Abs.	6th day	Population	Neighborhood
Waterbury	Waterbury	123	S	Hi-Vol	Atomic Abs.	6th day	High Concentration	Middle
West Haven	New Haven	003	S	Lo-Vol	Atomic Abs.	1 month	Population	Middle

TABLE 36

SUMMARY OF PROBE SITING CRITERIA

Pollutant	Spatial Scale	Distance from Supporting Structure (meters)		Height Above Ground (meters)	Other Spacing Criteria
		Vertical	Horizontal[a]		
TSP	All		>2	2 - 15	1. The sampler should be > 20 meters from any trees. 2. The distance from the sampler to an obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler.[b] 3. There must be unrestricted air flow 270 degrees around the sampler. 4. No furnace or incineration flues should be nearby.[c] 5. The sampler must have minimum spacing from roads. This varies with the height of the monitor and the spacial scale.
SO_2	All	3 - 15	>1	>1	1. The probe should be > 20 meters from any trees. 2. The distance from the inlet probe to an obstacle, such as a building, must be at least twice the height the obstacle protrudes above the inlet probe.[b] 3. There must be unrestricted air flow 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. 4. No furnace or incineration flues should be nearby.[c]
O_3	All	>1	>1	3 - 15	1. The probe should be > 20 meters from any trees. 2. The distance from the inlet probe to an obstacle, such as a building, must be at least twice the height the obstacle protrudes above the inlet probe. 3. There must be unrestricted air flow 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. 4. The spacing from roads varies with traffic.[d]

TABLE 36, CONTINUED

SUMMARY OF PROBE SITING CRITERIA

Pollutant	Spatial Scale	Distance from Supporting Structure (meters)		Height Above Ground (meters)	Other Spacing Criteria
		Vertical	Horizontal[a]		
CO	Micro	3 ± 1/2	>1	>1	1. The probe must be >10 meters from any intersection and should be at a midblock location. 2. The probe must be 2-10 meters from the edge of the nearest traffic lane. 3. There must be unrestricted airflow 180 degrees around the inlet probe.
	Middle Neighborhood	3 - 15	>1	>1	1. There must be unrestricted airflow 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. 2. The spacing from roads varies with traffic.[d]
NO_2	All	3 - 15	>1	>1	1. The probe should be > 20 meters from any trees. 2. The distance from the inlet probe to an obstacle, such as a building, must be at least twice the height the obstacle protrudes above the inlet probe.[b] 3. There must be unrestricted air flow 270 degrees around the inlet probe, or 180 degrees if the probe is on the side of a building. 4. The spacing from roads varies with traffic.[d]

[a] When the probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on the roof.

[b] Sites not meeting this criterion would be classified as middle scale.

[c] Distance is dependent upon height of furnace or incineration flue, type of fuel or waste burned, and quality of fuel (sulfur and ash content). This is to avoid undue influences from minor pollutant sources.

[d] Distance is dependent upon traffic ADT, pollutant, and spatial scale.

XII. EMISSIONS INVENTORY

The State of Connecticut maintains a computerized emissions inventory which contains a point source file of approximately 7,000 stationary industrial, commercial, and institutional sources of air pollution. Emissions from these sources are determined on the basis of actual operating data for 1987, such as actual fuel use and actual material throughputs, and with the help of pollutant emission factors contained in the Compilation of Air Pollutant Emission Factors, designated as EPA publication AP-42.

This inventory does not account for all the pollution sources in the state, however. There are a host of other industrial, commercial, agricultural, and human activities that account for most of the pollution emitted into Connecticut's air. These sources cannot be individually inventoried due to their nature, or large numbers, or widespread occurrence, etc. In spite of this, the emissions from these so-called area souces can be quantified by various means. For example, motor vehicle emissions can be determined from Connecticut Department of Transportation figures on vehicle-miles travelled (VMT's) on interstate and local roads, and from EPA MOBILE 4 emission factors; commercial and residential fuel-burning emissions can be determined from U. S. Department of Energy data, census figures, and AP-42 emission factors; and national per capita emissions, which are available from EPA for a number of pollution-causing activities, can be used in conjunction with census figures to calculate emissions by town, county, region, etc.

The computerized point source inventory and the more indirectly arrived at, but much larger, area source inventory together provide a good picture of the pollutants that are emitted into Connecticut's air each year. Table 37 summarizes the actual in-state emissions of each of the five (5) major air pollutants in Connecticut -- TSP, SO_2, CO, NO_2 ,and volatile organic compounds or VOC, -- by county, for 1987. The table reveals two things. First, the most populous counties have the largest pollutant totals; second, excluding SO_2, which is largely generated by utilities, area sources (mobile sources in particular) account for the bulk of the total emissions.

County names and geographic locations are displayed in Figure 32, which also serves as a reference for the charts that follow.

Figures 33 through 47 give various visual displays of the level of emissions for each of the major air pollutants. Figures 33, 36, 39, 42, and 45 are pie charts that show the percent of each air pollutant for Connecticut's eight (8) counties. Figures 34, 37, 40, 43, and 46 are pictorial displays of emissions by county, where the darker areas indicate higher emission levels. Figures 35, 38, 41, 44, and 47 are three dimensional graphs of each county's contribution to statewide emissions.

It should be noted that annual area source emissions will automatically increase from year to year due to a built-in 2% projected increase in annual VMT's. However, other effects may tend to mask this increase. For instance, "reconsiderations" of how VMT's are apportioned among the various speed classes and "adjustments" to the MOBILE emission factors (i.e., using MOBILE 4 instead of MOBILE 3) can result in significant changes in area source emissions from one year to the next. From 1986 to 1987, such factors resulted in a 24% increase in CO emissions, an 8% decrease in VOC emissions, and a 14% decrease in NO_2 emissions for area sources. These changes may be more apparent than real, since some of these factors should also be applied to 1986 emissions, as well as to 1987. Therefore, it is not advisable to compare area source emissions reported in different editions of the Annual Air Quality Summary.

TABLE 37

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY

		TONS PER YEAR OF EMISSIONS				
County	Sources	TSP	SO_2	CO	VOC	NO_x[1]
Fairfield	Area	8,678.5	4,644.7	150,194.3	27,824.3	23,423.4
	Point	2,206.6	30,480.6	3,995.9	3,735.6	15,235.0
	All	10,885.1	35,125.3	154,190.2	31,559.9	38,658.4
Hartford	Area	9,671.4	4,774.0	156,986.7	28,377.3	24,670.0
	Point	666.0	3,033.6	517.2	3,421.1	2,908.7
	All	10,337.4	7,807.6	157,503.9	31,798.4	27,578.7
Litchfield	Area	2,585.6	934.8	32,922.9	6,336.4	4,658.8
	Point	158.3	652.5	61.3	654.0	259.9
	All	2,743.9	1,587.3	32,984.2	6,990.4	4,918.7
Middlesex	Area	2,365.0	941.7	30,199.6	5,665.3	4,834.0
	Point	678.6	6,569.0	631.8	743.3	5,739.3
	All	3,043.6	7,510.7	30,831.4	6,408.6	10,573.3
New Haven	Area	8,455.2	4,310.3	123,480.4	24,067.7	20,747.9
	Point	1,186.5	22,187.8	888.8	4,494.3	6,936.0
	All	9,641.7	26,498.1	124,369.2	28,562.0	27,683.9
New London	Area	3,952.2	1,626.8	54,544.0	10,141.1	8,396.3
	Point	908.8	11,613.2	529.1	2,667.3	4,207.1
	All	4,861.0	13,240.0	55,073.1	12,808.4	12,603.4
Tolland	Area	2,190.6	738.4	29,977.8	5,275.6	4,562.5
	Point	110.8	840.5	36.3	58.9	285.1
	All	2,301.4	1,578.9	30,014.1	5,334.5	4,847.6
Windham	Area	1,910.7	578.0	23,151.9	4,011.2	3,208.2
	Point	242.0	438.9	841.0	463.9	299.1
	All	2,152.7	1,016.9	23,992.9	4,475.1	3,507.3
TOTAL	Area	39,809.3	18,548.7	601,457.6	111,698.9	94,501.1
	Point	6,157.7	75,816.2	7,501.5	16,238.4	35,870.3
	All	45,967.0	94,364.9	608,959.1	127,937.3	130,371.4

[1] NO_x emissions are expressed as NO_2.

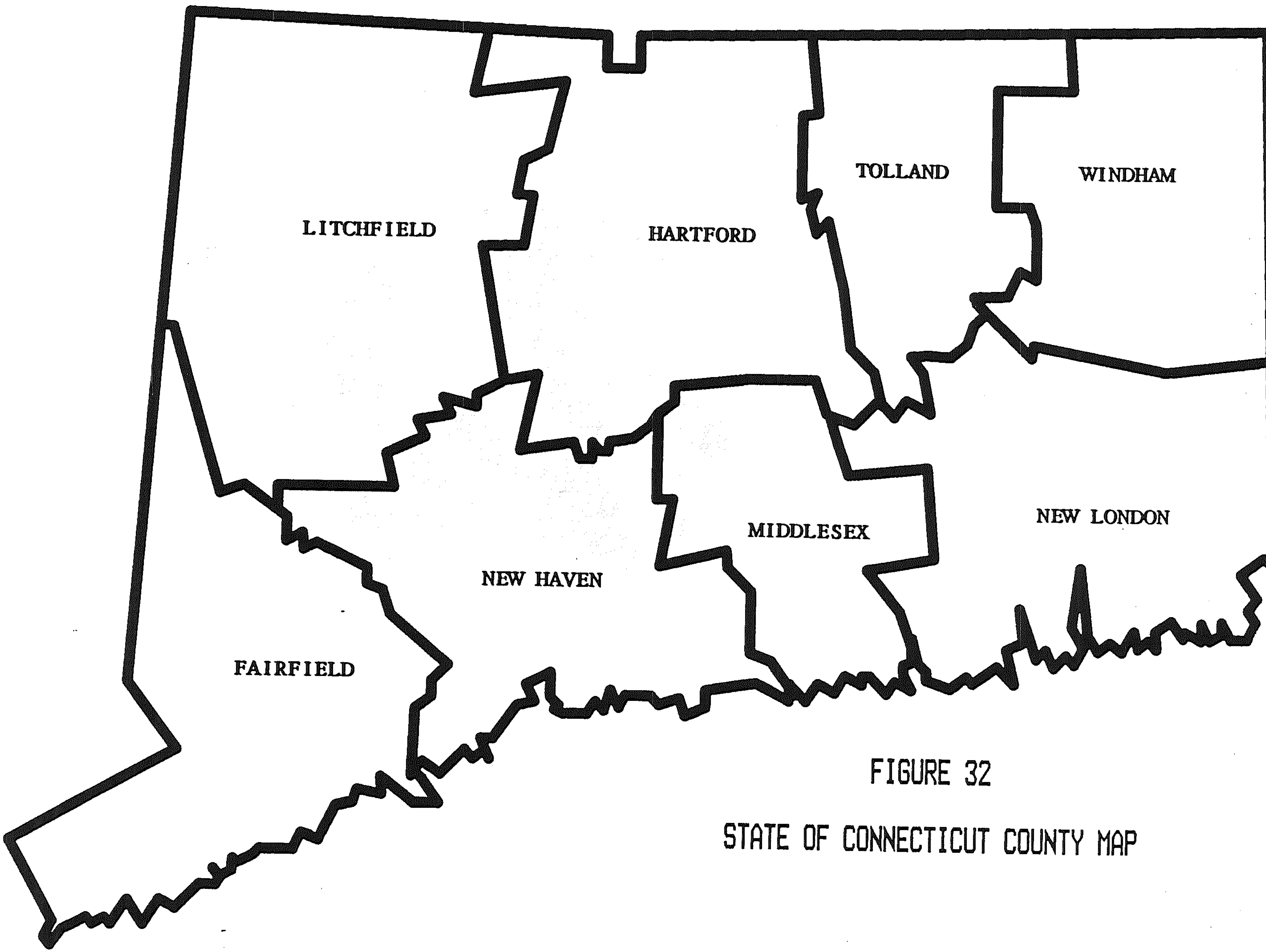


FIGURE 32

STATE OF CONNECTICUT COUNTY MAP

FIGURE 33

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY TOTAL SUSPENDED PARTICULATES

(TOTAL TONS PER YEAR : 45,967)

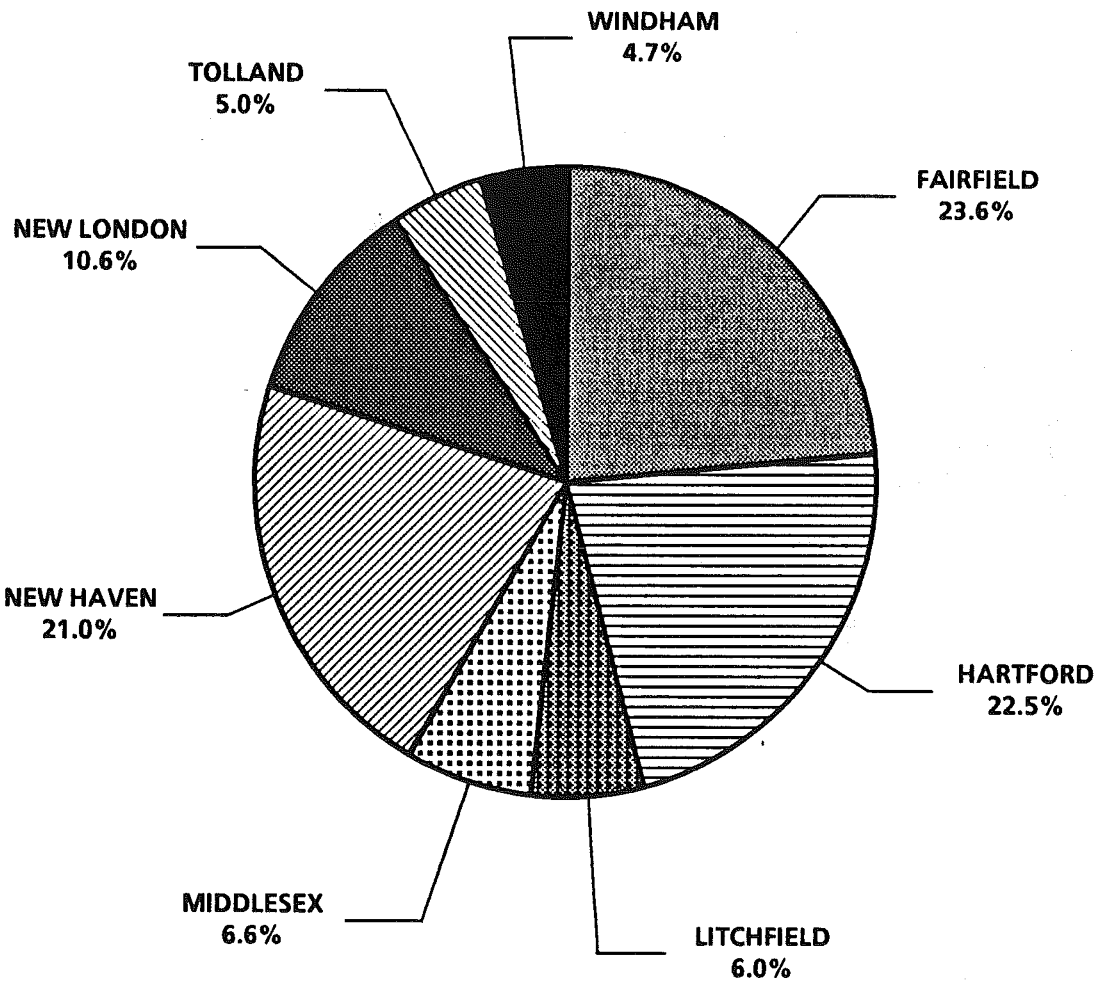


FIGURE 34

1987 TOTAL SUSPENDED PARTICULATES

Total Emissions by County

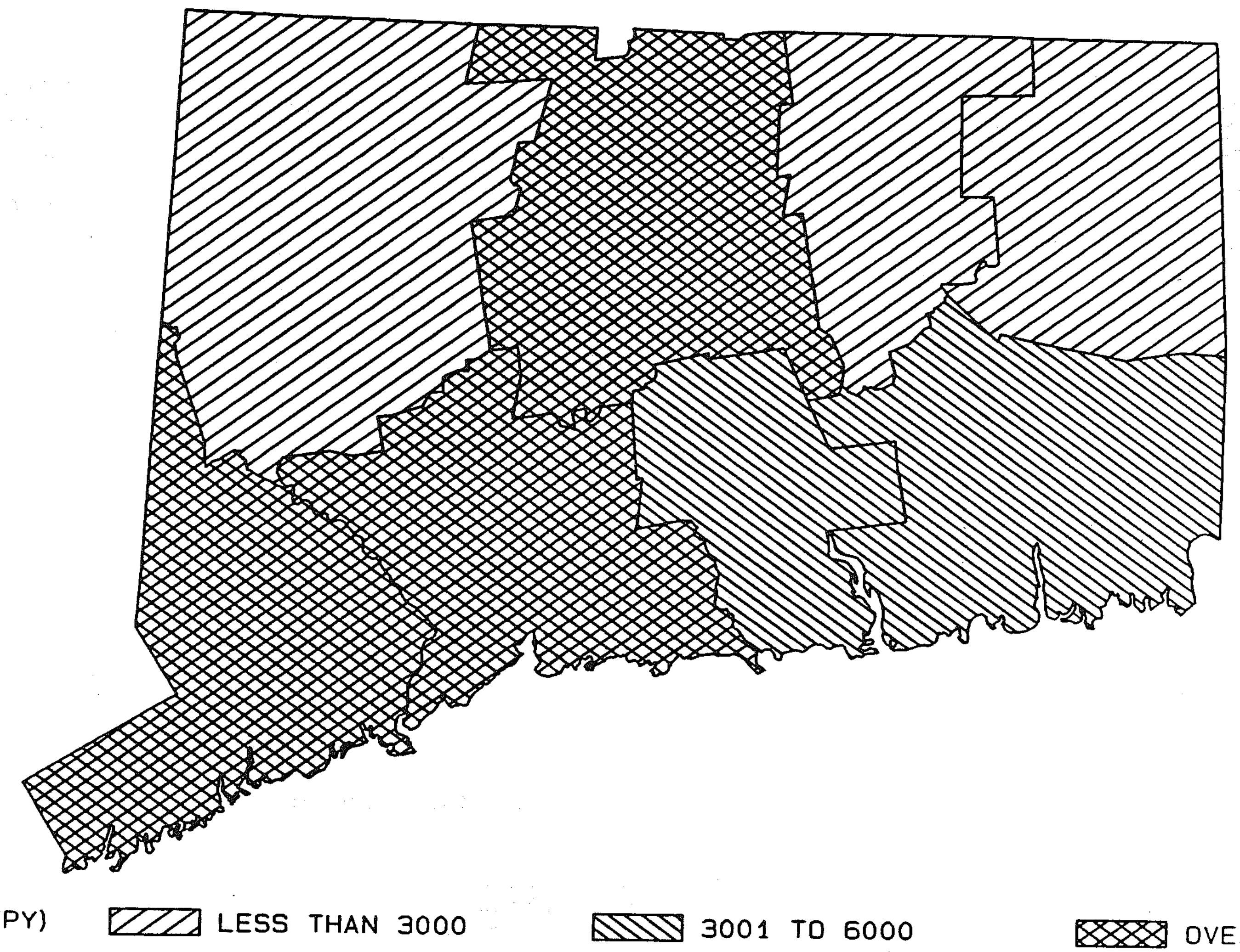
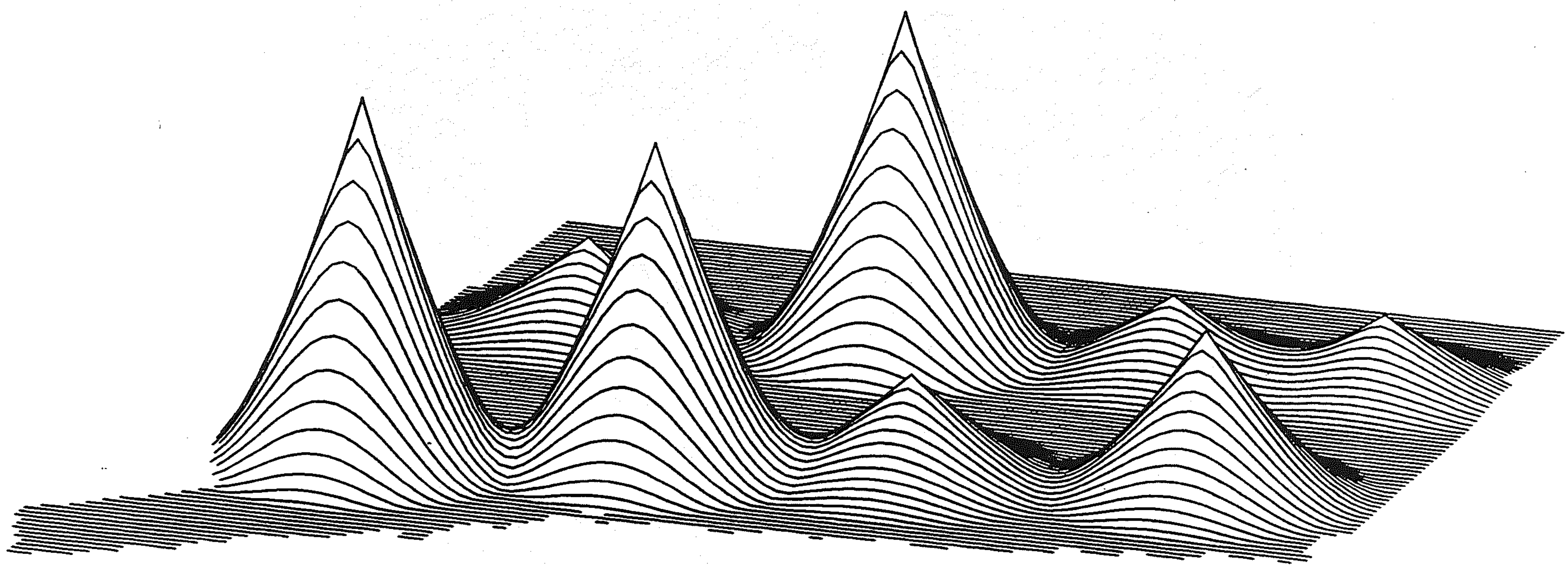


FIGURE 35

1987 TOTAL SUSPENDED PARTICULATES

Total Emissions by County



Three Dimensional View of TSP Emissions

FIGURE 36

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY
SULFUR DIOXIDE

(TOTAL TONS PER YEAR : 94,365)

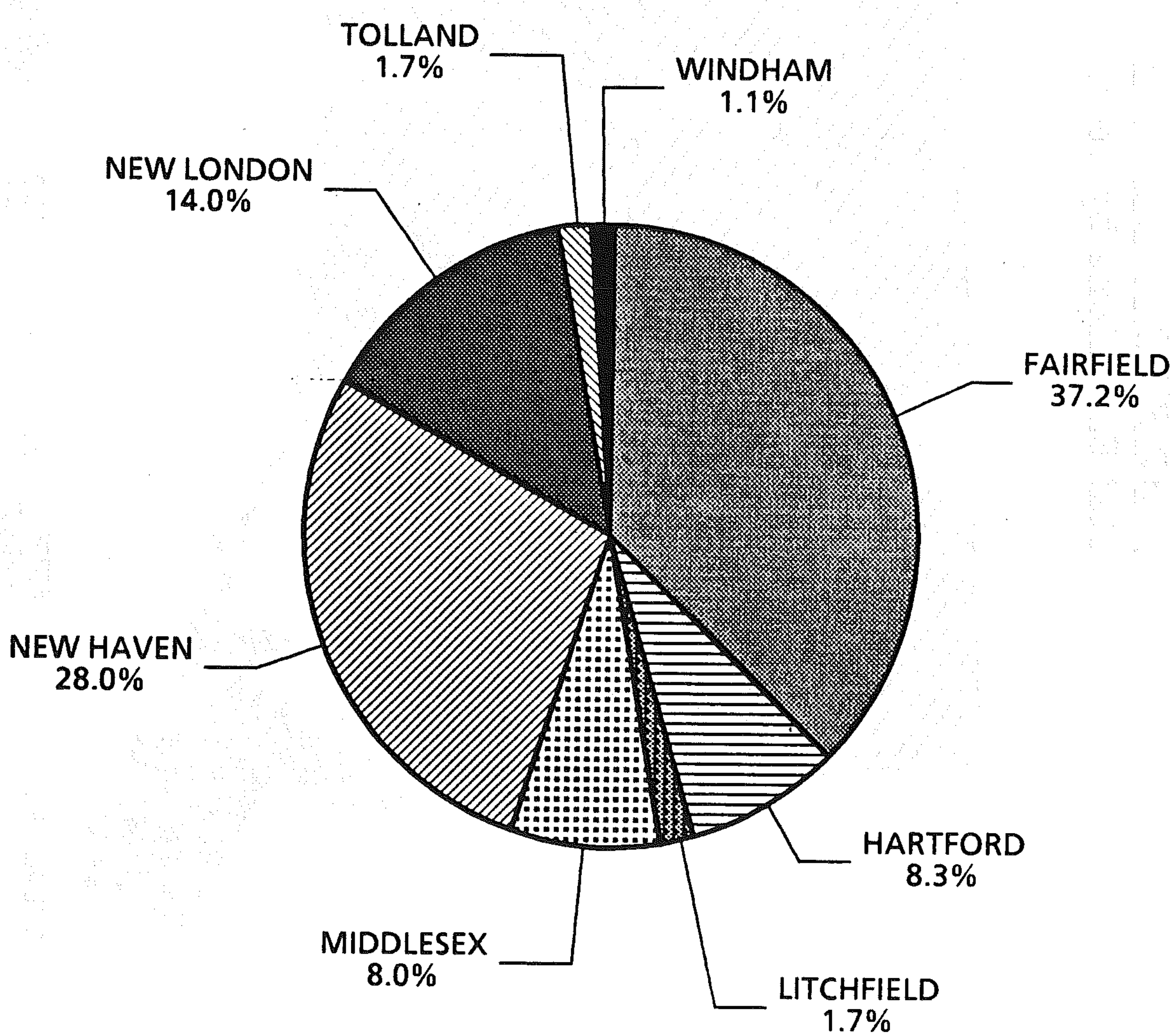


FIGURE 37

1987 SULFUR DIOXIDE

Total Emissions by County

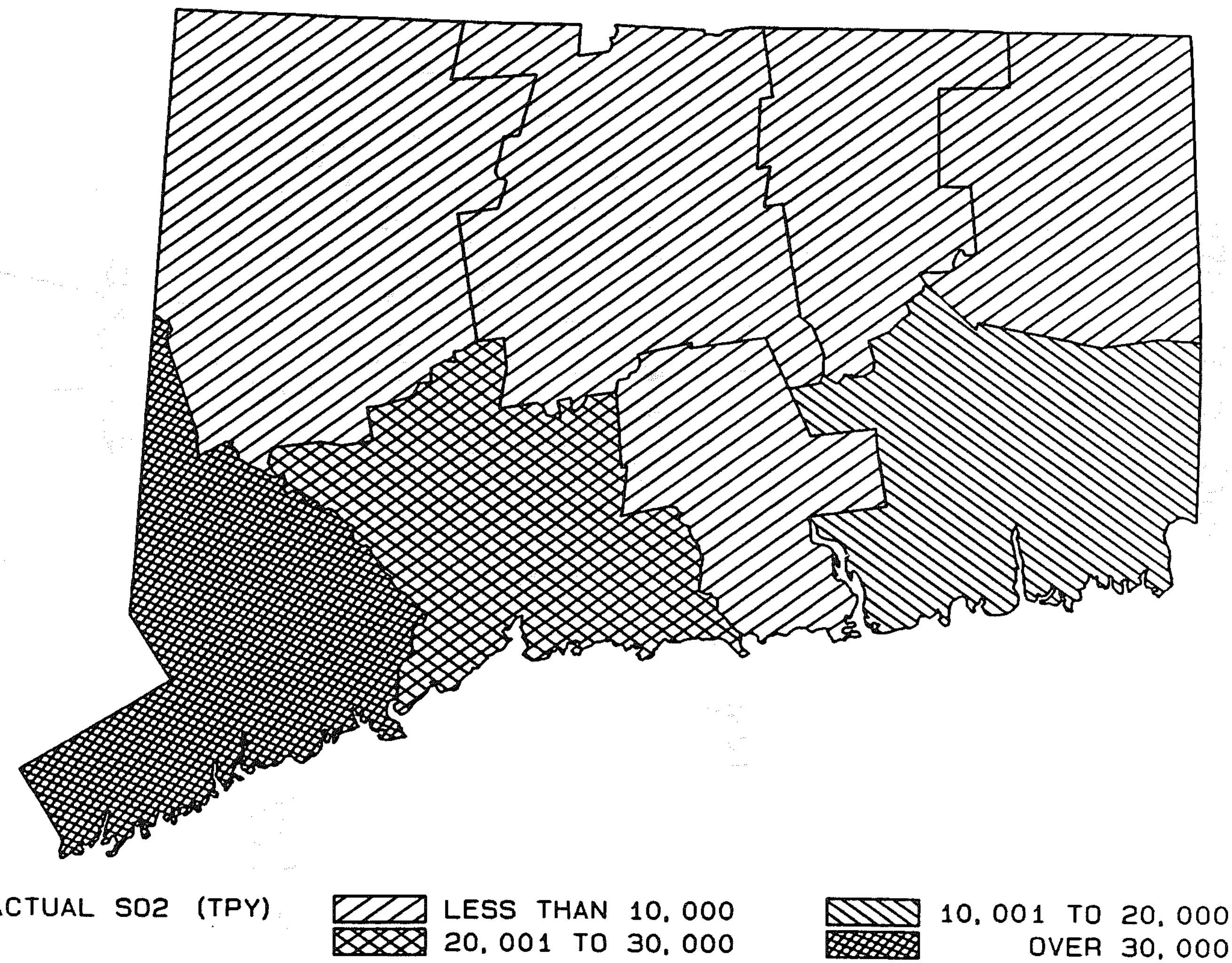
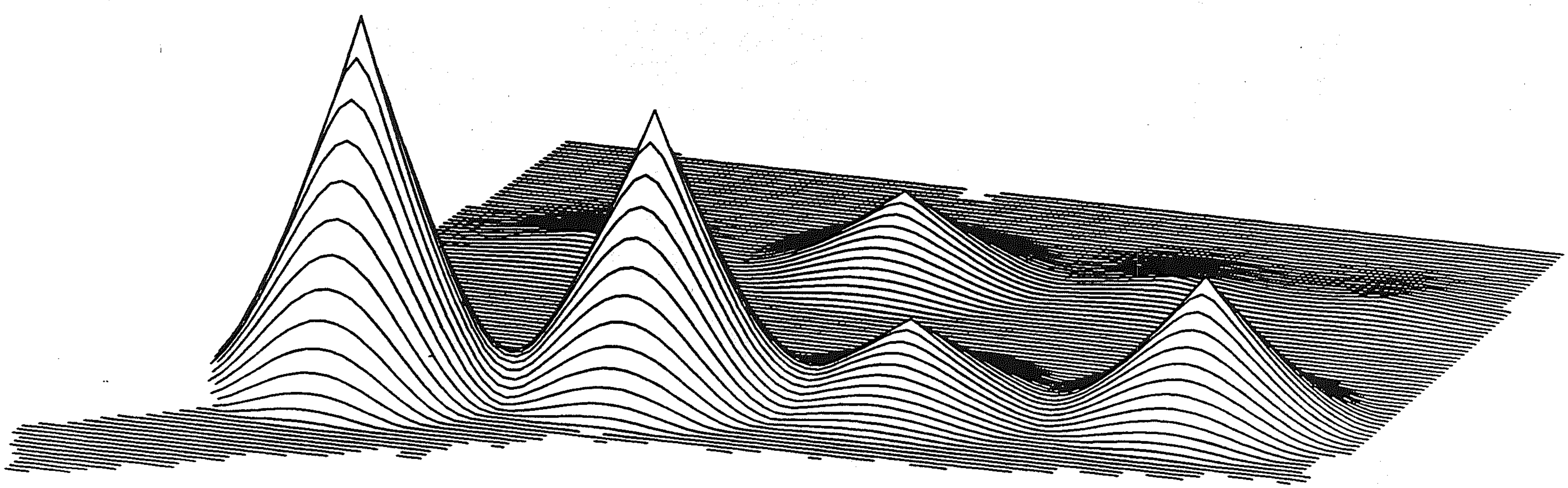


FIGURE 38

1987 SULFUR DIOXIDE

Total Emissions by County



Three Dimensional View of S02 Emissions

FIGURE 39

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY CARBON MONOXIDE

(TOTAL TONS PER YEAR : 608,959)

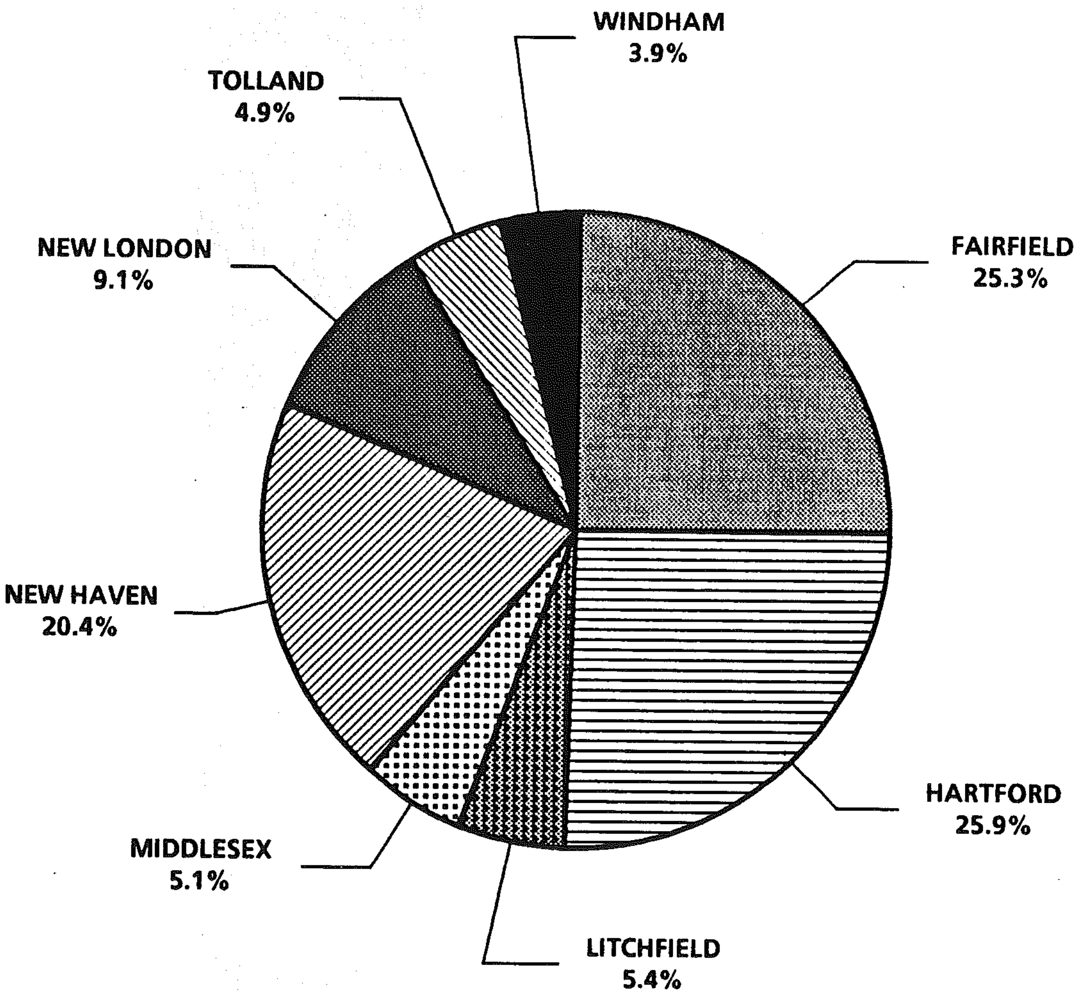


FIGURE 40

1987 CARBON MONOXIDE

Total Emissions by County

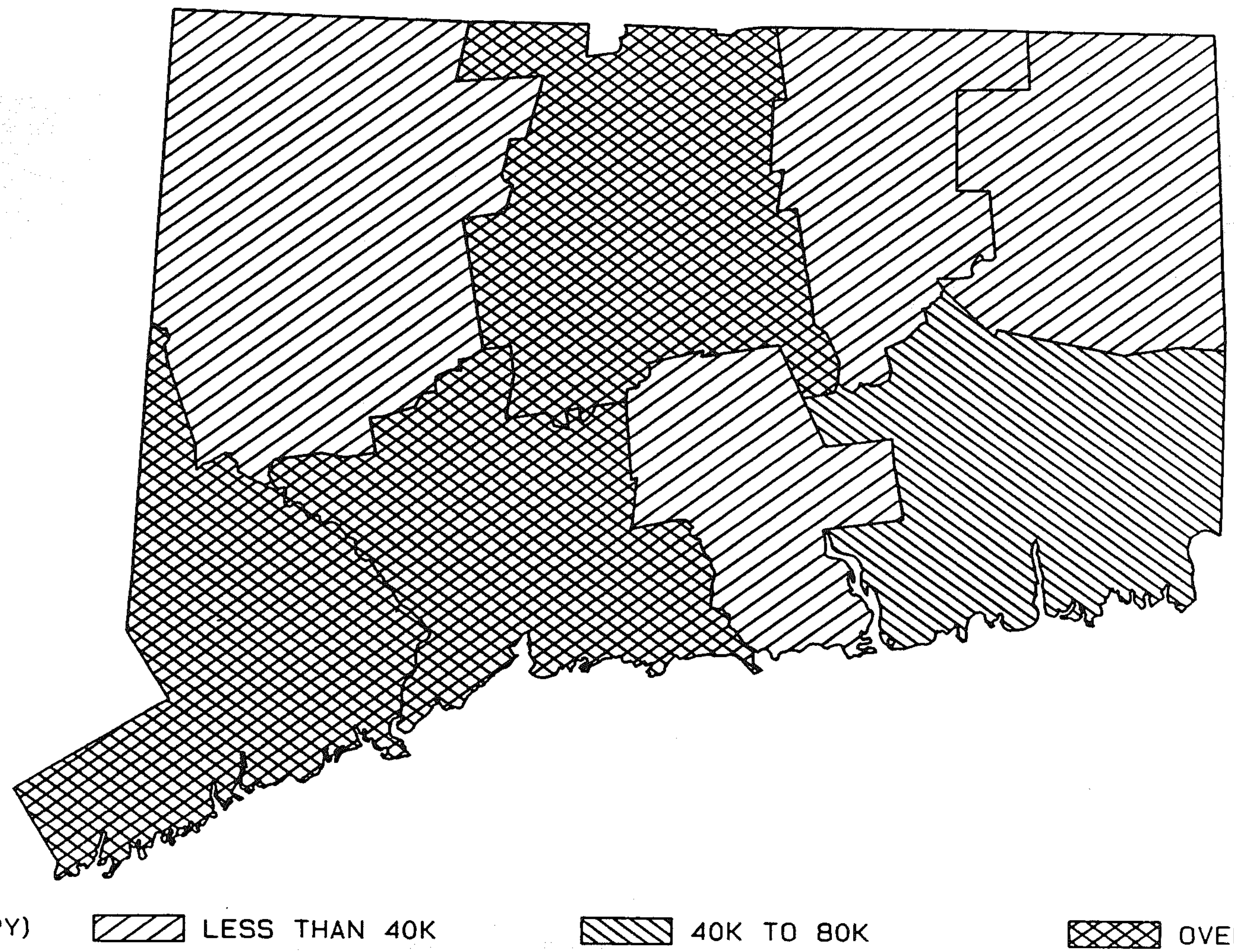
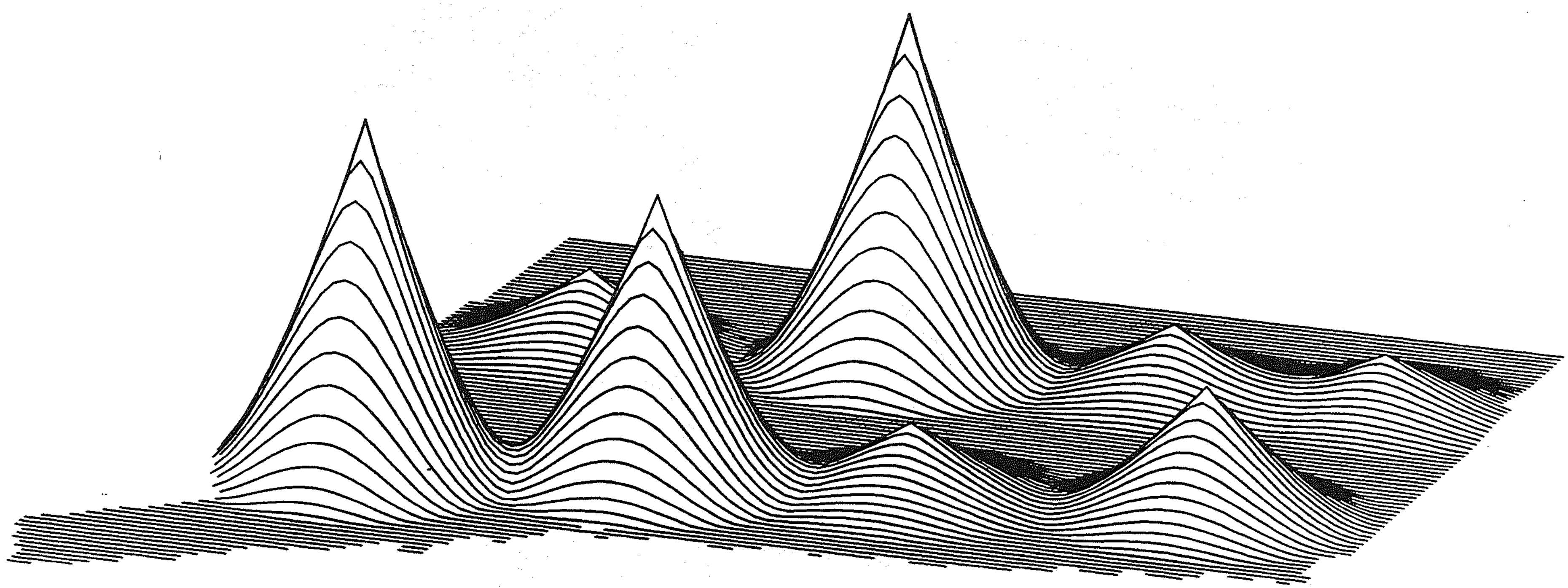


FIGURE 41

1987 CARBON MONOXIDE

Total Emissions by County



Three Dimensional View of CO Emissions

FIGURE 42

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY VOLATILE ORGANIC COMPOUNDS

(TOTAL TONS PER YEAR :127,937)

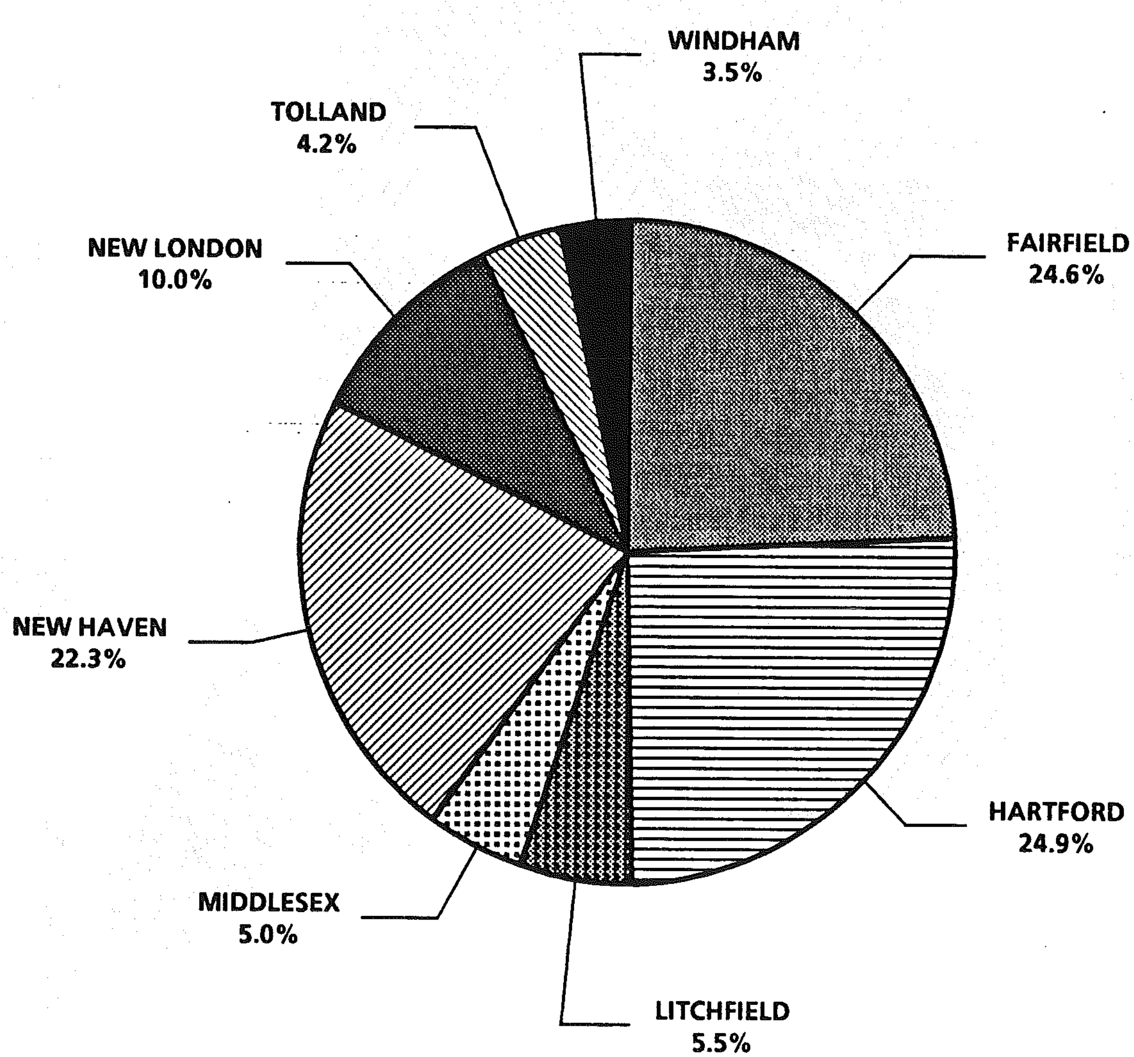


FIGURE 43

1987 VOLATILE ORGANIC COMPOUNDS

Total Emissions by County

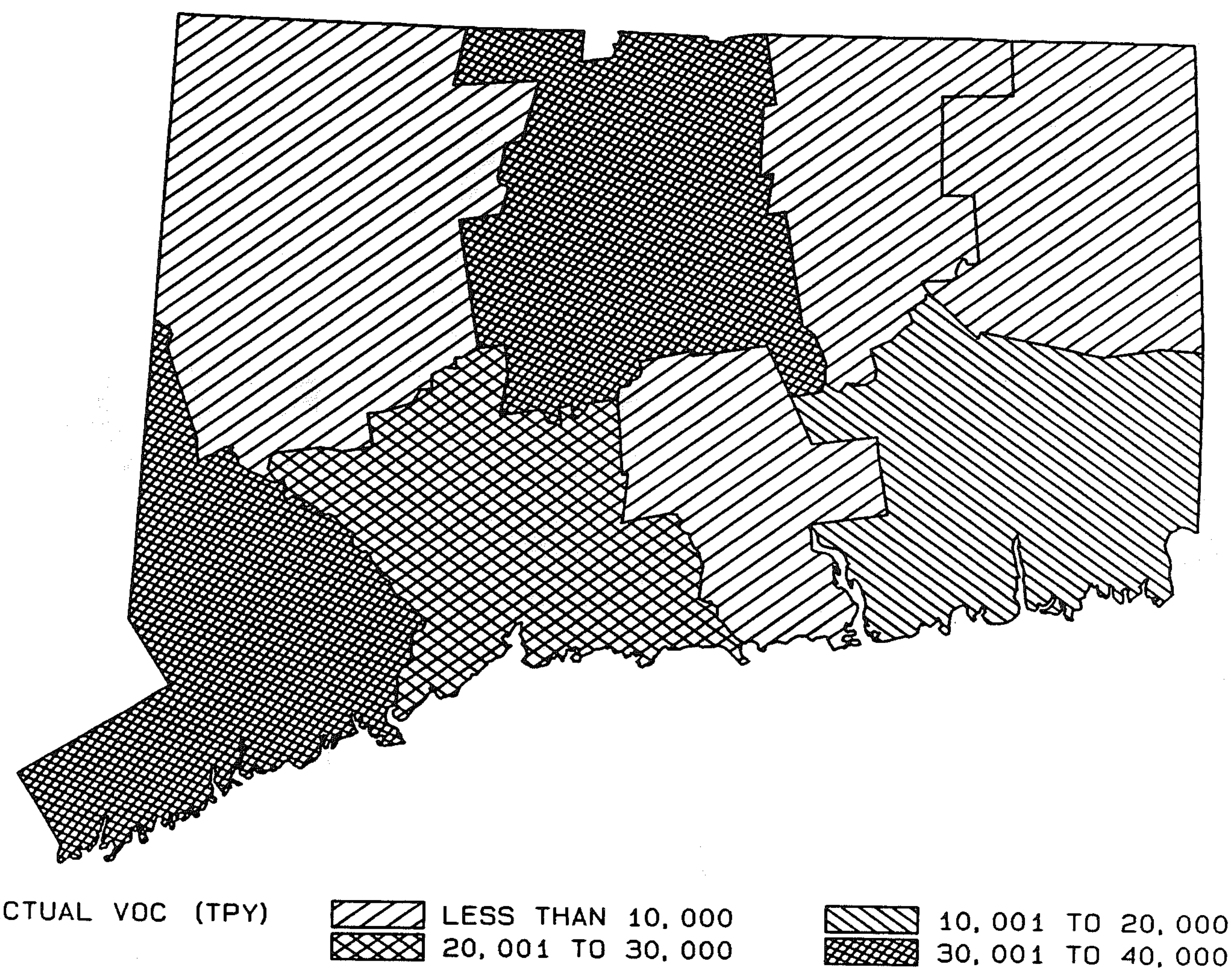
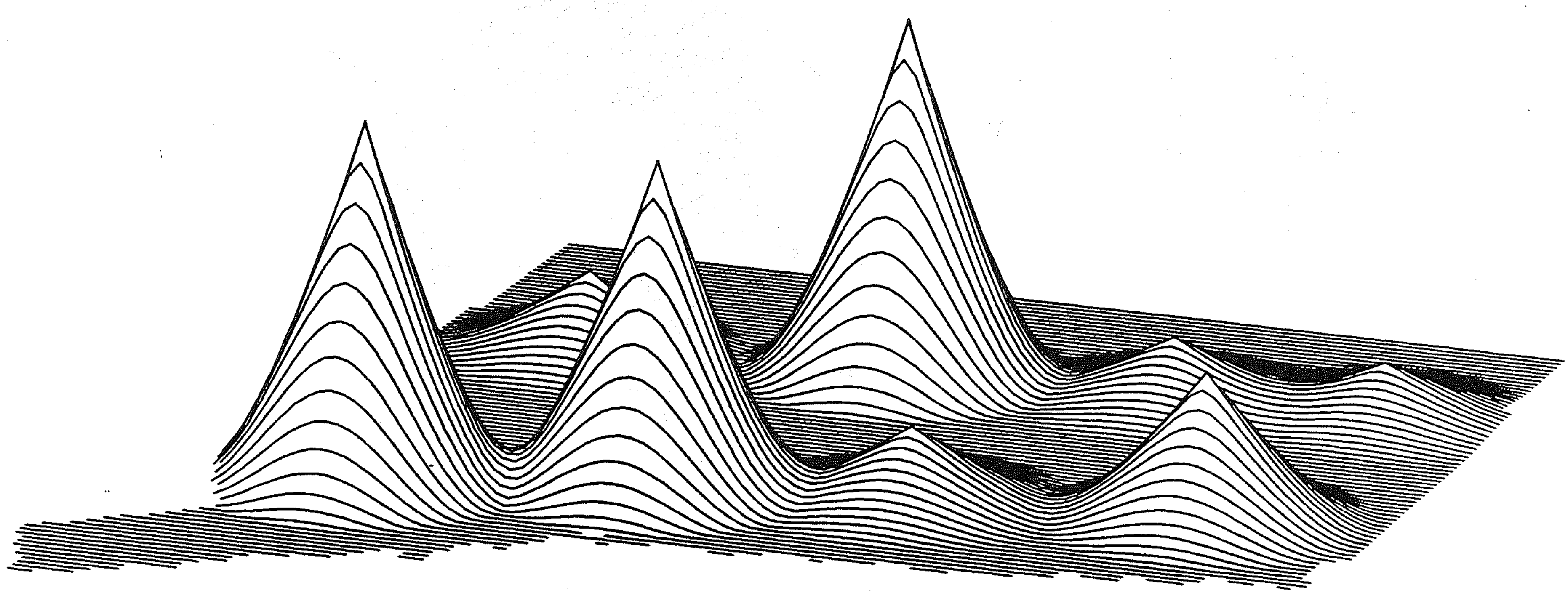


FIGURE 44

1987 VOLATILE ORGANIC COMPOUNDS

Total Emissions by County



Three Dimensional View of VOC Emissions

FIGURE 45

1987 CONNECTICUT EMISSIONS INVENTORY BY COUNTY
NITROGEN OXIDES
(Expressed as Nitrogen Dioxide)

(TOTAL TONS PER YEAR :130,371)

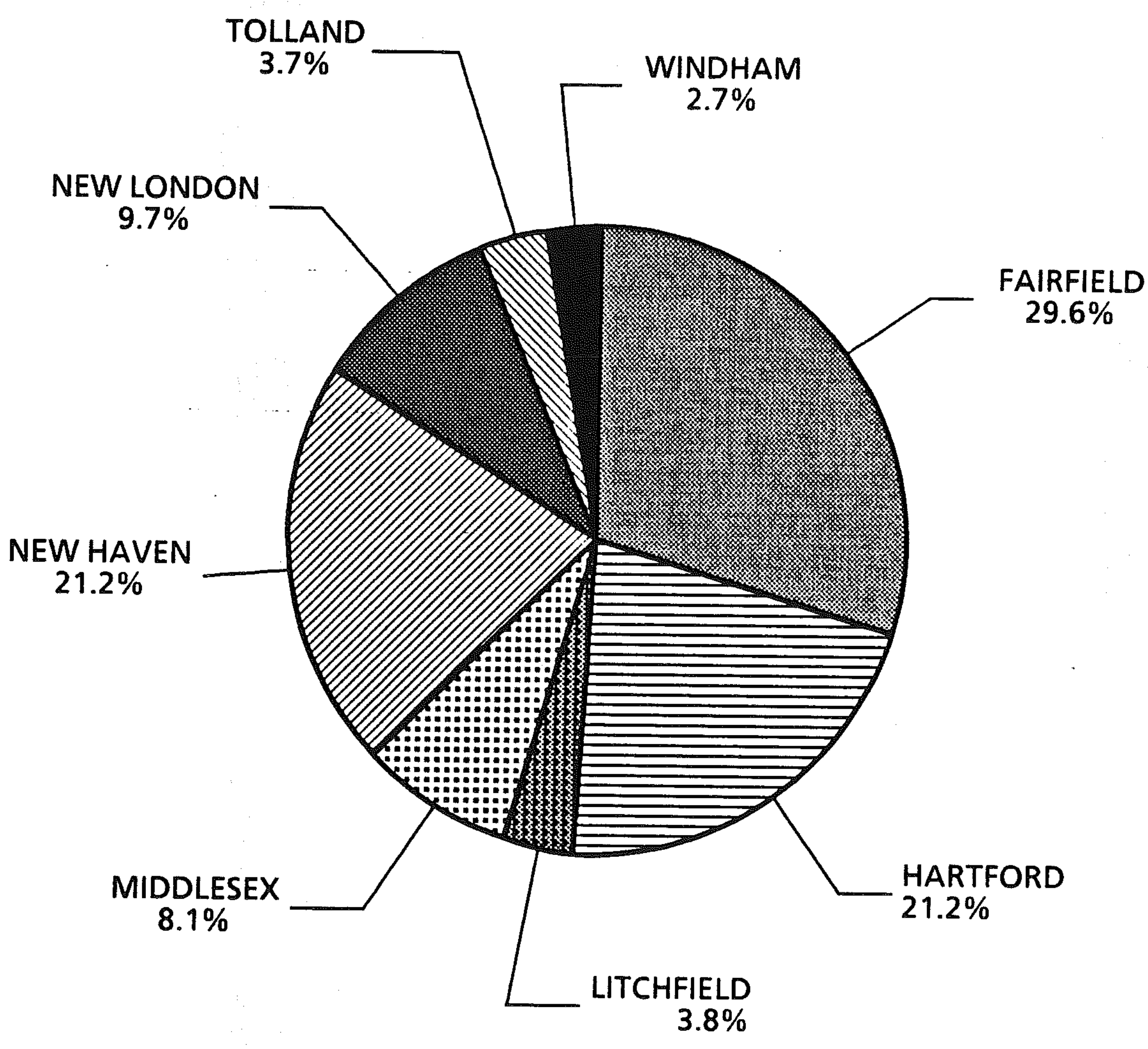


FIGURE 46

1987 NITROGEN OXIDES

(Expressed as Nitrogen Dioxide)

Total Emissions by County

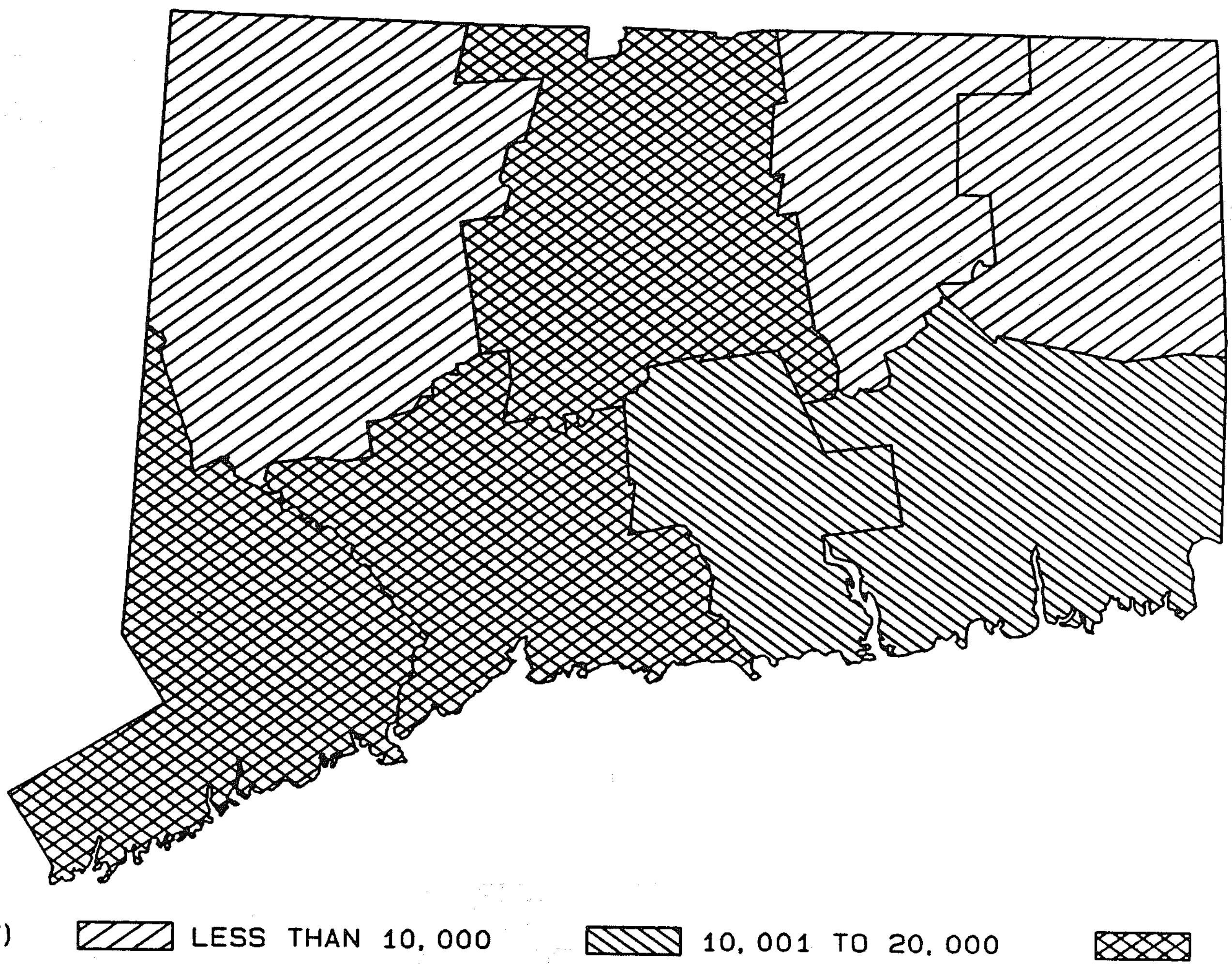
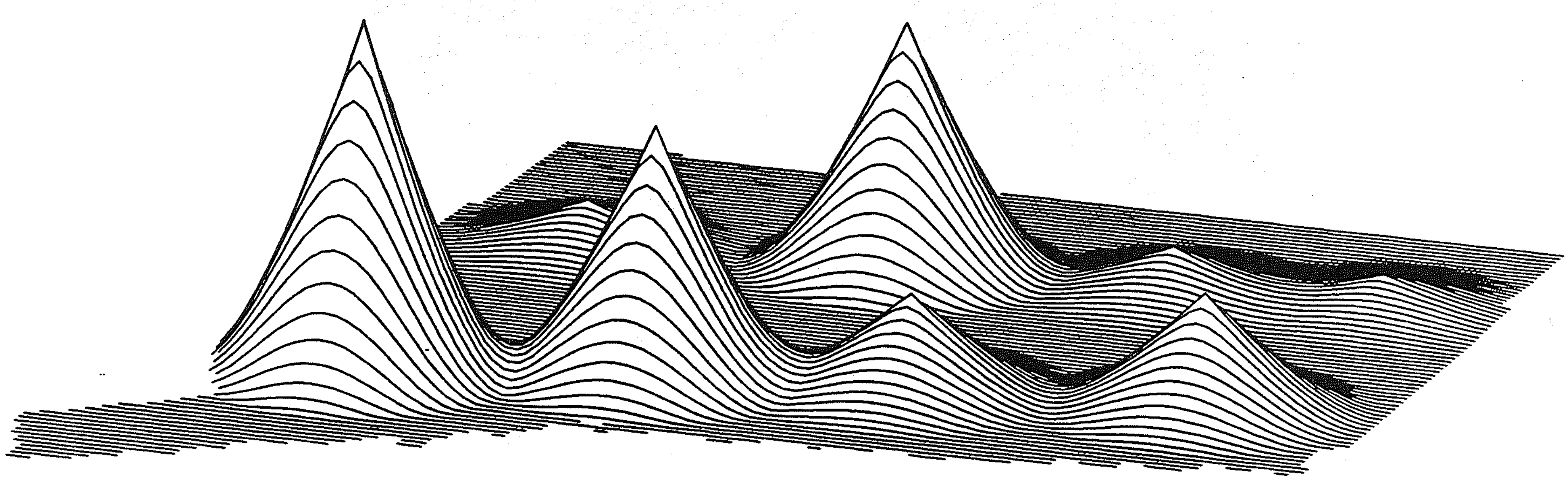


FIGURE 47

1987 NITROGEN OXIDES

(Expressed as Nitrogen Dioxide)

Total Emissions by County



Three Dimensional View of NOx Emissions

XIII. 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 in 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., 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 SO2 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.8 Control Association, 27: 460-3 (1977).

24. Wolff, G.T., P.J. Lioy, R.E. Meyers, R.T. Cederalll, 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 377-20.3, 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).

29. Bruckman, L., R.A. Rubino, and J. Gove, ***"Connecticut's Approach to Controlling Toxic Air Pollutants,"*** paper presented at the STAPPA / ALAPCO Air Toxics Conference, Air Toxics.Control: An Environmental Challenge, Washington, D. C., October 15-17, 1986.

30. Wackter, D.J., and P.V. Bayly, ***"The Effectiveness of Emission Controls on Reducing Ozone Levels in Connecticut from 1976 through 1987,"*** paper presented at the APCA Specialty Conference on: The Scientific and Technical Issues Facing Post-1987 Ozone Control Strategies, Hartford, Connecticut, November 17-19, 1987.

31. Wackter, D.J., ***"Sensitivity Analysis of Ozone Predictions by the Urban Airshed Model in the Northeast,"*** paper presented at the Air Pollution Control Association Conference on VOC and Ozone, Northampton, MA, November 1-2, 1988.

XIV. ERRATA

During the preparation of this document, a number of errors were discovered and corrected. In order to inform the reader of these changes and to prevent any confusion in the mind of the reader over conflicting data presented in this and previous editions of this document, the errors and corrections are presented below:

- Regarding the 1986 Air Quality Summary,

  1. In Section III, on page 96, the third sentence in the second paragraph under "Statistical Projections" should refer to the year 1986, not 1985.

  2. In Section IV, on page 117, the first sentence in the last paragraph under "Conclusions" should refer to publication no. 30, not 31.

  3. In Section IV, on pages 120 and 121, the site Stafford-007 should be changed to Stafford-001 in both Table 18 and Table 19.

  4. In Section V, Table 23 on page 135 should show the number of samples at the East Hartford-003 site to be 8272, not 8072.

  5. In Section VII, the last paragraph on page 153 and the legend in Figure B on page 157 should identify the correlation coefficient to be 0.977, not 0.955.

  6. In Section VIII, :

     a. In Table 28, the period of collection for event number 28 in 1984 should be 07/19/84; and

     b. In Table 29, the period of collection for event number 16 in 1985 should be 04/26/85 - 04/28/85.

  7. In Section IX, Table 32 on page 221 should be corrected as follows:

     a. The heading for the middle column of numbers under "No. of Days When Max. Temp. Exceeded 90 F" should be 1986, not 1985; and

     b. The footnote "f" should read 1958-1980, not 1964-1986.

  8. In Section XI, on page 229, the last sentence in the second paragraph under "Quality Assurance" should not contain a reference to site New Haven 123.

- Regarding the Air Quality Summaries from 1981 to 1985, in the section entitled "Climatological Data", the table presenting climatological data for Sikorsky International Airport, Stratford should have the years 1958-1980 as the footnote for the mean "Average Wind Speed".

- Regarding the 1985 Air Quality Summary, the corrections specified in items 6 a. and 6 b. above should be made.

- Regarding the 1984 Air Quality Summary, the corrections specified in item 6 a. above should be made.

ERRATA REPORTED IN THE 1986 AIR QUALITY SUMMARY

- Regarding the 1985 Air Quality Summary,

  1. In Section I, on page 2, the first paragraph pertaining to carbon monoxide should indicate that the carbon monoxide standard was exceeded at only 2 sites; that there was one exceedance at Stamford 020 and five exceedances at Hartford 017; that the 8-hour standard was violated at only Hartford 017 in 1985; and that violations of the standard occurred at both Hartford 017 and Stamford 020 in 1984.

  2. In Section I, on page 4, Table 2 should show no exceedances of the 8-hour CO standard at Bridgeport 004.

  3. In Section I, on page 10, Figure 2 should show the number of sites in 1985 to be 17. And the numbers in the bar segments for 1985 should be 18%, 60%, and 18%.

  4. In Section III, on page 99, Table 12 should show the annual average for New Haven 017 to be 37 $\mu g/m^3$.

  5. In Section III, on page 100, Table 13 should show the following statistics for Bridgeport 123 in 1985: 355 samples; an arithmetic mean of 30.8 $\mu g/m^3$; a standard deviation of 24.961; and upper and lower 95 percent confidence limits of 31 and 30 $\mu g/m^3$, respectively.

  6. In Section III, on page 102, Table 14 should show the first high at Bridgeport 123 to be 124 $\mu g/m^3$ on 1/19 and the second high to be 114 $\mu g/m^3$ on 1/28.

  7. In Section III, on page 104, Table 15 should show the first high calendar day average at Bridgeport 123 to be 124 $\mu g/m^3$; the second high calendar day average to be 114 $\mu g/m^3$; the first high running 24-hour average to be 141 $\mu g/m^3$; and the second high running 24-hour average to be 130 $\mu g/m^3$.

  8. In Section III, on page 105, Table 16 should show the first high running 3-hour concentration at Bridgeport 123 to be 231 $\mu g/m^3$ on 8/10/12 and the second high concentration to be 224 $\mu g/m^3$ on 2/4/8.

  9. In Section III, on page 107, the two highest concentrations in Table 17 for Bridgeport 123 should be deleted and the number of samples should be changed from 358 to 355.

  10. In Section IV, on page 116, the third paragraph should indicate that the number of days when ozone monitors measured levels in excess of the standard was 64 in 1985; that this translates to 4.3 occurrences per 100 sampling days in 1985; and that this represents a 49% decrease from 1984.

  11. In Section IV, on page 119, Table 18 should show that the number of 'total site days' of ozone standard exceedances in 1985 was 64.

  12. In Section VI, on page 136, the third paragraph should indicate two of the five monitoring sites had exceedances of the 8-hour standard, and that there was one exceedance at Stamford 020, five exceedances at Hartford 017, and no exceedances at Bridgeport 004.

  13. In Section VI, on page 137, the third paragraph should indicate that only Hartford 017 had a second high CO concentration exceeding the 8-hour standard, and that both Hartford 017 and Stamford 020 recorded violations of the standard in 1984.

14. In Section VI, on page 141, Table 25 should show no exceedances of the 8-hour standard in December for Bridgeport 004; in February for Hartford 01 7; and in December for Stamford 020.

15. In Section VI, on page 146, Table 26a should show no exceedances of the 8-hour standard in 1985 for Bridgeport 004; 7 exceedances in 1984 and 5 exceedances in 1985 for Hartford 017; 2 exceedances in 1982 for New Britain 002; no exceedances in 1981 for New Haven 007; 100 exceedances in 1981, 2 exceedances in 1984, and 1 exceedance in 1985 for Stamford 020.

16. In Section VI, starting on page 147, Figure 13 should show no exceedances in 1985 for Bridgeport 004; 2 exceedances in 1982 for New Britain 002; and no exceedances in 1981 for New Haven 007.

17. In Section VIII, on page 197, the first paragraph under "Discussion of Data" should indicate that 32% of all the precipitation events studied to date have had a pH of 4.0 or less, and that the yearly occurrences of these events was 23% in 1983 and 42% in 1985.

- Regarding earlier Air Quality Summaries, the errors referred to in item 15 above will affect various tables, figures, and discussions in the 1981-1985 editions of the Air Quality Summary and should be corrected wherever they occur. The corrections were necessitated by the realization that an exceedance of the 8-hour carbon monoxide standard was being assumed to occur at concentrations greater than or equal to 9.1 ppm, instead of 9.5 ppm. Therefore, in all pre-1985 editions of the Air Quality Summary, various statements, depictions, and tabulations regarding violations of the 8-hour CO standard and the total number of exceedances of the 8-hour CO standard may be incorrect.

ERRATA REPORTED IN THE 1985 AIR QUALITY SUMMARY

- Regarding the 1984 Air Quality Summary,

  1. In Section II, on page 68, the quarterly averages for ammonium are 160, 170, 150, 150, and the annual average is 160.

  2. In Section VI, on page 140, in the third paragraph, the first sentence should state that the eight-hour CO standard was exceeded at two, not four, of the monitoring sites.

- Regarding the 1983 and 1984 Air Quality Summaries, the title of Table 23 on page iv of the List of Tables should reflect the 1-hour, not the 24-hour, NO_2 averages.

ERRATA REPORTED IN THE 1984 AIR QUALITY SUMMARY

- Regarding the 1983 Air Quality Summary,

  1. In Section IV, on page 116, in the second paragraph, the last sentence should say that the largest increase is 0.096 ppm, not 96 ppm.

  2. In Section XI, on page 199, Table 35 should be amended as follows:

a. Under ozone, on page 199, the urban area for the town of Stafford should be "none";

b. Under total suspended particulates, on page 200, the urban area for the town of New Britain should be New Britain; for the town of Milford should be Bridgeport; and for the town of Willimantic should be "none"; and

c. Under ozone, total suspended particulates and lead, the urban area for Middletown should be Hartford.

- Regarding previous Air Quality Summaries, Table 33 in the 1981 Summary and Table 32 in the 1982 Summary should be amended as specified in item 2 above.

ERRATA REPORTED IN THE 1983 AIR QUALITY SUMMARY

- Regarding 1968 TSP data, all references to site Greenwich 003 should be ignored. This site had insufficient data for a valid annual average concentration.

- Regarding 1969 TSP data, the annual geometric mean concentration for site Naugatuck 001 has been changed from 92.6 to 92.5 $\mu g/m^3$.

- Regarding 1971 TSP data, the annual geometric mean concentration for site Norwalk 001 has been changed from 57.0 to 57.1 $\mu g/m^3$.

- Regarding 1972 TSP data,

  1. The annual geometric mean concentration for site New Haven 001 has been changed from 54.8 to 54.9 $\mu g/m^3$, and

  2. All references to site Enfield 003 should be ignored. This site was not part of the official particulate sampling network.

- Regarding 1968-1972 TSP data, all references to the following monitoring sites should be ignored: Bridgeport A 001, Hartford A 001, New Haven A 001, and Waterbury A 001. Questions about the handling of the sample filters are serious enough to invalidate all data from these sites.

- Regarding 1977 TSP data, the annual geometric mean concentration for site Ansonia 003 has been changed from 63.1 to 57.3 $\mu g/m^3$.

- Regarding 1978 TSP data, the annual geometric mean concentration for site Norwalk 005 has been changed from 57.0 to 59.0 $\mu g/m^3$.

- Regarding 1979 TSP data, the following corrections have been made:

  1. For site Ansonia 003, the number of samples for the year has been changed from 115 to 116 and the standard geometric deviation of the data is 1.525.

  2. For site Burlington 001, the number of samples for the year has been changed from 116 to 117; the annual geometric mean concentration has been changed from 24.4 to 24.2 $\mu g/m^3$; and the standard geometric deviation of the data is now 1.746.

- Regarding the 1982 Air Quality Summary:

1. In Section I.A.5 on page 3, the third sentence should read: "The standard was exceeded twice at ~~Hartford 012, three times at~~ New Britain 002, and twice at Stamford 020."

2. In Table 1, for carbon monoxide, the number of times the standard was exceeded should read "2/-" for ~~Hartford 012~~ NEW BRITAIN 002 and "2/-" for Stamford 020. Also, for total suspended particulates, the number of times the secondary 24-hour standard was exceeded should read "-" for Wallingford 001.

3. In Section I.B. on page 6, a portion of the third sentence in the third paragraph should be rewritten to read: "...the statewide average and standard deviation of the mean pollutant concentrations at the sites..."

4. In Section I.B.1 on page 7, all references to low-volume samplers should be deleted from the third paragraph.

5. In Table 2:

   a. For the 1968-1969 period: the number of sites is 16; the averages of the annual geometric means are 74.9 and 67.8, respectively; the standard deviations are 21.7 and 18.7, respectively; and the actual significance of change is 0.00671.

   b. For the 1975-1976 period: the average of the annual geometric means for both years is 53.3; the standard deviation for 1976 is 9.5; and the actual significance of change is 0.93101.

   c. For the 1976-1977 period: the average of the annual geometric means for 1977 is 53.6; the standard deviation for 1977 is 9.1; and the actual significance of change is 0.85049.

   d. For the 1977-1978 period: the averages of the annual geometric means are 54.6 and 52.8, respectively; the standard deviation for 1977 is 9.8; and the actual significance of change is 0.03330.

   e. For the 1978-1979 period: the average of the annual geometric means for 1978 is 51.5; the trend at the 95% level is significantly down; and the actual significance of change is 0.04065.

6. In Figure 1, a number of changes were made and a number of errors were discovered in the data for the years 1968 and 1975-1982. The correct data for this figure are reflected in Figure 1 in the 1983 Air Quality Summary.

7. In Table 3A:

   a. For the 1978-1979 period: the number of sites is 9; the averages of the yearly means are 9.10 and 8.14, respectively; the standard deviations are 2.34 and 2.04, respectively; and the actual significance of change is 0.10.

   b. For the 1979-1980 period: the number of sites is 10; the averages of the yearly means are 8.30 and 7.56, respectively; the standard deviations are 1.74 and 1.99, respectively; the trend at the 95% level is significantly downward; and the actual significance of change is 0.022.

c. For the 1980-1981 period: the number of sites is 8; the averages of the yearly means are 8.04 and 7.97, respectively; the standard deviations are 1.58 and 1.67, respectively; and the actual significance of change is 0.30.

d. For the 1981-1982 period: the number of sites is 8; the averages of the yearly means are 7.97 and 8.01, respectively; the standard deviations are 1.67 and 1.70, respectively; and the actual significance of change is 0.27.

8. In Section I.C on page 19, the first sentence in the second paragraph should include nitrogen dioxide as one of the measured pollutants, and the fourth paragraph should show that there were 41 particulate hi-vol sites and 6 nitrogen dioxide sites in 1982.

9. In Section I.E on page 20, the references to carbon monoxide in the first paragraph and to CO in the second paragraph should be deleted.

10. In Section I.F.2. on page 24, the reference to lead in paragraph a. should be deleted from the heading. Paragraph b. should be changed to c. Also, a new paragraph I.F.2.b. should be inserted - - it can be found in the 1983 Air Quality Summary as paragraph I.E.2.b.

11. In Table 9, the sections on sites Torrington 123 and Waterbury 123 should be either deleted or footnoted to indicate that these two sites are no longer considered to be valid TSP hi-vol sites.

12. In Table 10, the pH reading for Putnam 002 in December is given as 0.09. This should be considered spurious.

13. In Table 12, the 1982 annual arithmetic averages for several of the sites have been amended as follows: Bridgeport 001 is 31; Danbury 123 is 20; Greenwich 017 is 21; Hartford 123 is 36; Milford 002 is 37; New Haven 123 is 32; Stamford 123 is 31; and Waterbury 123 is 21.

14. In Table 13, the standard deviation for the site New Haven 123 is 24.665.

15. In Table 19, the number of hours the standard was exceeded in 1982 should be 24 for Danbury 123 and 62 for Groton 005.

16. In Table 22, all the data are erroneous. The correct data can be found in Table 22 in the 1983 Air Quality Summary.

17. ~~In Table 23, "1-HOUR" should replace "24-HOUR" in the heading.~~ Base table 23 on hourly values in the future.

18. In Section VIII on page 177, the last sentence in the second paragraph should be deleted.

19. In Table 28:

a. In the section titled "Precipitation In Inches Water Equivalent," the subheading "Mean" should have the superscript "a";

b. In the section titled "Number of Days with More Than .01 Inches of Precipitation," the subheading 'Mean" should have the superscript "c";

c. In the section titled "Average Wind Speed (MPH)," the subheading 'Mean" should have the superscript "c";

d. The footnote "b" should read "1960-1982"; and

e. The footnote "c" should read "1955-1982."

20. In Table 29, the footnote "f" should read "1960-1982."

21. In Table 32:

a. The operating schedule for TSP site Norwalk 001 should be "6-day";

b. The operating schedule for TSP site Norwalk 005 should be "3-day";

c. The spatial scale and representativeness for the sulfur dioxide site Milford 002 should be "middle"; and

d. The monitoring objectives for a number of sites should be changed as indicated below:

Pollutant	**Town/Site**	**Objective**
NO_2	Bridgeport 123	High Conc.
	East Hartford 003	High Conc.
	New Haven 123	High Conc.
Ozone	New Haven 123	Population
	Stratford 007	High Conc.
TSP	Bridgeport 009	Population
	Danbury 002	High Conc.
	Danbury 123	Population
	New Britain 007	High Conc.
	New Britain 008	Population
	Stamford ~~Stratford~~ 007	High Conc.
	Waterbury 005	Population
	Waterbury 007	High Conc.
SO_2	Bridgeport 123	High Conc.
	Milford 002	Source
	New Haven 123	High Conc.

- Regarding previous Air Quality Summaries:

1. In Section I.B. of the 1978-1981 editions, a portion of the third sentence in the third paragraph should be rewritten to read: "...the statewide average and standard deviation of the mean pollutant concentrations at the sites..."

2. Figure 1 and all references thereto should be ignored in favor of Figure 1 in the 1983 edition.

3. Table 2 in the 1978-1981 editions should be ignored in favor of relevant portions of Table 3 in the 1983 edition.

4. Paragraph I.F.2.b in the 1983 edition should be inserted into the appropriate areas of Section I.F in the 1978-1981 editions.

5. Table 7 in the 1981 edition is incomplete. The site Stamford 021 should be inserted with a first high of 85 on July 9 and a second high of 83 on March 29.

6. Table 22 in the 1981 edition contains erroneous data. The correct data can be found in Table 22 in the 1983 edition.

7. In the 1978-1981 editions, the last sentence in the second paragraph of Section VIII. CLIMATOLOGICAL DATA should be deleted.

8. In the 1981 edition, the same corrections should be made to Table 32 that were listed in Item 21 of the foregoing section regarding the 1982 Air Quality Summary.

ERRATA REPORTED IN THE 1982 AIR QUALITY SUMMARY

- Regarding the 1975 TSP data, all references to the following monitoring sites should be ignored: Enfield 123, Enfield 001/123, Danbury 001, Danbury 123, Danbury 001/123, Groton 001, Groton 123, Groton 001/123, Torrington 001, Torrington 123, Torrington 001/123. These sites either had insufficient data for a valid annual average concentration or they included data from two different sites.

- Regarding 1976 TSP data, all references to the following monitoring sites should be ignored: Stamford 003, Stamford 123, Stamford 003/123. These sites either had insufficient data for a valid annual average concentration or they included data from two different sites.

- Regarding 1980 TSP data, the following corrections have been made:

  1. Bridgeport 001: The number of samples for the year at this site has been changed from 57 to 58, and the annual geometric mean concentration has been changed from 47.8 to 47.6 $\mu g/m^3$.

  2. Bridgeport 123: the annual geometric mean concentration at this site has been changed from 64.2 to 63.8 $\mu g/m^3$.

  3. Greenwich 016: All references to this site should be ignored. This site is considered to have been unsuitably located for acceptable particulate monitoring.

  4. Morris 001: The standard deviation of the sampling data at this site has been changed from 1.567 to 1.557.

- Regarding 1981 TSP data, the following corrections have been made:

  1. Bristol 001: The number of samples for the year at this site has been changed from 55 to 58, and the annual geometric mean concentration has been changed from 34.1 to 34.6 $\mu g/m^3$.

- Regarding TSP data for the years 1975 through 1981, all references to sites Torrington 123 and Waterbury 123 should be ignored. These sites are now considered to have been unsuitably located for acceptable particulate monitoring.

- The above corrections, where relevant, are implicit in Table 2 and Table 8 of the 1982 Air Quality Summary. Accordingly, versions of these tables found in post-1974 (and pre-1982) editions of this document contain erroneous information and should be ignored or appropriately footnoted.

- Regarding Table 2, some of the earlier editions of this document have contained versions of this table which appeared to present annual "arithmetic" mean data. This is incorrect. All versions of this table contain annual "geometric" mean data.