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Staten Island/New Jersey Urban Air Toxics Assessment Project Report

Volume III
Part A

Results and Discussion of the Volatile Organic Compounds in Ambient Air

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This report is a collaborative effort of the staffs of the Region II Office of the U.S. Environmental Protection Agency (EPA), the New Jersey Department of Environmental Protection and Energy, the New York State Department of Environmental Conservation, the New York State Department of Health, the University of Medicine and Dentistry of New Jersey and the College of Staten Island. The project was undertaken at the request of elected officials and other representatives of Staten Island concerned that emissions from neighboring industrial sources might be responsible for suspected excess cancer incidences in the area.

Other EPA offices that provided assistance included the Office of Air Quality Planning and Standards, which provided contract support and advice; and particularly the Atmospheric Research and Exposure Assessment Laboratory, which provided contract support, quality assurance materials, and sampling and analysis guidance, and participated in the quality assurance testing that provided a common basis of comparison for the volatile organic compound analyses. The Region II Office of Policy and Management and its counterparts in the States of New York and New Jersey processed the many grants and procurements, and assisted in routing funding to the project where it was needed.

The project was conceived and directed by Conrad Simon, Director of the Air and Waste Management Division, who organized and obtained the necessary federal funding.

Oversight of the overall project was provided by a Management Steering Committee and oversight of specific activities, by a Project Work Group. The members of these groups are listed in Volume II of the report. The Project Coordinators for EPA, Robert Kelly, Rudolph K. Kapichak, and Carol Bellizzi, were responsible for the final preparation of this document and for editing the materials provided by the project subcommittee chairs. William Baker facilitated the coordinators' work.

Drs. Edward Ferrand and, later, Dr. Theo. J. Kneip, working under contract for EPA, wrote several sections, coordinated others, and provided a technical review of the work.

The project was made possible by the strong commitment it received from its inception by Christopher Daggett as Regional Administrator (RA) for EPA Region II, and by the continuing support it received from William Muszynski as Acting RA and as Deputy RA, and from Constantine Sidamon-Eristoff, the current RA. The project has received considerable support from the other

project organizations via the Management Steering Committee, whose members are listed in Volume II.

PREFACE - DESCRIPTION OF THE STATEN ISLAND/NEW JERSEY URBAN AIR TOXICS ASSESSMENT PROJECT REPORT

This report describes a project undertaken by the States of New York and New Jersey and the United States Environmental Protection Agency with the assistance of the College of Staten Island, the University of Medicine and Dentistry of New Jersey and, as a contractor, the New Jersey Institute of Technology.

Volume I contains the historical basis for the project and a summary of Volumes II, III, IV, and V of the project report.

Volume II of the report lists the objectives necessary for achieving the overall purpose of the project, the organizational structure of the project, and the tasks and responsibilities assigned to the participants.

Volume III of the report presents the results and discussion of each portion of the project for ambient air. It includes monitoring data, the emission inventory, the results of the source identification analyses, and comparisons of the monitoring results with the results of other studies. Volume III is divided into Part A for volatile organic compounds, and Part B for metals, benzo[α]pyrene (BaP), and formaldehyde. Part B includes the quality assurance (QA) reports for the metals, BaP, and formaldehyde.

Volume IV presents the results and discussion for the indoor air study performed in this project. It contains the QA reports for the indoor air study, and a paper on the method for sampling formaldehyde.

Volume V presents the results of the detailed statistical analysis of the VOCs data, and the exposure and health risk analyses for the project.

Volume VI, in two parts, consists of information on air quality in the project area prior to the SI/NJ UATAP; quality assurance (QA) reports that supplement the QA information in Volume III, Parts A and B; the detailed workplans and QA plans of each of the technical subcommittees; the QA reports prepared by the organizations that analyzed the VOC samples; descriptions of the sampling sites; assessment of the meteorological sites; and a paper on emissions inventory development for publicly-owned treatment works.

The AIRS database is the resource for recovery of the daily data for the project. The quarterly summary reports from the sampling organizations are available on a computer diskette from the National Technical Information Service.

STATEN ISLAND/NEW JERSEY
URBAN AIR TOXICS ASSESSMENT PROJECT

VOLUME III, PART A.
RESULTS AND DISCUSSION OF THE VOLATILE ORGANIC COMPOUNDS IN AMBIENT AIR

EPA/902/R-93-001c

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1. INTRODUCTION

The Staten Island/New Jersey Urban Air Toxics Assessment Project (SI/NJ UATAP) was conducted as a cooperative program involving federal and state agencies, and several university research groups. The project was initiated in response to the concerns of the citizens of the area as expressed by their representatives to the government agencies. The organization and operation of the project are described in Description of the Project, Volume II of the project report. The details of the plans for the project are given in the subcommittee workplans and quality assurance (QA) plans in Appendices, Volume VI of the project report.

This volume reports the results obtained by the QA, Data Management, Ambient Monitoring, Emission Inventory, and Modeling and Source Identification Subcommittees. The efforts have focused on providing an overview of the volatile organic compounds (VOCs) portion of the data base and evaluating the data for potential significance. Methods selected by the various subcommittees have been applied to a selected subset of the data to satisfy the stated objectives for the project, determine the potential value of the results obtained, and guide efforts beyond the scope of the SI/NJ UATAP objectives.

The data obtained by each monitoring organization were submitted to the Data Management Subcommittee, examined for entry errors, and then reviewed by the QA Subcommittee. The data which met the quality assurance criteria in the QA plans were approved for use in subsequent analyses. Simultaneously with these activities, the Emission Inventory Subcommittee developed the Micro and Point Source Inventories and the Modeling Subcommittee tested methods for application to the data.

The results of an indoor air sampling program, multivariate statistical analyses of the ambient air data, and risk assessments using ambient and indoor air data are presented in Volumes IV and V of the project report; and results and discussion for the metals, benzo[α]pyrene, and formaldehyde are presented in Volume III, Part B.

The subcommittee reports in this volume represent the initial stages in analysis of the ambient air VOCs concentration data. The results demonstrate the utility of the methods chosen and reveal a number of significant relationships in the data. This volume documents the success of the project in producing data with sufficient accuracy and precision to fulfill the stated objectives of the project.

2. QUALITY ASSURANCE

2.1 INTRODUCTION

The Staten Island/New Jersey Urban Air Toxics Assessment Project (SI/NJ UATAP) presented unique Quality Assurance (QA) challenges due to the multiplicity of organizations conducting sampling and analysis for volatile organic compounds (VOCs), and the cutting edge technology used in the monitoring effort. This resulted in a monitoring effort conducted by organizations which varied greatly in their experience in conducting VOC sampling and analysis, using methods whose strengths, weaknesses, and variability were not fully known. Although each organization was responsible for assuring the quality of its own data, there was still a need to ensure the consistency, comparability, and quality of the QA efforts of the various organizations. As a result, the QA Subcommittee implemented a Quality Assurance program on two separate, but interlinked levels.

The first level was conducted by each of the individual organizations and consisted of establishing and maintaining sampling and analytical quality. This was done through the use of good laboratory practices, including the following:

proper calibration,
use of analytical standards,
sampling and analytical blanks,
duplicate analyses,
participation in inter-laboratory sampling,
analytical comparisons, and
data review.

The second level was conducted by the QA Subcommittee and consisted of verifying that the QA/QC procedures of each organization were appropriate and implemented. This was achieved by

requiring Quality Assurance Project Plans (QAPjPs) of each organization conducting sampling and analysis;

reviewing these QAPjPs;

performing QA management systems audits, coordinating and reviewing Performance Evaluation (PE) samples for all organizations, coordinating and reviewing the results of multi-day collocation experiments;

reviewing monitoring data;

requiring and reviewing final quality assurance reports from each organization, and recommending and requiring corrective action when necessary.

This section of the Report describes the results of QA Subcommittee activity. It includes brief discussions of each of the overall QA activities listed above. Since QA activities conducted by the individual organizations are included in their reports, and these reports were reviewed by the QA Subcommittee and reported here, this section indirectly covers all QA aspects for monitoring for volatile organics.

The complete and unabridged results and discussion of QA activities conducted for this project can be found in Volume VI. Presented here is an overview of these QA activities, with the most significant and important findings addressed in some detail.

2.2 QUALITY ASSURANCE ASSESSMENTS AS REPORTED BY THE INDIVIDUAL ORGANIZATIONS

2.2.1 Scope

QA reports based upon guidance developed by the QA Subcommittee were submitted by the New Jersey Institute of Technology (NJIT), the College of Staten Island (CSI), the New York State Department of Environmental Conservation (NYSDEC), and PEI, a contractor to U.S. Environmental Protection Agency (EPA). In these reports, each organization presented assessments of its data quality with respect to contamination, precision and accuracy, history of changes and improvements in sampling and analytical methodology; and an assessment of the variability of the data submitted.

The need for the QA reports was especially acute in this project for the following reasons:

1. Several of the organizations involved in the project had no previous experience in ambient air VOC analysis.

2. The course of the project was long enough that changes in key personnel and analytical methodologies occurred at several organizations during the project.

3. The course of the project was long enough that equipment problems were eventually discovered in all laboratories.

The following summary of the individual organizations' QA reports is sufficient for understanding the overall integrity of the data. However, it is strongly recommended that any future users of project data consult the original QA reports of the individual organizations, and treat these reports as part of the data. The complete QA reports are presented in Volume VI.

2.2.2 Summary of Findings in QA Reports Submitted by the Individual Organizations

Contamination was not found to be a significant problem with any of the organizations, with the exception of dichloromethane in the NJIT canisters. Toluene, and to a lesser extent benzene, were found as background in almost all sorbent based systems. However it was determined that these background levels did not affect the quality of the data generated. This was because either the background concentration was very low, or blank levels were relatively consistent. Thus, subtracting blank values from sample concentrations provided a reliable measurement of the concentration in the ambient air.

Accuracy of measurements by each of the organizations was determined through the use of sorbent tubes spiked by EPA/AREAL. Results of the analyses of these spikes showed that most organizations were capable of accuracy within ±50% of the spiked standard concentration. This rather broad criterion for accuracy was within the range normally seen with ambient monitoring. Additional accuracy data confirming these results were also presented by some organizations in their QA reports.

Precision data were obtained differently by each organization. NYSDEC collected a duplicate sample at every sampling event, while CSI collected duplicate samples at approximately monthly intervals. NJIT did not perform any duplicate monitoring, but relied instead upon the distributed-volume samples as a measure of analytical precision. These precision studies show that the agreement between duplicates was generally within 10-30%. Precision was also determined through the use of canisters collocated with the sorbent tube samplers; the results are reported in Section 2.3.

Breakthrough, defined as incomplete sample retention, is a predominant concern when sorbent traps are employed. Since breakthrough is flow-dependent, it was assessed through distributed-volume sampling, whereby results of two samplers operating at different flow rates were compared. Differences between samples outside the limits of laboratory precision were ascribed to breakthrough. Every sorbent sample collected for the project used this two-tube approach.

Breakthrough for most compounds was minimal, except for dichloromethane, where it was commonplace. Consistent dichloromethane results, without breakthrough, were available from NYSDEC only, where sorbent tube results were consistently in agreement with the collocated canisters. NYSDEC's ability to trap dichloromethane is attributable to its use of a trisorbent consisting of Tenax, charcoal, and Ambersorb in its sorbent tubes. Tubes used by other organizations consisted of Tenax alone, which was ineffective for trapping dichloromethane.

For 1,1,1-trichloroethane, CSI observed a 25% difference between the high- and low-flow distributed-volume pairs. CSI determined that these results were most likely due to breakthrough; the QA Subcommittee concurred. The other organizations did not find this problem with 1,1,1-trichloroethane.

Changes and Improvements were made by all organizations over the course of the project. This was most clearly seen with the PEI canisters, which were used as collocation samples to assess the variation between NJIT, NYSDEC and CSI sorbent samples. During the first two months of the project, the PEI detection limit was close to 1 ppb. As a result, only toluene was detected. Over the next three to six months, the PEI detection limit dropped to 0.5 ppb and toluene, benzene, xylene, and dichloromethane were consistently detected. Nine months into the project, the detection limit was lowered further to 0.2 ppb. As a result, ethylbenzene, 1,1,1-trichloroethane, and tetrachloroethene were commonly detected. Additional improvements by PEI in the last three months of the project resulted in the ability to detect carbon tetrachloride and chloromethane at concentrations $\geq$0.2 ppb. NJIT, CSI, and NYSDEC also showed improvements over time, as reported in the QA reports in Volume VI.

During the extended course of this study, it was expected that analytical problems and failures would develop. Although major failures were avoided during the project, there were cases in which data for specific compounds were withdrawn, invalidated, or caveated. Specifically these are as follows:

1. All NJIT chloromethane and dichloromethane data were invalidated. This decision is based on problems attributed to sampler contamination, possible analytical inaccuracies, and/or sample loss during analysis.

2. CSI dichloromethane data were invalidated. This decision is based on collocated canister results showing that breakthrough was occurring with CSI tubes; and CSI's high detection limits for this compound. The latter resulted in dichloromethane's rarely being detected in both high- and

low-flow distributed-volume pairs, making the determination of breakthrough impossible.

3. CSI data during the second and third quarters of 1989 were accepted with some reservations as noted in the caveats presented in Section 2.3. This decision was based upon CSI's observation of a progressive decline in compound concentrations found in their sorbent samples. Collocation with PEI canisters confirmed this relative decrease in CSI's reported concentrations. However, this decline was dramatic only during the last five to six samples of the third quarter, and was not observed for all compounds analyzed. Comparison between CSI and the PEI collocated canisters on an annual basis showed that CSI had a slight negative bias. The magnitude of this bias relative to PEI was within the range found for the other organizations. However, special care must be taken if data from the third quarter of 1989 are used beyond the context of this project. Further information can be found in Volume VI.

4. NYSDEC trichloroethylene data for the third quarter of 1989 were withdrawn due to calibration difficulties.

5. CSI and PEI hexane data from 1/88 to 4/88 were caveated. During this period of time, PEI reported high (5-100 ppb) levels of hexane in CSI's canister samples. This was not seen in CSI's collocated Tenax data. However, high hexane levels were found only in CSI's canisters and not in canisters of other organizations analyzed by PEI at the same time. Additionally, the high hexane levels were found in consecutive CSI samples, eventually declining to typical ambient levels. Although these results would be consistent with contamination of the canister sampling train, no definitive conclusions could be reached.

Detailed presentations of the reasons, extent, and degree of caution necessary when using the data are found in the QA reports in Volume VI. Additional, less significant variations in data quality were noted by the organizations in their QA reports. The conclusions presented here are relevant to the data uses intended for the project. Any other use of these results should not be attempted without consulting the QA reports in Volume VI to ensure that the data quality objectives required for the other use are met.

2.3 INTER-ORGANIZATION COMPARISONS VIA CANISTER COLLOCATIONS

2.3.1 Scope

Sampling and analysis of VOCs for the SI/NJ UATAP were conducted by three organizations: NYSDEC, NJIT, and CSI. Each organization had sole jurisdiction over its sampling sites[1] and used different sampling and analytical methodologies.[2] This resulted in the isolation of the sampling/analytical organizations from each other. In order to mitigate this isolation and to provide a basis for statistical inter-comparison of the results produced by the various organizations, the QA Subcommittee developed and implemented two strategies.

The first approach was to have shootouts, events in which all project participants gathered samples at one location for several days.[3] The resulting collocation data were analyzed to determine the degree of comparability between organizations. Shootout results are presented in Section 2.4, Inter-organization Comparisons via Shootouts.

Since shootouts are labor-intensive, requiring extra sampling equipment, analytical capacity, and monitoring personnel not always available, shootouts were scheduled infrequently. In addition, shootouts provide only a snapshot of an organization's capabilities over a short period of time, rather than a long-term assessment. The second approach, presented here, involved routine collocation of Summa® canisters with the sorbent tubes normally used by each organization. By assessing the collocation results on an annual basis, comparisons between organizations could be made. NYSDEC and CSI collected canister samples at the rate of one canister collocation for every three tube samples taken. Canisters were analyzed by PEI, a contractor to EPA/AREAL. NJIT was already collocating canister and sorbent tube samples, but in contrast to NYSDEC and CSI, was analyzing both the sorbent tube and the canister samples. To ensure consistent comparison of the NJIT data with that of NYSDEC and CSI, NJIT agreed to split canister samples with PEI on a monthly basis. Sample splitting was accomplished by having NJIT analyze an aliquot of gas from a sample canister and then send the canister, still filled with sampled ambient air, to PEI for analysis. Additional NJIT collocation samples were obtained during the second year of the study, when NJIT assumed the

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1 See the Data Management, Section 3 of this volume, for a full listing of site jurisdictions.

2 Details of sampling and analytical methodologies can be found in the Management Systems Audits in Volume VI.

3 Shootout results are reported in Volume VI.

responsibilities of Tenax and PEI canister sampling at the Sewaren and Piscataway sites. The data sets used for this section are given in the Tables III-2-26 to 36.

Statistical analysis of the collocation data was used to determine if any significant bias was evident on an organizational basis; an example of this would be the determination of whether NYSDEC's benzene data were significantly biased relative to NJIT's benzene data. Inter-site comparisons are not presented here, since extensive statistical consultation and specialized computer programs are required to analyze properly the complex data set that resulted from the project's experimental design. Further statistical analyses, including inter-site comparisons, are included in Volume V.

2.3.2 Caveats and Notes

1. The first data year is defined as October 1987 through September 1988, and the second data year as October 1988 through September 1989. This convention is consistent with the annual averages reported by the Data Management Subcommittee and submitted to the Risk Assessment Subcommittee.

2. All calculations were made on collocated data pairs for individual compounds.

3. Concentrations below the detection limit were deleted from the data set, resulting in the invalidation of the collocated data pair for the compound not detected.

4. Comparisons were made among all organizations for toluene, benzene, m- and p-xylene, o-xylene, tetrachloroethene, and 1,1,1-trichloroethane.

5. Dichloromethane data are presented for NYSDEC only. The high detection limits for CSI's dichloromethane data caused computational artifacts due to the project convention of reporting data below the detection limit as one half the detection limit. NJIT had analytical problems with dichloromethane that made its analysis subject to a variation greater than an order of magnitude. As a result, these data were withdrawn from consideration in the collocation comparisons.

6. Trichloroethene, chloroform, and carbon tetrachloride concentrations were almost always below the detection limit of PEI; therefore comparison with collocated sorbent tubes was omitted.

7. The PEI numbers for hexane in the first year of the project are suspect. Large concentrations (>50 ppb) were reported

by PEI for these samples. CSI's collocated Tenax showed concentrations typically at 1 ppb or less, typical for all organizations throughout the project. Additionally, these high concentrations were only reported by PEI for a short period of time. Subsequent collocations revealed close agreement between PEI and CSI, as evidenced by the second year's data. However, since there was no physical basis to disqualify PEI's results, the data have been included in the data tables.

8. Hexane data were not reported by NYSDEC.

9. Ethylbenzene was not reported by NJIT. NYSDEC's ethylbenzene data for the first year of the study were drawn entirely from the 4th quarter of that year.

10. There were insufficient NJIT tetrachloroethene data above the detection limit in the first year of the project to warrant inclusion.

11. PEI analysis was not a true reference or standard for any compound. However, it does represent a valid basis for comparison in this project. PEI analysis of collocated or split canister samples is the only available means for comparing the continuing performance of the individual sampling/analysis organizations. The resulting assessments should not be interpreted as true comparisons with a reference or standard, but as comparisons with a consistent, reliable point of reference.

2.3.3 Results - Descriptive Summary Statistics

This section summarizes the statistics obtained from the comparison of collocation or split analysis of canisters analyzed by PEI with samples analyzed by the participating organizations. The statistics are presented in Tables III-2-1 and 2. Table III-2-3 shows the standard deviation of collocated PEI canisters as a measure of the precision of the PEI reference. The descriptions below outline how the components of these tables were computed.

% of PEI: This represents the degree of agreement between the individual organizations and the PEI reference. A value of 100% indicates total agreement. The NYSDEC and CSI results were derived by first computing annual means for the collocated canister and sorbent samples. Then, the annual means for the sorbent tube concentrations were divided by the PEI canister mean and multiplied by 100. NJIT's % of PEI results were derived by first determining annual means for NJIT and PEI from (1) NJIT/PEI split canister analyses, and 2) Tenax samples collocated with PEI canisters at the Piscataway and Sewaren sites. The annual NJIT means were then divided by the PEI annual mean and multiplied by 100.

When using the % of PEI calculations to make inferences about the data, care must be used because the variability of the individual comparisons that make up the averages is not evident. This variability is addressed in detail in the analysis of variance in the next section.

Average Concentration: This represents the annual mean concentration, in parts per billion, obtained by the individual sampling organization (NJIT, CSI, or NYSDEC) during collocation sampling.

Standard Deviation: This represents a measure of the variability between the sample and the collocated PEI reference. This statistic was generated by taking the differences between the samples and the collocated PEI references and determining the standard deviation of these differences.

Standard Error: This represents the standard error associated with the standard deviation reported above. It is obtained by dividing the standard deviation by the sample size, and taking the square root of that result.

n: This is the number of collocated samples taken, or the statistical sample size. This number is a function of the way the study was constructed. For example, NYSDEC had many sampling sites and therefore had the most collocated canister samples. NJIT, which conducted its own canister analysis, sent only a limited number of canisters to PEI for split analysis.

PEI Precision Analysis, Table II-2-3: This represents the standard deviation of collocated PEI canisters derived from two separate experiments and subsequently pooled.

2.3.4 Results of the Inter-organization Comparisons via Canister Collocation

Tables III-2-1 and 2 show several clear and consistent patterns when comparing NJIT, CSI, and NYSDEC to the collocated PEI reference. In almost all cases, the results of the organizations were within ± 50 of the PEI reference, with the important exceptions noted below. The differences relative to the PEI reference were greater in the first year of the project than in the second year of the project. NYSDEC had the most consistent response from year to year; and NJIT, the most variable. NJIT's year-to-year variability may be an artifact of the small number of collocated/split samples taken during the first year of the project. Specific findings for each organization are presented below.

NJIT Canisters: Benzene relative response was similar for the two years of the study--109% of the PEI reference during the first year, and 116% of the reference during the second year.

However, annual averages for toluene, m- and p-xylene, and o-xylene relative responses were 187%, 240%, and 144% of the PEI reference during the first year of the study; and 91%, 75%, and 67% of the reference during the second year. In contrast, the 1,1,1-trichloroethane average increased from 78% of the PEI reference in the first year of the study to 133% in the second year.

NJIT Tenax: Annual averages for all compounds were within 95% to 116% of the PEI reference in the first year, and 72% to 113% of the reference in the second year. Relative responses for m- and p-xylene, o-xylene, 1,1,1-trichloroethane, and hexane averages were approximately 25% lower in the second year of the study relative to the first year. Conversely, the benzene average was 16% higher in the second year of the study than in the first. Toluene was essentially unchanged, with only a 4% relative difference between years. Comparisons on a yearly basis must be made with care, since the first year's results were drawn from a much smaller data set than the second year's, and thus may be skewed more easily. Therefore, the second year's results are more likely to be representative of NJIT's performance.

NYSDEC Sorbent Tubes: For each year of the study, annual averages for benzene, toluene, and m- and p-xylene were within 20% of the PEI reference. Ortho-xylene, dichloromethane, tetrachloroethene, and 1,1,1-trichloroethane averages were 61% to 76% of the PEI reference during the first year of the project, and 57% to 79% of the PEI reference during the second year. NYSDEC maintained an extremely consistent relationship to the PEI reference over the two years, showing a difference of -16% for toluene, +12% for benzene, and less than ±9% for all other compounds reported, with the exception of ethylbenzene. NYSDEC ethylbenzene results for the first year of the study are based on one quarter of data.

CSI Tenax: Annual averages for toluene, benzene, m- and p-xylene, and tetrachloroethene were within 30% of the PEI reference for both years of the study. Ortho-xylene and 1,1,1-trichloroethane averages were 53%-65% of the PEI reference throughout the project. These two compounds typically showed a response lower than the PEI reference when sorbent-based sampling was employed, regardless of the laboratory performing the sampling/analysis. The responses for m- and p-xylene, o-xylene, and 1,1,1-trichloroethane varied by less than 10% between the first and second year of the project. Hexane data for the first year were caveated above, due to possible sampler contamination. The second year's data were 101% of the PEI reference. Ethylbenzene results appear to be biased high, with a response of 169% of PEI in the first year; however, this declined to 120% of PEI in the second year.

2.3.5 Results - Analysis of Variance and LSD

The analysis of variance (ANOVA) is presented for seven compounds--toluene, benzene, m- and p-xylene, o-xylene, tetrachloroethene, 1,1,1-trichloroethane, and hexane. Sample sizes were insufficient for each of the other compounds sampled; the reasons for this data insufficiency are explained in the Section 2.3.2 caveats and notes. Calculations were done for each year of the project.

The sample set used for the ANOVA was developed from the collocated samples. For each collocation event, the concentration reported by the individual sampling organization was subtracted from the PEI canister result reported. This was done for all compounds examined, and for each organization. The transformation of data in this manner allows for the direct comparison of NJIT, CSI, and NYSDEC because the transformed data reflect only the difference between each organization and the reference PEI canister, independent of the ambient air concentrations present during sampling. This treatment of PEI as the standard, although not technically a standard, forms a legitimate reference for comparison. The data transformation approach and the statistical methods applied here were developed in consultation with EPA/AREAL.

The results of the statistical analysis presented offer several important and different pieces of information. The ANOVA partitions the variance of the data set into the variance occurring between treatments and the variance occurring within treatments. In our case, the term treatment refers to the organization. Therefore, the ANOVA partitions the variance into the components attributable to the differences between CSI, NYSDEC, and NJIT, and the variance attributable to variability within the individual organizations themselves.

The F statistic is used to determine if the differences between organizations, computed in the ANOVA procedure, are significant. Significance at the 5% level is indicated by a single asterisk, and at the 1% level by a double asterisk. If significance is indicated by the F test, further analysis may be done using the Least Significant Difference (LSD) statistic. The advantage of the LSD is that it allows a determination of which organizations are similar to one another and which are different. The F test, in contrast, only signifies that differences exist between all of the organizations analyzed. The LSDs presented here should be used only to compare the performance of the organizations. These LSDs should not be used to compare differences observed between individual sites operated by the different organizations. The limitations of the data set and the experimental design require the use of advanced statistical models and computer programs, as well as extensive statistical consultation, to understand the limitations, caveats, and assumptions inherent in an analysis of inter-site comparisons.

Comparisons of sites operated by different organizations are addressed in Volume V of the project report.

This following section includes the ANOVA and LSD statistics for all sampling events that included collocation (or splits) with PEI canisters. Estimates of bias between organizations are relative to the PEI reference, not an absolute standard. ANOVA tables for both years of the study are presented in Tables III-2-4 to 17, and LSD tables are presented in Tables III-2-18 to 23. Data sets used in the collocated canister intercomparison of organizations are presented in Tables III-2-26 to 36.

2.3.5.1 First-year data

The results of the ANOVA and F tests are presented in Tables III-2-4 to 10. Examination of these data shows that no significant differences existed between organizations for the analysis of benzene, 1,1,1-trichloroethane, tetrachloroethylene, and hexane. Significant differences were found for toluene, m- and p-xylene, and o-xylene.

LSDs are presented in Tables III-2-18 to 20 for results shown to be significant by the F test. Analysis of the data using the LSDs is presented in Table III-2-23. The toluene and m- and p-xylene data showed the same trends. All organizations had greater concentrations than the collocated PEI canisters, with the exception of NYSDEC results with m- and p-xylene. The NJIT canisters, showing the most extreme case of this bias, were significantly different from all other organizations and sampling methods. The NYSDEC tubes, most closely resembling the collocated PEI canisters, were significantly different from the CSI tubes. The NJIT tubes were statistically indistinguishable from either the CSI or NYSDEC sorbent tubes.

For o-xylene, CSI and NYSDEC tubes had lower concentrations than the PEI canisters, whereas the NJIT canisters had greater concentrations than PEI. NJIT tubes were almost equal to the PEI canisters. The NYSDEC and CSI tubes were statistically indistinguishable from one another, although both were significantly different from the NJIT canisters. The NJIT tubes were statistically equivalent to all samples and methods used.

2.3.5.2 Second-year data

The results of the ANOVA and F tests are presented in Tables III-2-11 to 17. Examination of these data show no significant differences for benzene, m- and p-xylene, o-xylene, tetrachloroethylene, and hexane. Significant differences were found with toluene and 1,1,1- trichloroethane.

LSDs are presented for results shown to be significant by the F test in Tables III-2-21 and III-2-22. Analysis of the data using the LSDs is presented in Table III-2-23. For toluene, the NJIT canisters and CSI tubes had lower concentrations than the PEI canisters, whereas the NYSDEC and NJIT tubes had greater concentrations than the PEI canisters. The NJIT canisters and Tenax were not significantly different from any other organizations, or each other. The CSI and NYSDEC tubes, however, were significantly different from each other.

For 1,1,1-trichloroethane, CSI, NYSDEC and NJIT sorbent tubes had lower concentrations relative to the PEI canisters, while the NJIT canisters had greater concentrations. The CSI tubes had the lowest concentrations relative to PEI, and were significantly different from all other organizations. The NJIT and NYSDEC tubes were statistically equivalent to one another, although they were different from both the CSI tubes and the NJIT canisters.

2.3.6 Discussion

The above statistical analysis indicates that real biases did exist in the sampling/analysis for certain compounds. Furthermore, these biases were suggested by the descriptive statistics found in Tables III-2-1 and 2. Other differences may exist, however they are obscured by the variability in the sampling/analysis methodology.

The sorbent methods showed a remarkable degree of agreement across organizations relative to PEI. The range of differences between all organizations was ≤63% relative to PEI, and typically ≤30-40%. Use of the NJIT canister data must be done with care, due to the small sample size, which may not be representative.

Further analyses of the differences between organizations and sites might include the following:

1. Based on the ANOVA, in cases where significance was observed, adjust all data for that organization by the mean difference for each organization as stated in the ANOVA table. Based on the QA information provided by the organizations, construct 95% confidence bands around the data reported for each organization/site.

2. Perform an ANOVA, segregated by site, for each collocated pair. This would allow for the determination of the variability inherent within an organization that occurs at each site. (It is this interaction term of site and organization that complicated the ANOVA, precluding its being presented here.)

2.4 INTER-ORGANIZATION COMPARISON VIA SHOOTOUTS

2.4.1 Scope

These comparisons, also referred to as shootouts, are based on multi-day collocation experiments involving all of the participating sampling organizations. The experiments were conducted to ascertain the extent of variability among the organizations, including the combined effects of sampling and analysis. This was necessary because each organization had independent control of its own sites; under normal operation, the organizations did not collocate samplers. Therefore, these experiments were the only opportunity to compare the organizations with each other directly. Three such experiments were conducted over the course of the SI/NJ UATAP. Further information may be found in Volume VI.

2.4.2 Results and Discussion

The results of the experiments are presented in Tables III-2-24 and 25. Table III-2-24 compares the mean results of each organization to either EPA/AREAL or PEI, depending on the experiment examined. The organization means are based on days when there were samples for both the individual organization and EPA/AREAL or PEI. Data that were reported as below the minimum detection limit (MDL) were used in the computations by treating one half the detection limit as the real concentration. All computations using one half the MDL in Table III-2-24 are asterisked. The PEI data presented for Experiment I are not treated in this fashion because the detection limits of PEI at that time were so high (>0.5 ppb) that using half the detection limit would be misleading; in these cases, "MDL" was entered in the table instead of a number. Table III-2-25, Experiment Results, shows the results for each day of all three shootouts. The Tenax data presented are the means of the two distributed-volume tubes used for each sample.

Specific observations and findings for each of the experiments are presented below.

Experiment I: The experiment, conducted 10/20/87 - 10/22/87 on the roof of Susan Wagner High School in Staten Island, was the official start-up of the sampling phase of the SI/NJ UATAP. Sorbent samples were taken by CSI, NYSDEC, and NJIT. Each institution analyzed the samples it collected. Canister samples were taken by CSI and the University of Medicine and Dentistry of New Jersey (UMDNJ) and analyzed by PEI, a contractor to EPA. Personnel from EPA/AREAL in Research Triangle Park also participated and collected canister and Tenax samples. Samples were obtained for all three days by each organization, with the exception of NYSDEC, which had technical problems on the first day, and EPA/AREAL, which was scheduled to sample for only two days.

The results can be examined in Tables III-2-24 and 25. These tables show that the differences between organizations for the various compounds ranged from near agreement to several hundred percent. Certain trends were apparent, such as PEI's inability to detect most compounds. Another trend observed was that NJIT Tenax data were generally lower, and its canister data higher, than those of other organizations. Another finding was that dichloromethane was not being retained by the Tenax traps.

Additional QA was arranged by the Quality Assurance Subcommittee based on these results. First, all participants were required to analyze an additional Performance Evaluation (PE) sample, which is an EPA/AREAL sample spiked with volatile organic compounds of concentration unknown to the analyzing organization. Second, PEI was audited by EPA/AREAL, and a subsequent field sample was split between EPA/AREAL and PEI. The results of the PE's can be found in the QA assessments of NJIT, CSI, and NYSDEC found in Volume VI. PEI's results can be found in a separate section of Volume VI.

Experiment II: The second experiment was conducted on 7/25/88 - 7/28/88 at Susan Wagner High School. By this time, the shakedown period of the project had ended, and a typical profile of the VOCs in the project was evident. Additionally, the limitations and strengths of the sampling and analytical processes as they influenced the project and quality of the data were known. The participants were the same as previously, along with several institutions that did not provide routine monitoring for the SI/NJ UATAP. Samples were obtained from NYSDEC, CSI, NJIT, and PEI for all four days with the following exceptions: (1) NYSDEC's ATD-50 tubes for day 1, (2) NJIT tubes and canisters for day 2, and (3) EPA/AREAL canisters for day 4 and Tenax tubes for days 3 and 4.

The results of this experiment are discussed at length in the report, "Quality Assurance Subcommittee Report on the Results of Shootout #2," which is included in Volume VI. A major finding was that differences between organizations narrowed to within a factor of two for almost all compounds over the course of the study. However, greater levels of variation were sometimes evident for a particular day of the experiment, especially with compounds present at ambient concentrations <0.5 ppb. This suggested that differences between organizations, and consequently between sampling sites in the study as a whole, would be more difficult to discern due to the large variation produced by the different sampling and analytical methodologies. An additional finding of this experiment was that PEI's detection limits had improved dramatically.

Experiment III: This experiment was conducted during September 1989 at the Port Richmond post office site in Staten Island. Twenty-four-hour samples were taken at six-day intervals, commencing with 9/1/89. This experiment differed from previous ones in that its purpose was to ascertain the differences in analytical variation between organizations. The sampling equipment for all sorbent tube samples was provided by NYSDEC, with the exception of the sorbent cartridges themselves, which were provided by the individual organizations. The participants in the study were NJIT, CSI, NYSDEC, and PEI.

The results can be seen in Tables III-2-24 and 25. NYSDEC's and PEI's results had the closest level of agreement. The low o-xylene readings relative to PEI are indicative of a trend reported in Volume VI that is seen for all organizations. However, the magnitude of the response in this instance is double that typically seen with annual averages. CSI and NJIT reported data that were substantially below those reported for NYSDEC and PEI for all compounds. The reason for these differences is unknown. However it should be reiterated that NJIT and CSI were using NYSDEC's samplers, and not their own, in this experiment. Thus, the low readings reported for these organizations may have resulted from tube/sampler interface problems. During the time period of this experiment, CSI had additional analytical difficulties which were corroborated by the CSI/PEI Tenax/canister collocations done at this time. A further discussion of CSI's assessment of these difficulties is presented in Volume VI.

2.5 MANAGEMENT SYSTEMS AUDITS

2.5.1 Scope

Volume VI contains the audit reports generated by the Management Systems Audits (MSAs) conducted by the Quality Assurance Subcommittee. The purpose of the MSAs was to examine the implementation of Quality Assurance and Quality Control methods in the sampling and analytical processes of each of the organizations submitting data for the study. Also related in the audits were several differences in the sampling and analytical procedures used by organizations, differences that may not have been recorded elsewhere.

2.5.2 Summary of Results

The findings of the MSAs showed satisfactory QA/QC implementation by all the organizations participating in the study. The original MSA's are found in Volume VI.

2.6 QUALITY ASSURANCE PROJECT PLANS

The approved Quality Assurance Plans submitted for the analysis of VOCs for this project are found in Volume VI.

2.7 SAMPLING SITE REPORTS

The site reports contain descriptions of the sampling sites, photographs, maps of the nearby geographical area, and scale drawings of the sampling sites. The complete site reports can be found in Volume VI.

2.8 QUALITY ASSURANCE SUMMARY

The Quality Assurance Reports submitted by each organization contain their assessments of data quality, supported by statistical evidence. These reports show that sample contamination was negligible. Organizations with sorbent-based systems reported either low background levels or consistent background levels for which corrections were made easily. For most compounds, accuracy was ascertained to be within ± 50% of performance evaluation samples provided by EPA/AREAL. Duplicate samples or comparison of parallel distributed-volume sorbent tubes were within 10-30%, depending on the organization. Breakthrough was not found to be a concern, except in the case of dichloromethane; for dichloromethane, breakthrough was widespread, with the exception of the NYSDEC trisorbent tubes. CSI had some breakthrough with 1,1,1-trichloroethane, approaching a 25% difference between distributed-volume pairs.

Comparisons among organizations were made for seven out of the 11 compounds on the original target list. These compounds were toluene, benzene, m- and p-xylene, o-xylene, 1,1,1-trichloroethane, tetrachloroethylene, and hexane. Compounds not analyzed for differences between organizations were dichloromethane, chloroform, trichloroethylene and carbon tetrachloride. Comparisons were based on each organization's performance relative to PEI canisters, which were routinely collocated with the organization's samplers throughout the study.

Deviation from the PEI reference was ≤50% for almost all samples and compounds examined. Deviations beyond this range were shown to have a statistically significant bias as seen by the ANOVA. The range of difference for the sorbent methods used by the organizations was typically 30-40% or less, depending on the chemical, validating the factor-of-two estimate developed from the shootout data. NJIT's canister methods could not be evaluated as rigorously as the Tenax methods because sufficient collocation data were lacking.

Dichloromethane was not analyzed by ANOVA because only the NYSDEC and PEI data could be accepted unequivocally and without large gaps. The direct comparison of these two organizations showed that NYSDEC's trisorbent results were within 70-80% of PEI's canisters.

Chloroform, trichlorethylene, and carbon tetrachloride results were not analyzed by ANOVA because the ambient concentrations were below the detection limit of the collocated Summa® canister. Thus, there was no basis upon which to compare the different organizations. CSI, NJIT, and NYSDEC all reported annual mean concentrations for these compounds in the range of 0.03 - 0.2 ppb, with typical levels being close to 0.1 ppb. The variability for compounds found at such concentrations, close to the detection limits of the analytical systems used, was greater inherently than that for compounds present at higher concentrations. Therefore, it is unlikely that any significant differences between organizations can be discerned for these three compounds.

ANOVA results for the first year of the study showed significant differences between organizations for toluene, m- and p-xylene, and o-xylene. The largest differences between organizations were seen with toluene and m- and p-xylene, where the NJIT canisters were biased to a much larger extent than any other method. Differences between other methods were of much smaller magnitude. With o-xylene, all sorbent tube-based methods showed equivalent negative bias relative to the PEI reference. NJIT canisters showed positive bias relative to PEI, but the magnitude of the bias was equivalent to that of the sorbent tubes. No significant differences were found in the cases of benzene, 1,1,1-trichloroethane, tetrachlorethylene, or hexane.

ANOVA results for the second year of the study showed significant differences between organizations for toluene and 1,1,1-trichloethane. With toluene, the largest difference from the PEI reference was exhibited by the NYSDEC sorbent tubes. In the case of 1,1,1-trichloroethane, the greatest difference from the PEI reference was observed with the CSI sorbent tubes. No significant differences were found in the case of benzene, m- and p-xylene, o-xylene, tetrachloroethene, and hexane.

The findings elucidated by the ANOVA indicate that biases between organizations occurred only for a minority of the compounds analyzed. Other differences may also exist; however they are obscured by the variability of the sampling/analysis methodology and the limitations of the data set.

The results of the collocation experiments that intercompared organization performance directly (i.e., the shootouts) showed that the organizations generally differed within a factor of two. Variation between organizations exhibited no consistent pattern across all three experiments. Individual studies, however, did reveal instances of inadequate detection limits, bias, and confirmation of trends observed in the data.

Management Systems Audits showed adequate quality control measures and appropriate laboratory practices. Site inspections and reports indicated proper sampler siting and uniformity of approach within each organization.

2.9 ACKNOWLEDGEMENT

This section was prepared by Mr. Avraham Teitz and Mr. Marcus Kantz of the U.S. Environmental Protection Agency Region II.

2.10 REFERENCES

Steel, R. G. D.; Torrie, J. H. (1980) Principles and procedures of statistics. New York, NY: McGraw-Hill Book Company.

QA Tables III-2-1 through 25

Table III-2-1

Comparison Between Organizations and PEI Canisters
Year Number 1 of Study

Organization	Toluene	Benzene	M/P Xylene	O-Xylene	Dichloro methane	Tetra chloro ethylene	1,1,1 Trichloro ethane	Hexane	Ethyl Benzene	Trichloro ethylene	Chloroform	Carbon Tetra chloride
NJIT Tenax												
% of PEI	116	97	104	94	withdrawn	insuffi-	101	95	not done	insufficient data due to MDL		
Avg. Conc.	4.78	1.51	1.58	0.62	withdrawn	cient	0.71	1.71	not done	insufficient data due to MDL		
Std. Dev.	1.63	0.90	1.49	0.57	withdrawn	data due	0.68	----	not done	insufficient data due to MDL		
Std. Error	0.64	0.47	0.61	0.44	withdrawn	to PEI	0.63	----	not done	insufficient data due to MDL		
n	4	4	4	3	withdrawn	MDL	2	1	not done	insufficient data due to MDL		
NJIT Canister												
% of PEI	187	109	240	144	withdrawn	insuffi-	78	111	not done	insufficient data due to MDL		
Avg. Conc.	7.73	1.07	3.67	0.96	withdrawn	cient	0.55	2.00	not done	insufficient data due to MDL		
Std. Dev.	4.24	0.75	2.49	0.66	withdrawn	data due	----	----	not done	insufficient data due to MDL		
Std. Error	1.03	0.43	0.79	0.41	withdrawn	to PEI	----	----	not done	insufficient data due to MDL		
n	4	4	4	4	withdrawn	MDL	1	1	not done	insufficient data due to MDL		
NYSDEC Tubes												
% of PEI	104	110	92	61	71	66	76	not done	67	insufficient data due to MDL		
Avg. Conc.	2.46	0.98	1.15	0.38	0.58	0.25	0.48	not done	0.40	insufficient data due to MDL		
Std. Dev.	0.97	0.60	0.55	0.32	0.41	0.36	0.32	not done	0.60	insufficient data due to MDL		
Std. Error	0.14	0.11	0.11	0.09	0.11	0.15	0.16	not done	0.20	insufficient data due to MDL		
n	48	47	42	40	33	17	12	not done	12	insufficient data due to MDL		
CSI Tubes												
% of PEI	128	89	130	60	artifact	129	58	4	169	insufficient data due to MDL		
Avg. Conc.	3.90	1.13	1.87	0.39	artifact	0.67	0.34	0.90	0.95	insufficient data due to MDL		
Std. Dev.	1.51	0.71	1.20	0.21	artifact	0.15	0.30	36.11	0.64	insufficient data due to MDL		
Std. Error	0.21	0.14	0.20	0.10	artifact	0.11	0.13	1.34	0.20	insufficient data due to MDL		
n	34	34	31	23	artifact	13	18	20	16	insufficient data due to MDL		

% of PEI = (Annual average concentration/collocated PEI average concentration)*100
Avg. Conc. = Mean Annual Organization Concentration
Std. Dev. = Standard Deviation of the Difference Between the Collocated PEI and Organization Concentrations
Std. Err. = Standard Error; Square Root(Std. Dev./n)
n = Sample size

Table III-2-2

Comparison Between Organizations and PEI Canisters
Year Number 2 of Study

Organization	Toluene	Benzene	M/P Xylene	O-Xylene	Dichloro methane	Tetra chloro ethylene	1,1,1 Trichloro ethane	Hexane	Ethyl Benzene	Trichloro ethylene	Chloroform	Carbon Tetra chloride
NJIT Tenax												
% of PEI	112	113	74	78	withdrawn	83	72	100	not done	insufficient data due to MDL		
Avg. Conc.	3.07	1.19	0.77	0.35	withdrawn	0.23	0.51	0.85	not done	insufficient data due to MDL		
Std. Dev.	1.74	0.65	0.72	0.27	withdrawn	0.11	0.38	0.48	not done	insufficient data due to MDL		
Std. Error	0.23	0.14	0.15	0.10	withdrawn	0.10	0.11	0.14	not done	insufficient data due to MDL		
n	32	33	32	30	withdrawn	11	32	25	not done	insufficient data due to MDL		
NJIT Canister												
% of PEI	91	116	75	67	withdrawn	61	133	101	not done	insufficient data due to MDL		
Avg. Conc.	3.51	2.08	1.05	0.38	withdrawn	0.12	1.04	1.46	not done	insufficient data due to MDL		
Std. Dev.	0.71	0.27	0.44	0.14	withdrawn	0.06	0.23	0.60	not done	insufficient data due to MDL		
Std. Error	0.34	0.21	0.27	0.15	withdrawn	0.12	0.20	0.35	not done	insufficient data due to MDL		
n	6	6	6	6	withdrawn	4	6	5	not done	insufficient data due to MDL		
NYSDEC Tubes												
% of PEI	120	98	95	57	79	57	70	not done	122	insufficient data due to MDL		
Avg. Conc.	3.76	1.14	1.47	0.48	0.76	0.52	0.48	not done	0.60	insufficient data due to MDL		
Std. Dev.	1.31	0.36	1.00	0.98	0.68	1.08	0.34	not done	0.40	insufficient data due to MDL		
Std. Error	0.10	0.05	0.09	0.09	0.08	0.15	0.06	not done	0.10	insufficient data due to MDL		
n	130	127	123	109	114	51	108	not done	94	insufficient data due to MDL		
CSI Tubes												
% of PEI	94	107	121	65	artifact	95	53	101	120	insufficient data due to MDL		
Avg. Conc.	3.14	1.39	1.69	0.38	artifact	0.86	0.48	0.84	0.53	insufficient data due to MDL		
Std. Dev.	2.01	0.45	0.63	0.15	artifact	0.30	0.50	0.32	0.23	insufficient data due to MDL		
Std. Error	0.25	0.12	0.14	0.08	artifact	0.15	0.14	0.11	0.10	insufficient data due to MDL		
n	31	30	30	25	artifact	13	25	25	25	insufficient data due to MDL		

% of PEI = (Annual average concentration/collocated PEI average concentration)*100
Avg. Conc. = Mean Annual Organization Concentration
Std. Dev. = Standard Deviation of the Difference Between the Collocated PEI and Organization Concentrations
Std. Err. = Standard Error; Square Root(Std. Dev./n)
n = Sample size

Table III-2-3 PEI Precision Analysis

	Average Concentration	Standard Deviation
Toluene	3.01	0.34
Benzene	0.84	0.06
M/P Xylene	0.93	0.25
Dichloromethane	0.89	0.22
Hexane	0.79	0.26
O-Xylene	0.50	0.25
1,1,1 Trichloroethane	0.37	0.10
Ethyl Benzene	0.24	0.11
Tetrachloroethylene	0.16	0.03

Based on 2 studies.

Study 1 involved three collocated canisters over a period of four seperate days during shootout #2.

Study 2 was based on the pump/pumpless collocations conducted with three collocated canisters on two seperate days.

The data from the studies were pooled after analysis of variance and homogeneity of variance tests indicated the acceptability of such an approach.

Further statistics available upon request.

Table III-2-4 to 5

Analysis of Variance Betwen Organizations

4th Quarter 1987 - 3rd Quarter 1988

Table 4. Toluene 1st Year of Study

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	31	4	4	48		
Sum (Xi)	-27.50	-14.40	-2.60	-4.77	Y..	-49.27
Sum (Xi^2)	98.13	91.98	7.74	43.56		241.41
(Sum (Xi))^2/n	24.40	51.84	1.69	0.47	C =	27.90
Individual SS	73.73	40.14	6.05	43.08		
Individual Mean	-0.89	-3.60	-0.65	-0.10		

Total SS =	213.50	df =	86
Treatment SS =	50.50	df =	3
Error SS =	163.01	df =	83

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	50.50	16.83	8.57 **
Within treatments	83	163.01	1.96	

Table 5. Benzene 1st Year of Study

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	31	4	4	47		
Sum (Xi)	5.10	-0.60	0.20	-4.15	Y..	0.55
Sum (Xi^2)	15.98	1.34	1.96	16.65		35.93
(Sum (Xi))^2/n	0.84	0.09	0.01	0.37	C =	0.00
Individual SS	15.14	1.25	1.95	16.29		
Individual Mean	0.16	-0.15	0.05	-0.09		

Total SS =	35.93	df =	85
Treatment SS =	1.30	df =	3
Error SS =	34.63	df =	82

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	1.30	0.43	1.03
Within treatments	82	34.63	0.42	

Table III-2-6 to 7

Analysis of Variance Betwen Organizations

4th Quarter 1987 - 3rd Quarter 1988

Table 6. M/P Xylene 1st Year of Study

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	31	4	4	42		
Sum (Xi)	-13.70	-8.60	-0.20	4.17	Y..	-18.33
Sum (Xi^2)	47.16	32.04	4.92	12.41		96.53
(Sum (Xi))^2/n	6.05	18.49	0.01	0.41	C =	4.15
Individual SS	41.11	13.55	4.91	11.99		
Individual Mean	-0.44	-2.15	-0.05	0.10		

Total SS =	92.38	df =	80
Treatment SS =	20.82	df =	3
Error SS =	71.56	df =	77

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	20.82	6.94	7.47 **
Within treatments	77	71.56	0.93	

Table 7. O-Xylene 1st Year of Study

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	23	3	3	40		
Sum (Xi)	5.30	-0.90	0.10	10.20	Y..	14.70
Sum (Xi^2)	2.15	0.83	0.51	6.52		10.01
(Sum (Xi))^2/n	1.22	0.27	0.00	2.60	C =	3.13
Individual SS	0.93	0.56	0.51	3.92		
Individual Mean	0.23	-0.30	0.03	0.26		

Total SS =	6.88	df =	68
Treatment SS =	0.96	df =	3
Error SS =	5.91	df =	65

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	0.96	0.32	3.53 *
Within treatments	65	5.91	0.09	

Table III-2-8 to 9

Analysis of Variance Betwen Organizations

4th Quarter 1987 - 3rd Quarter 1988

Table 8. 1st Year of Study

1,1,1 Trichloroethane

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	18	1	2	12		
Sum (Xi)	4.00	0.80	-0.10	1.86	Y..	6.56
Sum (Xi^2)	2.28	0.64	0.25	1.32		4.49
(Sum (Xi))^2/n	0.89	0.64	0.00	0.29	C =	1.30
Individual SS	1.39	0.00	0.25	1.03		
Individual Mean	0.22	0.80	-0.05	0.16		

Total SS =	3.18	df =	32
Treatment SS =	0.52	df =	3
Error SS =	2.66	df =	29

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	0.52	0.17	1.88
Within treatments	29	2.66	0.09	

Table 9. 1st Year of Study

Tetrachloroethylene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	13	0	0	17		
Sum (Xi)	-2.10			2.20	Y..	0.10
Sum (Xi^2)	0.63			2.22		2.85
(Sum (Xi))^2/n	0.34			0.28	C =	0.0003
Individual SS	0.29			1.94		
Individual Mean	-0.16			0.13		

Total SS =	2.85	df =	29
Treatment SS =	0.62	df =	3
Error SS =	2.23	df =	26

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	0.62	0.21	2.43
Within treatments	26	2.23	0.09	

Table III-2-10

Analysis of Variance Betwen Organizations

4th Quarter 1987 - 3rd Quarter 1988

Table 10. 1st Year of Study

Hexane

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	20	1	1			
Sum (Xi)	393.70	-0.20	0.10		Y..	393.60
Sum (Xi^2)	31290.7	0.04	0.01			31290.76
(Sum (Xi))^2/n	7749.98	0.04	0.01		C =	7041.86
Individual SS	23540.7	0.00	0.00			
Individual Mean	19.69	-0.20	0.10			

Total SS =	24248.90	df =	21
Treatment SS =	708.17	df =	3
Error SS =	23540.73	df =	18

Source of Variation	Sum of Squares	Mean Square	F
Between treatments	708.17	236.06	0.18
Within treatments	23540.73	1307.82	

Table III-2-11 to 12

Analysis of Variance Betwen Organizations

4th Quarter 1988 - 3rd Quarter 1989

Table 11. 2nd Year of Study

Toluene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	31	6	32	130		
Sum (Xi)	6.50	2.10	-11.00	-81.34	Y..	-83.74
Sum (Xi^2)	117.71	2.83	148.19	269.61		538.33
(Sum (Xi))^2/n	1.36	0.73	3.78	50.89	C =	35.23
Individual SS	116.35	2.09	144.41	218.71		
Individual Mean	0.21	0.35	-0.34	-0.63		

Total SS =	503.10	df =	198
Treatment SS	21.54	df =	3
Error SS =	481.56	df =	195

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	21.54	7.18	2.91 *
Within treatments	195	481.56	2.47	

Table 12. 2nd Year of Study

Benzene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	30	6	33	127		
Sum (Xi)	-2.90	-1.80	-4.60	3.10	Y..	-6.20
Sum (Xi^2)	5.75	0.80	18.98	16.51		42.04
(Sum (Xi))^2/n	0.28	0.54	0.64	0.08	C =	0.20
Individual SS	5.47	0.26	18.34	16.43		
Individual Mean	-0.10	-0.30	-0.14	0.02		

Total SS =	41.84	df =	195
Treatment SS =	1.34	df =	3
Error SS =	40.50	df =	192

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	1.34	0.45	2.12
Within treatments	192	40.50	0.21	

Table III-2-13 to 14

Analysis of Variance Betwen Organizations

4th Quarter 1988 - 3rd Quarter 1989

Table 13. 2nd Year of Study

M/P Xylene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	30	6	32	123		
Sum (Xi)	-9.00	2.10	8.81	9.90	Y..	11.81
Sum (Xi^2)	14.00	1.63	17.71	121.93		155.27
(Sum (Xi))^2/n	2.70	0.74	2.42	0.80	C =	0.73
Individual SS	11.30	0.90	15.29	121.13		
Individual Mean	-0.30	0.35	0.28	0.08		

Total SS =	154.54	df =	190
Treatment SS =	5.92	df =	3
Error SS =	148.62	df =	187

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	5.92	1.97	2.49
Within treatments	187	148.62	0.79	

Table 14. 2nd Year of Study

O-Xylene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	25	6	30	109		
Sum (Xi)	5.30	1.10	3.00	38.50	Y..	47.90
Sum (Xi^2)	1.69	0.31	2.40	115.77		120.17
(Sum (Xi))^2/n	1.12	0.20	0.30	13.60	C =	13.50
Individual SS	0.57	0.11	2.10	102.17		
Individual Mean	0.21	0.18	0.10	0.35		

Total SS =	106.67	df =	169
Treatment SS =	1.73	df =	3
Error SS =	104.95	df =	166

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	1.73	0.58	0.91
Within treatments	166	104.95	0.63	

Table III-2-15 to 16 Analysis of Variance Betwen Organizations

4th Quarter 1988 - 3rd Quarter 1989

Table 15. 2nd Year of Study

1,1,1 Trichloroethane

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	25	6	32	108		
Sum (Xi)	10.20	-1.70	6.30	21.82	Y..	36.62
Sum (Xi^2)	10.44	0.71	4.03	16.77		31.95
(Sum (Xi))^2/n	4.16	0.48	1.24	4.41	C =	7.84
Individual SS	6.28	0.23	2.79	12.36		
Individual Mean	0.41	-0.28	0.20	0.20		

Total SS =	24.10	df =	170
Treatment SS =	2.45	df =	3
Error SS =	21.65	df =	167

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	2.45	0.82	6.30 **
Within treatments	167	21.65	0.13	

Table 16. 2nd Year of Study

Tetrachloroethylene

	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	13	4	11	51		
Sum (Xi)	0.50	0.20	0.50	20.05	Y..	21.25
Sum (Xi^2)	1.01	0.02	0.17	64.56		65.76
(Sum (Xi))^2/n	0.02	0.01	0.02	7.88	C =	5.72
Individual SS	0.99	0.01	0.15	56.68		
Individual Mean	0.04	0.05	0.05	0.39		

Total SS =	60.04	df =	78
Treatment SS =	2.22	df =	3
Error SS =	57.83	df =	75

Source of Variation	df	Sum of Squares	Mean Square	F
Between treatments	3	2.22	0.74	0.96
Within treatments	75	57.83	0.77	

Table III-2-17

Analysis of Variance Betwen Organizations

4th Quarter 1988 - 3rd Quarter 1989

Table 17.	Hexane				2nd Year of Study	
	CSI TUBES	NJIT CANS	NJIT TUBES	NYSDEC TUBES		
Samples (n)	25	5	25			
Sum (Xi)	-0.300	0.000	0.000		Y..	-0.30
Sum (Xi^2)	2.250	1.160	9.240			12.65
(Sum (Xi))^2/n	0.004	0.000	0.000		C =	0.00
Individual SS	2.246	1.160	9.240			
Individual Mean	-0.012	0.000	0.000			
Total SS =		12.650		df =	54	
Treatment SS =		0.002		df =	3	
Error SS =		12.646		df =	51	

Table III-2-18 to 20

Least Significant Differences between Organizations

(All units are ppb)

First Year of Study

Second Year of Study

Table 18.

1st Year LSD Comparisons:Toluene

	NJIT Tenax	NJIT Canisters	NYSDEC Tubes	CSI Tubes
NJIT Tenax	------	1.97	1.45	1.48
NJIT Canisters	1.97	------	1.45	1.48
NYSDEC Tubes	1.45	1.45	------	0.64
CSI Tubes	1.48	1.48	0.64	------

Table 19.

1st Year LSD Comparisons:M/P Xylene

	NJIT Tenax	NJIT Canisters	NYSDEC Tubes	CSI Tubes
NJIT Tenax	------	1.36	1.00	1.02
NJIT Canisters	1.36	------	1.00	1.02
NYSDEC Tubes	1.00	1.00	------	0.45
CSI Tubes	1.02	1.02	0.45	------

Table 20.

1st Year LSD Comparisons:O-Xylene

	NJIT Tenax	NJIT Canisters	NYSDEC Tubes	CSI Tubes
NJIT Tenax	------	0.49	0.36	0.37
NJIT Canisters	0.49	------	0.36	0.37
NYSDEC Tubes	0.36	0.36	------	0.16
CSI Tubes	0.37	0.37	0.16	------

Table III-2-21 to 22

Tables 18 to 22. Least Significant Differences between Organizations

(All units are ppb)

First Year of Study | Second Year of Study

Table 21.

2nd Year LSD Comparisons:Toluene	NJIT Tenax	NJIT Canisters	NYSDEC Tubes	CSI Tubes
NJIT Tenax	------	1.37	0.61	0.78
NJIT Canisters	1.37	------	1.29	1.37
NYSDEC Tubes	0.6[illegible]	1.29	------	0.62
CSI Tubes	0.78	1.37	0.62	------

Table 22.

2nd Year LSD Comparisons:1,1,1 Trichloroethane	NJIT Tenax	NJIT Canisters	NYSDEC Tubes	CSI Tubes
NJIT Tenax	------	0.31	0.14	0.19
NJIT Canisters	0.31	------	0.30	0.32
NYSDEC Tubes	0.14	0.30	------	0.16
CSI Tubes	0.19	0.32	0.16	------

Table III-2-23

Table of LSD Rankings by Organization for Compounds Where 'F' is Significant

1st Year Data

TOLUENE

Organization	Average Difference From PEI (in ppb)
NYSDEC Tubes	-0.10 a
NJIT Tubes	-0.65 a,b
CSI Tubes	-0.89 b
NJIT Canisters	-3.60 c

M/P XYLENE

Organization	Average Difference From PEI (in ppb)
NYSDEC Tubes	0.10 a
NJIT Tubes	-0.05 a,b
CSI Tubes	-0.44 b
NJIT Canisters	-2.15 c

O-XYLENE

Organization	Average Difference From PEI (in ppb)
NYSDEC Tubes	0.26 a
CSI Tubes	0.23 a
NJIT Tubes	0.03 a,b
NJIT Canisters	-0.30 b

2nd Year Data

TOLUENE

Organization	Average Difference From PEI (in ppb)
NJIT Canisters	0.35 a,b
CSI Tubes	0.21 a
NJIT Tubes	-0.34 a,b
NYSDEC Tubes	-0.63 b

1,1,1 TRICHLOROETHANE

Organization	Average Difference From PEI (in ppb)
CSI Tubes	0.41 a
NJIT Tubes	0.20 b
NYSDEC Tubes	0.20 b
NJIT Canisters	-0.28 c

The letters following the "Average Difference From PEI" are used to indicate statistically significant differences.

Organizations that have the same letters are considered statistically indistinguishable from one another.

Table III-2-24

Shootout Means Relative to EPA/AREAL and PEI

Results of Shootouts 1 and 2

Units = [Organization] mean/[EPA/AREAL canister] mean

	NJIT TUBES	NYSDEC ENV TUBE	CSI TUBES	EPA/RTP TUBES	NJIT CANISTER	PEI CANISTER	EPA/AREAL CANISTER CONCENTRATION (ppbv)
TOLUENE							
shootout 1	0.3	0.8	1.6	1.0	2.2	1.9	2.6
shootout 2	1.0	0.7	1.1	0.9	2.1	0.9	3.1
BENZENE							
shootout 1	0.5	1.4	1.0	0.9	1.2	MDL	1.1
shootout 2	0.9	0.7	0.7	1.1	1.6	0.8	1.0
M/P XYLENE							
shootout 1	0.2	1.2	NR	0.0	1.1	MDL	1.6
shootout 2	0.7	0.0	1.4	1.0	1.6	0.9	0.7
O-XYLENE							
shootout 1	0.3	0.6	0.8	1.1	2.5	MDL	0.4
shootout 2	0.3	0.6	0.6	1.2	1.4	1.2	0.5
*** DICHLOROMETHANE**							
shootout 1	0.0	0.2	0.1	0.2	0.2	MDL	4.4
shootout 2	0.0	0.9	0.6	0.2	1.6	1.5	0.6
*** TETRACHLOROETHENE**							
shootout 1	0.4	0.6	1.0	NR	0.3	MDL	0.2
shootout 2	1.0	0.6	1.1	1.3	2.1	0.6	0.3
*** 1,1,1-TRICHLOROETHANE**							
shootout 1	0.4	1.1	0.6	NR	4.1	MDL	**0.5
shootout 2	0.4	0.4	0.5	1.5	1.6	0.3	0.7
*** CARBON TETRACHLORIDE**							
shootout 1	1.7	NR	1.1	1.5	2.2	MDL	0.1
shootout 2	0.7	0.4	0.5	1.1	6.6	0.5	0.2

Results of Shootouts 2 and 3

Units = [Organization] mean/[PEI canister] mean

	NJIT TUBES	NYSDEC ATD TUBE	CSI TUBES	EPA/RTP TUBES	NJIT CANISTER	EPA/RTP CANISTER	PEI CANISTER CONCENTRATION (ppbv)
TOLUENE							
shootout 2	1.2	0.9	1.2	1.1	1.6	1.1	3.6
shootout 3	0.4	1.2	0.7	DNP	DNP	DNP	3.6
BENZENE							
shootout 2	1.0	1.6	0.0	1.6	1.6	1.3	0.9
shootout 3	0.3	0.0	0.3	DNP	DNP	DNP	1.2
M/P XYLENE							
shootout 2	0.0	0.7	1.7	1.1	1.1	1.1	1.2
shootout 3	0.3	0.9	0.5	DNP	DNP	DNP	2.2
O-XYLENE							
shootout 2	0.5	0.7	0.6	1.1	0.9	0.9	0.6
shootout 3	0.2	0.3	0.1	DNP	DNP	DNP	2.2
DICHLOROMETHANE							
shootout 2	0.0	0.5	0.3	0.2	1.2	0.7	1.0
shootout 3	0.0	0.6	0.1	DNP	DNP	DNP	0.7
*** TETRACHLOROETHENE**							
shootout 2	1.7	1.2	2.1	2.2	2.7	1.7	0.2
shootout 3	0.0	0.0	0.8	DNP	DNP	DNP	0.4
*** 1,1,1-TRICHLOROETHANE**							
shootout 2	1.3	0.1	1.2	5.7	3.4	3.4	0.3
shootout 3	0.2	0.6	0.1	DNP	DNP	DNP	0.9

* indicates that some concentrations were below the MDL.
As a result, 1/2 the MDL was used in the computations.
Please consult text for a discussion of the caveats of using '*' data.

** indicates that canister data was unavailable, and EPA/RTP Tenax was substituted.

MDL = Below the minimum detectable limit.
NR = Data for this compound was not reported.
DNP = Did not participate in study

Table III-2-25

Collocation Experiment Results

Compound / Organization	Shootout I (1987)			Shootout II (1988)				Shootout III (1989)				
	10/20	10/21	10/22	7/25	7/26	7/27	7/28	9/1	9/7	9/13	9/19	9/25
Benzene												
CSI	0.8	1.3	0.6	0.5	1.2	0.3	0.8	0.3	0.6	0.2	0.2	0.9
NYSDEC Envirochem	----	1.7	1.3	0.1	1.4	0.5	0.9	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	1.7	1.6	1.9	0.7	1.3	0.8	1.2	1.2
NJIT Tenax	0.5	0.6	0.5	0.6	----	0.8	1.4	0.3	0.6	0.5	0.3	0.4
NJIT Canisters	1.4	1.1	1.0	1.4	----	1.3	1.6	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	0.5	1.0	0.8	1.4	1.0	----	1.4	1.1	1.3
EPA Canister	0.9	1.2	----	0.7	1.2	0.8	----	----	----	----	----	----
EPA Tenax	0.8	1.0	----	1.0	1.3	----	----	----	----	----	----	----
Toluene												
CSI	4.1	4.1	2.1	2.4	4.7	2.8	7.1	1.6	2.4	2.2	2.9	3.9
NYSDEC Envirochem	----	2.0	1.2	0.9	3.7	1.7	4.3	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	3.8	2.4	5.0	2.7	6.5	3.9	5.2	5.4
NJIT Tenax	0.9	0.7	0.8	1.7	----	3.0	7.0	1.4	----	2.7	----	0.1
NJIT Canisters	6.5	4.8	3.6	5.5	----	4.0	4.5	----	----	----	----	----
PEI Canisters	3.1	2.5	<0.5	1.6	4.1	2.6	6.0	2.5	----	4.2	3.7	4.1
EPA Canister	2.6	2.6	----	1.9	4.4	2.6	----	----	----	----	----	----
EPA Tenax	2.6	2.4	----	1.8	4.4	----	----	----	----	----	----	----
M/P Xylene												
CSI	----	----	----	0.9	2.4	1.3	3.1	0.6	1.0	0.7	1.2	1.9
NYSDEC Envirochem	----	1.5	0.9	0.5	1.3	0.6	1.3	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	1.5	0.8	0.5	1.1	2.5	1.5	2.3	2.9
NJIT Tenax	0.3	0.2	0.3	0.5	----	0.7	1.3	0.7	----	1.0	----	0.0
NJIT Canisters	3.1	0.3	0.0	2.0	----	0.7	0.9	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	0.9	1.3	0.8	1.5	1.9	----	2.3	2.1	2.5
EPA Canister	1.5	1.6	----	0.9	1.5	0.8	----	----	----	----	----	----
EPA Tenax	1.1	1.3	----	0.6	1.8	----	----	----	----	----	----	----

Table III-2-25 cont'd

Collocation Experiment Results

Compound	Organization	Shootout I (1987) 10/20	10/21	10/22	Shootout II (1988) 7/25	7/26	7/27	7/28	Shootout III (1989) 9/1	9/7	9/13	9/19	9/25
O-Xylene													
	CSI	0.3	0.4	0.1	0.2	0.5	0.2	0.5	0.1	0.2	0.1	0.3	0.4
	NYSDEC Envirochem	----	0.4	0.2	0.2	0.5	0.2	0.4	----	----	----	----	----
	NYSDEC ATD-50	----	----	----	----	0.7	0.3	0.5	0.3	0.9	0.4	0.7	0.8
	NJIT Tenax	0.1	0.2	0.2	0.1	----	0.2	0.4	0.4	----	0.4	----	0.1
	NJIT Canisters	1.8	0.2	0.4	0.7	----	0.3	0.4	----	----	----	----	----
	PEI Canisters	<0.5	<0.5	<0.5	0.5	0.9	0.4	0.7	2.2	----	1.9	1.2	1.2
	EPA Canister	<0.2	0.7	----	0.4	0.8	0.3	----	----	----	----	----	----
	EPA Tenax	0.4	0.5	----	0.3	1.2	----	----	----	----	----	----	----
Dichloromethane													
	CSI	0.1	0.4	0.0	<0.45	0.4	<0.6	0.4	0.1	0.1	0.1	0.1	0.1
	NYSDEC Envirochem	----	1.3	0.4	0.3	0.8	0.5	0.4	----	----	----	----	----
	NYSDEC ATD-50	----	----	----	----	0.5	0.5	0.7	0.2	0.9	0.2	0.9	0.4
	NJIT Tenax	0.0	0.0	0.3	0.2	----	0.6	1.6	0.0	0.0	0.0	0.0	0.0
	NJIT Canisters	1.3	0.1	0.0	0.7	----	0.9	2.2	----	----	----	----	----
	PEI Canisters	<0.5	<0.5	<0.5	0.6	1.0	1.3	1.4	0.2	----	0.5	1.4	0.7
	EPA Canister	1.1	7.2	----	0.4	0.8	0.6	----	----	----	----	----	----
	EPA Tenax	0.5	1.2	----	0.1	0.1	----	----	----	----	----	----	----
1,1,1 Trichloroethane													
	CSI	0.3	0.3	0.2	0.2	0.5	0.2	0.4	0.1	0.2	0.1	0.1	0.2
	NYSDEC Envirochem	----	0.4	0.3	0.2	0.5	0.2	0.5	----	----	----	----	----
	NYSDEC ATD-50	----	----	----	----	0.1	<0.03	0.0	0.3	0.8	0.3	0.9	0.4
	NJIT Tenax	0.2	0.2	0.2	0.2	----	0.3	0.6	0.2	0.4	0.2	0.3	0.2
	NJIT Canisters	4.3	0.1	0.1	0.9	----	0.8	1.1	----	----	----	----	----
	PEI Canisters	<0.5	<0.5	<0.5	<0.2	0.6	0.3	0.5	0.7	----	0.7	1.2	0.9
	EPA Canister	----	----	----	0.5	0.9	0.6	----	----	----	----	----	----
	EPA Tenax	0.6	0.5	----	0.4	1.7	----	----	----	----	----	----	----

Table III-2-25 cont'd

Shootout Results

Compound / Organization	Shootout I (1987)			Shootout II (1988)				Shootout III (1989)				
	10/20	10/21	10/22	7/25	7/26	7/27	7/28	9/1	9/7	9/13	9/19	9/25
Tetrachloroethene												
CSI	0.2	0.2	0.2	0.3	0.6	0.2	0.5	0.0	0.3	0.3	0.6	0.4
NYSDEC Envirochem	----	0.1	0.1	0.1	0.3	0.1	0.2	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	0.4	0.1	0.2	0.3	0.6	0.3	0.5	0.3
NJIT Tenax	0.1	0.1	0.1	0.2	----	0.2	0.3	0.2	----	0.6	----	0.0
NJIT Canisters	0.1	0.1	0.0	0.4	----	0.4	0.3	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	0.2	0.3	<0.2	0.2	<0.2	----	0.8	0.7	<0.2
EPA Canister	0.2	0.2	----	0.2	0.5	0.2	----	----	----	----	----	----
EPA Tenax	----	----	----	0.2	0.7	----	----	----	----	----	----	----
Ethyl Benzene												
CSI				0.2	0.7	0.4	0.9	0.2	0.3	0.2	0.3	0.5
NYSDEC Envirochem	----	0.3	0.2	0.1	0.2	0.1	0.3	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	0.4	0.1	0.2	0.3	0.6	0.4	0.5	0.6
NJIT Tenax	----	----	----	----	----	----	----	----	----	----	----	----
NJIT Canisters	----	----	----	----	----	----	----	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	0.2	0.3	0.2	0.3	0.7	----	0.8	0.6	0.7
EPA Canister	0.5	0.5	----	0.3	0.5	0.3	----	----	----	----	----	----
EPA Tenax	0.4	0.4	----	0.2	0.5	----	----	----	----	----	----	----

Table III-2-25 cont'd

Collocation Experiment Results

Compound / Organization	Shootout I (1987) 10/20	10/21	10/22	Shootout II (1988) 7/25	7/26	7/27	7/28	Shootout III (1989) 9/1	9/7	9/13	9/19	9/25
Carbon Tetrachloride												
CSI	0.12	0.10	0.15	0.19	0.08	0.04	0.05	0.02	0.02	0.01	0.01	0.02
NYSDEC Envirochem	----	----	----	0.07	0.12	0.05	0.05	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	0.11	<0.03	<0.03	0.18	0.09	0.06	0.08	0.09
NJIT Tenax	0.13	0.21	0.23	0.19	----	0.13	0.40	0.08	0.13	0.09	0.06	0.06
NJIT Canisters	0.39	0.06	0.06	1.10	----	1.04	0.88	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	----	<0.2	<0.2	<0.2
EPA Canister	<0.2	<0.2	----	0.32	0.17	0.15	----	----	----	----	----	----
EPA Tenax	0.17	0.13	----	0.35	0.19	----	----	----	----	----	----	----
Chloroform												
CSI	0.02	0.05	0.03	0.02	0.01	0.02	0.02	0.01	0.01	0.01	<0.01	<0.01
NYSDEC Envirochem	----	0.04	0.02	0.06	0.26	0.06	0.07	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	0.08	0.08	0.08	0.05	0.06	0.06	0.05	0.04
NJIT Tenax	0.38	0.00	0.17	0.03	----	0.04	0.04	----	----	----	----	----
NJIT Canisters	0.39	0.03	0.03	0.31	----	0.16	<0.01	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	----	<0.2	<0.2	<0.2
EPA Canister	<0.2	<0.2	----	----	----	----	----	----	----	----	----	----
EPA Tenax	----	----	----	----	----	----	----	----	----	----	----	----
Hexane												
CSI	0.02	0.05	0.03	0.5	0.7	0.5	1.2	0.2	0.3	0.1	0.1	0.4
NYSDEC Envirochem	----	0.04	0.02	----	----	----	----	----	----	----	----	----
NYSDEC ATD-50	----	----	----	----	----	----	----	----	----	----	----	----
NJIT Tenax	0.38	0.00	0.17	U.4	----	0.6	1.1	0.2	0.5	0.2	0.3	0.3
NJIT Canisters	0.39	0.03	0.03	1.7	----	1.0	1.3	----	----	----	----	----
PEI Canisters	<0.5	<0.5	<0.5	0.7	0.8	0.8	1.5	0.5	----	0.7	1.0	0.7
EPA Canister	<0.2	<0.2	----	----	----	----	----	----	----	----	----	----
EPA Tenax	----	----	----	----	----	----	----	----	----	----	----	----

QA Tables III-2-26 through 36

DATA SETS USED IN COMPUTATIONS

Table III-2-26

New Jersey Institute of Technology

PEI Canisters vs. NJIT Canisters and Tenax

Cartaret and Elizabeth Samples

4th Quarter 87 - 3rd Quarter 88

(All units are ppb)

Compound: Toluene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
3.1	11.9	3.2	-8.8	-0.1
3.0	3.3	4.2	-0.3	-1.2
5.1	7.3	4.1	-2.2	1.0
5.3	8.4	7.6	-3.1	-2.3

Compound: Benzene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
2.5	2.5	1.3	0.0	1.2
0.9	0.2	1.3	0.7	-0.4
1.0	1.7	1.0	-0.7	0.0
1.8	2.4	2.4	-0.6	-0.6

Compound: M/P Xylene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.6	3.8	0.9	-3.2	-0.3
1.8	6.4	1.3	-4.6	0.5
2.3	3.1	1.0	-0.8	1.3
1.4	1.4	3.1	0.0	-1.7

Compound: O-Xylene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.6	1.5	0.5	-0.9	0.1
0.9	1.0	0.4	-0.1	0.5
0.5	0.4	1.0	0.1	-0.5

Compound: Hexane

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
1.8	2.0	1.7	-0.2	0.1

Compound: 1,1,1-Trichloroethane

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.8	0.5	0.5	0.3	0.3
0.6		1.0		-0.4

Compound: Tetrachloroethene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
nd	0.1	0.2		
nd	0.0	0.3		
nd	0.1	0.2		
nd	0.1	0.2		

Table III-2-27

New Jersey Institute of Technology

PEI Canisters vs. NJIT Canisters and Tenax

Carteret and Elizabeth Samples

4th Quarter 88 - 3rd Quarter 89

(All units are ppb)

Compound: Toluene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
3.4	3.4	4.8	0.0	-1.4
3.1	3.8	11.6	-0.7	-8.5
6.8	5.7	9.5	1.1	-2.7
1.9	1.5	1.0	0.4	0.9
2.3	1.9	2.9	0.4	-0.6
5.6	4.7	3.2	0.9	2.4

Compound: Hexane

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
1.2	1.5	1.2	-0.3	0.0
1.3	1.8	3.4	-0.5	-2.1
1.5	1.5	2.8	0.0	-1.3
1.0	1.1	0.5	-0.1	0.5
2.2	1.3	1.2	0.9	1.0

Compound: Benzene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
2.0	2.5	2.3	-0.5	-0.3
1.7	2.2	4.4	-0.5	-2.7
3.1	3.3	5.4	-0.2	-2.3
0.9	0.9	0.6	0.0	0.3
1.0	1.1	0.9	-0.1	0.1
2.1	2.6	1.2	-0.5	0.9

Compound: 1,1,1-Trichloroethane

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.9	1.0	0.7	-0.1	0.2
0.8	1.0	1.2	-0.2	-0.4
0.7	1.3	0.7	-0.6	0.0
0.6	0.7	0.3	-0.1	0.3
0.5	0.7	0.3	-0.2	0.2
1.2	1.7	0.4	-0.5	0.8

CC188L

Compound: M/P Xylene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.8	0.6	1.6	0.2	-0.8
0.7	0.7	3.4	0.0	-2.7
3.2	2.2	1.2	1.0	2.0
0.7	0.8	0.2	-0.1	0.5
0.9	0.6	0.4	0.3	0.5
2.1	1.4	1.4	0.7	0.7

Compound: Tetrachloroethene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.2	0.2	0.2	0.0	0.0
0.2	0.2	0.2	0.0	0.0
0.2	0.1	0.2	0.1	0.0
0.2	0.1	0.2	0.1	0.0

Compound: O-Xylene

PEI Canister	NJIT Canister	NJIT Tenax	Difference Canister	Difference Tenax
0.3	0.2	0.6	0.1	-0.3
0.3	0.2	1.1	0.1	-0.8
1.2	0.8	0.3	0.4	0.9
0.3	0.3	0.1	0.0	0.2
0.4	0.2	0.3	0.2	0.1
0.9	0.6	0.8	0.3	0.1

Table III-2-28

New Jersey Institute of Technology

PEI Canisters vs. NJIT Tenax

Supplemental Collocation Data from Sewaren and Piscataway

1st Quarter 89 - 3rd Quarter 89

1,1,1 Trichloroethane

PEI Can.	Tenax	Difference
1.6	1.6	0
0.3	0.2	0.1
0.4	0.1	0.3
0.6	0.4	0.2
0.2	0.2	0
0.2	0.5	-0.3
0.7	0.4	0.3
0.5	0.3	0.2
0.4	0.3	0.1
0.9	1.2	-0.3
0.8	0.5	0.3
0.4	0.2	0.2
0.6	0.2	0.4
0.6	0.2	0.4
0.8	0.4	0.4
1.5	1.7	-0.2
0.5	0.3	0.2
0.6	0.3	0.3
1.7	0.8	0.9
0.3	0.2	0.1
0.3	0.2	0.1
1.1	0.5	0.6
0.8	0.5	0.3
0.4	0.7	-0.3
0.6	0.3	0.3
1	0.4	0.6

Hexane

PEI Can.	Tenax	Difference
1.4	2	-0.6
0.4	0.5	-0.1
0.9	0.7	0.2
1	0.7	0.3
0.4	0.3	0.1
0.7	0.7	0
0.4	0.8	-0.4
1.8	1.2	0.6

Benzene

PEI Can.	Tenax	Difference
2.4	3.1	-0.7
0.4	0.6	-0.2
1	0.9	0.1
0.5	0.6	-0.1
0.5	1	-0.5
0.8	0.9	-0.1
0.8	0.7	0.1
0.7	0.9	-0.2
0.8	1.3	-0.5
1.6	1.2	0.4
0.8	0.5	0.3
1.4	0.8	0.6
0.6	0.4	0.2
1.5	2.6	-1.1
1.9	2.8	-0.9
0.7	0.4	0.3
0.4	0.4	0
0.5	0.3	0.2
0.7	0.4	0.3
0.3	0.4	-0.1
0.4	0.4	0
0.7	1	-0.3
0.6	0.7	-0.1
1.3	0.5	0.8
0.7	0.9	-0.2
0.7	0.2	0.5
1.1	0.5	0.6

Tetrachloroethene

PEI Can.	Tenax	Difference
0.6	0.3	0.3
0.2	0.1	0.1
0.3	0.2	0.1
0.2	0.1	0.1
0.3	0.5	-0.2
3.8	0.1	3.7
0.3	0.2	0.1
0.3	0.3	0

Meta and Para Xylene

PEI Can.	Tenax	Difference
2.6	2.7	-0.1
1	0.6	0.4
0.9	0.4	0.5
0.5	0.2	0.3
0.3	0.2	0.1
0.9	0.5	0.4
0.8	0.3	0.5
0.5	0.3	0.2
0.9	0.7	0.2
2.3	1.5	0.8
0.8	0.5	0.3
1.8	0.9	0.9
0.6	0.3	0.3
1.8	1.5	0.3
1.9	1.8	0.1
0.7	0.1	0.6
0.4	0.2	0.2
0.5	0.3	0.2
0.8	0.2	0.6
0.3	0.1	0.2
0.3	0.1	0.2
0.9	0.8	0.1
0.7	0.5	0.2
0.6	0.8	-0.2
0.5	0.2	0.3
1.6	0.6	1

Ortho-Xylene

PEI Can.	Tenax	Difference
1	1.1	-0.1
0.4	0.2	0.2
0.4	0.1	0.3
0.2	0.1	0.1
0.2	0.4	-0.2
0.3	0.2	0.1
0.3	0.2	0.1
0.2	0.1	0.1
0.4	0.2	0.2
0.9	0.6	0.3
0.4	0.2	0.2
0.8	0.5	0.3
0.3	0.2	0.1
0.7	0.5	0.2
0.7	0.6	0.1
0.3	0.2	0.1
0.2	0.1	0.1
0.2	0.2	0
0.3	0.2	0.1
0.3	0.4	-0.1
0.3	0.2	0.1
0.2	0.3	-0.1
0.3	0.1	0.2
0.7	0.3	0.4

Toluene

PEI Can.	Tenax	Difference
6.9	9.2	-2.3
0.9	1.1	-0.2
2	2.3	-0.3
0.7	0.7	0
0.7	0.7	0
2	1.7	0.3
2	7.3	-5.3
1.8	2.2	-0.4
2.1	3	-0.9
5.7	5.1	0.6
1.9	1	0.9
4.3	2.2	2.1
1.3	0.8	0.5
4.1	4.5	-0.4
5	6.7	-1.7
1.4	0.8	0.6
2.1	1.5	0.6
1.8	0.9	0.9
2.1	1	1.1
0.8	0.6	0.2
0.7	0.5	0.2
2	2.5	-0.5
1.9	2.1	-0.2
1.8	3.2	-1.4
4.7	1.7	3
3.3	1.8	1.5

Table III-2-29

College of Staten Island

PEI Canisters vs. Tenax Data

4th Quarter 87 - 3rd Quarter 88

(All units are ppb)

Compound: 111-Trichloroethane

Canister	Tenax	Difference
1.3	0.3	1.0
0.6	0.5	0.1
0.4	0.1	0.3
0.3	0.3	0.0
0.8	0.2	0.6
0.3	0.2	0.1
0.4	0.2	0.2
0.4	0.1	0.3
0.4	0.2	0.2
0.7	0.2	0.5
0.6	0.2	0.4
0.9	1.1	-0.2
0.5	0.4	0.1
0.4	0.2	0.2
0.6	0.8	-0.2
0.6	0.5	0.1
0.6	0.3	0.3
0.5	0.5	0.0

Compound: Carbon Tetrachloride

Canister	Tenax	Difference
0.2	0.0	0.2
0.2	0.1	0.1
0.4	0.3	0.1

Compound: Tetrachloroethene

Canister	Tenax	Difference
0.3	0.2	0.1
0.2	0.3	-0.1
0.3	0.4	-0.1
0.4	0.5	-0.1
0.2	0.4	-0.2
0.3	0.7	-0.4
0.4	0.7	-0.3
0.8	1.1	-0.3
0.9	1.2	-0.3
0.6	0.9	-0.3
1.0	1.1	-0.1
0.4	0.5	-0.1
0.7	0.6	0.1

Compound: Ethylbenzene

Canister	Tenax	Difference
0.2	0.5	-0.3
0.7	1.0	-0.3
0.5	0.8	-0.3
0.3	0.8	-0.5
0.2	0.6	-0.4
0.4	1.1	-0.7
0.3	0.7	-0.4
0.5	0.7	-0.2
0.5	1.0	-0.5
0.7	0.9	-0.2
0.6	1.0	-0.4
0.5	0.7	-0.2
0.5	0.9	-0.4
0.6	1.3	-0.7
1.0	3.2	-2.2
1.3	0.2	1.1

Compound: Hexane

Canister	Tenax	Difference
0.9	0.4	0.5
0.6	1.7	-1.1
0.4	0.2	0.2
0.8	0.6	0.2
4.8	0.5	4.3
0.6	0.4	0.2
1.2	1.4	-0.2
0.5	0.8	-0.3
0.7	0.5	0.2
0.9	0.5	0.4
0.8	0.7	0.1
1.2	1.6	-0.4
68.2	1.4	66.8
132.0	1.2	130.8
74.8	3.5	71.3
59.0	0.4	58.6
27.2	0.4	26.8
17.9	0.5	17.4
10.2	0.8	9.4
9.0	0.5	8.5

Compound: Benzene

Canister	Tenax	Difference
1.7	0.9	0.8
0.9	3.0	-2.1
1.3	0.7	0.6
0.6	0.6	0.0
1.6	1.1	0.5
1.0	0.3	0.7
0.6	0.4	0.2
0.7	0.4	0.3
0.9	0.9	0.0
1.6	1.2	0.4
2.3	0.4	1.9
1.5	0.7	0.8
1.1	0.8	0.3
0.8	0.3	0.5
0.8	0.4	0.4
1.6	0.6	1.0
0.7	0.3	0.4
0.5	0.7	-0.2
1.4	1.3	0.1
1.2	1.6	-0.4
1.9	1.9	0.0
2.0	0.8	1.2
1.4	1.5	-0.1
1.9	1.7	0.2
2.4	3.1	-0.7
2.6	2.7	-0.1
1.2	1.8	-0.6
1.3	2.2	-0.9
0.6	0.7	-0.1
1.3	0.8	0.5
0.9	1.4	-0.5
0.6	0.9	-0.3
1.4	1.6	-0.2
0.7	0.9	-0.2

Compound: M/P Xylene

Canister	Tenax	Difference
0.7	0.6	0.1
0.5	1.0	-0.5
1.3	0.8	0.5
1.3	0.5	0.8
0.5	0.7	-0.2
0.7	0.6	0.1
1.0	1.6	-0.6
1.0	1.4	-0.4
2.5	2.9	-0.4
1.9	2.6	-0.7
0.6	1.0	-0.4
1.3	2.5	-1.2
1.3	1.9	-0.6
0.9	1.5	-0.6
1.0	2.6	-1.6
1.1	2.0	-0.9
0.8	2.4	-1.6
1.8	3.5	-1.7
2.0	3.3	-1.3
2.4	3.4	-1.0
1.6	2.6	-1.0
1.8	3.1	-1.3
2.7	4.3	-1.6
1.2	1.6	-0.4
1.4	2.3	-0.9
5.8	0.9	4.9
1.1	0.9	0.2
0.9	1.6	-0.7
0.7	1.1	-0.4
1.6	1.8	-0.2
0.9	1.0	-0.1

Compound: O-Xylene

Canister	Tenax	Difference
0.5	0.1	0.4
0.2	0.1	0.1
0.2	0.1	0.1
0.3	0.3	0.0
1.0	0.5	0.5
0.7	0.5	0.2
0.2	0.2	0.0
0.5	0.4	0.1
0.4	0.3	0.1
0.4	0.3	0.1
0.5	0.4	0.1
0.3	0.3	0.0
0.7	0.3	0.4
0.7	0.5	0.2
0.9	0.5	0.4
0.9	0.7	0.2
0.7	0.5	0.2
0.8	0.6	0.2
0.9	0.8	0.1
1.4	1.0	0.4
0.6	0.3	0.3
1.0	0.1	0.9
0.6	0.3	0.3

Compound: Toluene

Canister	Tenax	Difference
1.6	1.7	-0.1
1.9	7.5	-5.6
1.5	1.8	-0.3
6.4	1.6	4.8
2.9	2.7	0.2
1.0	0.9	0.1
1.4	1.2	0.2
1.7	2.1	-0.4
1.9	2.7	-0.8
5.7	6.0	-0.3
3.9	4.6	-0.7
1.6	1.4	0.2
4.3	5.5	-1.2
2.3	2.9	-0.6
2.5	3.1	-0.6
3.8	5.4	-1.6
2.0	3.1	-1.1
1.5	2.9	-1.4
3.4	4.2	-0.8
4.3	6.3	-2.0
5.2	6.1	-0.9
5.0	5.7	-0.7
3.3	5.0	-1.7
3.7	5.0	-1.3
5.8	8.0	-2.2
7.0	7.8	-0.8
2.8	5.0	-2.2
3.5	5.8	-2.3
1.0	1.5	-0.5
2.3	2.4	-0.1
1.7	4.5	-2.8
1.5	1.9	-0.4
3.6	4.1	-0.5
1.9	2.5	-0.6

Table III-2-30

College of Staten Island

PEI Canisters vs. Tenax Data

4th Quarter 88 - 3rd Quarter 89

(All units are ppb)

Compound: 111-trichloroethane

Canister	Tenax	Difference
1.2	0.8	0.4
0.6	0.4	0.2
0.9	0.9	0.0
0.4	0.2	0.2
0.7	0.5	0.2
0.8	0.6	0.2
0.4	0.4	0.0
2.3	1.4	0.9
0.9	0.6	0.3
2.0	1.3	0.7
1.3	0.6	0.7
1.0	0.8	0.2
0.6	0.5	0.1
0.9	0.5	0.4
0.3	0.3	0.0
0.4	0.4	0.0
0.4	0.3	0.1
0.4	0.3	0.1
0.8	0.3	0.5
1.1	0.2	0.9
0.4	0.1	0.3
0.5	0.1	0.4
2.7	0.2	2.5
0.5	0.2	0.3
0.8	0.2	0.6

Compound: Carbon Tetrachloride

Canister	Tenax	Difference
0.3	0.5	-0.2
0.2	0.6	-0.4

Compound: Trichloroethene

Canister	Tenax	Difference
0.3	0.4	-0.1
0.2	0.1	0.1
0.3	0.0	0.3

Compound: Tetrachloroethene

Canister	Tenax	Difference
0.6	0.4	0.2
0.3	0.3	0.0
3.3	3.9	-0.6
0.7	0.6	0.1
0.4	0.5	-0.1
0.4	0.4	0.0
0.2	0.3	-0.1
0.4	0.3	0.1
1.1	1.1	0.0
0.5	0.1	0.4
0.8	0.4	0.4
1.1	0.7	0.4
1.8	2.1	-0.3

Compound: Ethylbenzene

Canister	Tenax	Difference
0.3	0.3	0.0
0.4	1.0	-0.6
0.7	1.0	-0.3
0.4	0.5	-0.1
0.6	0.8	-0.2
0.6	0.8	-0.2
0.4	0.7	-0.3
0.8	1.5	-0.7
0.2	0.5	-0.3
0.3	0.4	-0.1
0.9	0.9	0.0
0.7	0.7	0.0
0.6	0.5	0.1
0.3	0.6	-0.3
0.2	0.3	-0.1
0.3	0.3	0.0
0.3	0.3	0.0
0.3	0.3	0.0
0.4	0.3	0.1
0.5	0.5	0.0
0.2	0.2	0.0
0.3	0.1	0.2
0.6	0.4	0.2
0.4	0.2	0.2
0.3	0.3	0.0

Compound: Hexane

Canister	Tenax	Difference
0.5	0.8	-0.3
1.1	1.8	-0.7
1.1	1.3	-0.2
0.6	0.7	-0.1
0.6	0.9	-0.3
0.8	0.7	0.1
0.8	0.9	-0.1
1.7	1.8	-0.1
0.7	0.7	0.0
0.7	0.6	0.1
0.4	0.4	0.0
1.5	1.5	0.0
1.3	0.7	0.6
0.9	1.0	-0.1
1.0	1.0	0.0
0.4	0.6	-0.2
0.5	0.3	0.2
1.2	1.8	-0.6
0.7	0.7	0.0
1.1	0.7	0.4
0.6	0.3	0.3
0.5	0.2	0.3
1.0	1.3	-0.3
0.5	0.2	0.3
0.5	0.1	0.4

Compound: Benzene

Canister	Tenax	Difference
0.5	0.5	0.0
0.9	0.9	0.0
0.3	0.3	0.0
2.1	3.0	-0.9
2.8	3.4	-0.6
0.6	0.9	-0.3
1.5	1.7	-0.2
1.8	1.9	-0.1
1.9	2.3	-0.4
0.8	1.1	-0.3
0.7	0.5	0.2
1.4	1.8	-0.4
2.9	4.3	-1.4
1.1	1.4	-0.3
1.0	1.0	0.0
0.9	0.8	0.1
2.3	2.6	-0.3
2.0	2.1	-0.1
1.7	2.2	-0.5
1.5	1.8	-0.3
1.4	1.6	-0.2
0.7	0.6	0.1
0.9	0.6	0.3
0.9	0.5	0.4
1.1	0.8	0.3
0.8	0.5	0.3
1.8	1.1	0.7
0.8	0.4	0.4
0.9	0.3	0.6
1.1	1.1	0.0

Compound: meta or para Xylenes

Canister	Tenax	Difference
0.5	0.6	-0.1
1.3	0.9	0.4
0.3	0.5	-0.2
2.4	3.5	-1.1
2.8	3.7	-0.9
0.4	0.9	-0.5
1.5	1.8	-0.3
2.1	2.7	-0.6
2.0	2.8	-0.8
0.8	1.4	-0.6
1.5	2.4	-0.9
2.5	5.1	-2.6
0.9	1.8	-0.9
1.3	1.4	-0.1
0.6	0.7	-0.1
2.9	2.9	0.0
2.2	2.4	-0.2
1.8	2.0	-0.2
1.4	2.2	-0.8
0.9	1.0	-0.1
1.1	1.2	-0.1
1.1	1.3	-0.2
1.1	1.2	-0.1
1.1	0.8	0.3
1.9	1.6	0.3
0.8	0.7	0.1
0.9	0.2	0.7
1.6	1.4	0.2
1.1	0.7	0.4
1.1	1.1	0.0

Compound: ortho-xylene

Canister	Tenax	Difference
0.5	0.1	0.4
0.9	0.7	0.2
1.0	0.7	0.3
0.2	0.2	0.0
0.6	0.3	0.3
0.8	0.6	0.2
0.7	0.5	0.2
1.0	1.1	-0.1
0.3	0.4	-0.1
0.6	0.4	0.2
0.2	0.2	0.0
1.1	0.8	0.3
0.9	0.5	0.4
0.8	0.5	0.3
0.6	0.5	0.1
0.3	0.2	0.1
0.3	0.2	0.1
0.4	0.3	0.1
0.6	0.2	0.4
0.7	0.4	0.3
0.3	0.1	0.2
0.3	0.0	0.3
0.7	0.3	0.4
0.5	0.1	0.4
0.5	0.2	0.3

Compound: Toluene

Canister	Tenax	Difference
0.9	1.1	-0.2
3.1	2.6	0.5
0.7	0.8	-0.1
5.1	5.7	-0.6
5.7	5.5	0.2
1.0	1.5	-0.5
3.2	2.9	0.3
4.0	4.3	-0.3
3.6	4.5	-0.9
1.9	2.8	-0.9
1.2	0.8	0.4
3.3	4.0	-0.7
5.2	8.4	-3.2
2.1	3.1	-1.0
3.1	2.6	0.5
1.5	1.4	0.1
7.6	7.0	0.6
5.9	5.0	0.9
3.2	3.8	-0.6
3.2	4.3	-1.1
1.5	1.9	-0.4
1.9	2.4	-0.5
2.6	2.3	0.3
2.4	2.5	-0.1
2.9	2.2	0.7
4.5	4.0	0.5
1.9	1.6	0.3
2.0	0.8	1.2
13.4	3.6	9.8
2.9	1.8	1.1
2.7	2.5	0.2

Table III-2-31

New York State Department of Environmental Conservation

PEI Canisters vs. Envirochem Sorbent Tubes

4th Quarter 1987 - 3rd Quarter 1988

(All units in ppb)

Compound:Toluene

Canister	Tube	Difference
0.9	0.3	0.6
2.8	1.3	1.5
1.8	1.6	0.2
0.6	0.7	-0.1
1.7	1.8	-0.1
1.9	2.5	-0.6
1.7	1.0	0.7
3.5	3.1	0.4
1.8	2.4	-0.6
1.7	1.8	-0.1
2.9	4.4	-1.5
2.8	4.8	-2.0
1.7	1.1	0.6
2.7	2.5	0.2
1.4	4.4	-3.0
1.3	1.7	-0.4
5.5	4.5	1.0
3.7	2.3	1.4
4.2	3.6	0.6
2.0	1.4	0.6
5.8	4.4	1.4
2.7	1.4	1.3
6.7	4.4	2.3
1.8	2.1	-0.3
2.4	2.8	-0.4
2.9	3.5	-0.6
2.0	2.0	0.0
4.2	4.2	0.0
2.9	2.9	0.0
3.3	4.1	-0.8
2.7	2.5	0.2
1.1	1.5	-0.4
1.9	1.8	0.1
2.4	2.7	-0.3
1.7	1.5	0.2
3.3	3.3	0.0
2.5	2.0	0.5
0.8	1.0	-0.2
0.3	1.8	-1.5
1.2	1.4	-0.2
1.2	1.4	-0.2
1.4	2.4	-1.0
1.3	1.4	-0.1
2.2	2.4	-0.2
5.4	6.9	-1.5
0.7	1.4	-0.7
0.9	0.9	0.0
1.1	2.9	-1.8

Compound:Benzene

Canister	Tube	Difference
0.8	1.0	-0.2
1.1	1.0	0.1
0.2	0.2	0.0
0.3	2.6	-2.3
0.5	1.1	-0.6
0.6	0.8	-0.2
0.9	0.1	0.8
0.6	0.3	0.3
0.6	1.0	-0.4
1.0	1.7	-0.7
1.2	2.1	-0.9
0.6	0.3	0.3
1.1	1.3	-0.2
0.5	1.8	-1.3
0.7	0.6	0.1
1.7	1.8	-0.1
1.9	0.7	1.2
1.0	1.5	-0.5
0.8	0.3	0.5
0.8	0.7	0.1
1.5	1.0	0.5
0.7	0.5	0.2
1.3	1.3	0.0
0.9	0.5	0.4
1.0	0.6	0.4
1.2	1.8	-0.6
0.9	0.6	0.3
1.8	0.9	0.9
1.5	0.9	0.6
1.2	1.4	-0.2
1.0	1.0	0.0
0.5	0.9	-0.4
0.7	0.5	0.2
1.1	0.8	0.3
0.6	0.9	-0.3
1.3	1.4	-0.1
0.7	0.4	0.3
0.8	1.2	-0.4
0.5	0.5	0.0
0.3	0.5	-0.2
0.5	1.5	-1.0
0.5	0.9	-0.4
0.9	0.7	0.2
2.1	3.0	-0.9
0.5	0.6	-0.1
0.5	0.3	0.2
0.5	0.5	0.0

Compound:M/P Xylenes

Canister	Tube	Difference
0.5	0.3	0.2
1.2	0.9	0.3
0.8	1.0	-0.2
0.5	0.4	0.1
0.5	0.8	-0.3
0.7	1.1	-0.4
1.0	0.4	0.6
1.0	1.0	0.0
1.1	0.9	0.2
1.7	0.7	1.0
3.9	1.9	2.0
1.4	2.4	-1.0
0.7	0.5	0.2
1.3	1.3	0.0
1.2	2.0	-0.8
0.7	0.8	-0.1
2.1	1.8	0.3
2.0	1.1	0.9
1.5	1.2	0.3
1.4	0.7	0.7
1.0	0.5	0.5
1.9	1.4	0.5
1.0	1.0	0.0
1.2	1.3	-0.1
1.3	1.5	-0.2
1.0	1.1	-0.1
1.9	2.2	-0.3
1.6	1.1	0.5
1.5	2.0	-0.5
2.6	1.3	1.3
0.7	0.9	-0.2
0.9	0.9	0.0
1.0	1.2	-0.2
0.9	0.9	0.0
1.7	1.7	0.0
1.0	0.8	0.2
0.4	0.7	-0.3
0.2	0.5	-0.3
0.7	0.7	0.0
0.6	0.7	-0.1
1.0	1.0	0.0
3.0	3.5	-0.5

Compound:O-Xylene

Canister	Tube	Difference
0.2	0.1	0.1
0.4	0.3	0.1
0.3	0.3	0.0
0.4	0.1	0.3
0.4	0.3	0.1
0.4	0.3	0.1
0.8	0.2	0.6
1.6	0.6	1.0
0.5	0.7	-0.2
0.5	0.2	0.3
0.5	0.4	0.1
0.6	0.6	0.0
0.3	0.3	0.0
1.1	0.6	0.5
1.5	0.4	1.1
1.2	0.5	0.7
1.1	0.3	0.8
0.7	0.2	0.5
1.1	0.4	0.7
1.2	0.6	0.6
0.4	0.3	0.1
0.5	0.4	0.1
0.5	0.4	0.1
0.4	0.3	0.1
0.5	0.7	-0.2
0.7	0.3	0.4
0.6	0.6	0.0
1.1	0.4	0.7
0.2	0.3	-0.1
0.6	0.3	0.3
0.4	0.4	0.0
0.6	0.3	0.3
0.6	0.6	0.0
0.6	0.3	0.3
0.2	0.2	0.0
0.3	0.3	0.0
0.3	0.2	0.1
0.4	0.3	0.1
1.1	1.0	0.1
0.5	0.1	0.4

Table III-2-32

New York State Department of Environmental Conservation

PEI Canisters vs. Envirochem Sorbent Tubes

4th Quarter 1987 - 3rd Quarter 1988

(All units in ppb)

Compound:1,1,1-Trichloroethane

Canister	Tube	Difference
0.7	0.2	0.5
1.0	0.3	0.7
1.3	1.5	-0.2
0.3	0.5	-0.2
0.5	0.5	0.0
1.2	0.5	0.7
0.3	0.4	-0.1
0.4	0.3	0.1
0.6	0.5	0.1
0.5	0.4	0.1
0.4	0.3	0.1
0.4	0.3	0.1

Compound:Dichloromethane

Canister	Tube	Difference
0.7	0.2	0.5
0.8	0.9	-0.1
0.6	0.3	0.3
0.8	0.6	0.2
0.6	0.9	-0.3
0.6	1.0	-0.4
1.0	0.2	0.8
0.7	1.3	-0.6
0.5	0.5	0.0
1.2	0.7	0.5
0.8	0.4	0.4
1.4	0.8	0.6
0.5	0.3	0.2
1.4	0.3	1.1
1.5	0.4	1.1
0.6	0.7	-0.1
1.6	[illegible]	-0.4
0.4	0.3	0.1
0.6	0.5	0.1
0.9	0.6	0.3
0.8	0.4	0.4
0.8	0.7	0.1
0.7	0.4	0.3
0.8	0.4	0.4
0.6	0.5	0.1
1.2	0.4	0.8
1.3	1.1	0.2
1.0	0.4	0.6
0.8	0.3	0.5
0.4	0.3	0.1
0.3	0.3	0.0
0.5	0.2	0.3
0.8	1.0	-0.2

Compound:Tetrachloroethane

Canister	Tube	Difference
0.7	0.1	0.6
1.5	0.2	1.3
0.2	0.2	0.0
0.3	0.2	0.1
0.3	0.3	0.0
0.2	0.3	-0.1
0.2	0.4	-0.2
0.2	0.2	0.0
0.3	0.3	0.0
0.2	0.2	0.0
0.2	0.2	0.0
0.2	0.2	0.0
0.3	0.2	0.1
0.8	0.5	0.3
0.2	0.2	0.0
0.3	0.2	0.1
0.3	0.3	0.0

Compound:Ethyl Benzene

Canister	Tube	Difference
2.0	0.2	1.8
0.5	0.2	0.3
1.2	0.4	0.8
0.2	0.5	-0.3
0.5	0.1	0.4
0.5	0.2	0.3
0.3	0.2	0.1
0.2	0.1	0.1
0.5	0.3	0.2
0.2	0.1	0.1
0.3	0.5	-0.2
0.3	0.3	0.0

Table III-2-33

New York State Department of Environmental Conservation
PEI Canisters vs. ATD50 Tubes
4th Quarter 1988 - 3rd Quarter 1989

(All units are ppb)

Compound: Toluene

Canister	Tube	Difference
2.4	2.6	-0.2
2.2	3.0	-0.8
2.8	1.5	1.3
4.3	4.6	-0.3
2.9	3.6	-0.7
4.2	5.2	-1.0
3.3	7.2	-3.9
1.1	1.9	-0.8
3.3	5.1	-1.8
2.6	3.6	-1.0
1.7	1.9	-0.2
3.3	4.9	-1.6
3.0	4.9	-1.9
1.7	2.2	-0.5
1.2	0.9	0.3
1.2	0.9	0.3
1.4	1.8	-0.4
3.4	2.9	0.5
5.4	6.0	-0.6
0.7	1.6	-0.9
2.7	3.5	-0.8
3.9	5.6	-1.7
2.4	3.6	-1.2
2.8	4.2	-1.4
3.2	3.7	-0.5
4.6	6.2	-1.6
2.2	8.1	-5.9
1.1	1.6	-0.5
1.8	1.8	0.0
1.0	1.0	0.0
4.1	7.0	-2.9
1.3	5.0	-3.7
4.8	4.1	0.7
4.1	10.1	-6.0
3.2	4.2	-1.0
2.9	4.0	-1.1
1.3	1.9	-0.6
1.6	2.3	-0.7
3.8	2.6	1.2
1.1	1.5	-0.4
2.8	3.5	-0.7
6.6	9.1	-2.5
3.4	5.0	-1.6
6.9	7.7	-0.8
8.1	9.3	-1.2
8.1	7.3	0.8
6.1	6.9	-0.8
1.2	1.5	-0.3
1.7	2.0	-0.3
1.2	1.4	-0.2
1.2	1.6	-0.3
1.6	1.6	0.0
1.8	2.2	-0.4
9.7	8.8	0.9
1.9	0.9	1.0
10.9	10.2	0.7
1.0	0.6	0.4
3.3	3.1	0.2
2.0	2.9	-0.9
4.2	7.3	-3.1
0.8	0.9	-0.1
4.5	7.3	-2.8
3.7	4.0	-0.3
1.8	1.7	0.1
7.2	9.9	-2.7

Compound: Toluene (Continued)

Canister	Tube	Difference
3.9	1.9	2.0
0.6	0.4	0.2
5.9	2.7	3.2
2.5	2.8	-0.3
1.5	2.3	-0.8
6.7	7.6	-0.9
6.4	7.4	-1.0
6.0	5.8	0.2
1.7	4.0	-2.3
2.5	2.2	0.3
1.1	2.3	-1.2
0.5	0.7	-0.2
0.7	1.3	-0.6
1.1	1.0	0.1
1.1	1.1	0.0
3.4	3.1	0.3
2.0	1.9	0.1
3.9	3.6	0.3
1.4	1.3	0.1
3.8	4.7	-0.9
9.9	11.0	-1.1
2.3	1.9	0.4
6.1	2.9	3.2
1.6	2.8	-1.2
2.2	3.8	-1.6
1.3	1.9	-0.6
1.6	2.8	-1.2
1.5	2.3	-0.8
3.8	5.3	-1.5
1.9	2.7	-0.8
2.2	4.4	-2.2
3.0	3.9	-0.9
2.5	3.4	-0.9
3.1	4.1	-1.0
1.7	3.8	-2.1
1.6	2.1	-0.5
2.9	3.0	-0.1
3.5	4.7	-1.2
2.3	1.5	0.8
3.3	3.9	-0.6
1.9	1.9	0.0
3.7	1.9	1.8
3.3	3.6	-0.3
2.9	2.7	0.2
2.6	3.2	-0.6
2.8	2.8	0.0
2.4	2.4	0.0
2.5	2.7	-0.2
8.2	9.8	-1.6
1.1	5.0	-3.9
3.9	4.0	-0.1
2.9	2.6	0.3
8.6	7.6	1.0
10.0	10.8	-0.8
2.0	2.1	-0.1
1.2	1.3	-0.1
1.2	1.4	-0.2
4.3	4.9	-0.6
4.2	3.9	0.3
2.8	4.0	-1.2
4.1	5.2	-1.1
0.9	1.0	-0.1
1.9	2.3	-0.4
3.1	3.8	-0.7
1.8	2.6	-0.8

Compound: Benzene

Canister	Tube	Difference
1.0	1.0	0.0
0.9	1.1	-0.2
0.8	0.9	-0.1
1.9	1.4	0.5
1.2	0.9	0.3
1.8	1.5	0.3
1.2	0.9	0.3
0.5	0.6	-0.1
1.4	1.2	0.2
1.1	1.1	0.0
0.6	0.6	0.0
1.3	1.8	-0.5
0.9	1.2	-0.3
0.8	0.9	-0.1
0.5	0.4	0.1
0.3	0.4	-0.1
0.5	0.8	-0.3
1.1	0.8	0.3
2.1	2.3	-0.2
0.5	0.6	-0.1
0.5	0.5	0.0
0.8	0.6	0.2
0.6	0.5	0.1
2.1	2.3	-0.2
0.8	1.7	-0.9
1.6	1.0	0.6
2.8	3.6	-0.8
1.8	1.1	0.7
1.0	0.8	0.2
0.8	0.7	0.1
0.8	0.8	0.0
1.4	0.8	0.6
0.8	0.6	0.2
0.7	0.7	0.0
0.9	1.4	-0.5
0.9	1.0	-0.1
2.2	3.0	-0.8
1.0	1.7	-0.7
2.4	2.2	0.2
2.1	2.5	-0.4
1.6	2.2	-0.6
1.5	1.3	0.2
1.9	2.2	-0.3
0.9	0.4	0.5
4.2	3.8	0.4
0.6	0.5	0.1
0.7	0.7	0.0
0.7	0.7	0.0
0.3	0.4	-0.1
1.4	1.4	0.0
1.9	1.9	0.0
1.3	1.1	0.2
0.9	0.9	0.0
2.5	2.8	-0.3
1.5	0.1	1.4
0.9	0.6	0.3
0.3	0.4	-0.1
2.6	0.9	1.7
1.1	1.1	0.0
0.7	0.7	0.0
2.7	2.7	0.0
3.0	3.5	-0.5
2.0	2.2	-0.2
0.7	0.6	0.1

Compound: Benzene (Continued)

Canister	Tube	Difference
0.7	0.5	0.2
0.6	0.6	0.0
0.3	0.2	0.1
0.4	0.1	0.3
0.4	0.3	0.1
0.6	0.6	0.0
1.3	1.2	0.1
0.8	0.6	0.2
1.3	1.2	0.1
0.6	0.7	-0.1
1.1	1.3	-0.2
1.9	2.2	-0.3
0.6	0.4	0.2
1.6	0.8	0.8
0.6	0.7	-0.1
1.0	1.2	-0.2
0.8	0.7	0.1
0.6	0.7	-0.1
0.7	0.8	-0.1
1.3	2.2	-0.9
0.7	1.2	-0.5
0.7	1.0	-0.3
1.2	1.4	-0.2
1.1	1.1	0.0
1.4	1.1	0.3
0.7	0.8	-0.1
0.5	0.7	-0.2
0.8	0.6	0.2
1.3	1.2	0.1
0.7	0.4	0.3
1.4	1.2	0.2
0.8	0.3	0.5
0.8	0.4	0.4
1.1	0.9	0.2
1.2	1.1	0.1
0.7	0.6	0.1
1.1	1.1	0.0
0.8	0.7	0.1
1.0	0.7	0.3
2.7	2.9	-0.2
0.6	0.9	-0.3
1.5	1.5	0.0
1.1	1.0	0.1
2.7	2.2	0.5
3.4	3.2	0.2
0.7	0.7	0.0
0.5	0.4	0.1
0.5	0.4	0.1
0.7	0.8	-0.1
1.4	1.3	0.1
1.4	0.8	0.6
1.1	1.2	-0.1
1.3	1.1	0.2
0.4	0.2	0.2
0.5	0.4	0.1
0.8	0.9	-0.1
0.4	0.3	0.1
1.2	1.5	-0.3
1.7	2.0	-0.3
1.2	1.4	-0.2
1.2	1.4	-0.2
1.6	1.6	0.0
1.8	2.2	-0.4

Table III-2-34

New York State Department of Environmental Conservation
PEI Canisters vs. ATD50 Tubes
4th Quarter 1988 - 3rd Quarter 1989

(All units are ppb)

Compound: M/P Xylene

Canister	Tube	Difference
1.2	1.2	0.0
1.1	1.7	-0.6
0.8	0.9	-0.1
1.9	1.7	0.2
1.3	1.3	0.0
1.9	2.4	-0.5
1.5	2.1	-0.6
0.7	0.9	-0.2
1.5	2.2	-0.7
1.0	1.2	-0.2
0.9	0.9	0.0
1.7	2.0	-0.3
1.3	1.4	-0.1
0.7	0.8	-0.1
0.6	0.6	0.0
1.1	0.6	0.5
0.7	1.1	-0.4
1.2	1.1	0.1
3.0	2.9	0.1
0.1	0.7	-0.6
1.1	1.2	-0.1
1.8	2.4	-0.6
1.1	1.4	-0.3
1.1	1.5	-0.4
1.6	1.5	0.1
2.0	2.7	-0.7
0.4	0.7	-0.3
0.9	0.9	0.0
0.5	0.6	-0.1
2.1	2.9	-0.8
0.5	1.7	-1.2
1.8	1.5	0.3
1.9	4.4	-2.5
1.3	1.8	-0.5
1.3	1.2	0.1
0.6	0.7	-0.1
0.5	0.7	-0.2
1.6	0.8	0.8
0.9	0.8	0.1
0.4	0.5	-0.1
1.0	1.2	-0.2
2.6	3.6	-1.0
2.6	1.4	1.2
1.3	1.4	-0.1
3.4	3.0	0.4
3.5	3.6	-0.1
2.3	2.8	-0.5
2.4	2.3	0.1
2.6	3.0	-0.4
0.9	0.6	0.3
3.3	3.5	-0.2
0.5	0.6	-0.1
0.7	0.8	-0.1
0.5	1.6	-1.1
0.4	0.2	0.2
1.7	2.0	-0.3
2.7	2.0	0.7
1.5	1.6	-0.1
0.9	0.9	0.0
3.0	4.3	-1.3
6.6	0.9	5.7
0.4	0.2	0.2
2.9	1.2	1.7
1.1	1.3	-0.2

Compound M/P Xylene (Continued)

Canister	Tube	Difference
0.8	0.9	-0.1
3.3	3.8	-0.5
3.4	4.1	-0.7
2.8	2.5	0.3
0.9	0.9	0.0
0.9	1.0	-0.1
0.3	0.3	0.0
0.3	0.4	-0.1
0.6	0.5	0.1
0.5	0.8	-0.3
1.4	1.6	-0.2
0.9	1.0	-0.1
1.7	1.8	-0.1
0.6	0.6	0.0
1.2	1.5	-0.3
2.4	3.0	-0.6
0.7	0.5	0.2
2.3	0.9	1.4
0.6	0.7	-0.1
1.9	1.5	0.4
0.5	0.7	-0.2
0.6	0.8	-0.2
0.5	0.6	-0.1
2.3	2.1	0.2
0.8	0.9	-0.1
0.7	1.0	-0.3
2.1	1.3	0.8
2.9	1.1	1.8
2.9	1.6	1.3
0.5	0.8	-0.3
0.6	0.7	-0.1
1.5	1.3	0.2
1.6	1.3	0.3
0.6	0.6	0.0
1.3	1.4	-0.1
0.9	1.0	-0.1
1.1	0.3	0.8
2.6	1.0	1.6
2.9	1.1	1.8
0.8	1.0	-0.2
4.0	1.2	2.8
0.8	0.8	0.0
1.9	1.1	0.8
3.1	4.1	-1.0
0.4	1.1	-0.7
1.5	1.6	-0.1
1.0	1.1	-0.1
9.0	2.9	6.1
4.0	3.7	0.3
0.6	0.7	-0.1
0.5	0.5	0.0
0.4	0.5	-0.1
1.7	1.9	-0.2
2.3	1.5	0.8
1.4	2.0	-0.6
2.5	2.8	-0.3
0.5	0.5	0.0
0.7	0.9	-0.2
2.7	1.3	1.4
0.8	1.0	-0.2

Compound: O-xylene

Canister	Tube	Difference
0.3	0.3	0.0
0.6	0.7	-0.1
0.2	0.3	-0.1
0.6	0.7	-0.1
0.4	0.4	0.0
0.6	0.3	0.3
0.6	0.6	0.0
0.5	0.5	0.0
0.3	0.3	0.0
0.2	0.2	0.0
0.7	0.2	0.5
0.3	0.4	-0.1
0.4	0.3	0.1
1.1	0.9	0.2
0.4	0.4	0.0
0.7	0.8	-0.1
0.5	0.4	0.1
0.5	0.5	0.0
0.6	0.5	0.1
0.8	0.8	0.0
0.4	0.3	0.1
0.2	0.2	0.0
0.8	0.9	-0.1
0.7	0.5	0.2
0.7	1.3	-0.6
0.5	0.5	0.0
0.6	0.4	0.2
0.2	0.2	0.0
0.5	0.2	0.3
0.5	0.2	0.3
0.4	0.4	0.0
1.2	1.2	0.0
1.2	0.9	0.3
1.5	1.3	0.2
0.8	0.8	0.0
0.9	0.7	0.2
1.1	1.0	0.1
0.4	0.2	0.2
1.4	1.1	0.3
0.2	0.2	0.0
0.3	0.2	0.1
0.7	0.5	0.2
0.2	0.7	-0.5
0.7	0.6	0.1
1.0	0.8	0.2
0.6	0.5	0.1
0.4	0.3	0.1
1.2	1.3	-0.1
0.5	0.3	0.2
0.2	0.1	0.1
1.2	0.4	0.8
0.5	0.4	0.1
0.3	0.3	0.0
1.4	1.2	0.2
1.4	1.3	0.1
1.5	0.8	0.7
0.3	0.3	0.0
0.3	0.3	0.0
0.3	0.3	0.0
0.3	0.2	0.1
0.2	0.2	0.0
0.5	0.5	0.0
0.3	0.3	0.0

Compound O-xylene (Continued)

Canister	Tube	Difference
0.7	0.5	0.2
0.3	0.2	0.1
0.6	0.6	0.0
0.9	1.0	-0.1
0.3	0.2	0.1
0.9	0.3	0.6
0.2	0.2	0.0
1.4	0.4	1.0
0.2	0.2	0.0
0.2	0.3	-0.1
0.2	0.2	0.0
1.6	0.6	1.0
0.3	0.3	0.0
1.7	0.4	1.3
2.3	0.4	1.9
2.3	0.5	1.8
0.2	0.2	0.0
0.2	0.2	0.0
0.9	0.3	0.6
1.2	0.5	0.7
0.2	0.3	-0.1
2.5	0.4	2.1
0.4	0.3	0.1
4.8	0.4	4.4
0.4	0.3	0.1
2.2	0.3	1.9
0.5	0.4	0.1
0.4	0.3	0.1
0.5	0.0	0.5
2.1	0.4	1.7
0.2	0.3	-0.1
0.6	0.4	0.2
0.4	0.3	0.1
8.6	0.8	7.8
2.1	1.1	1.0
0.3	0.3	0.0
0.2	0.2	0.0
0.2	0.1	0.1
0.8	0.6	0.2
1.9	0.5	1.4
0.6	0.7	-0.1
1.2	0.8	0.4
0.2	0.2	0.0
0.3	0.3	0.0
3.0	0.5	2.5
0.3	0.3	0.0

Table III-2-35

New York State Department of Environmental Conservation
PEI Canisters vs. AT050 Tubes
4th Quarter 1988 - 3rd Quarter 1989

(All units are ppb)

Compound Canister	1,1,1-Trichloroethane Tube	Difference
0.6	0.5	0.3
0.6	0.3	0.3
0.3	0.4	-0.1
0.5	0.4	0.1
1.7	1.0	0.7
1.1	0.6	0.5
0.6	0.3	0.3
0.2	0.3	-0.1
0.4	1.2	-0.8
0.7	0.3	0.4
0.2	0.0	0.2
0.7	0.4	0.3
0.7	0.6	0.1
0.5	0.4	0.1
0.5	0.6	-0.1
0.6	0.3	0.3
0.9	0.6	0.3
0.2	0.3	-0.1
0.4	0.3	0.1
0.2	0.2	0.0
0.7	0.4	0.3
1.0	0.5	0.5
0.7	0.5	0.2
1.3	0.5	0.8
0.6	0.4	0.2
0.1	0.3	-0.2
0.4	0.5	-0.1
0.9	0.3	0.6
0.5	0.3	0.2
0.3	0.4	-0.1
1.3	1.2	0.1
2.6	1.6	1.0
1.7	1.1	0.6
1.1	0.7	0.4
1.8	1.4	0.4
0.4	0.2	-0.2
1.3	1.9	-0.6
0.3	0.2	0.1
0.5	0.3	0.2
0.9	0.7	0.2
0.3	0.1	0.2
1.2	0.9	0.3
1.6	0.9	0.7
1.0	0.6	0.4
0.3	0.1	0.2
0.3	2.3	-2.0
0.5	0.3	0.2
0.2	0.1	0.1
1.1	0.3	0.8
0.5	0.3	0.2
0.4	0.4	0.0
0.7	0.5	0.2
0.5	0.4	0.1
0.8	0.4	0.4
0.4	0.2	0.2
0.5	0.2	0.3
0.3	0.2	0.1
0.3	0.2	0.1
0.2	0.2	0.0
0.4	0.1	0.3
0.5	0.3	0.2
0.9	0.6	0.3
0.8	0.7	0.1

1,1,1-Trichloroethane (Cntd) Canister	Tube	Difference
1.3	0.9	0.4
0.5	0.3	0.2
1.0	0.8	0.2
1.0	0.9	0.1
0.3	0.2	0.1
1.5	0.3	1.2
0.5	0.4	0.1
0.4	0.2	0.2
0.3	0.3	0.0
0.3	0.3	0.0
0.5	0.4	0.1
0.8	0.9	-0.1
0.4	0.4	0.0
0.5	0.5	0.0
0.6	0.5	0.1
0.7	0.5	0.2
0.5	0.4	0.1
0.5	0.4	0.1
0.6	0.3	0.3
0.5	0.4	0.1
0.7	0.4	0.3
0.5	0.2	0.3
0.6	0.5	0.1
0.7	0.6	0.1
0.7	0.0	0.7
0.6	0.3	0.3
0.6	0.4	0.2
0.7	0.5	0.2
0.6	0.3	0.3
0.6	0.3	0.3
0.7	0.3	0.4
0.4	0.3	0.1
0.6	0.3	0.3
0.7	0.4	0.3
1.5	0.8	0.7
1.0	1.0	0.0
0.7	0.4	0.3
0.3	0.2	0.1
0.4	0.3	0.1
0.6	0.4	0.2
0.7	0.3	0.4
0.9	0.4	0.5
0.6	0.4	0.2
0.8	0.4	0.4
0.7	0.3	0.4

Compound Canister	Dichloromethane Tube	Difference
0.8	0.5	0.3
0.8	0.8	0.0
1.6	1.3	0.3
0.6	0.7	-0.1
0.8	0.7	0.1
0.7	0.3	0.4
1.1	2.2	-1.1
0.6	1.0	-0.4
1.2	0.3	0.9
1.3	0.9	0.4
0.5	0.2	0.3
1.5	1.1	0.4
0.3	0.1	0.2
0.4	0.4	0.0
0.6	0.4	0.2
0.8	0.9	-0.1
0.9	0.4	0.5
1.1	1.2	-0.1
0.7	0.5	0.2
0.6	1.2	-0.6
0.7	0.3	0.4
1.2	1.4	-0.2
0.5	0.2	0.3
0.3	0.2	0.1
0.5	0.2	0.3
0.6	0.5	0.1
0.4	0.7	-0.3
1.8	1.2	0.6
0.7	0.9	-0.2
1.3	0.5	0.8
0.9	0.5	0.4
0.9	1.0	-0.1
0.5	0.2	0.3
0.7	0.5	0.2
2.4	3.9	-1.5
1.8	0.9	0.9
2.6	2.9	-0.3
2.2	3.0	-0.8
1.5	0.8	0.7
2.6	2.3	0.3
0.7	0.3	0.4
6.4	3.2	3.2
0.2	0.2	0.0
0.4	0.1	0.3
2.2	0.7	1.5
0.2	0.3	-0.1
0.7	1.9	-1.2
1.3	0.8	0.5
0.7	0.5	0.2
0.3	0.3	0.0
3.4	7.0	-3.6
0.6	0.1	0.5
0.7	0.3	0.4
1.0	1.0	0.0
0.6	0.4	0.2
0.9	0.8	0.1
3.1	4.6	-1.5
2.9	1.6	1.3
0.4	0.1	0.3
0.4	0.2	0.2
0.2	0.2	0.0
0.3	0.1	0.2
3.2	0.3	2.9

Dichloromethane (Cntd) Canister	Tube	Difference
0.3	0.4	-0.1
1.0	0.8	0.2
0.6	0.4	0.2
2.4	1.3	1.1
0.4	0.2	0.2
1.0	0.8	0.2
1.9	1.9	0.0
0.7	0.4	0.3
2.0	0.6	1.4
0.3	0.2	0.1
0.6	0.6	0.0
0.2	0.1	0.1
0.3	0.2	0.1
0.4	0.1	0.3
1.3	1.1	0.2
0.4	0.3	0.1
0.6	0.3	0.3
0.5	0.4	0.1
0.9	0.2	0.7
0.5	0.3	0.2
0.4	0.3	0.1
0.4	0.2	0.2
1.0	0.6	0.4
0.8	0.5	0.3
0.6	0.3	0.3
0.7	0.7	0.0
0.5	0.6	-0.1
0.9	0.6	0.3
0.9	0.4	0.5
0.4	0.3	0.1
0.7	0.5	0.2
0.6	0.3	0.3
0.4	0.1	0.3
0.2	0.2	0.0
0.8	0.8	0.0
0.3	0.2	0.1
0.7	0.4	0.3
0.7	0.5	0.2
2.1	1.0	1.1
2.3	2.1	0.2
0.5	0.3	0.2
0.5	0.3	0.2
0.4	0.4	0.0
1.0	0.8	0.2
0.5	0.2	0.3
0.5	0.2	0.3
0.7	0.3	0.4
0.6	0.1	0.5
0.3	0.1	0.2
0.6	0.4	0.2
0.6	0.2	0.4

Table III-2-36

New York State Department of Environmental Conservation
PEI Canisters vs. ATD50 Tubes
4th Quarter 1988 - 3rd Quarter 1989

(All units are ppb)

Compound: Tetrachloroethane

Canister	Tube	Difference
0.2	0.1	0.1
0.2	0.3	-0.1
0.3	0.2	0.1
0.3	0.3	0.0
0.8	0.6	0.2
0.2	0.3	-0.1
0.3	0.2	0.1
0.2	0.2	0.0
0.5	0.3	0.2
0.3	0.3	0.0
0.3	0.1	0.2
0.4	0.3	0.1
5.1	1.3	3.8
0.2	0.1	0.1
0.5	0.1	0.4
0.7	0.4	0.3
0.3	0.2	0.1
0.8	0.9	-0.1
0.9	0.4	0.5
0.9	0.6	0.3
0.8	0.6	0.2
1.8	1.1	0.7
0.8	0.7	0.1
0.4	0.3	0.1
6.7	0.3	6.4
0.6	0.5	0.1
1.1	0.7	0.4
1.4	1.3	0.1
0.2	0.1	0.1
5.4	3.0	2.4
0.3	0.2	0.1
0.4	0.2	0.2
0.2	0.2	0.0
0.7	0.5	0.2
0.9	0.6	0.3
0.4	0.2	0.2
0.7	0.6	0.1
0.3	0.2	0.1
0.3	0.1	0.2
0.2	0.1	0.1
3.7	4.4	-0.7
0.5	0.2	0.3
0.5	0.6	-0.1
1.2	0.5	0.7
0.6	0.3	0.3
0.6	0.3	0.3
0.3	0.2	0.1
0.3	0.2	0.1
0.8	0.3	0.5
0.5	0.4	0.1
0.5	0.4	0.1

Compound: Ethyl Benzene

Canister	Tube	Difference
0.4	0.6	-0.2
0.2	0.1	0.1
0.2	0.2	0.0
0.4	0.4	0.0
0.7	1.0	-0.3
0.2	0.3	-0.1
0.3	0.3	0.0
0.3	0.3	0.0
0.2	0.2	0.0
0.5	0.6	-0.1
0.6	0.0	0.6
0.6	1.2	-0.6
0.4	0.0	0.4
0.3	0.3	0.0
0.4	0.2	0.2
0.3	0.4	-0.1
0.7	1.0	-0.3
0.4	0.5	-0.1
1.0	0.5	0.5
1.0	1.0	0.0
0.6	0.8	-0.2
0.8	0.7	0.1
0.3	0.4	-0.1
0.5	0.8	-0.3
0.4	0.4	0.0
0.4	0.5	-0.1
0.5	0.5	0.0
0.6	0.8	-0.2
1.0	0.3	0.7
0.4	0.4	0.0
0.3	0.3	0.0
1.1	0.8	0.3
1.1	1.3	-0.2
0.4	1.0	-0.6
1.0	0.8	0.2
0.3	0.2	0.1
0.3	0.3	0.0
0.2	0.4	-0.2
0.2	0.2	0.0
0.4	0.4	0.0
0.3	0.3	0.0
0.5	0.5	0.0
0.2	0.2	0.0
0.4	0.4	0.0
0.7	0.9	-0.2
0.2	0.1	0.1
0.8	0.2	0.6
0.9	1.1	-0.2
0.3	0.1	0.2
1.0	1.1	-0.1
0.4	0.7	-0.3

Compound: Ethyl Benzene (continued)

Canister	Tube	Difference
0.2	0.2	0.0
0.2	0.2	0.0
0.7	0.6	0.1
0.2	0.2	0.0
0.2	0.3	-0.1
0.7	0.4	0.3
0.9	0.3	0.6
0.9	0.5	0.4
0.5	0.2	0.3
0.5	0.7	-0.2
0.2	0.4	-0.2
0.4	0.2	0.2
0.3	0.1	0.2
0.4	0.6	-0.2
1.0	0.3	0.7
1.4	0.3	1.1
0.3	0.2	0.1
0.7	0.3	0.4
1.0	1.1	-0.1
0.5	0.3	0.2
0.4	0.1	0.3
2.9	0.6	2.3
1.3	1.1	0.2
0.2	0.2	0.0
0.5	0.5	0.0
0.5	0.2	0.3
0.8	0.4	0.4
0.7	0.6	0.1
0.2	0.2	0.0
0.9	0.3	0.6
0.2	0.2	0.0

3. DATA MANAGEMENT

3.1 INTRODUCTION

The Data Management Subcommittee was formed to provide a point of contact for the collection, storage, and distribution of data. This was especially critical since six different project participants and contractors were to report ambient air data. The subcommittee was responsible for developing reporting formats, a data entry system, and a data reporting schedule. In addition, the subcommittee reviewed the data for entry errors and other anomalies, and conducted the initial data analyses which provided the basis for initial site-to-site and overall inter-laboratory comparisons. In addition, the data from this study were compared to those from other studies found to have collected sufficiently similar data.

3.2 DATA FORMATS

During the project, data were collected on several types of compounds (i.e., VOCs, formaldehyde, and metals) by different sampling methods (i.e., canisters, sorbents, and high volume samplers); up to six different project participants and contractors analyzed the samples contributing to the set of data for a given chemical. Given the complexity of managing the volume and variety of data generated, standard reporting formats were necessary.

The data were entered into Lotus spreadsheets to facilitate their manipulation on personal computers. The format for the VOCs collected on sorbents is shown in Table III-3-1. Data on one compound collected at one site during one month are shown on each page. Data from each of two tubes collected on each sampling day are shown, and the average for the two tubes is shown. Summary statistics such as number of samples, maximum and minimum concentrations, and average concentration are calculated and shown for the individual tubes and the average of the two tubes. The New York State Department of Environmental Conservation (NYSDEC) modified this form to accommodate idiosyncracies of its data, and to reduce the number of pages of output. NYSDEC used three tubes in parallel and, therefore, added a column to input data from this additional tube. The standard format had been designed to account for the daily sample collection schedule of the College of Staten Island (CSI). Since NYSDEC collected samples every sixth day, it deleted all dates on which samples were not scheduled to be collected. This reduced the number of outputs for each month and allowed NYSDEC to report three months of data from a site on each page.

For the VOCs collected in canisters, and for formaldehyde, metals, and benzo(α)pyrene, only one sample was collected on each sampling day. Therefore, the format was designed to allow for the entry of three months of data on one compound at one site on each page. An example is shown in Table III-3-2. Summary statistics for each month and for the quarter are calculated and given in these tables.

The quarterly summary report format developed for the project is shown in Table III-3-3. The summary statistics presented include maximum and second highest concentrations, average concentration, minimum concentration, standard deviation, number of samples, and number of samples greater than the minimum detection level (MDL) for the compound. It should be noted that when a compound was below the MDL, a concentration equal to one half of the MDL was to be entered into the spreadsheet.

In order to facilitate use of the data, additional summary formats were developed; they are shown in Tables III-3-4 through 6. Table III-3-4 shows the quarterly and annual average concentrations for one compound at each site at which it was measured for the duration of the project. Table III-3-5 is an example of a report format which rank orders the data on one compound for each quarter during the Project, so that for each quarter there is a list of the sites arranged from the one with the highest concentration to the one with the lowest. Table III-3-6 is similar to Table III-3-5, but ranks the annual average concentrations rather than quarterly average concentrations. The ambient air data in these formats appear as Tables III-3-7 through 73 in the appendices at the back of this volume.

All VOC concentration summary data (annual and quarterly average data) are available as WordPerfect and Lotus files on computer diskettes from the National Technical Information Service (NTIS) as NTIS Accession number PB92-504174. Daily monitoring data will be accessible on the U.S. EPA Aerometric Information Retrieval System (AIRS).

3.3 LOGISTICS

Data were to be submitted in the project formats on computer disk in Lotus within 45 days after the end of each calendar quarter. The data were also to be checked by each organization prior to its submittal in order to eliminate data entry errors. The Data Management Subcommittee was to release data listings for each quarter of data. These goals were met with a mixture of success and failure.

The Data Management Subcommittee fell behind its schedule for releasing quarterly data listings and did not release any data until September 1988 when it released data from July 1987 through March 1988. In February of 1989, the data tables were reviewed for errors from data entry or other sources. Several errors were found; each organization was asked to review its data and resubmit it. These actions resulted in higher quality data in subsequent submittals. Data submittals by the participants were completed during the summer of 1990. Preparation of the summary tables followed.

3.4 INITIAL DATA ANALYSIS

In order to guide the efforts of the other subcommittees responsible for the use of the data, the Data Management Subcommittee undertook several steps in the evaluation of the data. These included preparation of graphs of the annual averages for the second year of the study for a number of the sampling sites, and plots of the actual daily results in time series plots. Annual and quarterly average data were tabulated in Tables III-3-7 through 27. Sites were listed in concentration rank order in Tables III-3-28 through 48 for the annual average data. Rank order tables for quarterly average results are given in Tables III-3-49 through 69.

The preliminary examination of the tables indicates the following:

No single monitoring site consistently had the highest concentrations.

Of the chlorinated hydrocarbons, trichloroethane had the highest concentrations in both the first and second years of the project (0.48 ppb and 0.46 ppb, averages of the annual averages for all sites in each year).

Of the aromatic hydrocarbons, toluene had the highest concentrations in both the first and second years (3.66 ppb and 3.33 ppb, averages of the annual averages for all sites in each year).

Examination of Tables III-3-28 through 48 showed that some sites consistently had higher annual average concentrations for a number of compounds. Such sites were studied to determine the possible impacts of meteorological variables and local sources, and/or provide other explanations of the locally higher concentrations; the results are presented in Section 6, Source Identification.

For example, annual average concentrations for the Dongan Hills, Elizabeth, Port Richmond, and Eltingville sites were typically $\geq$1.4 ppb for benzene, and $\geq$4 ppb for toluene. The Carteret and Bayley Seton sites exceeded these levels in one of the two years. The first four sites mentioned are all located on heavily-trafficked multi-lane roads or highways; some of the sites are near the Fresh Kills Landfill; and one is near a petroleum refinery. Several techniques have been applied to these data in order to evaluate methods for relating the measured concentrations to potential sources. The methods tested included pollutant roses, back trajectory analyses, and studies of the micro-inventory data.

The Pump Station and the Dongan Hills sites are another example of how the tables and graphs were used to focus source identification efforts. The Dongan Hills site is clearly one of the most impacted for tetrachloroethylene. The site is unique in that the early site audit reports noted the proximity of several dry cleaning establishments. The micro-inventory reports for this site and others have been examined to confirm the degree to which dry cleaners may have contributed to tetrachloroethylene concentrations. The Pump Station site (near Staten Island Mall) is another location with high measured tetrachloroethylene concentrations. Publicly-owned treatment works (POTWs) have been reported to be sources of some chlorinated hydrocarbons; the possible relation of these sources to the pumping station function and the high tetrachloroethylene concentrations measured at the Pump Station site were pursued.

Figures III-3-1 through 11 show the second-year (October 1988 through September 1989) annual average data for 11 chemicals at 13 sites. For many compounds in this set of graphs, the ranges of means for all sites are not large. The three- to five-fold differences between sites for some chlorinated compounds may be significant. These differences were evaluated to determine their statistical significance, and to determine any potential impacts on the health risk estimates. The intersite differences in the means are considerably smaller for the aromatic hydrocarbons. Intersite differences in concentration and exposure are discussed in Sections 2, Quality Assurance, and 7, Exposure and Health Assessment, in this volume; and in Volume V.

The data for dichloromethane from NJIT and CSI, with 0 and 25% of the sample concentrations greater than the respective MDLs, failed the QA review. These organizations reported their data as evidence for the presence of the compound, or valuable as an order of magnitude estimate. Only the NYSDEC data are valid for any quantitative evaluation for dichloromethane.

The data for trichloromethane (chloroform) and trichloroethylene (trichloroethene) passed the QA review for all three organizations; however, the results in Figures III-3-2 and 3 indicate that some problems may have occurred in routine operations. For both compounds there was very little site-to-site variation in the annual averages for each of the NJIT and CSI sites, with the annual average only slightly above the MDL for some sites; and both organizations reported averages well below the range of averages for the NYSDEC sites. The relatively low boiling points of trichloromethane and trichloroethene may have resulted in collection efficiency problems with the Tenax absorbers used by NJIT and CSI. Caution should be exercised in the use of the trichloromethane and trichloroethene results from NJIT and CSI.

All VOCs with higher boiling points than dichloromethane, trichloromethane, and trichloroethene provided satisfactory evidence of adequate collection efficiencies on both the Tenax (NJIT and CSI) and trisorbent (NYSDEC) absorber systems.

The data in Figures III-3-12 through 19 show the sample-to-sample variation in concentration over time for the hydrocarbon and chlorinated hydrocarbon compounds at four sites. Figure III-3-20 is a graph of the average concentration for the four sites on the given days for sulfur dioxide, toluene, and benzene, for comparison purposes. The large variations (high peaks, large maxima) in the hydrocarbon graphs fell on the same sampling dates throughout the study period shown. The large variations for the chlorinated compounds were rarely on the same dates. Correlations for the chlorinated compounds are not apparent from these graphs.

The ambient concentrations of the aromatic hydrocarbons (benzene, toluene, *m*- and *p*-xylenes, and *o*-xylene) tended to vary together over the larger concentration variations, while the concentrations of the chlorinated compounds tended to vary independently of each other. The day-by-day coincidence of high and low values for the aromatic hydrocarbons at four sites indicates the likelihood that these compounds were emitted from the same source or a common type of source.

There appears to be no strong seasonal variation in the ambient concentrations of the compounds shown in these graphs. Some of the aromatic hydrocarbons appear to show higher concentrations in the winter months and the lower concentrations in the spring at some sites. According to a more detailed examination by CSI[1], the CSI data appear to show seasonal variation for some of the chlorinated compounds.

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[1] Personal communication of John Oppenheimer to Theo. J. Kneip.

3.5 COMPARISON TO AMBIENT AIR VOC DATA FOR OTHER LOCATIONS.

3.5.1 Relevant Data Sets

Four data bases were selected for comparison with the SI/NJ UATAP data. They are the 1988 and 1989 EPA Urban Air Toxics Monitoring Program (UATMP) studies, the Airborne Toxic Element and Organic Substances (ATEOS) project, and the EPA Total Exposure Assessment Methodologies (TEAM) studies.

Tables III-3-70a through 70b describe precision, accuracy, and detection limits, or indicators thereof, for the studies. Tables III-3-71 through 73 contain data reported in these studies. These tables address only an 11-VOC subset of the chemicals in these studies, since these VOCs were the focus of the initial quantitative risk assessment located in Section 7 of this volume.

The designs of the studies should be considered when comparing the reported concentrations. The five studies are described below in terms of number of sites, number of chemicals, sampling frequency, collection method(s), analytical detection methods, organization of sampling and analysis, bases for site selection, and objective(s).

3.5.1.1 SI/NJ UATAP (Staten Island/New Jersey Urban Air Toxics Assessment Project)

See Tables III-3-7 through 27.

Sites: 13 ambient air sites for VOCs, 5 sites for metals and B[α]P, and 2 sites for formaldehyde for the outdoor air portion of the study. (Piscataway served as an upwind site for VOCs and formaldehyde; and Highland Park, as an upwind site for metals and B[α]P. Upwind refers to the W to SW wind direction, the predominant wind direction for the project area.) Four indoor and two outdoor sites were used for the 8-month indoor air portion of the study.

Chemicals: 40 chemicals--21 VOCs[2], 17 metals, benzo[α]pyrene, and formaldehyde.

Sampling frequency: 24-h samples every 6th day; October '87 through September '89. (Only data for the period 10/88

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[2] In this tally, m- and p-xylene were counted as one VOC since they were not distinguished by the analytical methods used.

through 9/89 have been included in this comparison). CSI sampled daily during certain quarters. Annual averages are arithmetic averages of all samples; for CSI sites, many more samples were collected during some quarters than others.

Collection: For VOCs, NJIT and CSI used Tenax as the sole adsorbent, and NYSDEC used a series of Tenax/Amersorb/carbon in a single tube as the adsorbent. A combination of canisters and periodic simultaneous sampling by the three organizations was used as an indication of accuracy of the sorbent methods, and as a basis for integration of the inter-organizational set of data. For particulate matter and B[α])P, high-volume samplers were used. For formaldehyde, 2,4-dinitrophenylhydrazine-coated (DNPH-coated) silica cartridges were used.

Analysis: For VOCs, NYSDEC and CSI used GC/MS; NJIT used GC/FID/ECD with confirmation by GC/MS. For metals, all organizations used atomic absorption spectrophotometry.

Organization: Sites were run by three organizations--6 by NYSDEC, 5 by NJDEP, 3 by CSI; each organization had a different lab analyze samples collected at its sites.

Site selection: Residential neighborhood complaints, availability, accessibility, security, absence of known point sources nearby, geographic distribution, proximity to breathing zone, in general conforming to the USEPA air monitoring siting requirements.

Objectives: Characterization of ambient air quality, risk assessment, and source identification. Further detail may be found in the nine objectives stated in Volume II of the SI/NJ UATAP project report.

3.5.1.2 1988 and 1989 UATMP (Urban Air Toxics Monitoring Program, USEPA)

See Tables III-3-72a through 72c. Metals and B[α]P data for the 1988 UATMP study were available from the AIRS (Aerometric Information Retrieval System) database.

Sites: 19 sites operated in the 1988 study (9/24/87 through 10/6/88). 14 sites operated in 1989 study (1/22/89 through 1/17/90)--6 sites were the same as in the 1988 study, and 8 sites were new. See tables for site locations.

Chemicals: 38 gaseous organic compounds; and metals, B[α]P, and carbonyl compounds.

Sampling frequency: 24-h samples every 12 days. Annual arithmetic averages are listed in the tables.

Collection: For VOCs, stainless steel canisters. For particulate matter, high-volume filters. For carbonyl compounds, DNPH-coated silica cartridges.

Analysis: GC/MD, with 3 detectors for identification (ECD, PID, FID)[3]; FID for most quantitation, ECD for most halogenated compounds. GC/MS for identification confirmation of GC/MD results.

Organization: A contractor set up the sites. State or local personnel collected samples and sent them to the EPA contractor. The contractor analyzed all samples.

Site selection: OAQPS (Office of Air Quality Planning and Standards) guidelines, with site selection by Regional EPA offices and State offices together.

Objective: Screening to help state and local agencies determine if an air toxics problem existed, assess air quality, provide focus for follow-up studies and risk reduction activities.

3.5.1.3 ATEOS (Airborne Toxic Element and Organic Substances project)

See Table III-3-73.

Sites: 4 New Jersey sites--Elizabeth, Newark, Camden, Ringwood.

Chemicals: 24 polycyclic aromatic hydrocarbons (PAH's), 6 aromatics, 16 chlorinated hydrocarbons, 9 metals, nitrobenzene, 1,4-dioxane, inhalable particulate matter $\leq$ 15 μm (aerodynamic diameter), fine particulate matter $\leq$ 2.5 μm, carbon monoxide, sulfur dioxide, and sulfate.

Sampling frequency: 24-h samples on 39 consecutive days at each site over a 6-week period; this regimen was implemented 4 times during 3 calendar years as follows--7/6 to 8/14/81, 1/18 to 2/25/82, 7/6 to 8/14/82, and 1/17 to 2/25/83. The averages shown are seasonal geometric means.

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[3] GC = gas chromatograph. MD = multi-detector. ECD = electron capture detector. PID = photoionization detector. FID = flame ionization detector. MS = mass spectrometer.

Collection: For VOCs, Tenax/Spherocarb. For metals, size-selective samplers (two at ≤ 15 μm, one at ≤ 2.5 μm) at each site and operated at pre-determined flow rates.

Analysis: GC with MS confirmation for VOCs. Thin-layer chromatographic separation followed by HPLC (high-pressure liquid chromatography) for PAH. Atomic absorption spectrophotometry for metals.

Organization: The Institute of Environmental Medicine, New York University, coordinated and performed sampling and sample preparation; local personnel inserted and removed filters for sampling, and shipped samples to NYU. NYU analyzed for metals and some PAH's as a quality assurance check. NJIT analyzed for VOCs and PAHs.

Site selection: High population density, proximity to large centers with commercial and/or industrial activities, proximity to important transportation arteries, sites potentially affected by different types of sources.

Objective: Determine the concentrations and seasonal distribution patterns and sources of the biologically-active fraction of the atmospheric aerosol and VOC, analyze pollution episodes for composition and duration, identify inter-urban and rural differences.

3.5.1.4 TEAM Study (Total Exposure Assessment Methodology Study)

See Table III-3-73.

Sites: 3 locations in Phase II of study--New Jersey (Elizabeth-Bayonne area), North Carolina, and North Dakota.

Chemicals: 11 VOCs collected at each site.

Sample frequency: 12-h day and night samples in three seasons--86 samples in Fall 1981; 60 samples in Summer 1982; 9 samples in Winter 1983. Arithmetic means are provided in 1982 and 1983 for the Fall 1981 the reported concentrations are from weighted frequency distributions.

Collection: Collection was achieved using personal samples Tenax-GC at 30 ml/minute; the sampler was set up in a backyard or near the participating homes. The same sampler used for dichloromethane, to calculate the concentration when the breakthrough occurred, the breakthrough volume was used rather than sample volume.

Analysis: Capillary GC/MS analysis with combination of manual and automatic analyses of spectra. Improvements in sampling and analysis were made through the course of the study. Use of the terms limit of detection (LOD), quantitation limit (QL), and trace. Non-detection means < LOD. Trace means > LOD, but < QL. The QL is approximately equal to four times the LOD. Measurable means > QL.

Organization: Primary contractor was Research Triangle Institute, with audits by EPA's Environmental Monitoring Systems Laboratory, RTP.

Site selection: Based on stratified probability sample of 5500 households in 108 areas in Elizabeth and Bayonne; intended to represent 128,000 members of target population--residents > 6 years of age as of Fall 1981. Stratification based on age, socio-economic status, occupation, and proximity to major point sources. Greensboro, NC, and Devils Lake, ND, were selected for comparison to the NJ location. Greensboro is similar in size of population, but lacks chemical manufacturing and petroleum refining industries. Devils Lake is a small, rural agricultural town.

Objective: Develop methods to measure individual total exposure and resulting body burden of toxic and carcinogenic chemicals; and apply those methods to estimate exposure and body burdens of urban populations in several cities.

3.5.2 Inter-study Comparisons

The ranges of concentrations reported in the studies cited are generally similar to the data obtained for the SI/NJ UATAP sites. The tables are provided for the use of readers interested in detailed information as well as for use by the members of the project.

For rapid appreciation of the comparability of the data sets from the 1989 UATMP and the second year of the SI/NJ UATAP, a set of graphs has been prepared. Figures III-3-21 through 30 depict the following for the 11 VOCs: the annual average concentrations for the 1989 UATMP sites and for the SI/NJ UATAP sites, the average of the annual average concentrations for all the SI/NJ UATAP sites, and the average of the annual average concentrations for all the 1989 UATMP sites. The data have been plotted in order of concentration by location for each of the VOCs. The site codes for these graphs are given in Table III-3-74.

The SI/NJ UATAP data clearly fit with those for the rest of the country in these graphs. For all but two chemicals, the data point representing the average of the SI/NJ UATAP site annual averages falls in the mid-range of the values from the UATMP individual site averages. In most cases, the highest annual averages are from the UATMP data set.

The data for dichloromethane from this project are those from NYSDEC, which did not have a collection efficiency problem. This compounds received little further attention in the initial data analysis because of the limited data available.

The highest concentrations for tetrachloroethylene were measured at SI/NJ UATAP sites--Dongan Hills and the Pump Station sites; this was discussed earlier in Section 3. At the latter site, adjacent to a sewage pumping station, annual average concentrations for chloroform and trichloroethene were high, as well. At the Dongan Hills site, annual average concentrations were high for benzene and m- and p-xylene, and relatively high for toluene.

Section 7 of this volume presents additional comparisons of the UATMP and SI/NJ UATAP data.

3.6 CONCLUSIONS.

The quality-assured data in a reduced format are available from National Technical Information Services (NTIS) on a computer diskette.

The initial examination of the data led to a number of findings. The bulk of the SI/NJ data are comparable to data for a number of sites in a national study of a similar nature. None of the SI/NJ UATAP sites is consistently high in any one pollutant within the project data set. However, patterns emerge indicating high annual average results of possible significance in relation to sources. Further studies of these data have been undertaken to evaluate methods for determining source relationships and to obtain preliminary results concerning such relationships.

Seasonal variations may occur for the aromatic hydrocarbons, but these do not appear to occur with the chlorinated hydrocarbons. Strong commonality is apparent in the occurrence of peak concentrations for the hydrocarbons, but not for the chlorinated hydrocarbons. The values for tetrachloroethylene at Dongan Hills and the Pump Station sites are unusually high relative to other sites in this project, and relative to the nation-wide UATMP data set, as well. These and other site-to-site variations have been studied by the use of pollutant rose and back trajectory analyses, and by more detailed, statistical methods.

3.8 ACKNOWLEDGEMENT

This section was prepared by Mr. Rudolph K. Kapichak, Dr. Theo. J. Kneip, Ms. Carol Bellizzi, Mr. Robert Kelly, Mr. Stan Stephansen, Mr. Richard Ruvo, Ms. Lauren Bradford, and Mr. Ethan Kibbe of the U.S. Environmental Protection Agency Region II. Mr. Kevin Culligan of the U.S. Environmental Protection Agency Region II organized the project summary data onto computer diskettes available through NTIS.

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Table III-3-1: FORMAT FOR VOCs COLLECTED ON SORBENTS

Agency: College of Staten Island

Site: Bayley Seton Hospital - Ground Level

Site #: NY 8

Flow Rate Tube 1: 8 cc/min Tube 2: 16 cc/min

Pollutant Benzene CAS #: 71-43-2

Sampling Code: D Analytical Code: J

MDL: 0.13 ppb low flow and 0.06 ppb high flow Units: ppb

Month, year: March 89

Date	Tube 1	FC	Tube 2	FC	Blank	FC	2 Tube Av	FC
1	0.83		0.88				0.86	
2	1.95		2.00				1.97	
3	1.07		1.18				1.13	
4	1.07		1.18				1.13	
5	1.07		1.25				1.16	
6	0.48		0.55				0.52	
7	0.78		0.88				0.83	
8	0.58		0.56				0.57	
9	0.95		1.12				1.03	
10	2.31		3.03				2.67	
11	0.94		1.10				1.02	
12	0.78		0.83				0.81	
13	0.72			sa			0.72	
14		sc		sc				
15		sc		sc				
16	0.80		1.06				0.93	
17	0.64		0.54				0.59	
18	0.55		0.69				0.62	
19	0.73		0.82				0.77	
20	0.57		0.65				0.61	
21	0.60		0.68				0.64	
22	1.16		1.32				1.24	
23	0.75		0.77				0.76	
24	1.00		1.05				1.03	
25	0.80		0.96				0.88	
26		sa	1.36				1.36	
27	1.41		1.67				1.54	
28	0.98		0.65				0.81	
29		sa		sa				
30	0.54		1.04				0.79	
31	0.79		1.23				1.01	
# of Obs:	27		27				28	
Max Val:	2.31		3.03				2.67	
Arth Mean:	0.92		1.08				1.00	
Min Val:	0.48		0.54				0.52	

Table III-3-2: FORMAT FOR CANISTER VOC SAMPLES, AND FOR FORMALDEHYDE, METALS, AND BENZO[a]PYRENE

Agency: NJDEP-NJIT

Site: Elizabeth, NJ

SAROAD #: NJ-A

Pollutant: Benzene　　　　CAS #: 71-43-2

Sampling Code: B　　　　Analytical code: R

MDL: 0.01 PPB　　　　Units: PPB

Quarter Beginning: October, 1988

Date	Oct., 88	FC	Nov., 88	FC	Dec., 88	FC
1						
2						
3						
4						
5			0.82		1.01	
6	0.82					
7						
8						
9						
10						
11			0.85		0.50	
12	0.45					
13						
14						
15						
16						
17			0.90			SC
18	1.25					
19						
20						
21						
22						
23			1.39		1.82	
24	1.08					
25						
26						
27						
28						
29			0.69		1.06	
30	0.71					
31						
# of Obs:	5		5		4	
Max Value:	1.25		1.39		1.82	
Arith. Mean:	0.86		0.93		1.10	
Min Value:	0.45		0.69		0.50	
# Obs in Qtr:	14					
Qtr Arth Mean:	0.96					

Table III-3-3: QUARTERLY SUMMARY REPORT FORMAT

QUARTER BEGINNING: JANUARY 1989

CHEMICAL: BENZENE

MDL: 0.20

SITE	# OBS.	AVG.	STD. DEV.	1ST MAX	2ND MAX	MIN	> MDL
SUSAN WAGNER	12.00	1.07	0.71	2.95	1.69	0.31	12.00
PS-26	13.00	1.46	0.90	3.34	2.76	0.39	13.00
PORT RICHMOND	13.00	1.52	0.85	3.57	2.51	0.50	13.00
TOTTENVILLE	13.00	1.04	0.63	2.20	2.15	0.34	13.00
GREAT KILLS	12.00	1.09	0.70	2.47	2.30	0.36	12.00
PUMP STATION	13.00	1.28	0.86	3.02	2.78	0.38	13.00

QUARTER BEGINNING: APRIL 1989

CHEMICAL: BENZENE

MDL: 0.20

SITE	# OBS.	AVG.	STD. DEV.	1ST MAX	2ND MAX	MIN	> MDL
SUSAN WAGNER	12.00	0.69	0.36	1.40	1.27	0.14	12.00
PS-26	13.00	1.17	1.00	3.76	2.22	0.10	13.00
PORT RICHMOND	12.00	1.52	1.07	3.50	3.26	0.25	12.00
TOTTENVILLE	13.00	0.67	0.50	2.02	1.27	0.19	13.00
GREAT KILLS	12.00	0.84	0.55	1.86	1.80	0.35	12.00
PUMP STATION	13.00	1.11	0.73	2.72	2.20	0.28	13.00

QUARTER BEGINNING: JULY 1989

CHEMICAL: BENZENE

MDL: 0.20

SITE	# OBS.	AVG.	STD. DEV.	1ST MAX	2ND MAX	MIN	> MDL
SUSAN WAGNER	15.00	0.69	0.29	1.12	1.10	0.18	15.00
PS-26	15.00	1.39	0.92	3.59	3.19	0.55	15.00
PORT RICHMOND	15.00	1.21	0.44	2.22	2.18	0.60	15.00
TOTTENVILLE	15.00	0.91	0.43	1.67	1.60	0.31	15.00
GREAT KILLS	15.00	0.86	0.49	2.05	1.62	0.29	15.00
PUMP STATION	15.00	1.26	0.66	2.88	2.56	0.39	15.00

Table III-3-4

TOLUENE - C6H5CH3 (METHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	FIRST YEAR OCT 1987 - SEPT 1988 ARITH. MEAN (ppb)
CARTERET	B	13	2.83	14	1.70	14	3.01	15	5.02	56	3.18
ELIZABETH	A					3	2.90	15	5.24	18	4.85
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	1.88	14	2.32	13	1.46	10	2.07	50	1.93
PS 26	2	10	3.22	13	3.20	13	2.17	4	3.29	40	2.88
PORT RICHMOND PO	5	9	3.74	14	4.65	15	2.67	4	3.63	42	3.65
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	4.71	82	4.24	80	2.93	79	4.14	328	4.02
ELTINGVILLE	3	88	5.70	57	5.19	79	2.71	68	3.68	292	4.32
DONGAN HILLS	6	86	5.19	55	5.67	78	2.94	67	4.18	286	4.43

TOLUENE - C6H5CH3 (METHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	SECOND YEAR OCT 1988 - SEPT 1989 ARITH. MEAN (ppb)
CARTERET	B	15	4.18	11	5.57	13	2.82	14	2.90	53	3.80
ELIZABETH	A	15	4.59	14	4.23	15	2.83	14	2.82	58	3.62
SEWAREN	C			10	4.14	12	2.05	14	2.69	36	2.88
PISCATAWAY	D			13	3.42	15	1.27	14	1.80	42	2.11
SUSAN WAGNER HS	1	11	1.76	12	3.13	12	2.13	15	2.57	50	2.42
PS 26	2	13	3.21	13	4.55	13	3.38	15	4.32	54	3.88
PORT RICHMOND PO	5	14	3.56	13	4.72	12	4.36	15	4.39	54	4.25
PUMPING STATION	7	14	3.52	13	4.26	13	3.49	15	4.17	55	3.87
GREAT KILLS	4	14	2.78	12	3.27	12	2.58	15	2.95	53	2.89
TOTTENVILLE	9	11	2.56	13	3.34	13	2.17	15	3.09	52	2.81
BAYLEY SETON HOSPITAL	8	83	3.48	86	3.16	8	2.39	16	2.22	193	3.19
ELTINGVILLE	3	79	3.55	71	3.60	7	1.95	19	3.09	176	3.45
DONGAN HILLS	6	75	4.09	83	4.46	6	2.59	18	2.99	182	4.10

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
ELTINGVILLE	5.70	DONGAN HILLS	5.67	CARTERET	3.01	ELIZABETH	5.24
DONGAN HILLS	5.19	ELTINGVILLE	5.19	DONGAN HILLS	2.94	CARTERET	5.02
BAYLEY SETON HOSP	4.71	PORT RICHMOND PO	4.65	BAYLEY SETON HOSP	2.93	DONGAN HILLS	4.18
PORT RICHMOND PO	3.74	BAYLEY SETON HOSP	4.24	ELIZABETH	2.90	BAYLEY SETON HOSP	4.14
PS 26	3.22	PS 26	3.20	ELTINGVILLE	2.71	ELTINGVILLE	3.68
CARTERET	2.83	SUSAN WAGNER HS	2.32	PORT RICHMOND PO	2.67	PORT RICHMOND PO	3.63
SUSAN WAGNER HS	1.88	CARTERET	1.70	PS 26	2.17	PS 26	3.29
GREAT KILLS		GREAT KILLS		SUSAN WAGNER HS	1.46	SUSAN WAGNER HS	2.07
PISCATAWAY		PUMPING STATION		TOTTENVILLE		TOTTENVILLE	
TOTTENVILLE		TOTTENVILLE		GREAT KILLS		GREAT KILLS	
PUMPING STATION		PISCATAWAY		PUMPING STATION		PUMPING STATION	
SEWAREN		SEWAREN		PISCATAWAY		PISCATAWAY	
ELIZABETH		ELIZABETH		SEWAREN		SEWAREN	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
ELIZABETH	4.59	CARTERET	5.57	PORT RICHMOND PO	4.36	PORT RICHMOND PO	4.39
CARTERET	4.18	PORT RICHMOND PO	4.72	PUMPING STATION	3.49	PS 26	4.32
DONGAN HILLS	4.09	PS 26	4.55	PS 26	3.38	PUMPING STATION	4.17
PORT RICHMOND PO	3.56	DONGAN HILLS	4.46	ELIZABETH	2.83	ELTINGVILLE	3.09
ELTINGVILLE	3.55	PUMPING STATION	4.26	CARTERET	2.82	TOTTENVILLE	3.09
PUMPING STATION	3.52	ELIZABETH	4.23	DONGAN HILLS	2.59	DONGAN HILLS	2.99
BAYLEY SETON HOSP	3.48	SEWAREN	4.14	GREAT KILLS	2.58	GREAT KILLS	2.95
PS 26	3.21	ELTINGVILLE	3.60	BAYLEY SETON HOSP	2.39	CARTERET	2.90
GREAT KILLS	2.78	PISCATAWAY	3.42	TOTTENVILLE	2.17	ELIZABETH	2.82
TOTTENVILLE	2.56	TOTTENVILLE	3.34	SUSAN WAGNER HS	2.13	SEWAREN	2.69
SUSAN WAGNER HS	1.76	GREAT KILLS	3.27	SEWAREN	2.05	SUSAN WAGNER HS	2.57
PISCATAWAY		BAYLEY SETON HOSP	3.16	ELTINGVILLE	1.95	BAYLEY SETON HOSP	2.22
SEWAREN		SUSAN WAGNER HS	3.13	PISCATAWAY	1.27	PISCATAWAY	1.80

Table III-3-6

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	18	4.85
DONGAN HILLS	6	286	4.43
ELTINGVILLE	3	292	4.32
BAYLEY SETON HOSPITAL	8	328	4.02
PORT RICHMOND PO	5	43	3.65
CARTERET	B	56	3.18
PS 26	2	40	2.88
SUSAN WAGNER HS	1	50	1.93
TOTTENVILLE	9		
GREAT KILLS	4		
PUMPING STATION	7		
PISCATAWAY	D		
SEWAREN	C		

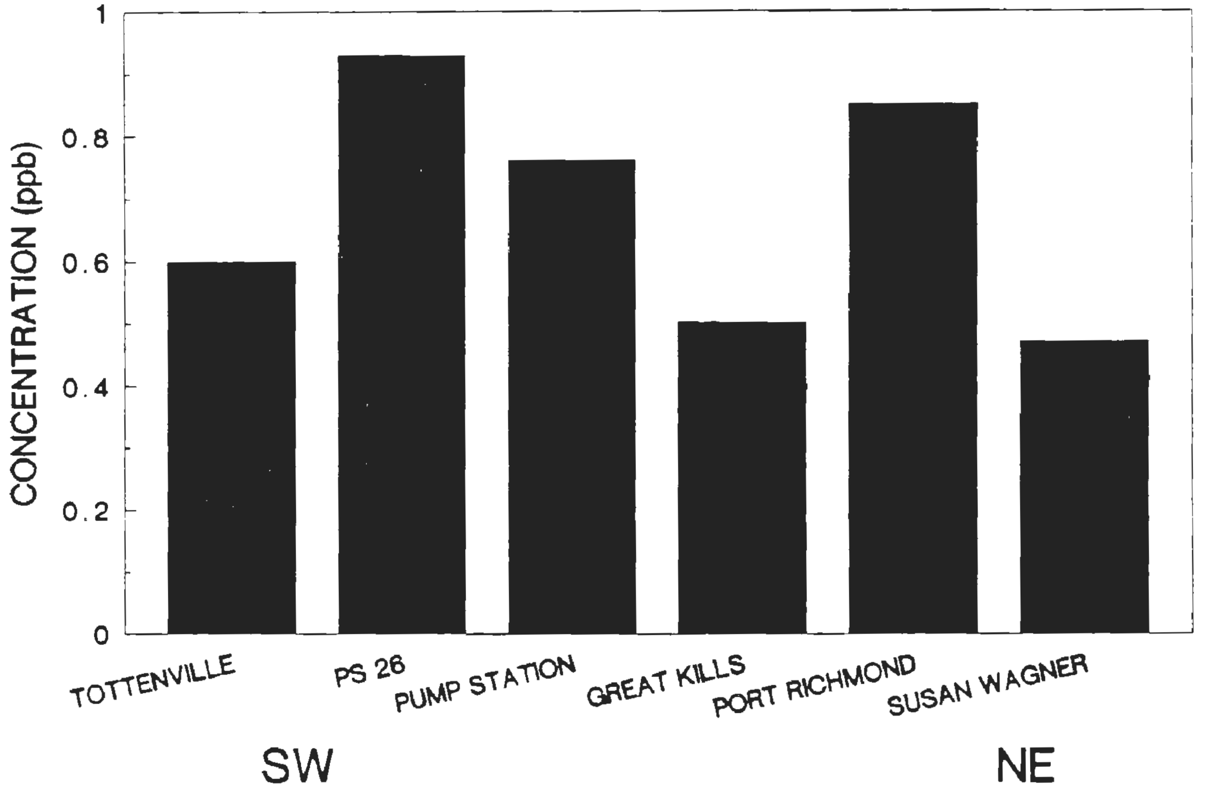
SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	54	4.25
DONGAN HILLS	6	182	4.10
PS 26	2	54	3.88
PUMPING STATION	7	55	3.87
CARTERET	B	53	3.80
ELIZABETH	A	58	3.62
ELTINGVILLE	3	176	3.45
BAYLEY SETON HOSPITAL	8	193	3.19
GREAT KILLS	4	53	2.89
SEWAREN	C	36	2.88
TOTTENVILLE	9	52	2.81
SUSAN WAGNER HS	1	50	2.42
PISCATAWAY	D	42	2.11

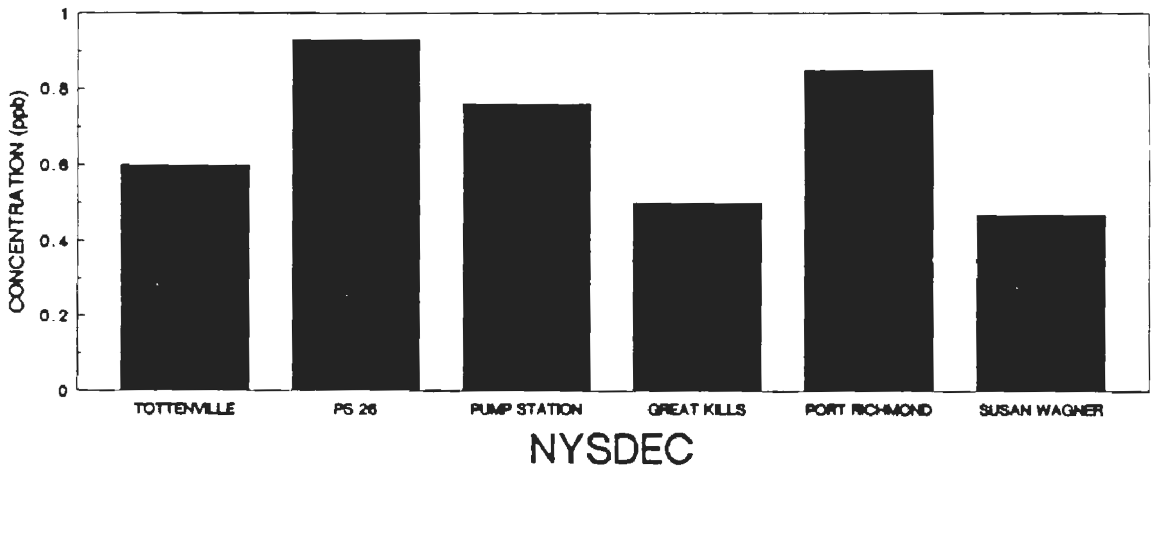
Figure III-3-1

DICHLOROMETHANE

2ND YEAR AVERAGES



MONITORING AGENCY



FIGURES III - 3 - 1

THROUGH III - 3 - 11

SECOND YEAR AVERAGES

FOR POLLUTANTS BY LOCATION

AND MONITORING AGENCY

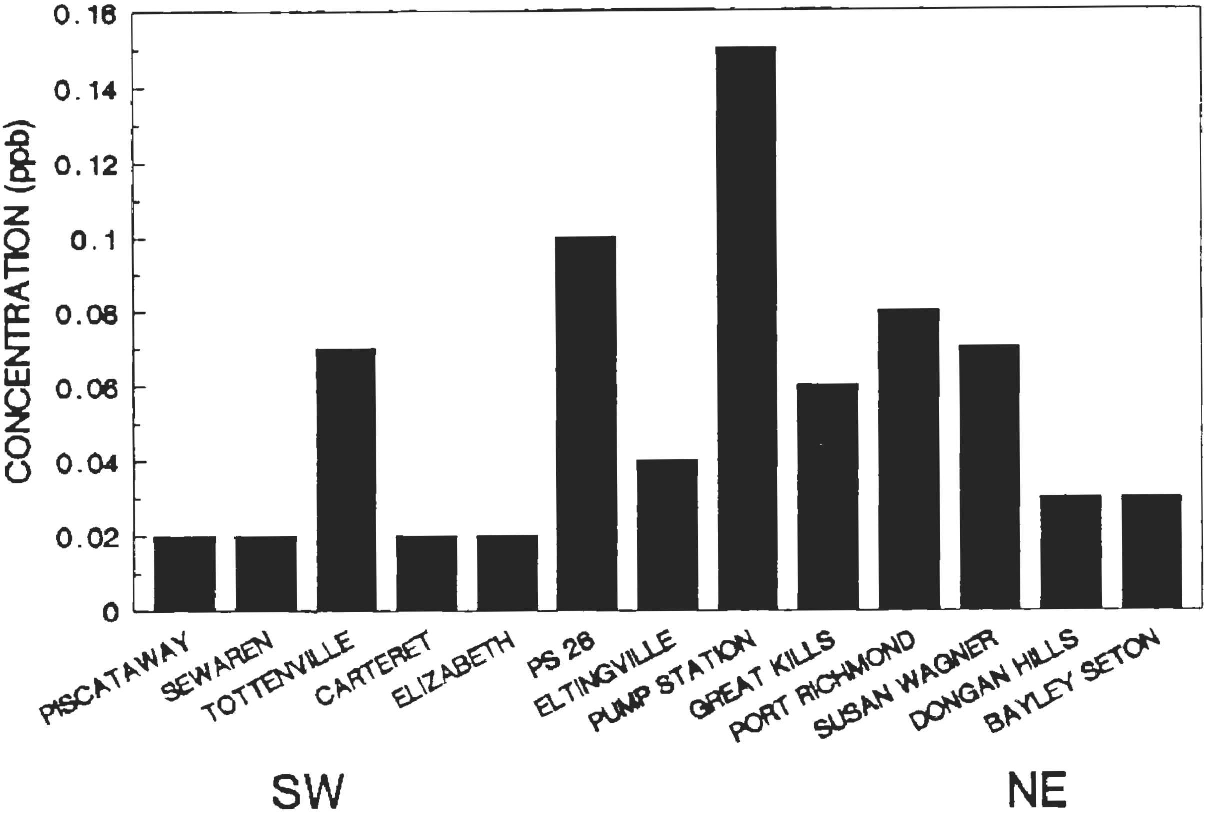
(Concentration vs. Site)

Figure III-3-2

TRICHLOROMETHANE

(CHLOROFORM)

2ND YEAR AVERAGES



MONITORING AGENCY

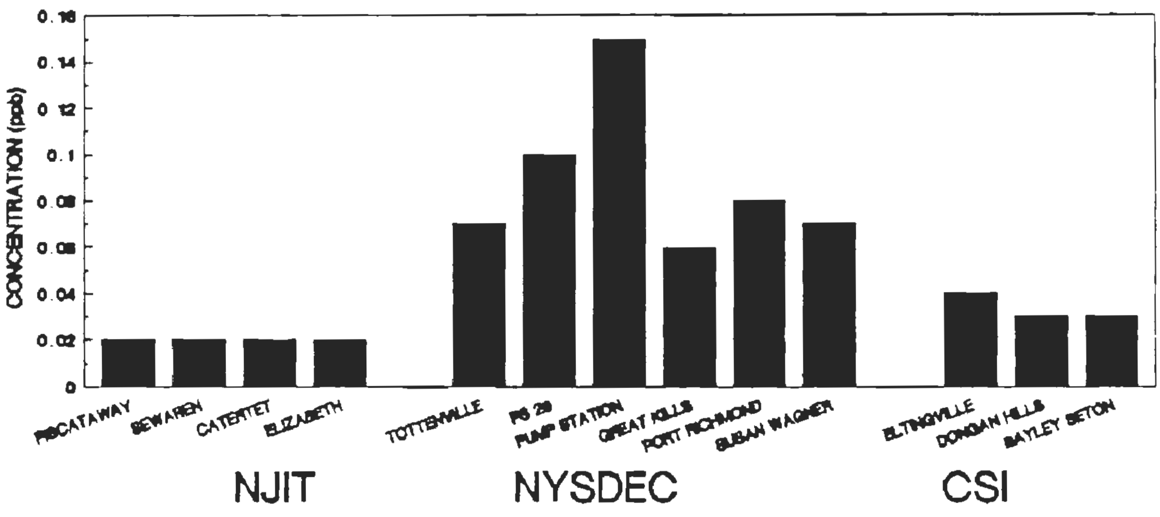
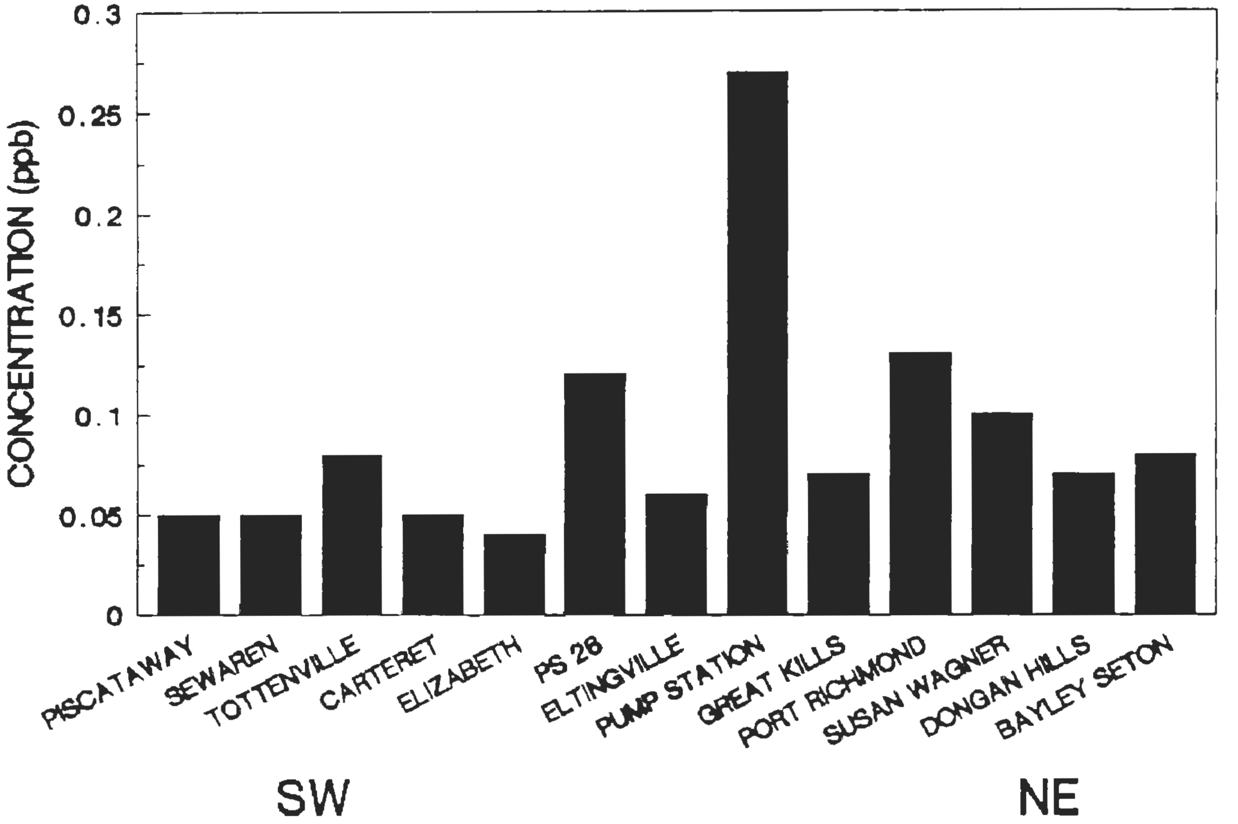


Figure III-3-3

TRICHLOROETHYLENE
(TRICHLOROETHENE)
2ND YEAR AVERAGES



MONITORING AGENCY

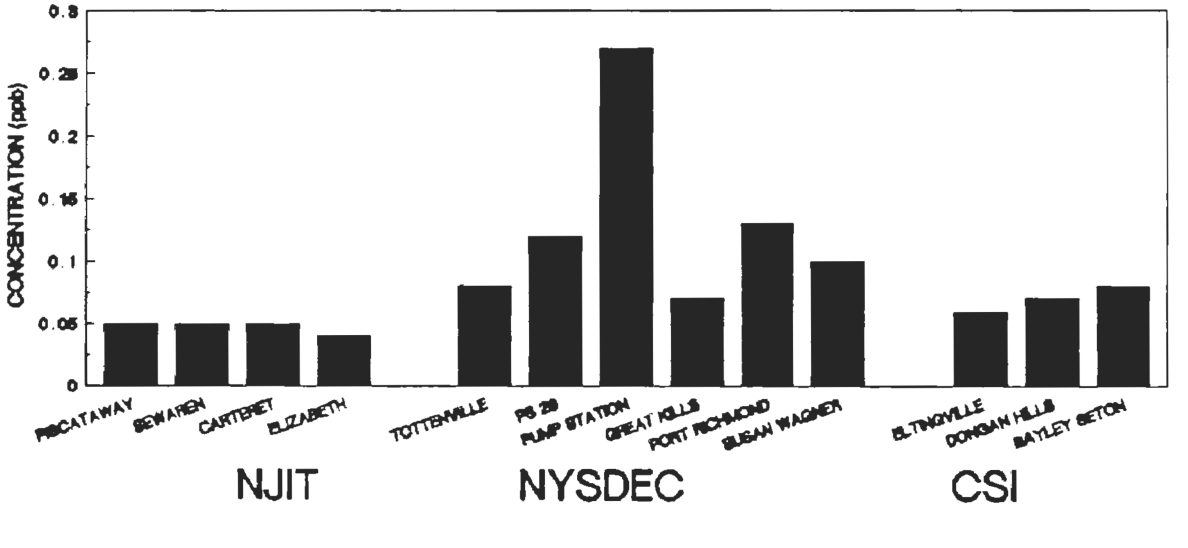
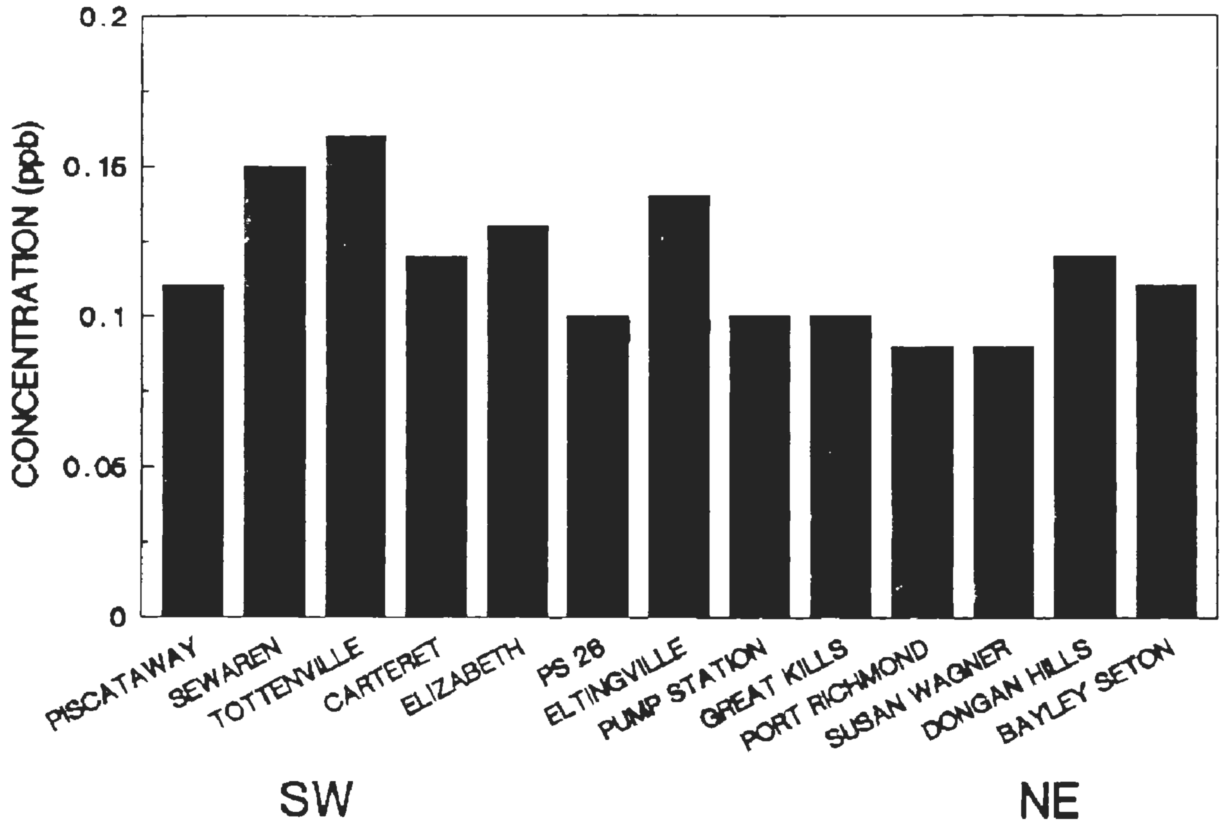
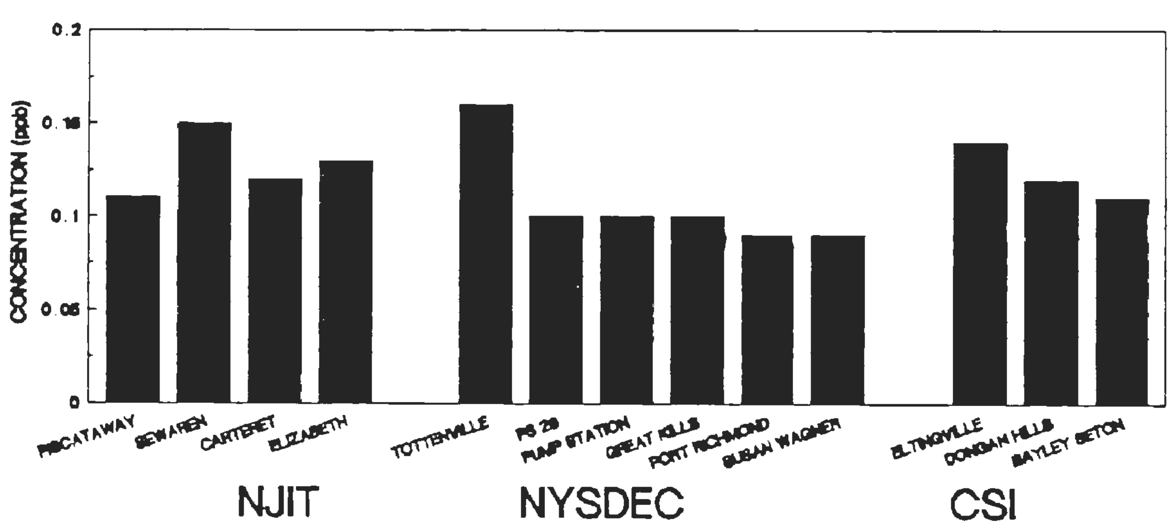


Figure III-3-4

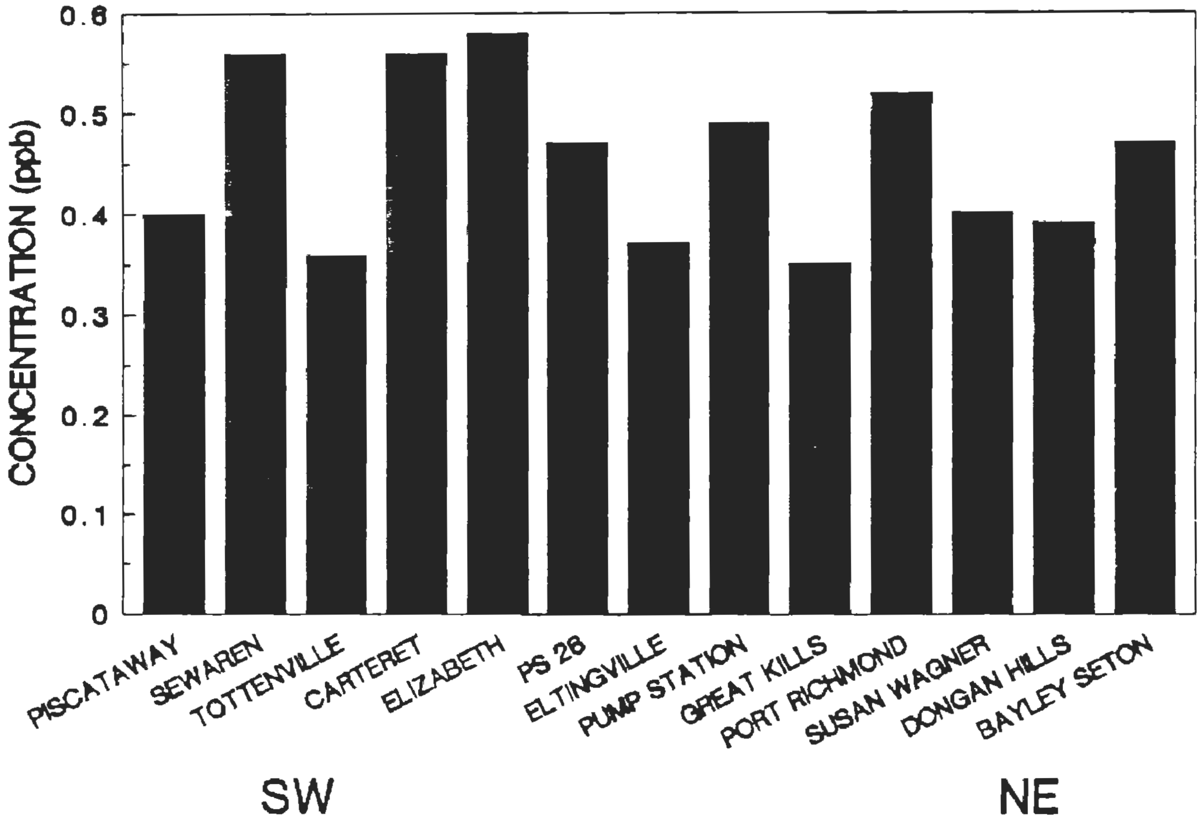
TETRACHLOROMETHANE
(CARBON TETRACHLORIDE)
2ND YEAR AVERAGES



MONITORING AGENCY



1,1,1 TRICHLOROETHANE
(METHYL CHLOROFORM)
2ND YEAR AVERAGES



MONITORING AGENCY

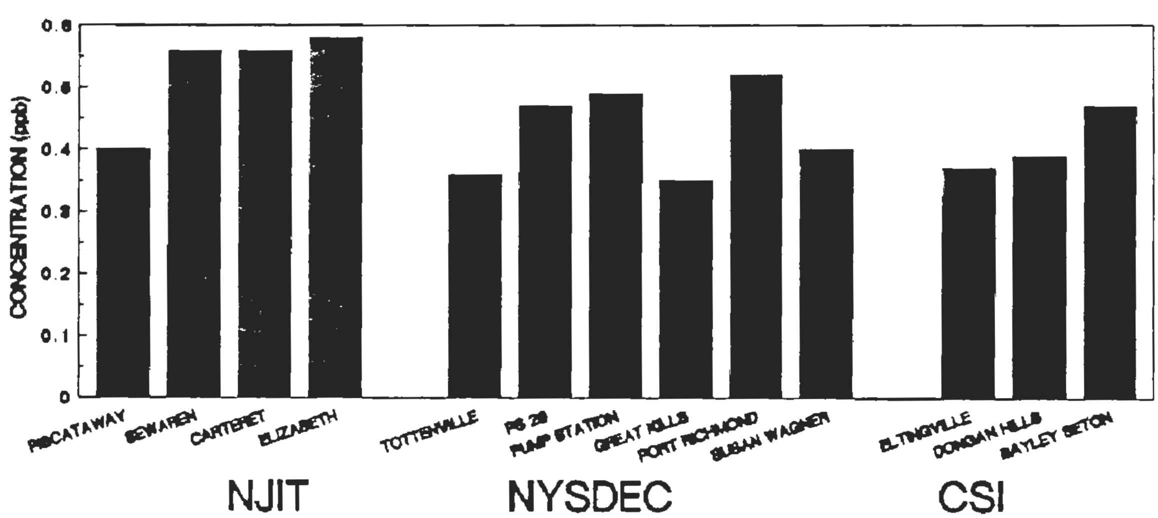
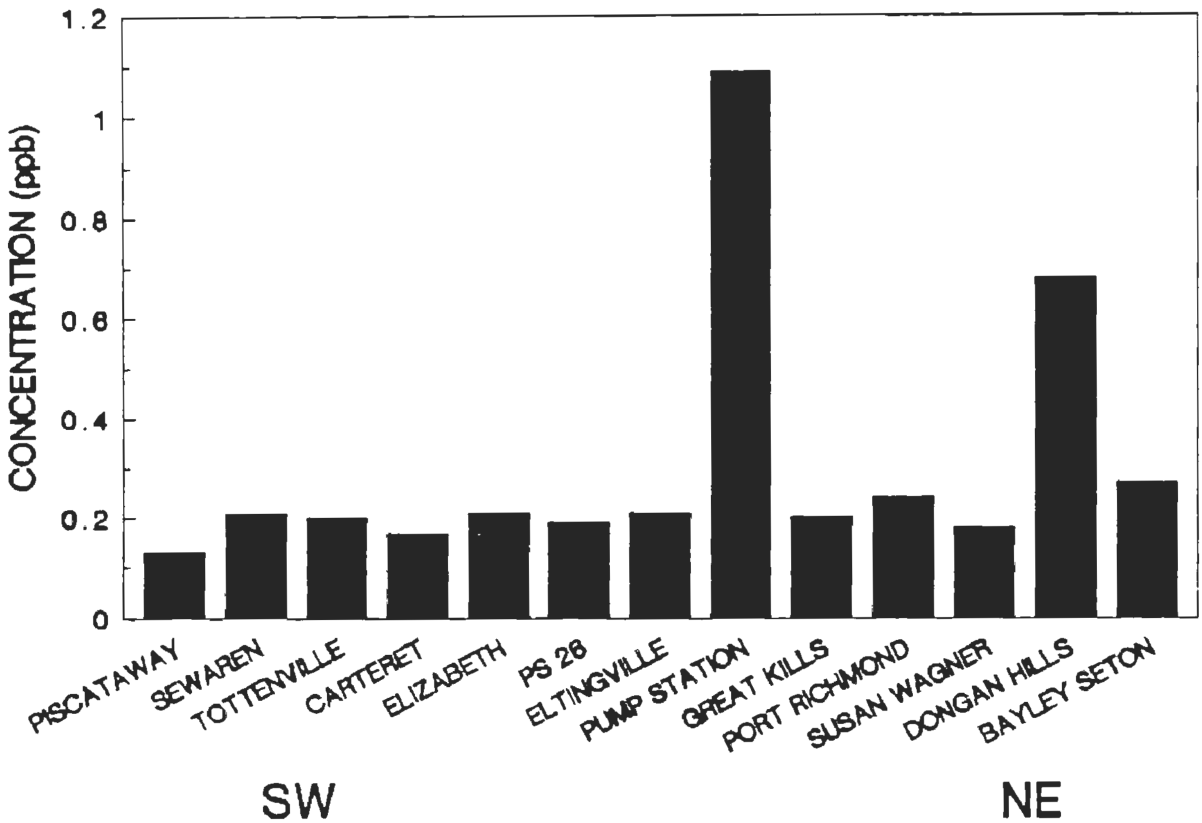


Figure III-3-6

TETRACHLOROETHYLENE

2ND YEAR AVERAGES



MONITORING AGENCY

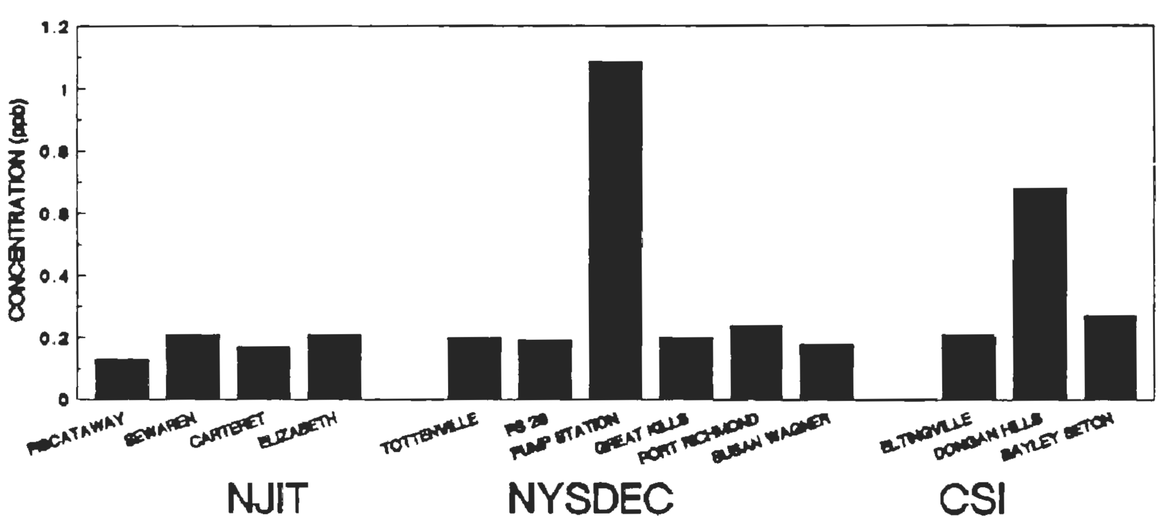
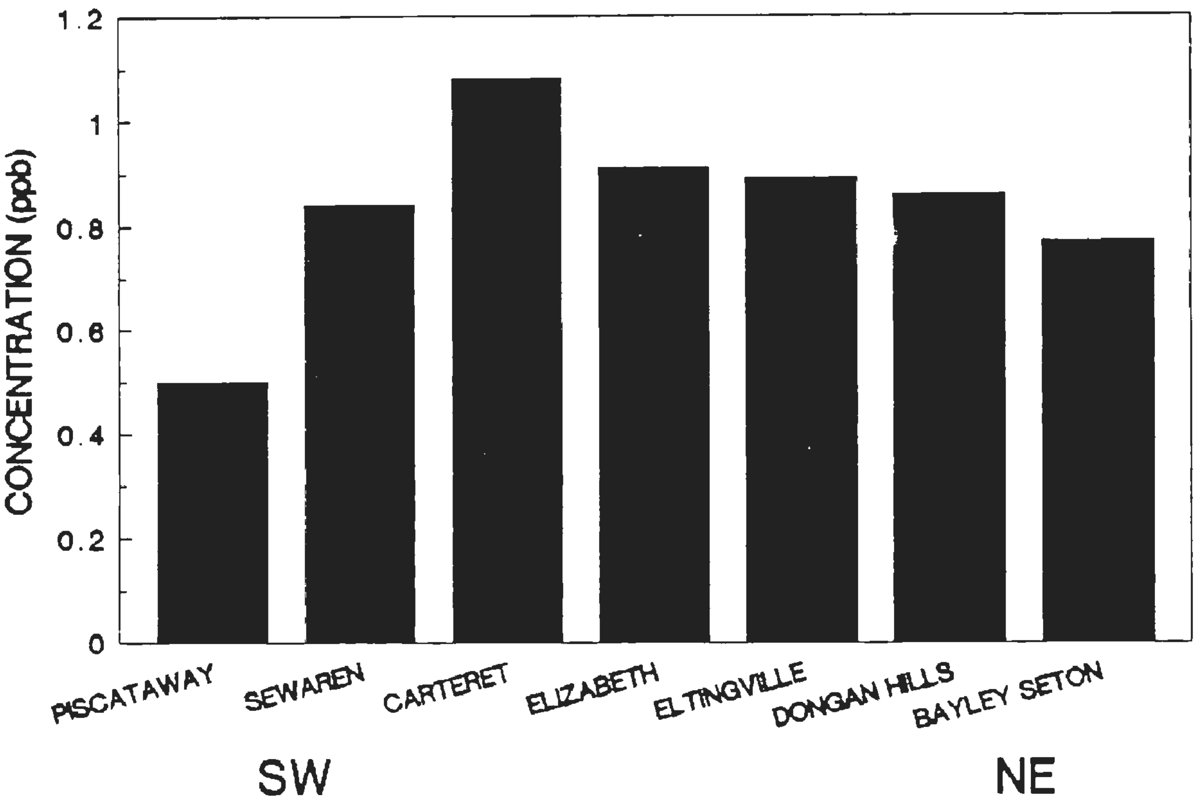


Figure III-3-7

HEXANE

2ND YEAR AVERAGES



MONITORING AGENCY

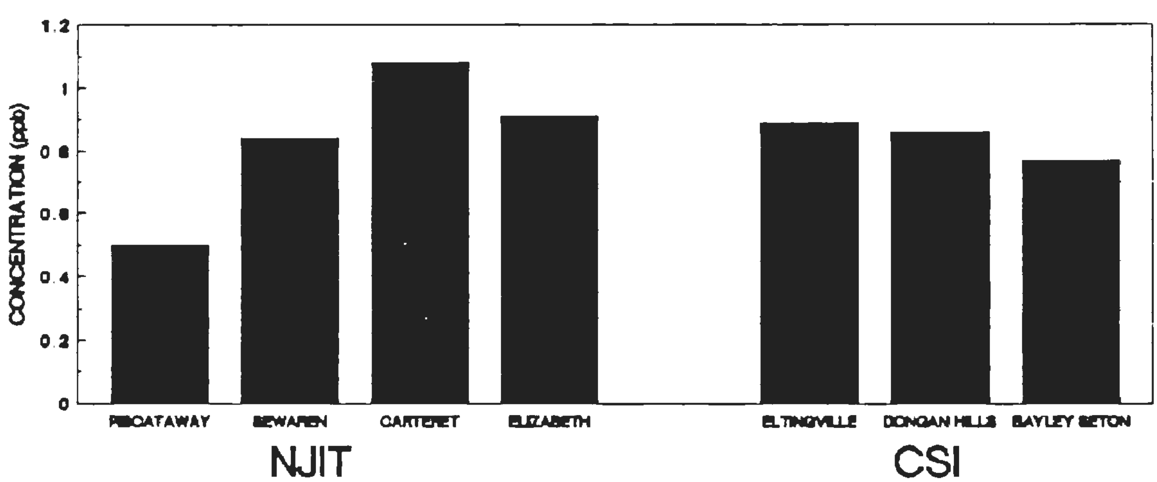
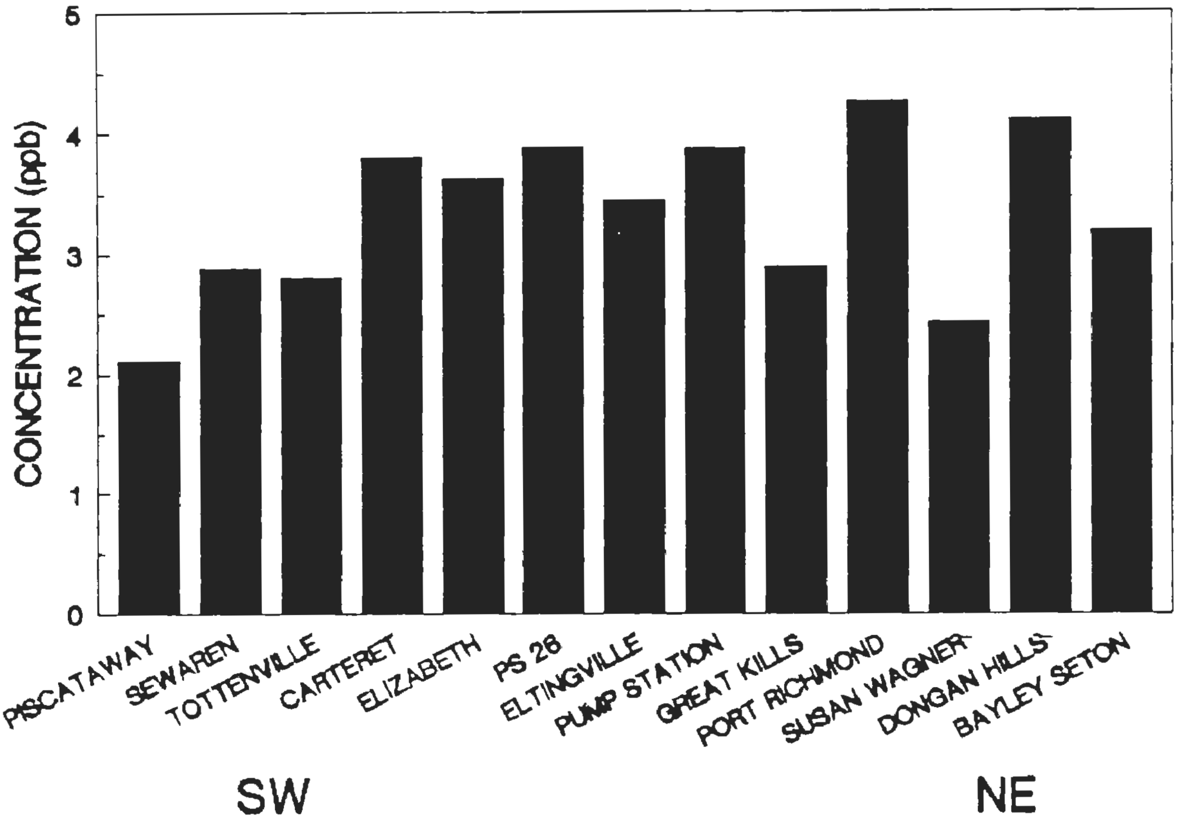


Figure III-3-8

TOLUENE
2ND YEAR AVERAGES



MONITORING AGENCY

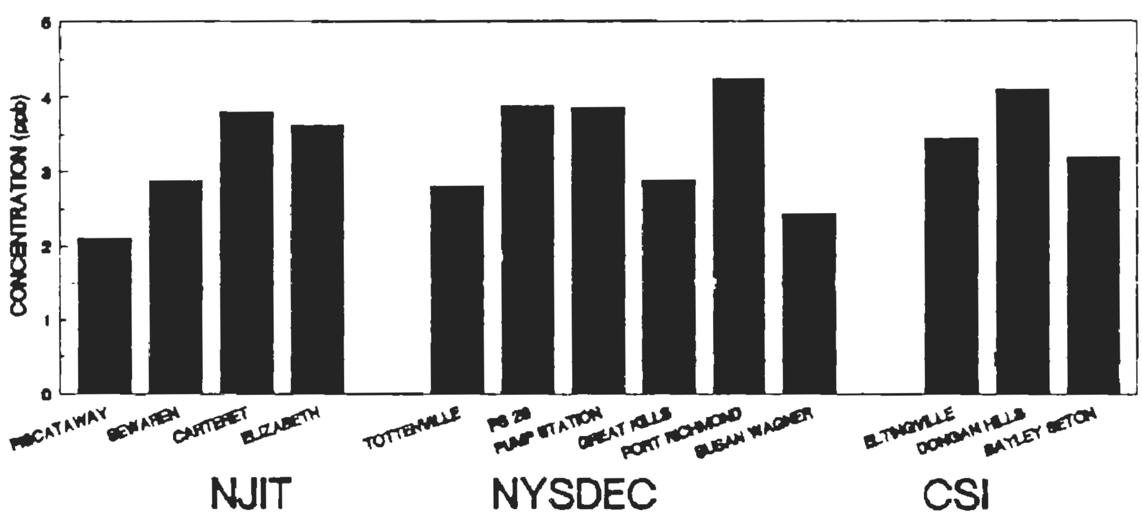
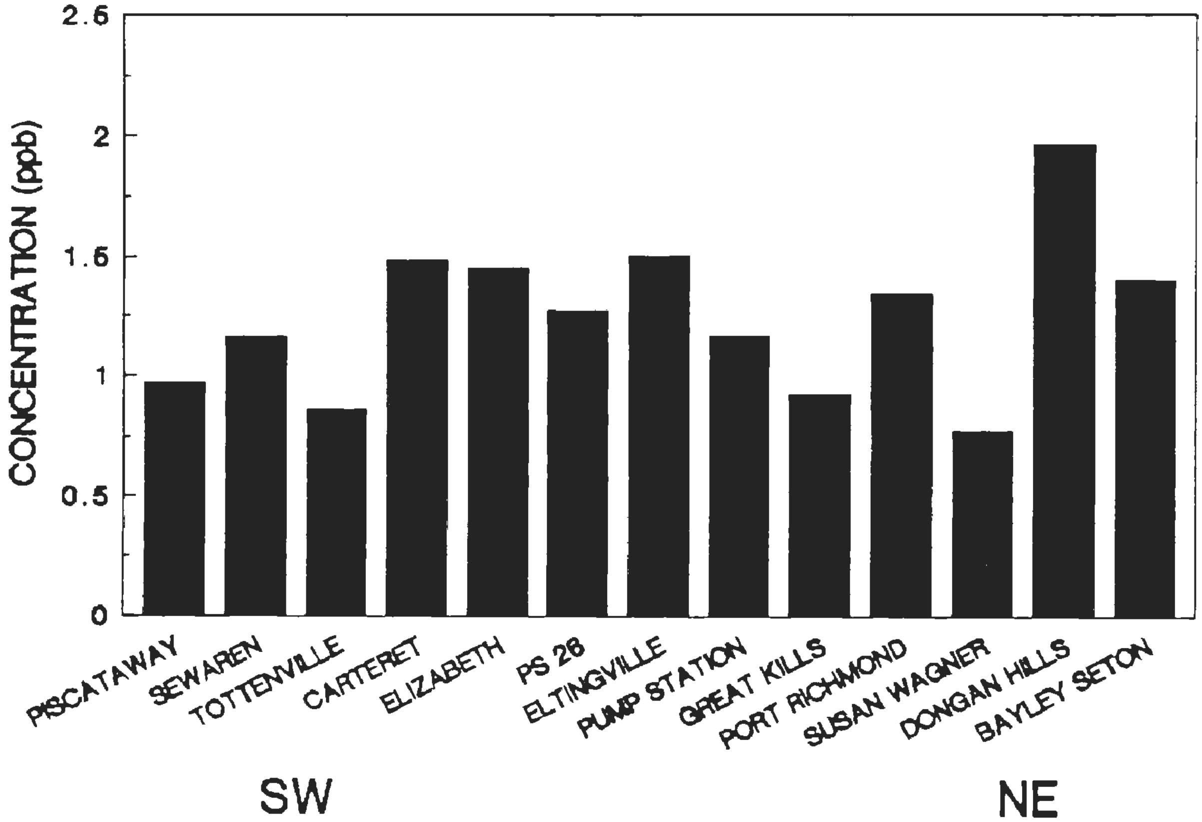


Figure III-3-9

BENZENE

2ND YEAR AVERAGES



MONITORING AGENCY

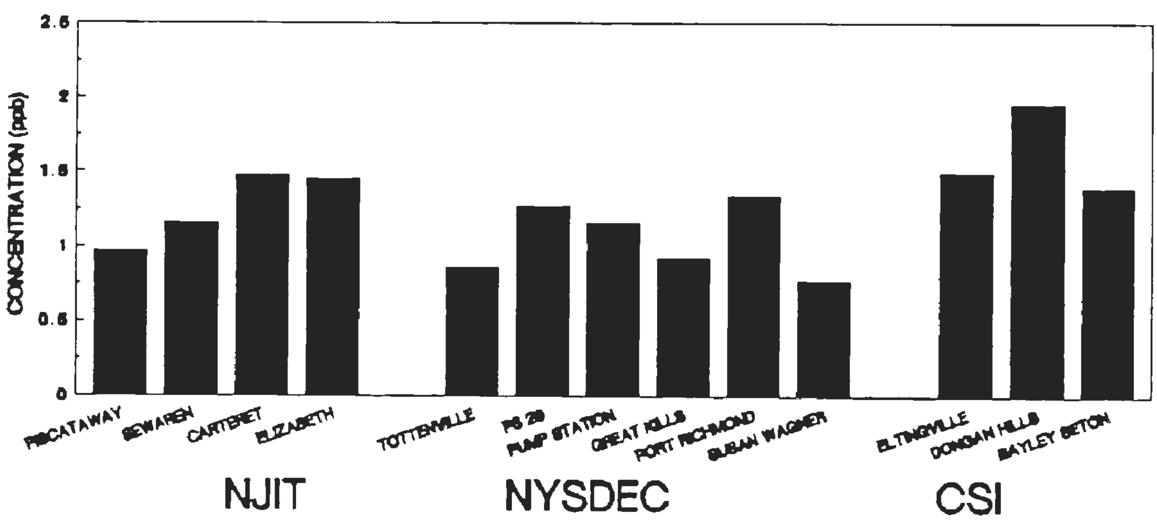
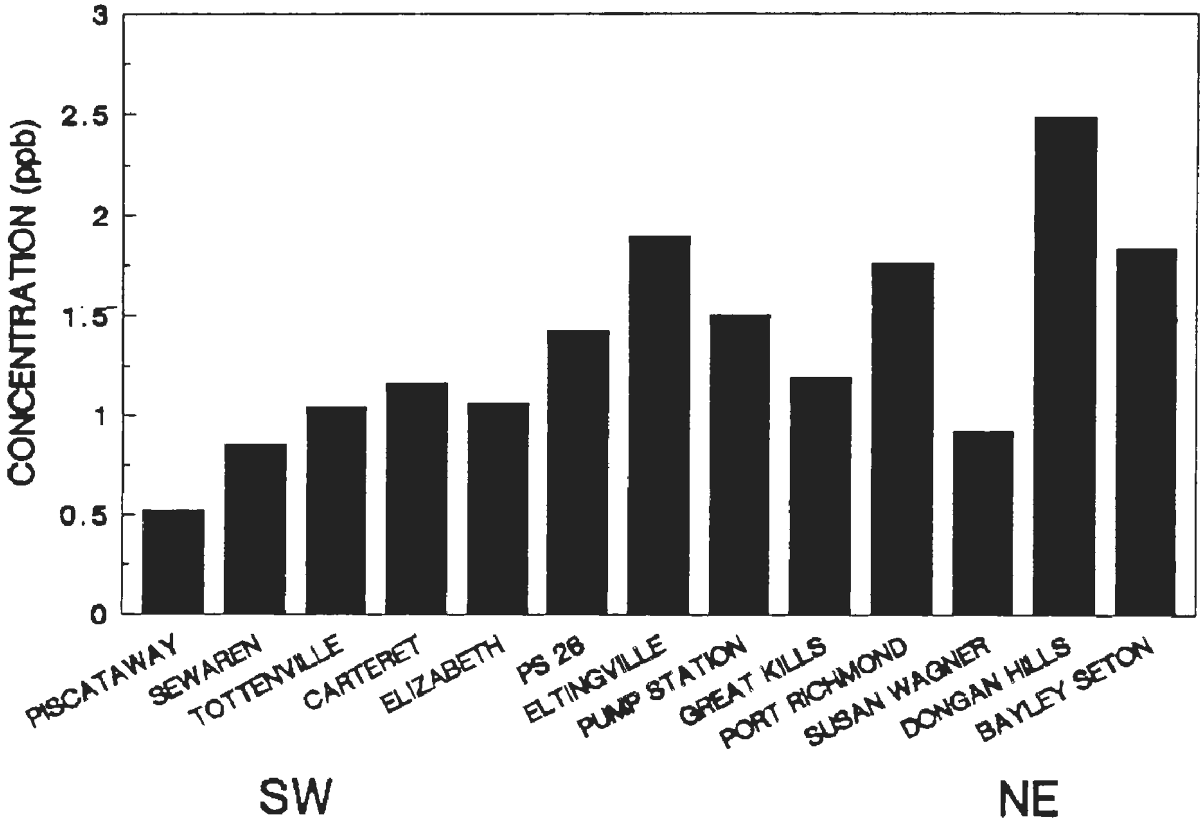
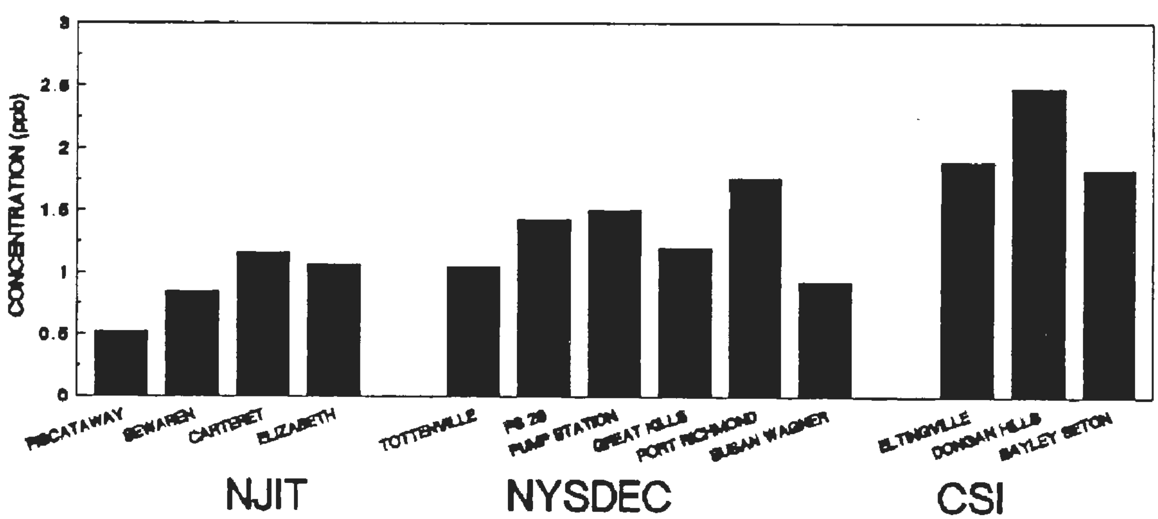


Figure III-3-10

M, P-XYLENE
2ND YEAR AVERAGES



MONITORING AGENCY



FIGURES III - 3 - 12

THROUGH III - 3 - 20

CONCENTRATION VS. SAMPLE DATE

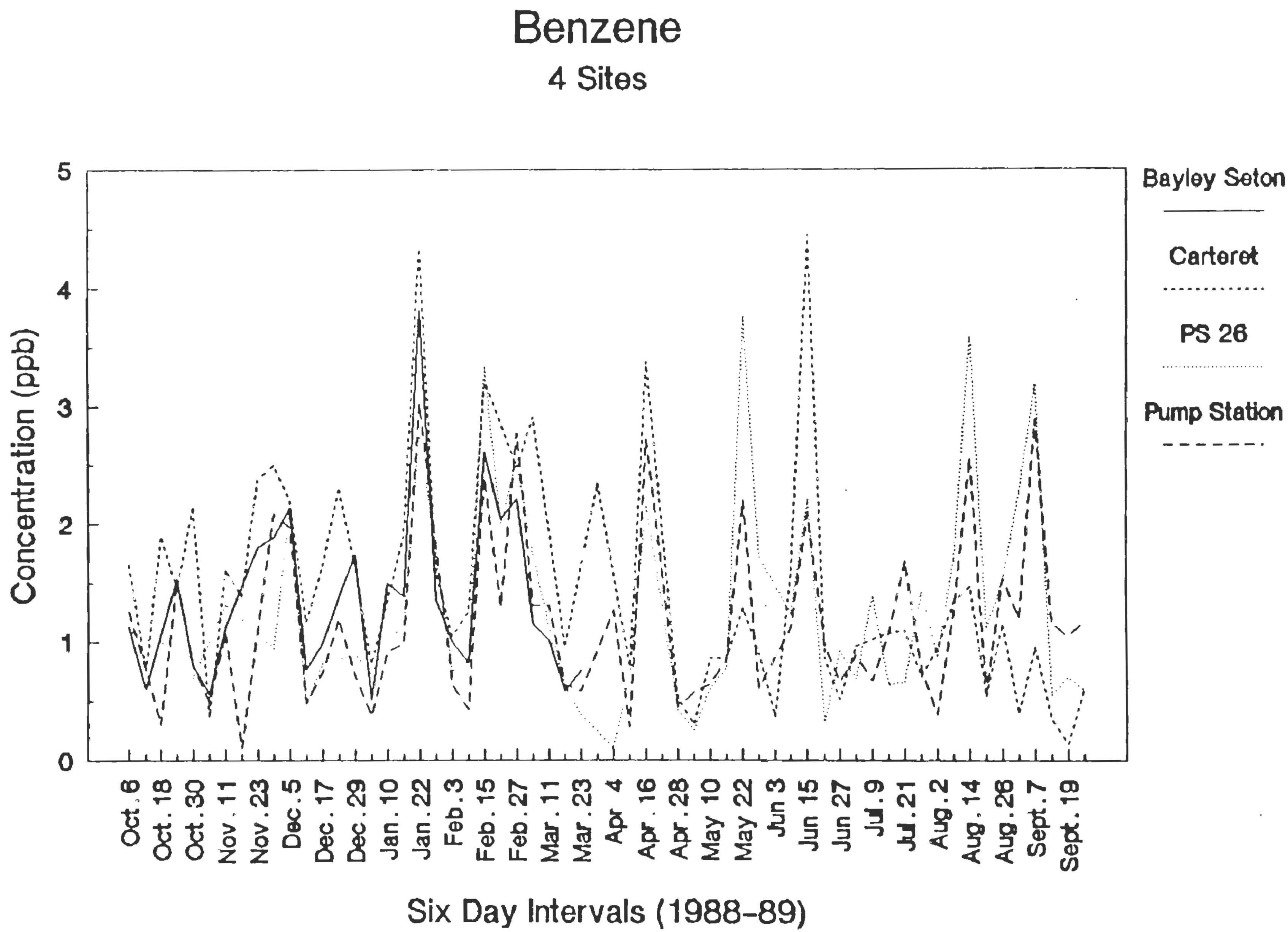


Figure III-3-12

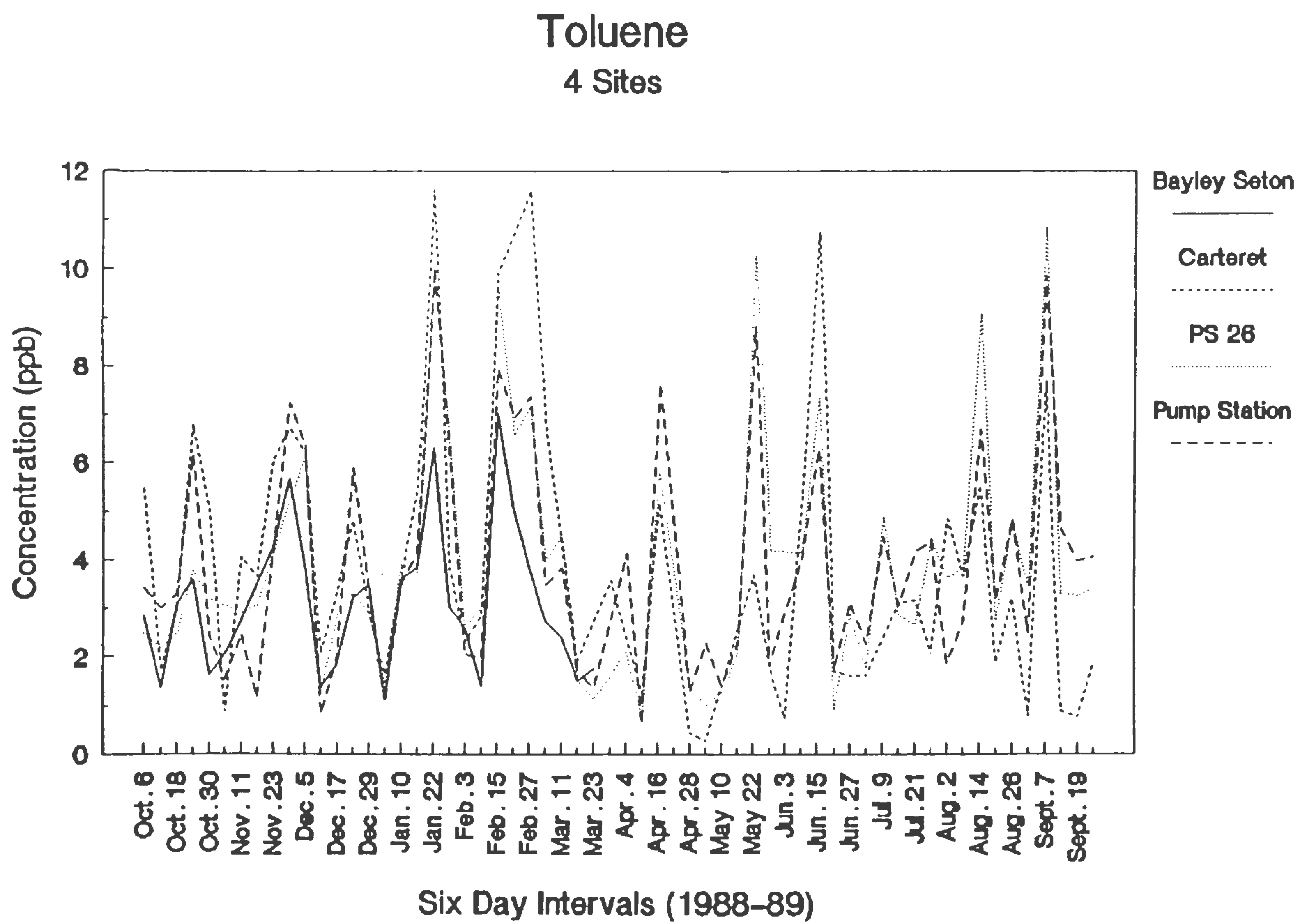


Figure III-3-13

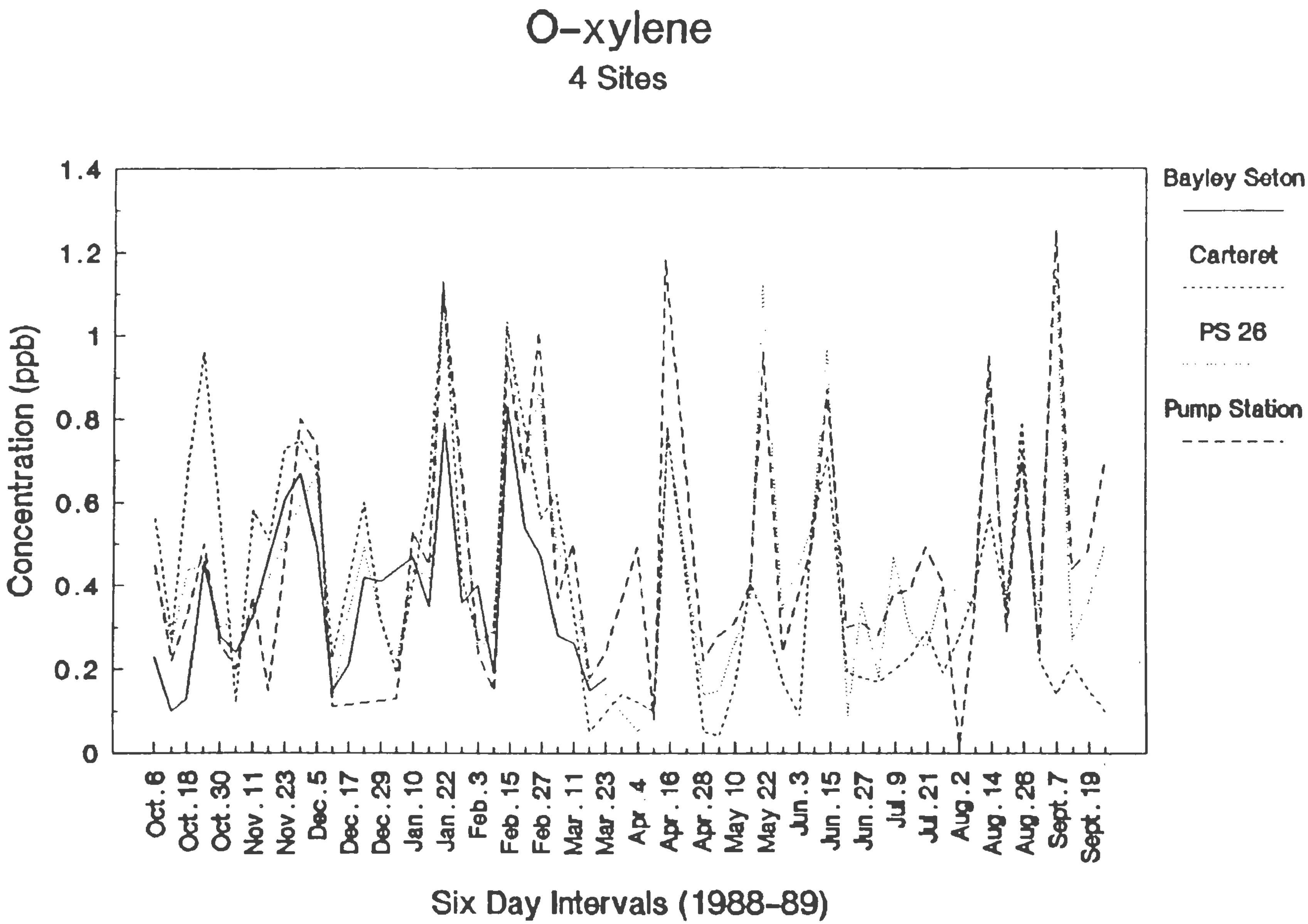


Figure III-3-14

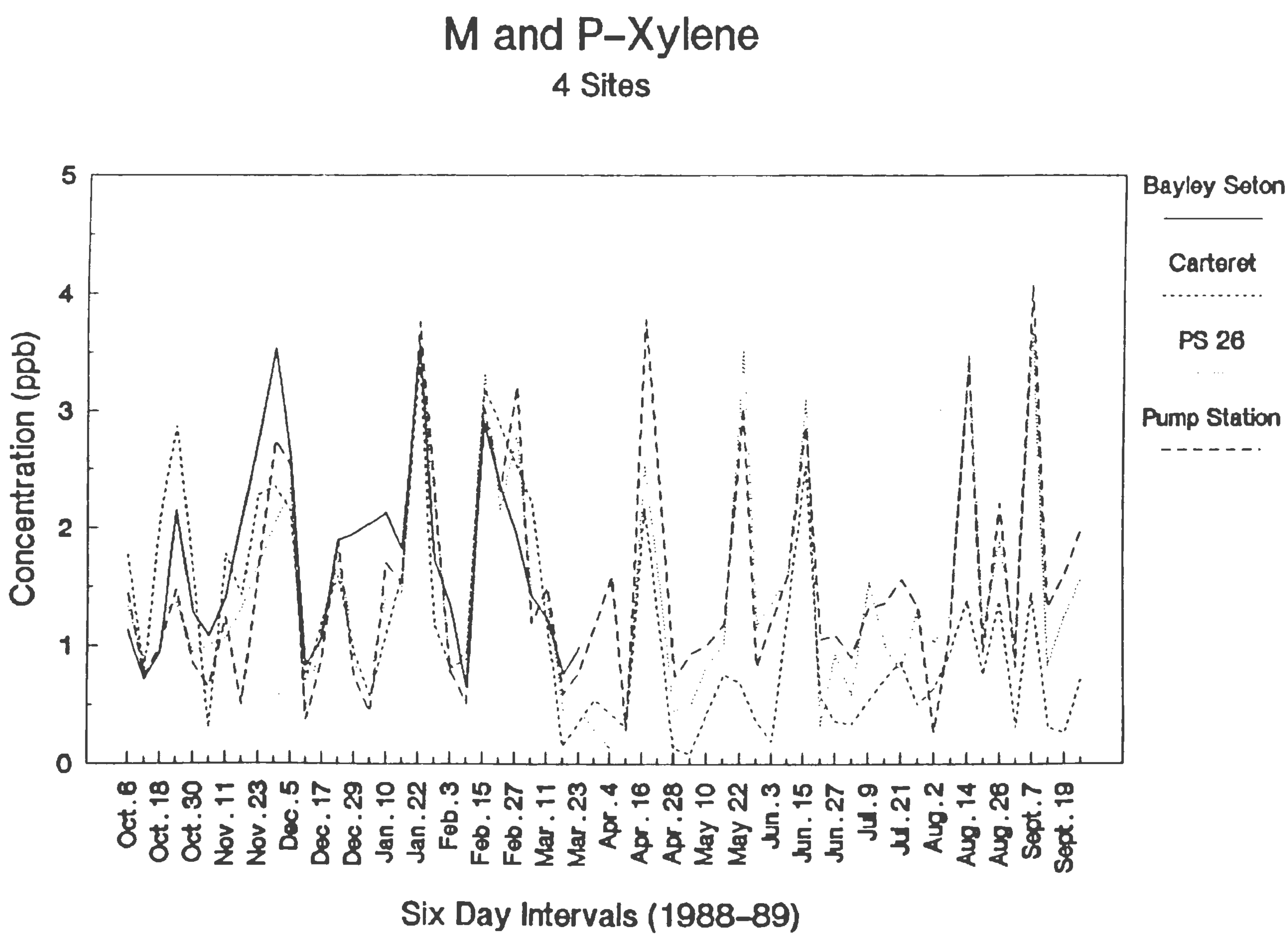


Figure III-3-15

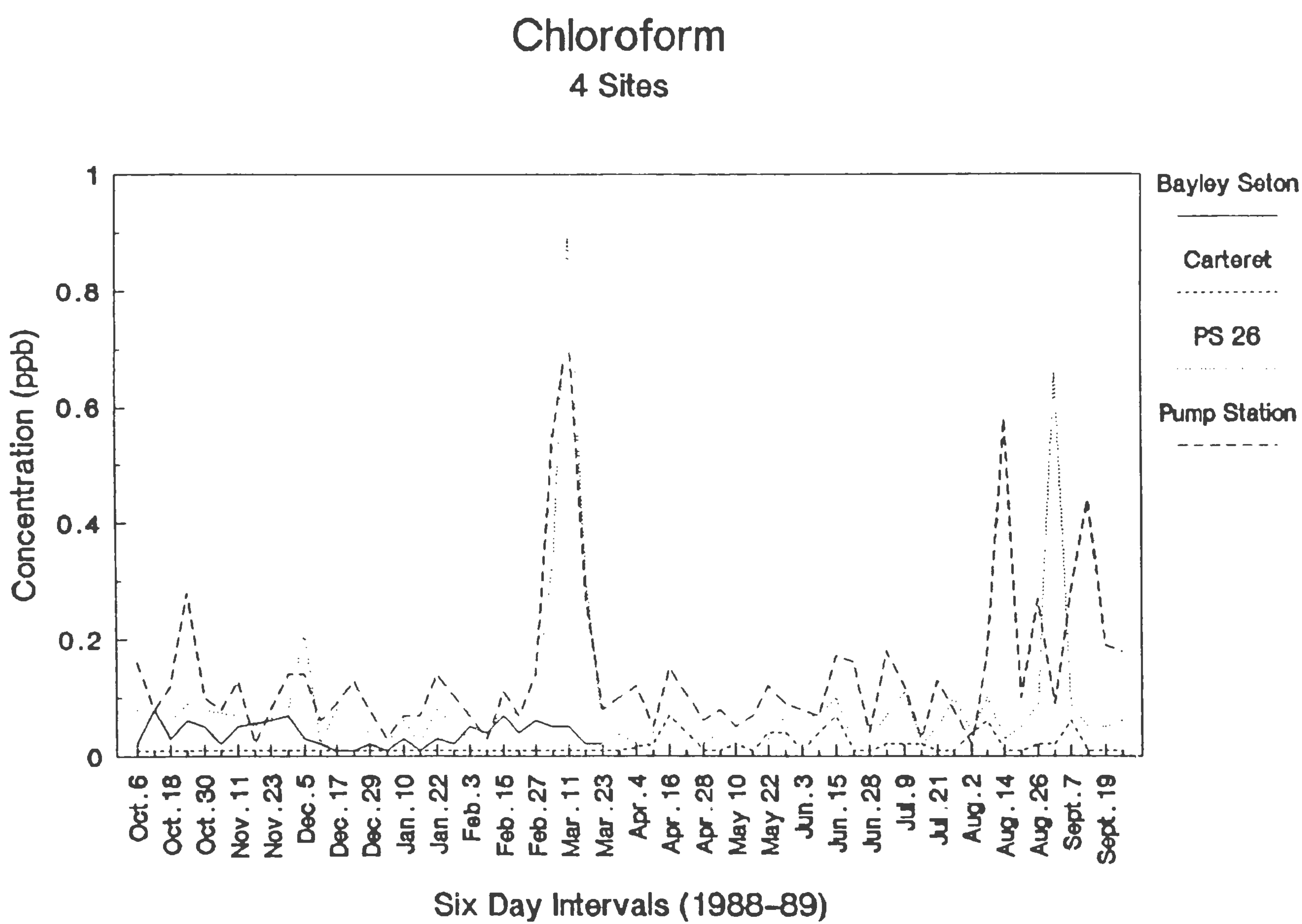


Figure III-3-16

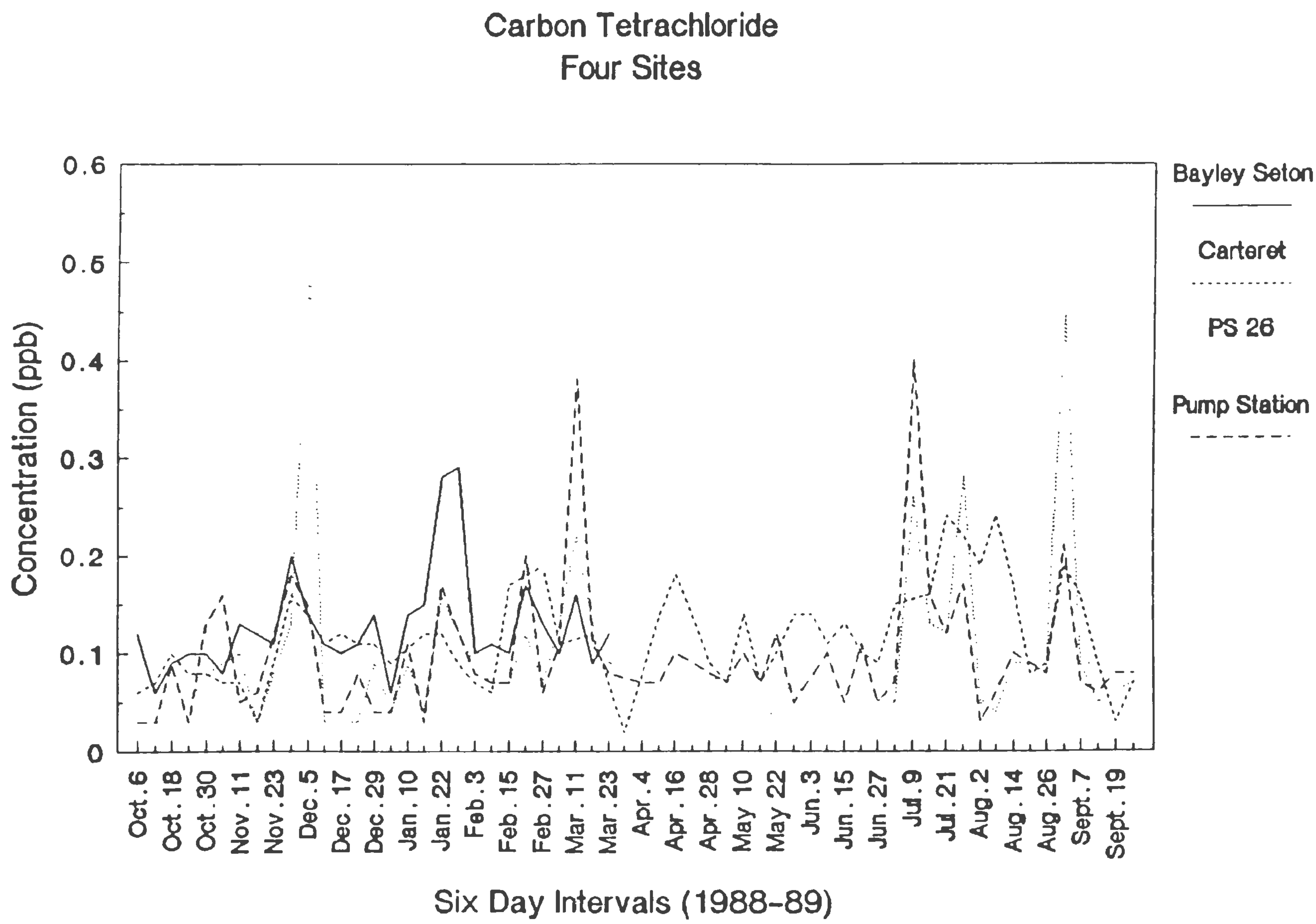


Figure III-3-17

Tetrachloroethylene

4 Sites

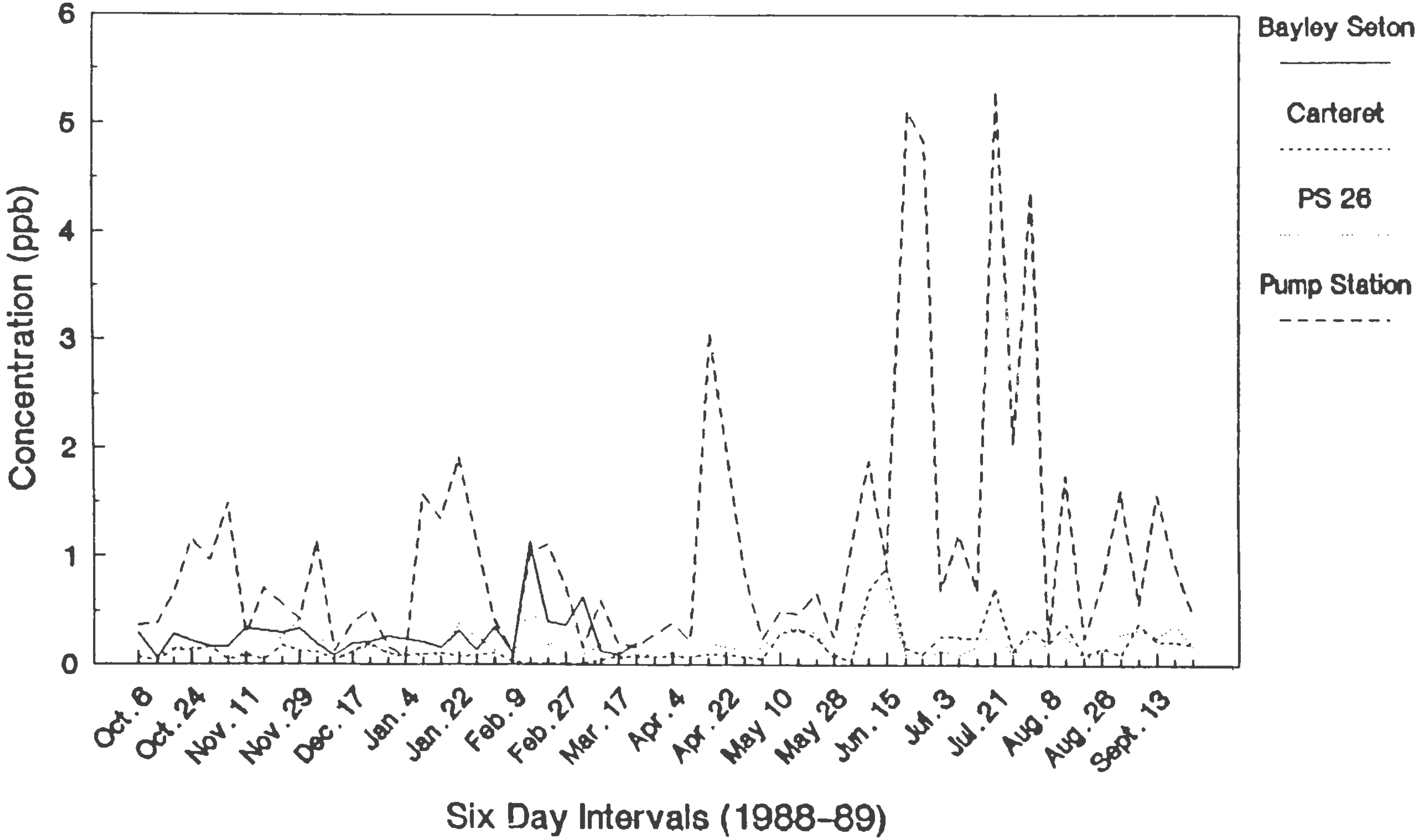


Figure III-3-18

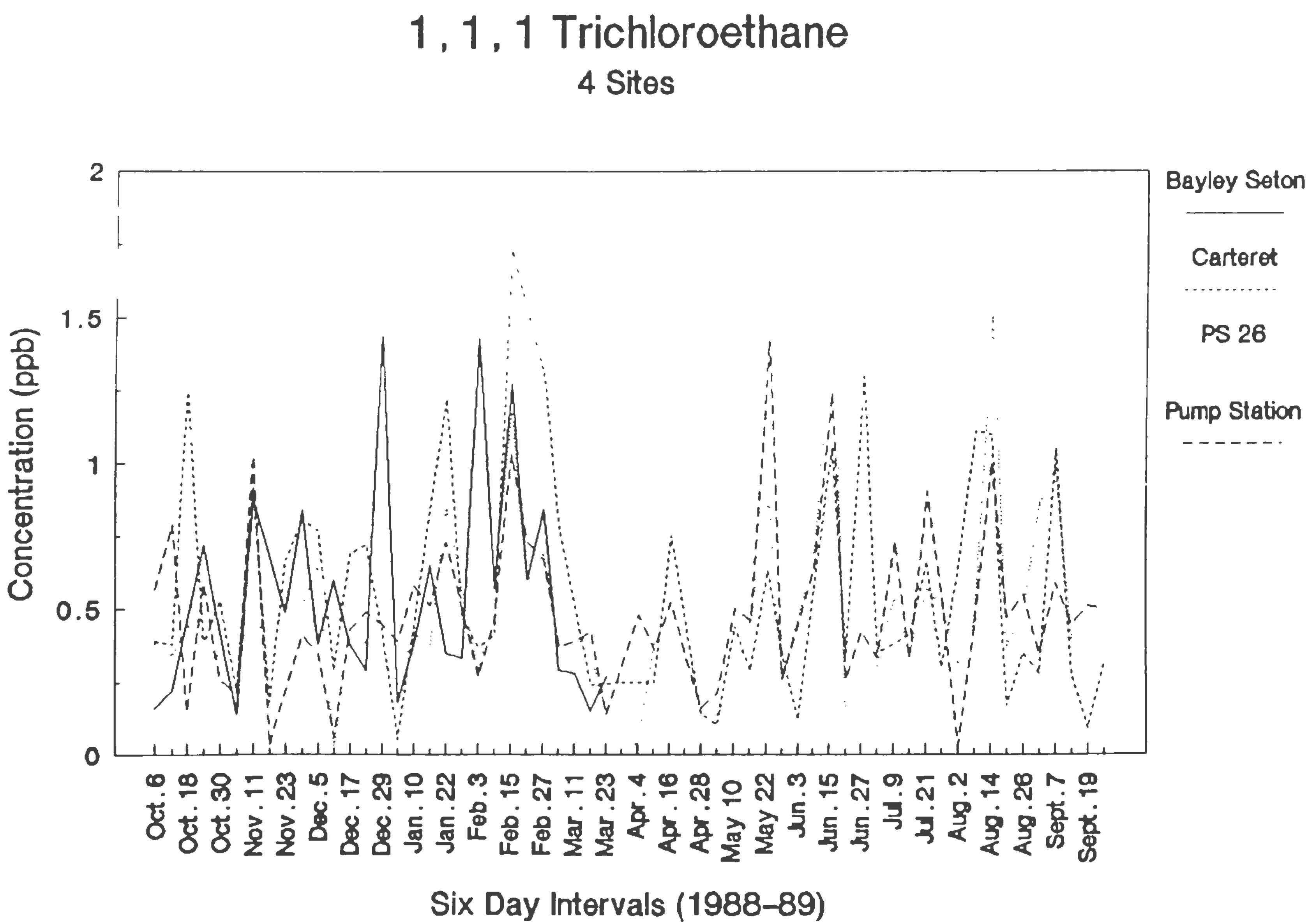


Figure III-3-19

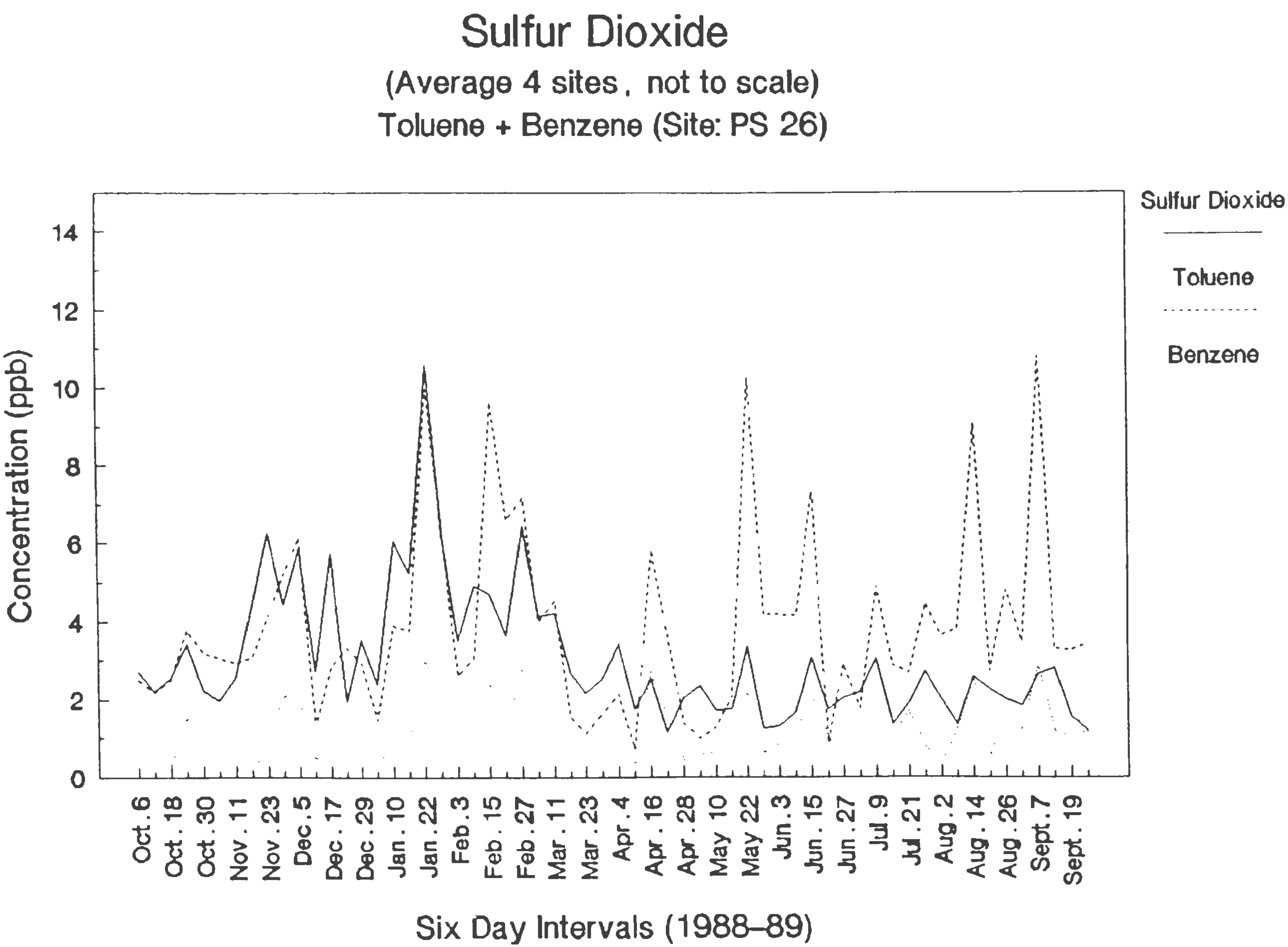


Figure III-3-20

TABLE III-3-70 : PRECISION, ACCURACY, AND DETECTION LIMITS FOR SELECTED VOC'S - COMPARISON OF SI/NJ UATAP TO OTHER STUDIES

	1988 UATMP	1989 UATMP	SI/NJ UATAP			ATEOS		TEAM
Precision for VOC's								
Range of % coeff of variation	0.00 to 130.88[1]	0.23 to 72.15[2]	See footnote 3.			-60 to 60[4]		15 to 47[5]
Accuracy (% bias) for VOC's								
Range of % bias	See footnote 6.	-35 to 75[2]	First year: -98 to 205 Second year: -99 to 59, typically -50 to 50[7].			See footnote 8.		>30[5]
Dectection limits, ppbv			NYSDEC	NJIT	CSI		(Quantitation limit)*	
Dichloromethane	0.11	0.11	0.04	0.01	(0.4, 0.2)	0.005	(0.10)	Values ≤ 1 ug/m3
Trichloromethane	0.006	0.006	0.04	0.01	0.02, 0.01	0.005	(0.10)	as not reliably
Tetrachloromethane	0.001	0.001	0.06	0.05	0.04, 0.01	0.005	(0.10)	quantitated.
Trichloroethylene	0.004	0.044	0.02	0.01	0.02, 0.01	0.005	(0.10)	Quantitation limit
Tetrachloroethylene	0.07	0.07	0.04	0.01	0.05, 0.03	0.005	(0.10)	as four times the
Hexane	-	-	-	0.01	0.01, 0.05			limit of detection.
Benzene	0.04	0.04	0.20	0.01	0.13, 0.06	0.005	(0.05)	
Toluene	0.02	0.02	0.10	0.01	0.4, 0.2	0.005	(0.05)	
Xylene, o-**	0.02**	0.02**	0.04	0.01	0.2, 0.1	0.005	(0.05)	
Xylene, m- and p-	0.04	0.04	0.04	0.01	0.4, 0.2	0.005	(0.05)	
Ethylbenzene	0.02	0.02	0.04	-	0.2, 0.1	0.005	(0.05)	

TABLE III-3-70, CONTINUED

Footnotes:

1 Table 11-25, U.S. EPA (1989).
2 Table 4-22, U.S. EPA (1990).
3 Precision estimates were obtained from either collocated distributed-volume or duplicate samples. These data showed that collocated samples agreed with each other within 10 to 30%. A detailed discussion of sample precision, with accompanying data, is presented individually by each of the sampling/analytical organizations in their quality assurance reports in Volume VI of the SI/NJ UATAP report.
4 JAPCA (1986).
5 Table 11, U.S. EPA (1987).
6 Inaccuracy of calibration standards prepared in-house led to calculated % biases > 30%. Late in study, change to vendor-certified gas led to calculated average % biases well within the ± 30% range regarded as adequate.
7 If the bias for NYSDEC's 1,1,1-trichloroethane data were omitted, the range of bias would be -53 to 59%.
8 No appropriate NBS standard materials were available (JAPCA, 1986).
* Approximately three times the detection noise level. See Table 14-4, Lioy et al. (1987). Estimated instrument detection limits.
** Co-elution with styrene.

TABLE III-3-71: COMPARISON OF REPORTED 1988 AND 1989 UATMP AND SI/NJ UATAP VOC CONCENTRATIONS

(ppbv)	Range for SI/NJ UATAP annual avgs., 10/88-9/89 (excludng Piscataway)** (Ref: Data summaries of 8/16/90.)				SI/NJ UATAP Piscataway 10/88 to 9/89 annual avg.	Range for 1988 UATMP annual averages for 19 urban areas			Range for 1989 UATMP annual averages for 14 urban areas		
	min.	max.	median	(# of sites)		min.	max.	median	min.	max.	median
Dichloromethane	0.47	0.93	0.68	(6) ***	--	0.06	0.73	0.44 (13)	0.13	4.09	0.21
Trichloromethane	0.02	0.15	0.05	(12)	0.02	0.01	3.25	0.10 (15)	0.004	2.61	0.04
Tetrachloromethane	0.09	0.16	0.12	(12)	0.11	0.004	0.05	0.01 (8)	0.13	0.24	0.19
Trichloroethylene	0.04	0.27	0.08	(12)	0.05	0.01	1.57	0.06 (18)	0.01	0.89	0.16
Tetrachloroethylene	0.17	1.09	0.22	(12)	0.13	0.04	4.00	0.07 (19)	0.07	0.39	0.17
Hexane	0.77	1.08	0.88	(6)	0.50	-	-	-	-	-	-
Benzene	0.77	1.96	1.31	(12)	0.97	0.32	3.41	0.87 (19)	0.60	3.97	1.72
Toluene	2.42	4.25	3.54	(12)	2.11	1.60	15.66	2.64 (19)	1.19	15.33	3.58
Xylene, o-	0.30	0.55	0.39	(12)	0.24	0.28	2.41	0.85 (19)*	0.024	2.43	0.71
Xylene, m- and p-	0.92	2.48	1.42	(12)	0.52	1.43	8.45	3.53 (19)	0.67	6.95	2.34
Ethylbenzene	0.50	0.66	0.53	(3)	--	0.16	5.77	0.39 (19)	0.12	1.37	0.44

Notes: Statistical significance of differences among reported concentrations has not been determined. Computation of the annual averages employed half the minimum detection limit in cases where the subject chemical was not detected, if the compound was detected at least once at the given site.

* Styrene/o-xylene co-eluted.
** Including sites with ≥ 35 samples in the annual average. SI/NJ UATAP annual averages are from data summaries dated 8/16/90.
*** NJIT and CSI data were excluded in arriving at this tally.
\- Compound not included in the study.
\-- Submitted data not good; inappropriate detection method.

TABLE III-3-72a: UATMP VOC ANNUAL AVERAGE CONCENTRATIONS (ppbv)

1988 UATMP

	(40) Hammond, IN	(35) Detroit, MI	(38) Dearborn, MI	(39) Cleveland, OH	(34) Chicago, IL (Carver H.S. and Washington H.S.)	(42) Burlington, VT	(39) Baton Rouge, LA
Dichloromethane	0.15 (1)	0.51 (1)	(0)	0.67 (5)	0.44 (3)	0.06 (1)	(0)
Trichloromethane	0.32 (6)	(0)	0.10 (2)	0.16 (1)	(0)	0.07 (3)	0.13 (1)
Tetrachloromethane	(0)	(0)	0.01 (1)	(0)	0.01 (1)	0.005(1)	(0)
Trichloroethylene	0.05 (2)	0.03 (2)	0.03 (2)	0.34 (10)	0.04 (5)	(0)	0.06 (3)
Tetrachloroethylene	0.05 (1)	0.50 (8)	0.05 (5)	0.47 (12)	4.00 (9)	0.07 (7)	0.05 (3)
Hexane	-	-	-	-	-	-	-
Benzene	0.86 (20)	0.99 (19)	0.83 (27)	1.74 (27)	0.85 (25)	0.82 (27)	0.87 (33)
Toluene	2.44 (39)	3.16 (32)	1.60 (37)	3.25 (37)	15.66 (33)	2.51 (41)	2.05 (37)
Xylene, o-	0.47 (28)*	0.69 (27)*	0.47 (25)	2.41 (35)*	0.87 (28)*	1.03 (36)*	0.85 (30)
Xylene, m- and p-	2.28 (35)	4.25 (35)	2.68 (36)	3.22 (37)	4.59 (34)	4.25 (42)	1.92 (33)
Ethylbenzene	0.16 (11)	0.35 (14)	0.32 (16)	0.41 (17)	0.68 (20)	0.41 (16)	0.76 (13)

1989 UATMP

	(32) Camden, NJ	(31) Ft. Lauder-dale, FL	(7) Pensacola, FL	(27) Chicago, IL (Carver H.S. and Washington H.S.)	(30) St. Louis, MO	(31) Baton Rouge, LA
Dichloromethane	(0)	(0)	(0)	4.09 (13)	0.19 (1)	(0)
Trichloromethane	0.14 (2)	0.02 (3)	0.12 (1)	0.09 (6)	0.04 (4)	0.11 (12)
Tetrachloromethane	0.18 (32)	0.13 (30)	0.14 (7)	0.24 (27)	0.19 (30)	0.20 (31)
Trichloroethylene	0.02 (5)	0.01 (6)	0.32 (2)	0.61 (20)	0.13 (16)	0.03 (6)
Tetrachloroethylene	0.20 (13)	0.15 (12)	(0)	0.17 (12)	0.39 (15)	0.10 (16)
Hexane	-	-	-	-	-	-
Benzene	1.83 (32)	1.83 (31)	0.6 (7)	3.37 (27)	3.97 (30)	1.62 (31)
Toluene	4.03 (32)	4.86 (31)	1.19 (7)	7.43 (27)	6.22 (30)	1.88 (31)
Xylene, o-	0.85 (32)	1.75 (31)	0.24 (7)	1.93 (27)	1.62 (30)	0.64 (31)
Xylene, m- and p-	2.46 (32)	3.45 (31)	0.67 (7)	6.42 (27)	5.91 (30)	1.88 (31)
Ethylbenzene	0.42 (32)	0.58 (31)	0.12 (7)	1.05 (27)	1.03 (30)	0.41 (31)

Example of how to read this table:

(38) <--------Total # of valid samples.
Dearborn, MI

(0) <----Chemical was not identified at this site. Annual avg. not computed
0.10 (2) <----Chemical was identified in 2 samples. Annual avg. was 0.1 ppbv.
0.01 (1) Half the mdl was used as the conc. of 36 of the 38 samples.
0.03 (2)
0.05 (5)
- <----Chemical was not included in study.

TABLE III-3-72b: UATMP VOC ANNUAL AVERAGE CONCENTRATIONS (CONTINUED)
(ppbv)

1988 UATMP

	(38) Birmingham Alabama	(40) Atlanta GA	(34) Port Huron, MI	(39) Portland, OR	(36) Miami, FLA.	(39) Houston, TX
Dichloromethane	(0)	0.63 (6)	0.12 (1)	0.17 (1)	0.30 (2)	(0)
Trichloromethane	(0)	0.16 (3)	0.70 (7)	0.03 (3)	3.25 (5)	0.02 (1)
Tetrachloromethane	(0)	0.004(1)	0.02 (2)	-	0.01 (1)	(0)
Trichloroethylene	0.01 (1)	1.09 (3)	0.35 (12)	0.02 (2)	1.57 (22)	0.04 (1)
Tetrachloroethylene	0.06 (5)	0.11 (11)	0.05 (3)	0.06 (2)	0.19 (7)	0.07 (3)
Hexane	-	-	-	-	-	-
Benzene	1.61 (31)	0.72 (29)	0.65 (20)	0.93 (34)	0.83 (33)	1.38 (36)
Toluene	2.64 (36)	2.10 (34)	2.16 (28)	2.41 (38)	4.63 (35)	5.80 (39)
Xylene, o-	0.97 (32)*	0.63 (29)*	0.28 (21)*	0.74 (29)*	1.62 (34)*	1.28 (35)*
Xylene, m- and p-	4.18 (37)	3.22 (36)	1.70 (30)	4.18 (36)	4.63 (32)	4.19 (39)
Ethylbenzene	5.77 (13)	0.21 (14)	0.23 (13)	0.31 (13)	0.55 (17)	0.54 (19)

1989 UATMP

	(27) Washington DC, #1	(27) Washington DC #2	(31) Wichita, KA #1	(31) Wichita, KA #2	(33) Miami, FLA.	(34) Houston, TX
Dichloromethane	0.19 (1)	(0)	0.21 (1)	0.53 (5)	2.21 (11)	0.14 (1)
Trichloromethane	0.01 (3)	0.01 (2)	0.01 (3)	0.09 (3)	0.03 (7)	0.08 (8)
Tetrachloromethane	0.15 (27)	0.16 (27)	0.20 (31)	0.24 (31)	0.14 (32)	0.23 (34)
Trichloroethylene	0.02 (8)	0.03 (7)	0.35 (22)	0.18 (17)	0.89 (29)	0.03 (3)
Tetrachloroethylene	0.23 (9)	0.22 (13)	0.07 (12)	0.11 (15)	0.20 (18)	0.09 (15)
Hexane	-	-	-	-	-	-
Benzene	1.38 (27)	2.08 (27)	0.91 (31)	1.07 (31)	1.47 (33)	2.35 (34)
Toluene	2.73 (27)	4.94 (27)	1.37 (31)	1.71 (31)	4.66 (33)	3.12 (34)
Xylene, o-	0.61 (27)	1.25 (27)	0.35 (31)	0.51 (31)	1.27 (33)	0.77 (34)
Xylene, m- and p-	1.81 (27)	3.60 (27)	1.14 (31)	1.39 (31)	3.33 (33)	2.22 (34)
Ethylbenzene	0.33 (27)	0.67 (27)	0.20 (31)	0.25 (31)	0.55 (33)	0.45 (24)

TABLE III-3-72c: UATMP VOC ANNUAL AVERAGE CONCENTRATIONS (CONTINUED)
(ppbv)

1988 UATMP

	(39) Sauget, IL	(37) Dallas, TX	(39) Midland, MI	(37) Lansing, KY #2	(37) Louisville, KY	(37) Jacksonville, FL
Dichloromethane	0.15 (2)	0.55 (3)	0.73 (7)	0.49 (1)	(0)	(0)
Trichloromethane	1.12 (2)	(0)	0.09 (3)	0.01 (1)	0.09 (1)	0.04 (1)
Tetrachloromethane	(0)	0.01 (1)	0.05 (4)	(0)	(0)	(0)
Trichloroethylene	0.50 (11)	0.07 (4)	0.11 (4)	0.05 (2)	0.05 (5)	0.11 (4)
Tetrachloroethylene	0.05 (4)	0.10 (8)	0.33 (11)	0.10 (10)	0.07 (3)	0.04 (2)
Hexane	-	-	-	-	-	-
Benzene	3.41 (25)	0.51 (27)	0.93 (25)	0.32 (21)	1.07 (25)	0.61 (29)
Toluene	4.27 (38)	3.92 (33)	2.03 (39)	2.79 (33)	7.03 (37)	2.25 (29)
Xylene, o-	1.64 (29)*	0.45 (28)*	0.48 (29)*	0.64 (26)*	1.45 (32)*	1.14 (28)*
Xylene, m- and p-	8.45 (39)	2.14 (33)	1.43 (35)	3.53 (35)	6.09 (37)	3.28 (32)
Ethylbenzene	1.41 (16)	0.12 (10)	0.16 (14)	0.39 (14)	0.81 (17)	0.63 (14)

1989 UATMP

	(31) Sauget, IL	(25) Dallas, TX
Dichloromethane	0.24 (1)	0.13 (1)
Trichloromethane	2.61 (2)	0.004(1)
Tetrachloromethane	0.19 (31)	0.16 (25)
Trichloroethylene	0.52 (15)	0.26 (18)
Tetrachloroethylene	0.30 (17)	0.09 (8)
Hexane	-	-
Benzene	2.93 (31)	0.92 (25)
Toluene	15.33 (31)	1.66 (25)
Xylene, o-	2.43 (31)	0.39 (25)
Xylene, m- and p-	6.95 (31)	1.20 (25)
Ethylbenzene	1.37 (31)	0.22 (25)

TABLE III-3-73: AMBIENT AIR VOC CONCENTRATIONS REPORTED FOR ATEOS AND TEAM STUDIES

	ATEOS, Elizabeth				ATEOS, Newark				TEAM, Elizabeth-Bayonne (ppbv calc'd at T=20 C)**		
	Summer '81		Winter '82		Summer '81		Winter '82		Fall '81	Summer '82	Winter '83
	GM*	Max.	GM	Max	GM	Max	GM	Max			
(ppbv)											
Dichloromethane	0.23	1.67	0.87	21.00	0.35	3.56	0.68	7.96	--	--	--
Trichloromethane	0.10	1.06	0.29	10.10	0.06	0.40	0.21	36.00	0.28	2.62	0.06
Tetrachloromethane	0.01	0.18	0.03	0.13	0.01	0.21	0.02	0.19	0.17	0.16	ND
Trichloroethylene	0.27	1.82	0.46	4.70	0.50	5.21	0.59	5.13	0.4	1.42	0.073
Tetrachloroethylene	0.39	1.43	0.44	2.80	0.45	3.40	0.42	2.33	0.87	0.90	0.61
Hexane	--	--	--	--	--	--	--	--	--	--	--
Benzene	1.05	4.32	3.11	7.50	1.03	6.53	2.61	12.70	2.8	NC	NC
Toluene	2.89	13.60	4.09	18.40	4.65	137.00	4.93	33.80	--	--	--
Xylene, o-	0.22	1.24	0.28	2.20	0.26	1.39	0.44	1.70	0.91	0.82	0.82
Xylene, m- and p-	0.75	4.14	1.10	16.21	0.99	4.98	1.79	18.00	2.49	2.27	2.13
Ethylbenzene	0.26	1.41	0.32	2.40	0.33	2.16	0.51	2.10	--	--	--

* GM = geometric mean
** ND = not detected in most samples
NC = not calculated, high background contamination

SITE CODES

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88-Sept 89 Annual Averages

SITE NAME	SITE CODE
Camden, NJ	a
Ft. Lauderdale, FL	b
Pensacola, FL	c
Chicago, IL	d
St Louis, MO	e
Baton Rouge, LA	f
Washington, DC #1	g
Washington, DC #2	h
Wichita, KS #1	i
Wichita, KS #2	j
Miami, FL	k
Houston, TX	l
Sauget, IL	m
Dallas, TX	n
Susan Wagner	1
PS 26	2
Eltingville	3
Great Kills	4
Port Rich	5
Dongan Hills	6
Pump Station	7
Bayley Seton	8
Tottenville	9
Elizabeth	10
Carteret	11
Sewaren	12
Piscataway	13
Highland Park	14

FIGURES III - 3 - 21

THROUGH III - 3 - 30

ANNUAL AVERAGE CONCENTRATIONS FOR UATMP (1989)

AND SI/NJ UATAP (1988-89) BY SITE

Figure III-3-21

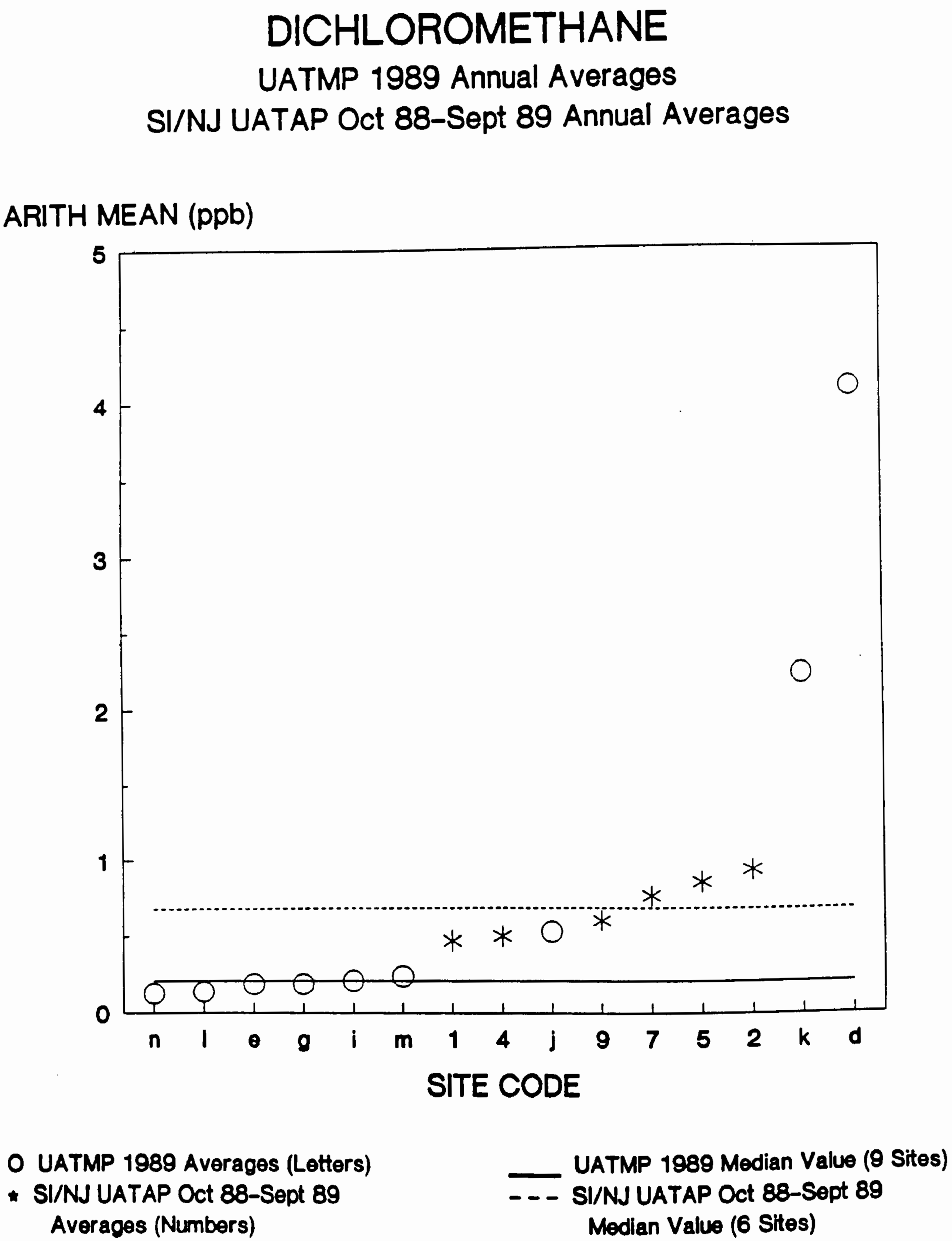
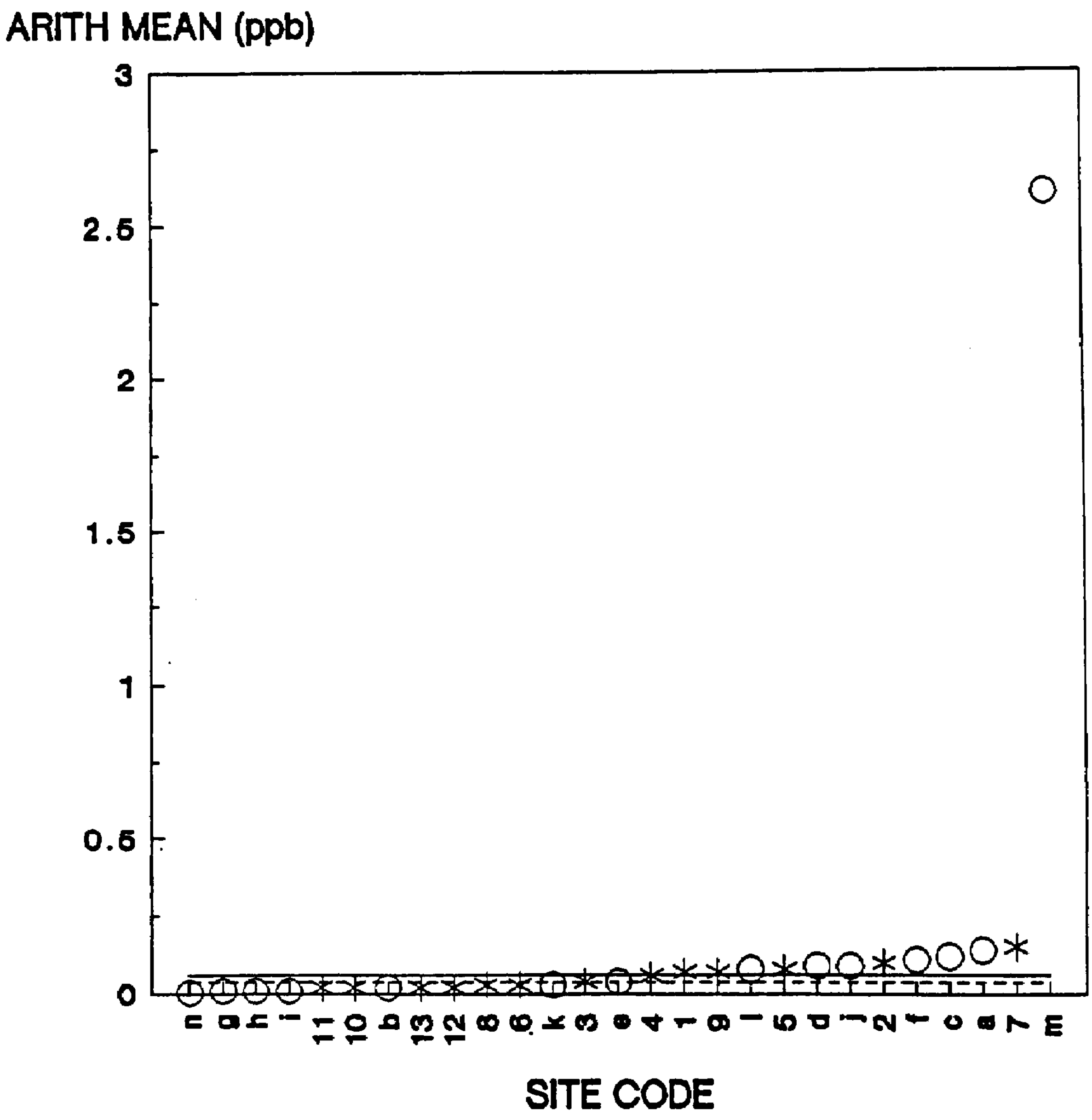


Figure III-3-22

TRICHLOROMETHANE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages



O UATMP 1989 Averages (Letters)
* SI/NJ UATAP Oct 88–Sept 89 Averages (Numbers)

____ UATMP 1989 Median Value (14 Sites)
\- - - SI/NJ UATAP Oct 88–Sept 89 Median Value (13 Sites)

Figure III-3-23

TETRACHLOROMETHANE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages

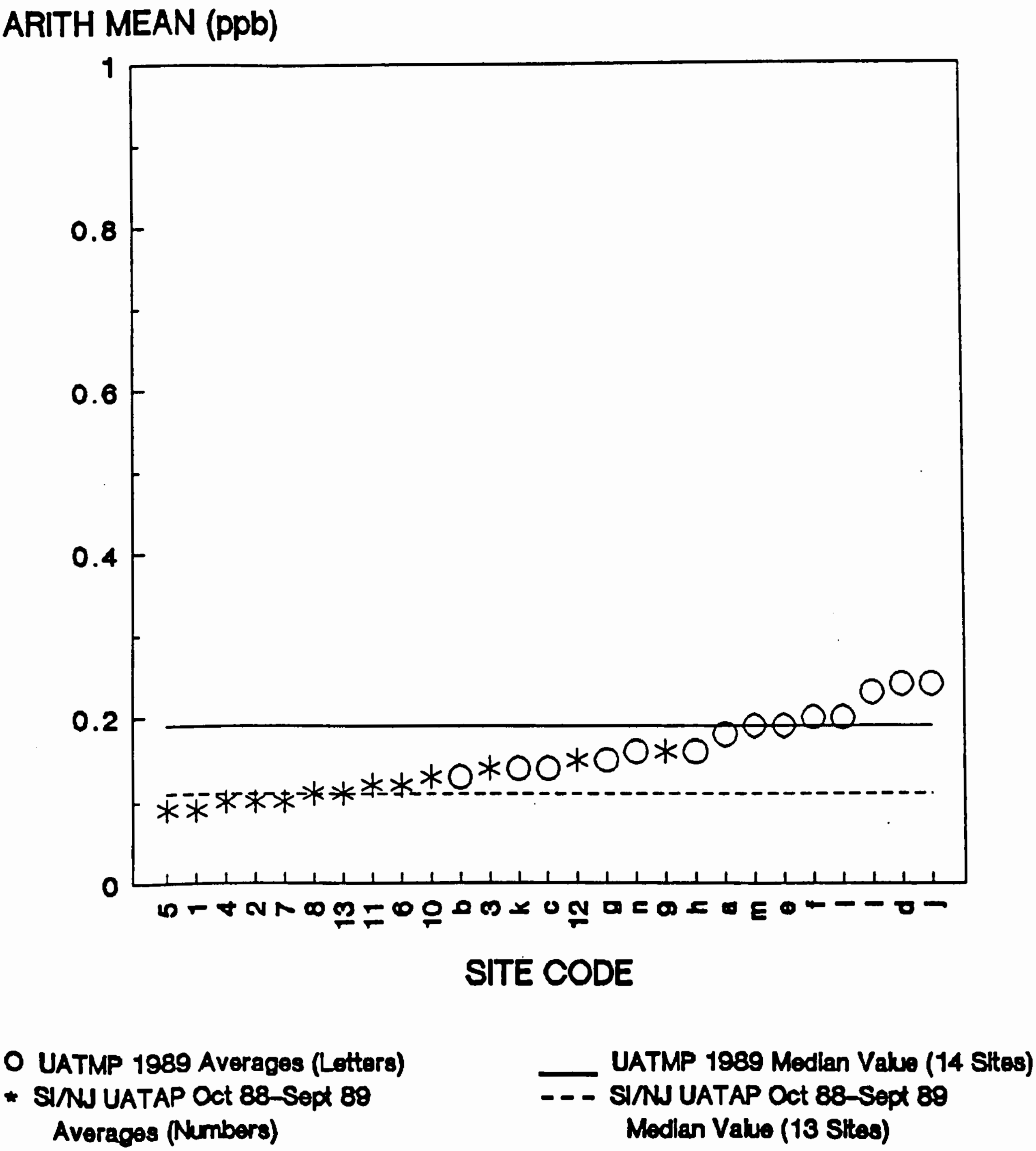


Figure III-3-24

TRICHLOROETHYLENE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages

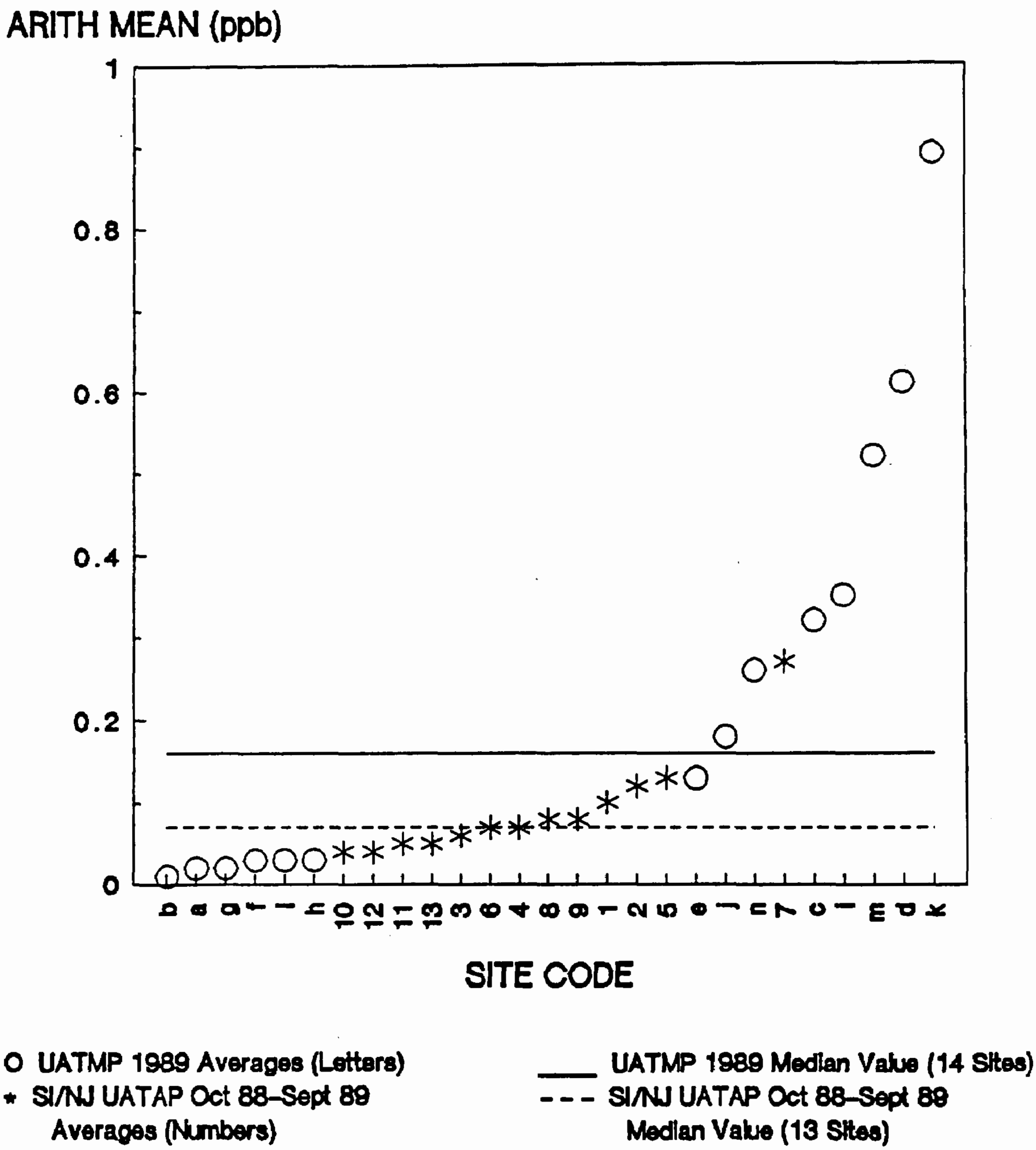
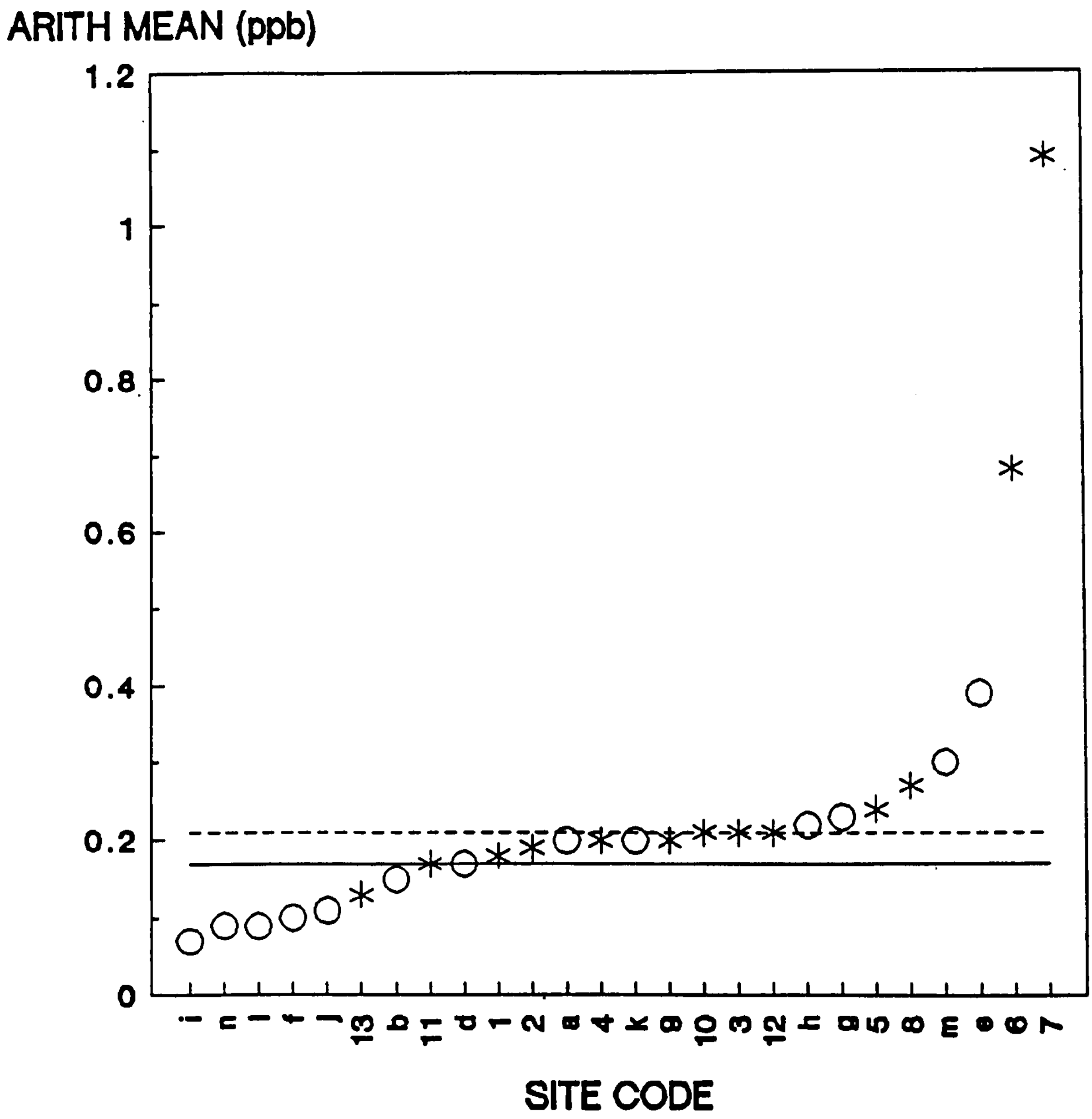


Figure III-3-25

TETRACHLOROETHYLENE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages



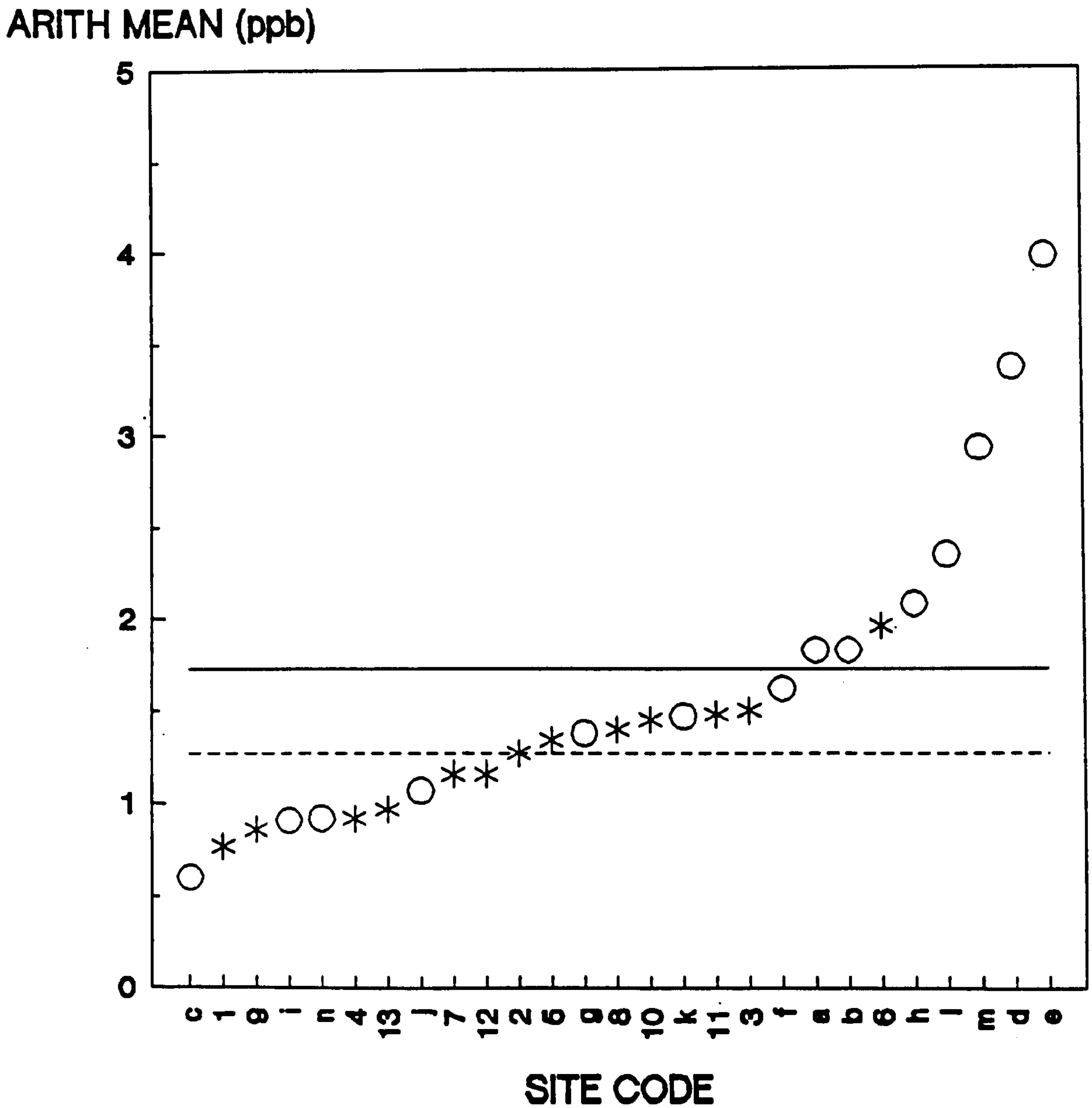
O UATMP 1989 Averages (Letters)
* SI/NJ UATAP Oct 88–Sept 89 Averages (Numbers)

____ UATMP 1989 Median Value (13 Sites)
- - - SI/NJ UATAP Oct 88–Sept 89 Median Value (13 Sites)

Figure III-3-26

BENZENE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages



O UATMP 1989 Averages (Letters)
* SI/NJ UATAP Oct 88–Sept 89 Averages (Numbers)

——— UATMP 1989 Median Value (14 Sites)
- - - SI/NJ UATAP Oct 88–Sept 89 Median Value (13 Sites)

Figure III-3-27

TOLUENE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages

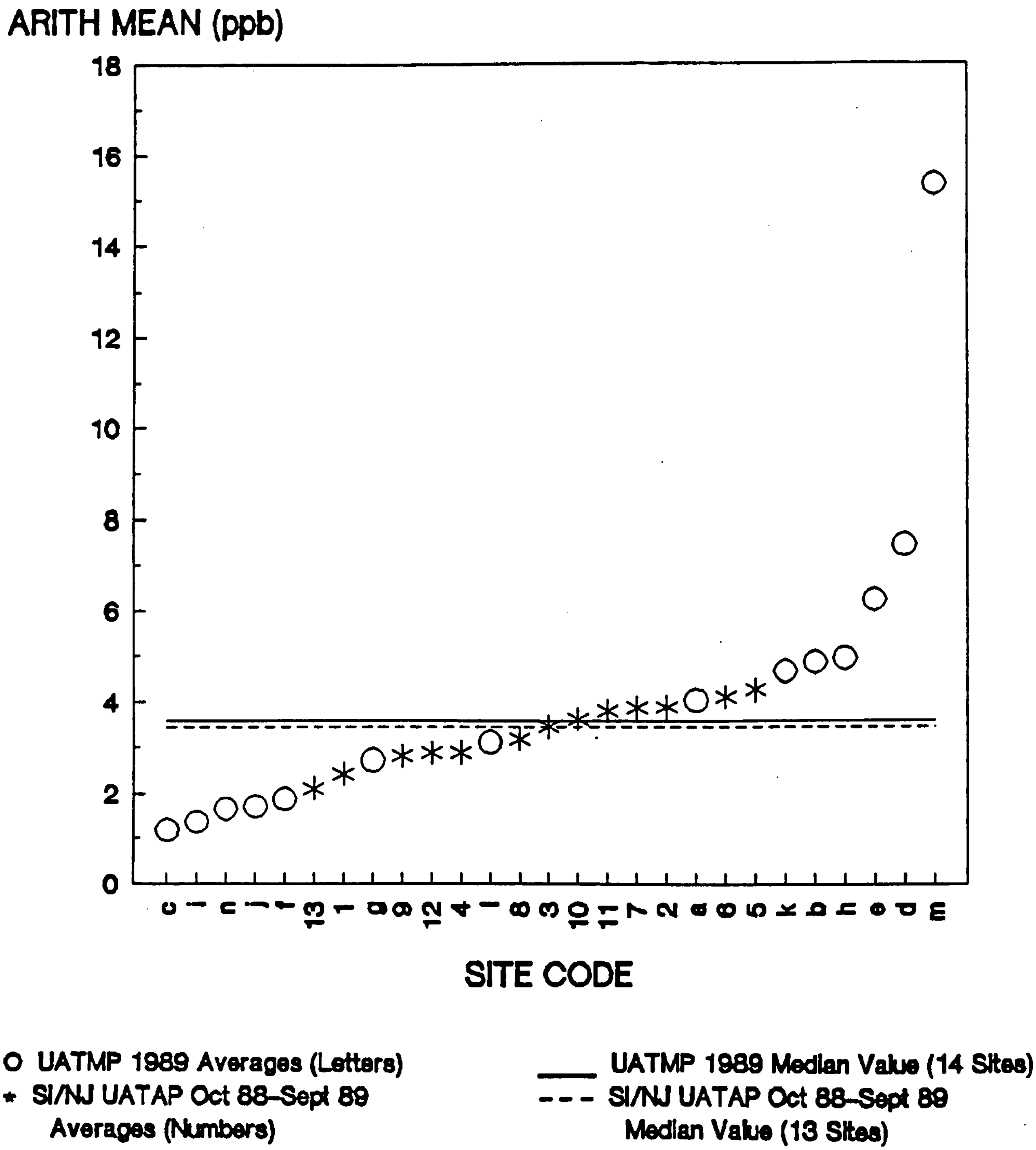
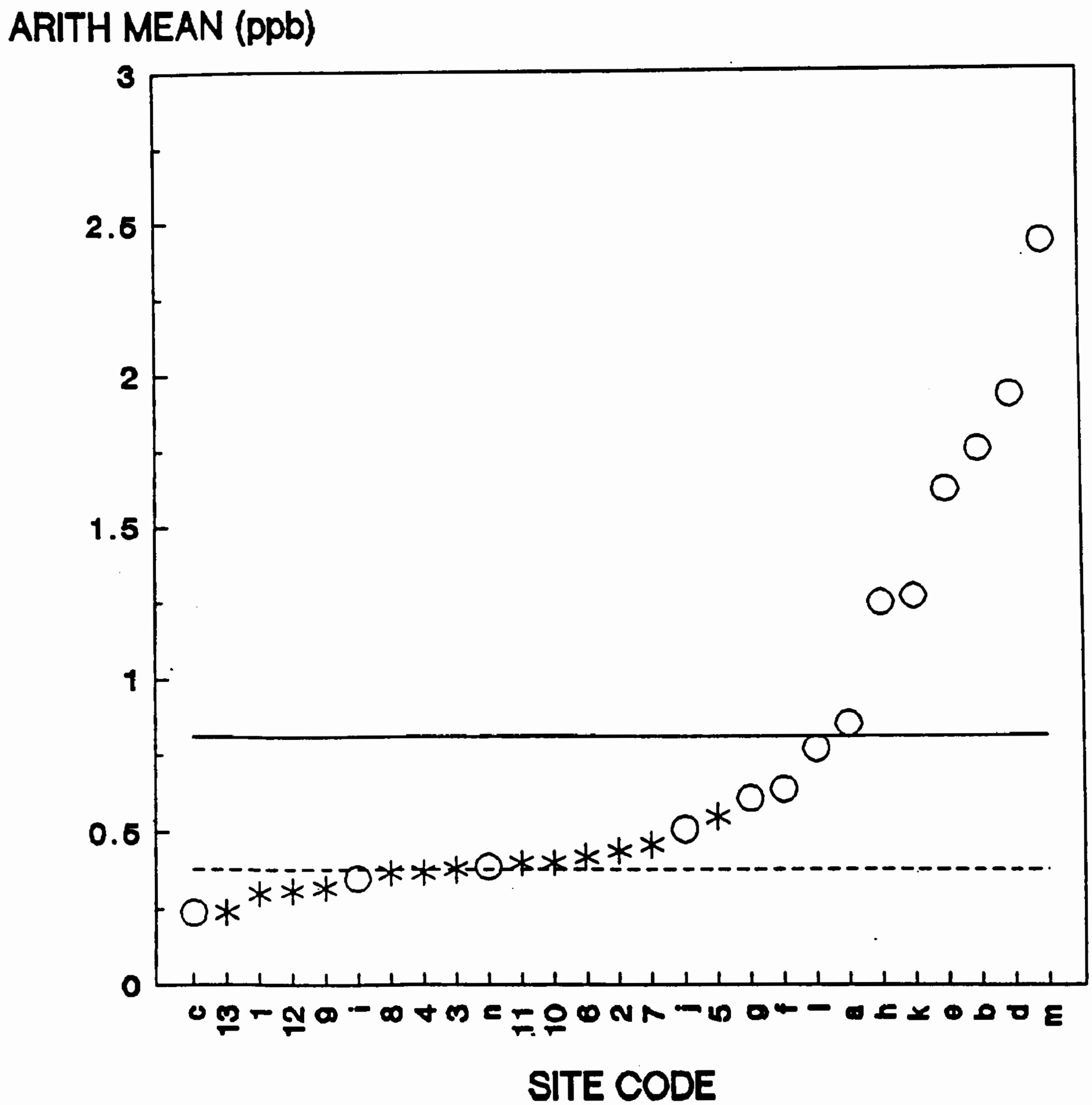


Figure III-3-28

O-XYLENE

UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88–Sept 89 Annual Averages



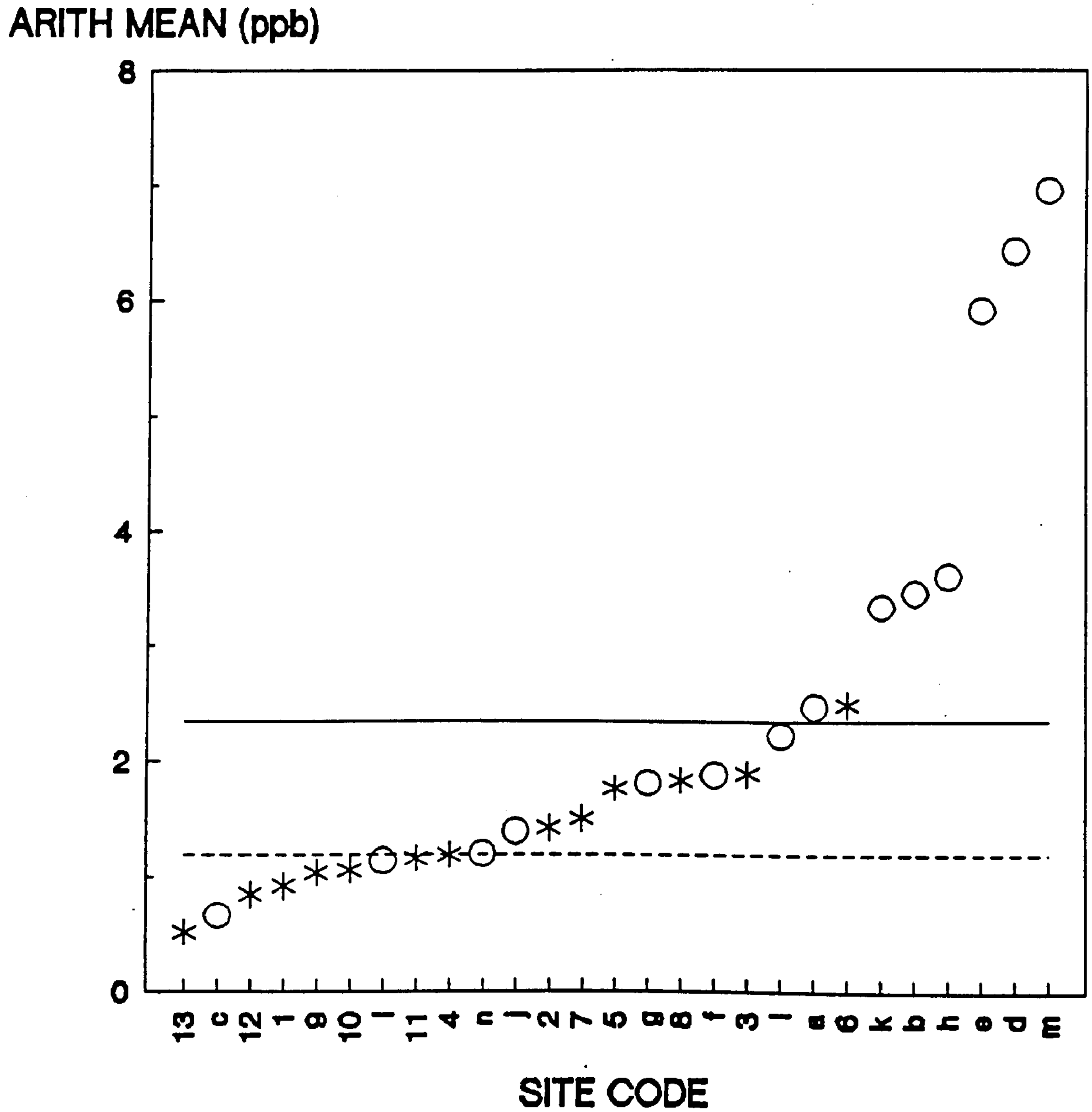
O UATMP 1989 Averages (Letters)
* SI/NJ UATAP Oct 88–Sept 89 Averages (Numbers)

——— UATMP 1989 Median Value (14 Sites)
- - - SI/NJ UATAP Oct 88–Sept 89 Median Value (13 Sites)

Figure III-3-29

M, P-XYLENE

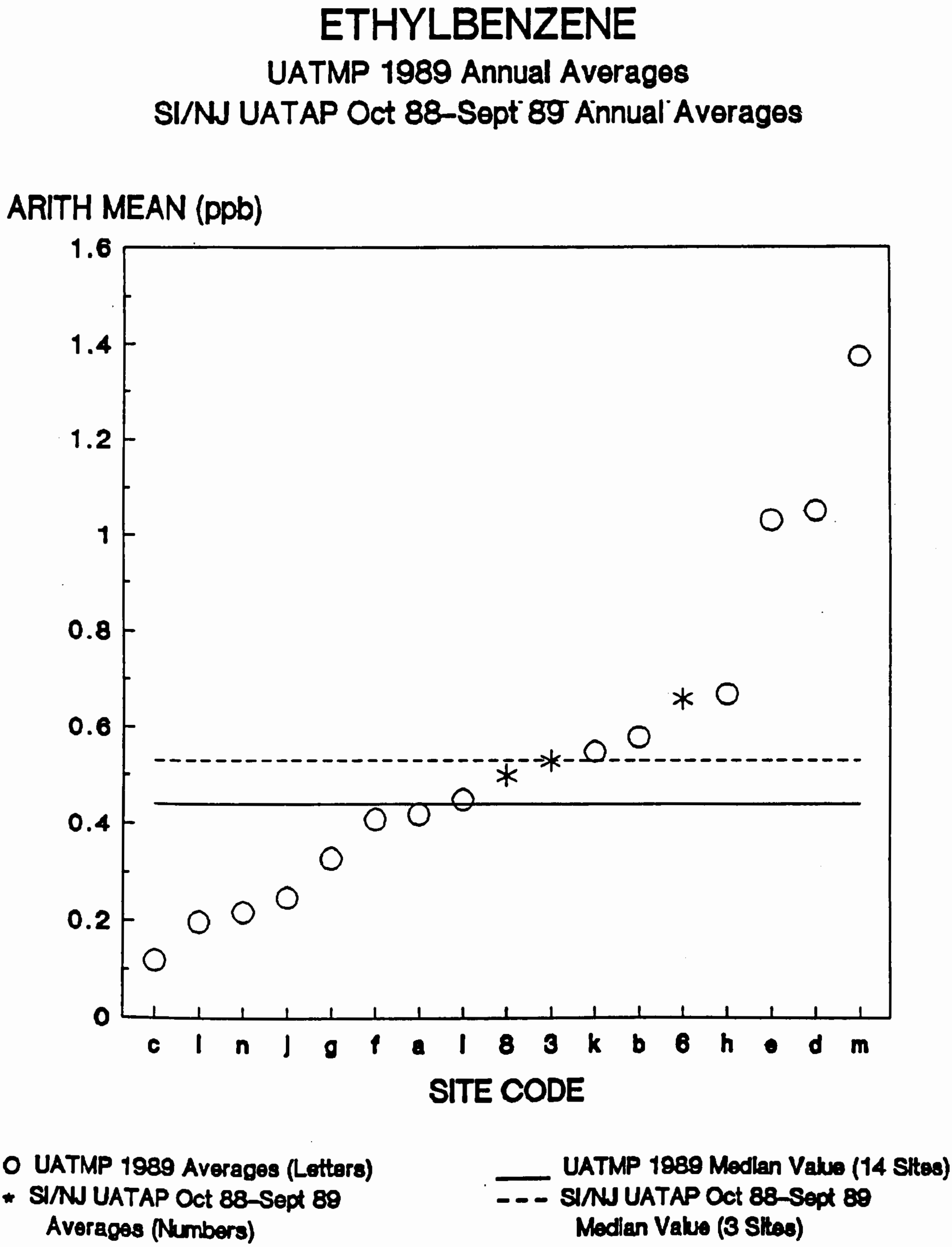
UATMP 1989 Annual Averages
SI/NJ UATAP Oct 88-Sept 89 Annual Averages



O UATMP 1989 Averages (Letters)
* SI/NJ UATAP Oct 88-Sept 89 Averages (Numbers)

——— UATMP 1989 Median Value (14 Sites)
- - - SI/NJ UATAP Oct 88-Sept 89 Median Value (13 Sites)

Figure III-3-30



4. AMBIENT MONITORING

4.1 INTRODUCTION

An integrated sampling program was undertaken to evaluate the ambient air concentrations of selected volatile organic compounds (VOCs), particulate trace metals, particulate benzo[α]pyrene (B[α]P), and formaldehyde; and the meteorological conditions within the Staten Island/New Jersey region. In addition to the Objectives listed in Volume II, the site selection and sampling frequency were designed to provide annual average concentrations for use in risk assessment and for evaluation of spatial and temporal variations of the ambient concentrations of the measured chemicals.

At the inception of this project little information was available about the VOC concentrations in the region, and no continuous, long-term measurements (of duration greater than one year) of VOCs had been reported at any urban sites. Singh et al. (1982) reported sub-part-per-billion levels of chlorinated, aromatic, and aliphatic hydrocarbons in Staten Island during one week of sampling. These values were similar to those that they measured in other urban cities. Lioy et al. (1983a,b) and Harkov et al. (1983,1984) reported concentrations of numerous VOCs in several New Jersey cities for the summer of 1981 and the winter of 1982 based on 30 to 40 samples collected in each season; the work was done as part of the Airborne Toxic Element and Organic Substances (ATEOS) project.

The Total Exposure Assessment Methodology (TEAM) program, undertaken by the EPA, also made ambient and indoor air measurements of VOCs in parts of New Jersey for limited time periods (Wallace et al. 1985, Hartwell et al. 1987). A number of other projects were developed by the US EPA concurrent with the SI/NJ UATAP to monitor the VOC concentrations in urban regions over extended time periods; among them were the Toxics Air Monitoring System (TAMS) network and the Urban Air Toxics Monitoring Program (UATMP) (U.S. EPA 1990). Neither of these had either the sampling site density within a single region or the sample frequency that was incorporated into the SI/NJ UATAP.

The particulate trace metal and B[α]P sampling, collection, and analysis were developed as extensions of the criteria pollutant programs of the two state governmental agencies involved in the project--NYSDEC and NJDEP. While these data are not as unique as the VOC data (Schroeder et al. 1987), their collection in the region, simultaneous with the other activities of the SI/NJ UATAP, was considered important in the final risk calculations for ambient air contaminants.

Meteorological information was obtained from stations established specifically for this project in Staten Island and from existing facilities in New Jersey and the surrounding areas in New York.

The results discussed in this chapter are the ambient concentration data for VOCs.

4.2 VOLATILE ORGANIC COMPOUNDS

Ambient air sampling for VOCs was more extensive than for the other compounds addressed. Little was known about VOCs in the project area, and VOC concentrations were expected to vary by site to a greater extent than the other pollutant species sampled. VOC monitoring was complicated further by the lack of a standard method, and the use of several laboratories and their different instrumentations for sampling and analysis.

Tenax sorbent was used as the primary sample collection medium for all organizations. This choice was made on the basis of cost, the documentation of its strengths and weaknesses (Walling et al., 1986), and SI/NJ UATAP members' experience. A mixture of Tenax, Ambersorb, and charcoal was used by NYSDEC; this mixture was demonstrated to be equivalent, and in some cases superior, to Tenax. Evacuated canisters were not used as the primary sampling method because of the expense and the lack of sufficient laboratory analytical capacity required by this sampling approach. Nevertheless, canister samples were used in the project as a quality assurance tool.[1] NJIT collocated canister and Tenax samplers at its sites because it was able to analyze and clean its own canisters.

Tenax samples were collected at nominal flows of 8 and 16 cc/min. Flow rates were based upon values reported in the literature (U.S. EPA, 1982; Butler and Burke, 1976) and the experience of members in the SI/NJ UATAP. The use of parallel samples at different flow rates, an arrangement termed distributed-volume sampling, was used to provide data to assess breakthrough and precision. Although previous distributed-volume sampling had been done with a four-tube apparatus (Walling 1984), this approach was rejected due to fiscal and analytical limitations. Also, experience early in the project, combined with extensive QA throughout the project, ensured that the two parallel tubes would be sufficient for confirming the quarterly and annual averages for the VOC parameters.

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[1]Refer to Section 2 of this volume.

Quality Assurance (QA) in the project was extensive as noted. From a monitoring standpoint, the QA covered two levels. First, each organization was responsible for its own QA and QC, preparing its own QA plans and proposing its own QA and QC procedures, including the process for determining what data to submit. The QA Subcommittee served a QA oversight role, arranging specific QA activities, reviewing and auditing work in progress, and reviewing the final data and the accompanying QA reports.

Comparability between the different laboratories in the SI/NJ UATAP was determined by the use of an outside commercial laboratory (PEI Associates) to analyze samples collocated with a portion of the adsorbent samples gathered by each of the sampling organizations.

Comparisons of the laboratories were performed as multi-day experiments where all SI/NJ UATAP participants collocated their own equipment and gathered consecutive 24-hour composite ambient air samples. These comparisons, referred to as shootouts, served the following purposes: (1) to evaluate inter-organizational differences, (2) to provide a forum for shakedown of the sample collection systems, and (3) to share ideas among participants. Shootouts were conducted in 1987 and 1988. A third shootout conducted in 1989 used NYSDEC sampling pumps and flow controllers for all participants, as opposed to each organization's using its own sampling apparatus. Shootout results are presented in Section 2 of this volume and in Volume VI.

Laboratory accuracy was verified by the analysis of unknowns spiked by EPA/AREAL at Research Triangle Park. Contamination was monitored through the use of blanks. For the first nine months of the study, blank data were reported and used to correct the data by all organizations except NJIT. NJIT maintained that a single measurement from a blank was not an accurate estimate of the contribution of background contamination to the sample concentration, since this background level is variable and arises from thermal degradation of the sorbent and sample handling. Thus, since blank levels were always below 20% of the sample concentration, the blank levels were discarded. After the fourth quarter of 1989, a rolling blank mean was computed from the five most recent blank values, not including those determined to be contaminated. This estimate of the blank contribution was then subtracted from the sample to obtain the reported concentration. A determination of contamination was made if the concentration of a particular compound in the blank (a) exceeded the rolling blank mean by twice the standard deviation of the rolling mean, **and** (b) exceeded 50% of the sample concentration for that day. Both criteria were needed--the first because consistent large background levels need not cause sample invalidation; and the second because variable small background levels need not cause sample invalidation.

Minimum detection limits (MDLs) for each compound are reported in Table III-4-1. CSI reported an MDL for each flow rate; therefore, two MDLs are reported for CSI. Compounds not detected in a sample or detected below the MDL were reported as one half the MDL. A sample value was also reported to be at the MDL if its concentration was one half of the blank value observed for that day. In the quarterly data reports, NYSDEC listed the MDL for the low-flow tube as the MDL for the chemical, but retained values less than the listed MDL in cases where the concentration in the high-flow tube exceeded the MDL for the high flow rate. In such cases, the reported concentration for that day would be a three-tube average based on actual and half-MDL values. All values were reported unless they could be ascribed to known problems in sampling and analysis.

4.2.1 Quarterly and Annual Average Data

Tables III-3-1 through 21 list the quarterly and annual arithmetic average concentrations, by compound, for samples collected with a solid sorbent. For each VOC, Table III-4-2 gives the number of valid samples collected, and the number of samples with concentrations above the MDL for the second year of sampling. Tables III-3-23 through 44 rank sites by decreasing quarterly average for each quarter of the study.

In the second year of sampling, benzene, toluene, ethylbenzene, m- and p-xylene, o-xylene and hexane were consistently detected at levels >MDL in >98% of the valid samples. Tetrachloroethene and 1,1,1-trichloroethane were detected in ≥85% and ≥94% of the samples, respectively. Tetrachloromethane was detected in ≥96% of the samples for NJIT and CSI, and in 54 to 77% of the samples for NYSDEC sites.

Dichloromethane was subject to breakthrough with Tenax; therefore, CSI and NJIT values for dichloromethane were deleted from the data set for this study. In contrast, canister collocation studies demonstrated that dichloromethane was efficiently collected with the mixed adsorbent used by NYSDEC; ≥92% of the valid samples were >MDL.

None of the sorbents efficiently collected chloromethane; submitted data were invalidated.

For the remaining VOCs, see Table III-4-3 below for the percentage of valid samples found to be greater than the MDL for each of the laboratories in the second year of sampling. (Note: This table was derived from Table III-4-2.)

Table III-4-3: Partial listing of % of samples >MDL in the second year of sampling

Chemical	Valid samples with concentrations >MDL		
	NJIT	NYSDEC	CSI
trichloromethane	33-53	52-91	90-91
trichloroethene	54-68	76-95	92-98
dichloroethane, 1,2-	-	15-42	88-93
styrene	-	-	96-99
tribromomethane	-	-	<1
chlorobenzene	-	16-48	22-26
dichlorobenzene, 1,3-dichloroethane,	-	66-82	12-19
1,1-	-	-	3-12
trichloroethane, 1,1,2-	-	0-6	<1
dichlorobenzene, 1,2-	-	0-22	14-18
dichlorobenzene, 1,4-	-	2-20	7-12

4.2.2 Temporal trends in the SI/NJ UATAP data

Seasonal trends were examined for compounds whose quarterly mean concentrations exceeded the MDL at least 75% of the time. No statistical tests were done, but various trends were identified. The aromatic compound data suggest that values higher than the annual mean occurred during the January-to-March quarter of each year, and lower values occurred during the April-to-June quarter for all sites, with few exceptions. No trends were apparent for the chlorinated compounds. Similarly, little seasonal variability was observed in New Jersey during the TEAM study in 1982/1983, although large seasonal variations were identified in Los Angeles, CA (Hartwell et al. 1987).

4.2.3 Spatial Trends in the SI/NJ UATAP Data

In this section, the sites are referred to by numbers and letters as follows:

Susan Wagner	1	Pumping Station	7
Travis (PS-26)	2	Bayley Seton Hospital	8
Eltingville	3	Tottenville	9
Great Kills	4	Elizabeth	A
Port Richmond	5	Carteret	B
Dongan Hills	6	Sewaren	C
		Piscataway	D

CSI ran sites 3, 6, and 8. NYSDEC ran sites 1, 2, 4, 5, 7, and 9. NJIT ran sites A, B, C, D.

Spatial trends among sites were examined by ranking sites according to their quarterly and annual mean concentrations, and studying the resulting relationships. It was suspected that variability between laboratories was greater than variability within laboratories; therefore, two approaches to ranking were taken. The first approach grouped sites of each laboratory separately (see Figures III-3-7 through 17), and then ranked the sites within the individual groups. The second approach (Tables III-3-23 through 44) ranked all sites regardless of laboratory jurisdiction. The likelihood of statistically significant results referred to in this section are based upon the quarterly precision data presented by each laboratory in reports contained in Volume VI of the project report; comparisons to collocated canisters presented in Section 2 of this volume and in the Volume III appendix; and shootout results presented in Section 2 of this volume and in Volume VI.

For ethylbenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,2-trichloroethane, tribromomethane, styrene, chlorobenzene, and o-and p-dichlorobenzene, the project data were insufficient to establish whether or not trends existed; either the number of sites or the number of values >MDL were too few.

4.2.3.1 Dichloromethane

Only the NYSDEC sites (sites 1,2,4,5,and 7) were analyzed for trends in dichloromethane concentrations. The NJDEP and CSI results for this compound were deleted from the data base. The range of annual mean concentrations was 0.47 to 0.93 ppb. Concentrations were highest at sites 2 and 5 and lowest at sites 1 and 4. Significant differences are likely to exist during the second year of the study between the sites with the highest concentrations and the sites with the lowest concentration. Examination of quarterly data showed varying concentration levels with no clearly discernable patterns, except that in the second with no clearly discernable patterns, except that in the second year, sites 1 and 4 always had readings lower than those at sites 2 and 5.

4.2.3.2 Trichloromethane (chloroform)

Annual average concentrations for trichloromethane in the first year of data range from 0.03 to 0.09 ppb. The quarterly and annual chloroform concentrations tended to segregate by analytical laboratory. Inter-laboratory comparisons are likely to be misleading. Intra-laboratory comparisons show that in the first year of the study, differences between any two sites were 0.02 ppb or less, and thus statistically indistinguishable. Further analysis may show that the differences between NYSDEC's site 7 and sites 1, 4, 5, and 9 in the second year of the data are statistically significant. Quarterly data showed the same trends as the annual data.

4.2.3.3 Tetrachloromethane (carbon tetrachloride)

No site was consistently, significantly higher for tetrachloromethane in every quarter. Annual mean concentrations ranged from 0.06 to 0.18 ppb in the first year of the study, and 0.09 to 0.16 ppb in the second year of the study. During three of the four quarters of the second year, NYSDEC Site 9 was consistently among the sites with the highest concentrations; and NYSDEC sites 1 and 5, consistently among those with the lowest concentrations. Since many values were below the MDL, differences among sites were hard to detect.

4.2.3.4 1,1,1-Trichloroethane

The annual mean concentrations for 1,1,1- trichloroethane ranged from 0.32-0.72 ppb. Concentrations for NYSDEC and CSI sites were generally uniform across all sites. For April 1988 through January 1989, the quarterly averages for the operating New Jersey sites, including the background site Piscataway, were higher than for the Staten Island sites. Based on the least-significant differences (LSDs) in Table III-2-22 of QA section, significant differences between annual average concentrations of 1,1,1-trichloroethane for any of the sites in the second year of the study are unlikely. This suggests that, on an annual average basis, the concentration of this ubiquitous solvent is uniform throughout the study area.

4.2.3.5 Tetrachloroethene (tetrachloroethylene, perchloroethylene)

Site 6, with a first-year annual mean concentration of 0.66 ppb, had the highest concentration of tetrachloroethene throughout the first year of data, and the second highest concentration throughout the second year. Site 7, inactive in the first year of the study, had the highest quarterly average concentrations of tetrachloroethene, and the highest annual average--1.09 ppb--in the second year. Concentrations for all other sites during the second year were typically 0.20 to 0.25 ppb. Intra-laboratory statistical examination indicates that sites 6 and 7 were significantly different from all other sites analyzed by their respective laboratories. Sites 6 (Dongan Hills) and 7 (Pumping Station) are likely to be significantly different from all other sites on an inter-laboratory basis, as well. The elevated concentrations of tetrachloroethene at site 6 were a likely consequence of the close proximity of dry cleaning establishments. Section 6 of this volume, the source identification analysis, addresses relationships between sources and observed concentrations.

4.2.3.6 Hexane

Hexane was measured at only seven sites, two of which provided data for only the last three quarters of the second year of the study. NYSDEC did not provide data for hexane. Site D had the lowest mean concentration, 0.50 ppb, for the three quarters in which samples were collected. Sites A and B, with quarterly average concentrations ranging from 0.67 to 1.55 ppb, had the highest mean concentrations for five of the six quarters for which both sites were sampled. The annual average concentration for the second year of site D could be considered significantly different (lower) from an intra-laboratory perspective; but significant inter-laboratory differences are unlikely.

4.2.3.7 Benzene

Annual average benzene concentrations ranged from 0.77 to 1.96 ppb. Site 1 was within 15% of the lowest reported mean concentration for seven of eight quarters. No single site was consistently the highest, however the mean quarterly concentrations at sites B (Carteret), A (Elizabeth), 5 (Port Richmond), and 6 (Dongan Hills), were above the average of all sites in all but one quarter. On an intra-laboratory basis, statistically significant differences are likely between the sites of lowest concentration and the sites of highest concentration, on both an annual and quarterly mean basis. Inter-laboratory differences are most likely to account for differences observed between CSI sites 3, 6, and 8, and NYSDEC sites 1, 4, and 9 during the second year of the study.

4.2.3.8 Toluene

Toluene annual average concentrations ranged from 1.93 to 4.25 ppb. Site 1 Susan Wagner, with quarterly average concentrations of 1.88 to 3.13 ppb, was within 15% of the lowest reported mean quarterly concentration during seven of the eight quarters, when the background site (D) is not included. Site D was significantly lower during two of the three quarters that samples were collected. No site was always highest. If the LSDs in QA Table III-2-21 are applicable to quarterly average comparisons, then the differences between the higher and lower quarterly mean concentrations at the different sites are likely to be statistically significant.

4.2.3.9 o-Xylene

Over the two-year period of the study, o-xylene concentrations ranged from 0.28 to 0.68 ppb. Site 5 (Port Richmond) had the highest mean concentration, typically 0.5 to 0.6 ppb, during seven of eight quarters. If the LSDs in QA Table III-2-20 are applicable to quarterly average comparisons, and if LSDs for o-xylene in the second year of the study are no greater than those for the first year (as was the case for toluene and m- and p-xylene), then the differences between the highest and lowest concentrations are likely to be statistically significant.

4.2.3.10 m- and p-Xylenes

The annual mean concentrations of m- and p-xylene ranged from 0.52 to 2.48 ppb. Site 6 (Dongan Hills) had the first or second highest quarterly average in five of the six quarters in which it was sampled, with concentrations usually exceeding 2.0 ppb. Site 1 (Susan Wagner), with a two-year average concentration of 0.97 ppb, was always below the average of all sites. Site D had the lowest mean concentration for the three quarters that it was sampled. If the LSDs in QA Table III-2-19 are applicable to quarterly average comparisons, then differences between the highest and lowest quarterly concentrations reported are likely to be statistically significant.

4.3 COMPARISON TO OTHER STUDIES OF AMBIENT VOC CONCENTRATIONS

VOC mean concentrations were compared to the data in Harkov et al. (1983, 1984), collected in NJ during 1981 and 1982 as the ATEOS project; and the 1989 UATMP (U.S. EPA, 1990), which reported annual mean concentrations at 14 sites across the country for the period from January 1989 through December 1990. These sets of data are the primary bases for the discussions of 20 VOCs in this section. Other data sets, limited in scope and not reporting annual means, were used only when a compound found in the SI/NJ UATAP was omitted from the two studies cited.

For 11 VOCs, selected summary data for the second year of the SI/NJ project, the 1989 UATMP, and the ATEOS and TEAM studies were presented in Tables III-3-71 to III-3-73. The results from the TAMS network were not available at the time of this report.

The UATMP study sampled VOCs every twelfth day for one year at 14 sites nationwide.

Although the ATEOS study was conducted only in the summer and winter, the measurements were made every day in seasons when maximum excursions were anticipated at the three urban New Jersey sites. For almost all the volatile organics listed in this comparison, including benzene, toluene, trichloroethylene, and tetrachloroethylene, the maximum values recorded in Elizabeth and in Newark during ATEOS were greater than those measured in SI/NJ. Although the characteristics of the ATEOS sites were not identical to those of the SI/NJ sites, the ATEOS study represented two different types of areas--Newark, heavily affected by small point and area sources; and Elizabeth, a commercial and residential area.

The TEAM data were of more limited utility than the UATMP and ATEOS data for the comparison purposes of this section. It is difficult to interpret the TEAM data since the sites changed from day to day; however, the median values for each season were similar to, or somewhat greater than, the ATEOS values.

4.3.1 Dichloromethane

Annual mean concentrations for dichloromethane varied from 0.47 to 0.93 at the NYSDEC sites. These concentrations are similar to the range of seasonal averages previously reported by Harkov et al. for NJ cities--0.23 to 0.72 ppb. The individual UATMP sites had annual mean concentrations ranging from 0.12 to 4.1 ppb, though the range 0.12 to 0.5 ppb includes all but two sites. At only three of the 14 UATMP sites was this chemical found at concentrations >MDL (0.11 ppb) in more than one sample;

whereas dichloromethane was found at >MDL (0.2 ppb) in ≥58% of the samples at each of the six NYSDEC sites. Thus, while the SI/NJ UATAP annual means are at the higher end of the values reported for urban air, they are not significantly different from values reported in previous studies in the region, and are lower than values reported for Chicago, IL, and Miami, FL.

4.3.2 Trichloromethane

The annual mean concentrations across all sites for trichloromethane varied between 0.02 to 0.15 ppb, with the majority of sites having large numbers of values at the MDL. These values are similar to those previously reported by Harkov et al. for this region, and to the overall UATMP mean from the UATMP of 0.2 ppb. The percentage of samples reported to be greater than the detection limit was 14% for the UATMP, and in the range of 33-91% for the second year of the SI/NJ UATAP sites.

4.3.3 Tetrachloromethane

The annual mean concentrations of tetrachloromethane across all sites in the SI/NJ UATAP ranged between 0.09 to 0.18 ppb, which represents an increase above the mean value of 0.01 ppb previously reported for NJ by Harkov et al. The SI/NJ data are similar to the UATMP overall mean of 0.19 ppb, and range of annual mean concentrations from 0.13 to 0.24 ppb.

4.3.4 1,1-Dichloroethane

The ambient concentrations of 1,1-dichloroethane were at the MDLs of 0.01 and 0.02 ppb almost throughout the SI/NJ UATAP, in agreement with the UATMP which only detected it in 3% of the samples.

4.3.5 1,2-Dichloroethane

The ambient concentration of 1,2-dichloroethane was close to the MDL in a large percentage of samples in the SI/NJ UATAP, with reported annual means of 0.02 to 0.04 ppb. It was detected less frequently in the UATMP, which reported a mean concentration of 0.02 ppb.

4.3.6 1,1,1-Trichloroethane

The annual mean concentrations across all sites for the SI/NJ UATAP ranged from 0.32 to 0.72 ppb, with almost universal detection. This compound was not reported in Harkov et al. (1983, 1984). Singh et al. (1982) measured a concentration of 0.5 ppb in Staten Island. The mean from UATMP was 1.1 ppb with measurable quantities in 99.5% of the samples. The range for individual sites from the UATMP was 0.31 to 5.2 ppb, with the SI/NJ UATAP sites having annual mean concentrations similar to the lowest 11 of 14 sites sampled by UATMP.

4.3.7 Trichloroethene (trichloroethylene)

The annual mean concentrations across all sites for the SI/NJ UATAP ranged from 0.03 to 0.27 ppb with all but one mean value ≤0.13 ppb. The means measured previously at three sites in NJ were 0.21 to 0.50 ppb. The Staten Island concentration reported by Singh et al. (1982) was 0.16 ppb. The average of all sites from the UATMP was 0.24 ppb with measurable amounts in 44% of the samples. The concentration was highly variable among cities, ranging from <0.1 ppb in six cities, to as high as 0.9 ppb in Miami, FL. The range mean concentrations for the SI/NJ UATAP sites agreed with the lower range of the annual mean concentrations measured for the UATMP sites.

4.3.8 1,1,2-Trichloroethane

This compound was detected in 0 to 6% of the samples at sites in the SI/NJ UATAP study, with MDLs of 0.02 and 0.04 ppb. This is consistent with the Harkov et al. data that reported 0.01 ppb levels in NJ, and with the UATMP data which found measurable quantities in <20% of the samples and a mean of 0.07 ppb.

4.3.9 Tetrachloroethene

This compound was detected in ≥92% of the samples at all sites in the SI/NJ UATAP. Annual mean concentrations exhibited the widest concentration range between sites in the project, varying from 0.13 to 1.1 ppb. This is thought to be the result of micro-environmental sources influencing the two sites with the highest reported concentrations. At the other sites in the SI/NJ UATAP, levels were similar to those reported by Harkov et al. for NJ, where seasonal average concentration ranged from 0.24 to 0.45 ppb. The mean for the UATMP sites was 0.18 ppb, with detection in only 44% of the samples. Variability among the UATMP urban sites--0.07 to 0.39 ppb--was smaller than that among the SI/NJ UATAP sites, even though the UATMP samples were drawn from 12 different metropolitan areas and the SI/NJ UATAP samples were drawn from a single metropolitan area. This reinforces the likelihood that point sources influenced the observed concentrations in the SI/NJ UATAP.

4.3.10 Tribromomethane (bromoform)

This compound was detected once (MDL of 0.01 to 0.04 ppb) during the SI/NJ UATAP, which concurs with the other literature for ambient, urban air.

4.3.11 Hexane

The annual means for hexane in the SI/NJ UATAP varied from 0.5 to 1.42 ppb. This compound was not quantitated in the UATMP or the ATEOS studies.

4.3.12 Benzene

The annual mean concentrations for all sites during the SI/NJ UATAP varied between 0.77 to 1.96 ppb. The average regional concentrations reported by Harkov et al. for NJ were 1.1 ppb during the summer and 2.8 ppb in the winter. The mean concentration measured for samples in all cities during the UATMP was 2.0 ppb, with a range of 0.6 to 4.0 ppb for annual averages of the individual cities. Thus, benzene concentrations in the SI/NJ region are typical of urban cities.

4.3.13 Toluene

The annual mean concentrations of toluene for all sites during the SI/NJ UATAP varied between 1.9 and 4.9 ppb. Harkov et al. reported summer mean values for NJ between 1.8 and 4.7 ppb, while winter mean concentrations varied between 3.4 to 4.9 ppb; it appears that toluene concentrations in the SI/NJ region have not changed significantly with time. The mean from the UATMP was 4.6 ppb, with annual mean concentrations of individual cities ranging from 1.2 to 15 ppb.

4.3.14 o-Xylene

The annual mean concentrations of o-xylene for all sites during the SI/NJ UATAP varied between 0.24 and 0.68 ppb. Harkov et al. reported a summer value of 0.2 ppb for NJ, and winter values between 0.2 and 0.4 ppb. Because of a lack of separation in the analytical process, o-xylene and styrene were reported together in the UATMP data set. Assuming the concentrations reported were mostly o-xylene, the mean concentration of all UATMP samples was 1.1 ppb, and the annual mean concentrations of individual sites ranged between 0.2 and 2.4 ppb. Therefore, the SI/NJ region currently has o-xylene concentrations similar to those measured in 1981/1982, and typical of those found in urban areas.

4.3.15 m- and p-Xylene

Annual mean concentrations of m-, p-xylene for all sites during the SI/NJ UATAP varied between 0.52 and 2.5 ppb. Harkov et al. reported summer values for NJ ranging between 0.49 and 0.99 ppb; and winter values, between 0.9 and 1.8 ppb. In the UATMP, the mean concentration reported for all sites was 3.2 ppb, with the annual mean concentrations of individual cities ranging between 0.67 and 7.0 ppb. Therefore, the SI/NJ region currently has m-, p-xylene concentrations similar to those measured in 1981/1982, and typical of those found in urban areas.

4.3.16 Ethylbenzene

The annual mean concentrations of ethylbenzene for all sites during the SI/NJ UATAP varied between 0.18 and 0.84 ppb. Harkov et al. reported summer values for NJ ranging from 0.17 to 0.33 ppb; and winter values, from 0.23 and 0.51 ppb. The mean concentration reported for samples from all UATMP sites was 0.57 ppb, with annual mean concentrations of the individual cities ranging from 0.12 to 1.4 ppb. This confirms that the SI/NJ region currently has ethylbenzene concentrations similar to those measured in 1981/1982, and typical of those found in urban areas.

4.3.17 Styrene

The annual mean concentrations for the three CSI sites for styrene varied between 0.08 and 0.11 ppb. Harkov et al. reported summer values between 0.07 and 0.13 ppb for NJ; and winter values, between 0.14 and 0.24 ppb. The gas chromatography scheme used for the UATMP did not separate o-xylene from styrene; see item 4.3.15 for o-xylene/styrene results from UATMP.

4.3.18 Chlorobenzene

Chlorobenzene was typically at its MDL of 0.01 and 0.02 ppb during the SI/NJ UATAP. Harkov et al. reported summer concentrations in this region from 0.07 to 0.11 ppb; and from 0.18 to 0.22 ppb during the winter. The mean for chlorobenzene at all sites of the UATMP was 0.13 ppb, but this was skewed by the fact that 2 cities, St. Louis, MO, and Sauget, IL, had concentrations of 0.43 ppb and 0.98 ppb, respectively. For the other 12 cities in the UATMP, the annual mean concentration was 0.02 ppb; and for the entire study, only 25% of the samples had concentrations above the detection limit. Thus, the SI/NJ region currently has concentrations of chlorobenzene lower than those measured in 1981/1982, and similar to those in most urban centers.

4.3.19 o- and m-Dichlorobenzene (1,2- and 1,3- Dichlorobenzene)

These compounds were >MDL for 12 to 19% of the samples at CSI sites (MDLs of 0.01 and 0.02 ppb), and for 0 to 82% of the samples at NYSDEC sites (MDLs of 0.04 and 0.02 ppb) during the second year of the SI/NJ UATAP. The concentrations reported for NJ by Harkov et al. and for the UATMP cities were similar to the CSI sites with respect to percent >MDL.

4.3.20 p-Dichlorobenzene (1,4- Dichlorobenzene)

p-Dichlorobenzene was less than its MDL of 0.02 to 0.04 ppb for ≥80% of the samples during the second year of the SI/NJ UATAP. Similar values were reported previously for this region by Harkov et al. In contrast, a mean concentration of 0.32 ppb was determined by the UATMP. The individual UATMP sites varied from 0.05 to 1.3 ppb, and 10 of the 14 sites had concentrations below 0.2 ppb. The concentration of this compound appears to be lower in the SI/NJ region than in other urban centers.

4.4 DISCUSSION OF RESULTS FOR THE SI/NJ UATAP

In general, the VOC concentrations found in this region are similar to those of other urban areas of the country. The data show general patterns of intersite relationships and temporal variations which are similar to those expected by a knowledgeable air pollution research scientist. However, some of the data for given times or places require further examination to explain variations of interest.

Toluene, the xylenes, and benzene--VOC components of petroleum refineries, gas stations, and automobile emissions--were among the major pollutants found. The common industrial solvents dichloromethane, 1,1,1- trichloroethane, and tetrachloroethene, were also identified in the project area at levels above background. Dichloromethane showed widely varying daily values; the reasons for the variation are not known. The variations are quite different from the relatively uniform pattern of concentrations observed for 1,1,1-trichloroethane. Trichloromethane, trichloroethene, and tetrachloromethane concentrations were observed at low concentrations, most likely the result of background levels present in the atmosphere.

The distribution of pollutant species across the region was relatively uniform, with concentrations of pollutants generally varying between sites by less than 1 ppb. Nevertheless, several important observations can be made by segregating the sites according to laboratory and ranking them by their annual mean concentrations.

1. Site rankings from the first year of the project were consistent with those from the second year of the study, almost without exception. Thus, the pollutant concentration trends seen among a laboratory's various sites are likely to be real, and not sampling artifacts.

2. Within laboratories, the site rankings for benzene, toluene, m- and p-xylene, and o-xylene were identical, except for a few reversals between two adjacently-ranked sites, when the concentration differences between these sites was < 0.1 ppb. This apparent correlation for these pollutants was expected, since these compounds are components of several sources which may be significant factors in VOC pollution in the project area.

3. Among all sites in the project, site 1 (Susan Wagner) and site D (Piscataway, the background site) had the lowest or near-lowest pollutant concentrations for almost all compounds. Although site D typically had lower concentrations than site 1, it is difficult to determine whether these differences are significant. For the CSI sites--Bayley Seton, Dongan Hills, and Eltingville (sites 3, 6, and 8)--the concentrations reported were greater than those for sites 1 or D by a margin likely to be significant. The low concentrations observed at site D were expected because of its upwind location from the more densely

populated project area. This, in fact, was the reason for choosing Piscataway as the background site for the project. The low concentrations at site 1 may be due to site location; this site was located at one of the highest geographical points on Staten Island, and sampled at a height of 18.8 meters above ground--higher than the typical 7- to 10-meter height that was used at other sites in the project.

4. 1,1,1-trichloroethane was found to be uniformly distributed throughout the project area. It showed remarkable quarter-to-quarter consistency in its mean concentration relative to the other VOC compounds, with the exception of those compounds at or near the detection limit.

5. For some compounds, point sources may play an important role in explaining the site-to-site variability observed; see the following examples:

   a. Tetrachloroethene concentrations were dramatically higher at sites 6 and 7 (Dongan Hills and the Pumping Station) than at all other sites in the project area. These elevated concentrations were consistent on a quarterly basis as well. Site 6 appears to have been affected by dry cleaning establishments close to the monitoring site. The site 7 results are unexplained, but may be affected by emissions from the sewage pumping station.

   b. Trichlorethylene and trichloromethane (chloroform) concentrations were almost two times higher at site 7 (Pumping Station) than at other NYSDEC sites (sites 1,2,4,5, and 9), where pollutant concentrations were close to their detection limits. No point source has been identified in relation to this observation; but publicly-owned treatment works (POTWs) are known to be major point sources of chlorinated VOCs. This may indicate likely pumping station emissions.

4.5 CONCLUSIONS

The objective of the ambient air portion of the SI/NJ UATAP was to characterize the air quality in the project area for selected parameters for the purpose of providing data for an exposure assessment. This task was carried out by a diverse group consisting of federal, state, and university personnel, with each contingent using its own equipment, techniques, methods, and philosophies. The challenges inherent in such an approach were met through successful coordination of effort by the extraordinary cooperation of each of these agencies as well as extensive quality assurance, which allowed meaningful data to be collected.

The results of the ambient air portion, first and foremost, produced an ambient air profile for the project area. Although the distribution of measured pollutants was generally uniform in the project area, significant differences may exist within this overall appearance of homogeneity that indicate the importance of geography and point sources. Concern that pollutant concentrations in the project area were greater than the range observed for other urban cities was not supported by the data. Furthermore, comparison to the Harkov data indicates that currently the SI/NJ area is less polluted than it was in the early 1980s.

An important product of this project was the development of expertise in air toxics monitoring. As a result, air monitoring groups in the region have the knowledge of, and experience with, the strengths and limitations of air toxics methods and the quality assurance needs required to conduct their mission.

The intercomparisons of the results from the SI/NJ UATAP, 1989 UATMP, ATEOS, and TEAM studies indicate that the SI/NJ area is not remarkably different from other urban areas in the United States. In fact taking benzene and toluene as indicator chemicals, the levels of the volatile organics for the sites in the SI/NJ UATAP are similar to those found in Washington, DC, or Detroit, MI. Further, there were no VOCs with unusually high values in SI/NJ; whereas concentrations for some of the UATMP locations were widely divergent, as in the case of the very high toluene concentrations at Sauget, IL.

4.6 ACKNOWLEDGEMENT

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Table III-4-1: Minimum detection limits for second year of SI/NJ UATAP VOCs data (Oct. 1988 - Sept. 1989)

Minimum detection limits, ppb

Chemical	NJIT	NYSDEC	CSI
chloromethane	---	---	---
dichloromethane	---	0.04	---
trichloromethane	0.01	0.04	0.02, 0.01
tetrachloromethane	0.05, 0.1, 0.01*	0.06	0.04, 0.02
dichloroethane, 1,1-	---	---	0.02, 0.01
dichloroethane 1,2-	---	0.04	0.02, 0.01
trichloroethene	0.01	0.02	0.02, 0.01
trichloroethane, 1,1,1-	0.01	0.06	0.04, 0.02
trichloroethane, 1,1,2-	---	0.04	0.04, 0.02
tetrachloroethene	0.01	0.04	0.05, 0.03
tribromomethane	---	---	0.02, 0.01; & 0.04, 0.02
hexane	0.01	---	0.1, 0.05
benzene	0.01	0.20	0.13, 0.06
toluene	0.01	0.1	0.4, 0.2
xylene, o-	0.01	0.04	0.2, 0.1
xylene, m- and p-	0.01	0.04	0.4, 0.2
styrene	---	---	0.03, 0.015
ethylbenzene	---	0.04	0.2, 0.1
chlorobenzene	---	0.02	0.02, 0.1
dichlorobenzene, 1,2-	---	0.04, then 0.02	0.02, 0.01
dichlorobenzene, 1,3-	---	0.02	0.02, 0.01
dichlorobenzene, 1,4-	---	0.02	0.4, 0.2

* The monthly (daily) and quarterly data reports and final QA reports contain different values for the MDL--0.1, 0.01, and 0.05 ppb, respectively.

Table III-4-2: Ratio of number of samples greater than the MDL to number of valid samples for VOCs in the second year of the SI/NJ UATAP (Oct.1988 - Sept.1989)

Chemical	NJIT				NYSDEC						CSI		
	Cart	Eliz	Sew	Piscat	SusWag	PS-26	PrtRich	Pump	GtKills	Tott	B-Seton	Eltvl	Dongan
chloromethane	-	-	-	-	-	-	-	-	-	-	-	-	-
dichloromethane	-	-	-	-	36/50	49/54	58/67	44/55	31/53	41/52	-	-	-
trichloromethane	19/53	19/57	19/36	19/42	26/50	33/54	46/67	50/55	33/53	34/52	179/197	159/177	165/182
tetrachloromethane	53/53	57/57	37/37	42/42	34/50	34/54	36/67	37/55	34/53	40/52	193/197	176/177	177/183
dichloroethane, 1,1-	-	-	-	-	-	-	-	-	-	-	6/197	21/177	5/182
dichloroethane, 1,2-	-	-	-	-	15/38	13/31	12/55	9/42	6/41	6/39	183/197	155/177	161/181
trichloroethene	36/53	31/57	24/37	24/42	27/35	32/39	39/52	38/40	29/38	28/37	188/197	163/177	178/182
trichloroethane, 1,1,1-	53/53	57/57	37/37	42/42	49/50	52/54	65/67	53/55	51/53	49/52	195/195	176/176	179/179
trichloroethane, 1,1,2-	-	-	-	-	0/50	3/54	3/67	0/55	0/53	0/52	1/197	-1/177	0/182
tetrachloroethene	49/53	57/57	36/37	42/42	40/50	50/54	62/67	55/55	45/53	46/52	196/196	170/176	182/182
tribromomethane	-	-	-	-	-	-	-	-	-	-	1/196	0/176	0/181
hexane	53/54	56/56	42/42	42/42	-	-	-	-	-	-	197/197	173/173	180/180
benzene	53/53	57/57	36/36	42/42	50/50	54/54	67/67	54/55	53/53	52/52	196/196	171/171	177/177
toluene	53/53	53/53	53/53	53/53	50/50	54/54	67/67	55/55	43/43	52/52	193/193	176/176	182/182
xylene, o-	53/53	53/53	53/53	53/53	50/50	54/54	64/64	51/52	50/50	49/49	194/194	173/174	178/179
xylene, m- and p-	53/53	53/53	53/53	53/53	49/50	54/54	67/67	55/55	53/53	52/52	176/176	155/155	162/162
styrene	-	-	-	-	-	-	-	-	-	-	187/194	167/174	177/178
ethylbenzene	-	-	-	-	50/50	53/54	67/67	55/55	53/53	52/52	195/195	172/174	180/180
chlorobenzene	-	-	-	-	4/50	13/54	7/67	9/55	4/53	2/51	50/196	39/175	39/181
dichlorobenzene, 1,2-	-	-	-	-	5/50	12/54	4/67	5/55	4/53	0/52	29/194	32/174	25/179
dichlorobenzene, 1,3-	-	-	-	-	26/50	29/54	39/67	33/55	31/53	32/52	37/194	20/173	22/179
dichlorobenzene, 1,4-	-	-	-	-	1/50	4/54	12/67	11/55	8/53	5/52	20/194	20/173	12/179

Footnotes:

This information was gathered from the quarterly QA reports prepared by NYSDEC, CSI, and NJIT.

NYSDEC trichloroethene: Apr and Jul '89 were problem and invalid samples, respectively.
dichloroethane, 1,2-: Apr. '89 is missing.
dichlorobenzene, 1,2-: Detection limit was lower for the ATD-50 tubes (0.02 ppb) than for the Envirochem tubes (0.04 ppb).

CSI m- and p-xylene: Apr '89 is missing.
For all compounds, most of samples were taken in Oct '88 and Jan '89 quarters. No more than 8 samples were from Apr '89; no more than 20 were from Jul '89.
tribromomethane: Detection limits as 0.02 and 0.01 ppb for Oct '88 and Apr '89 quarters; 0.04 and 0.02 ppb for Jan '89 and Jul '89 quarters.
1,1,2-trichloroethane: In Apr '89 quarterly report, # > mdl is -1; and 0.017, a value < the mdl, is the max.

NJIT tetrachloromethane: Monthly, quarterly, and final QA reports contain different values for the mdl--0.1, 0.01, and 0.05 ppb, respectively.
Where no samples are > mdl on quarterly report, quarterly avg. was the mdl, not half the mdl; e.g., see dichloromethane, trichloromethane.

5. EMISSION INVENTORY

5.1 INTRODUCTION

The development of a volatile organic compounds/air toxics emission inventory for the SI/NJ UATAP area was considered essential for understanding the urban air toxics problem in the area and facilitating evaluation of general abatement strategies for toxic air pollutants. The inventory included only those discharges, whether direct or indirect, emitted into the ambient atmosphere from specific source categories. Sources were categorized as point, area and mobile sources. Among the types of sources not included are aircraft operations and marine and rail activities. Sections 5.1.1 through 5.1.3 provide a full description of the scope of the source types or categories included in the project emissions inventory.

The bounds of the study area for area and mobile sources were Middlesex (88% of the population) and Union Counties in New Jersey, and Staten Island (Richmond County) in New York. For the point source portion of the inventory, sources in Monmouth, Essex, and Hudson Counties in New Jersey, and in Brooklyn (Kings County) in New York were considered, as well.

5.1.1 Point Sources

The point source category covers any facility located in the defined study area (see Figure III-5-1) and included in the following:

(1) the 1988 Toxic Chemical Release Inventory (TRI);
(2) the NJDEP Air Pollution Enforcement Data System (APEDS);
(3) the NYSDEC Source Management System (SMS);
(4) the New York City Department of Environmental Protection (NYCDEP), Bureau of Air Resources Air Management Information System (BARAMIS);
(5) the EPA Region II/Air Programs Branch POTW Emission Inventory; and/or
(6) certain area source categories originally evaluated under the area source inventory and selected for inclusion as point sources because of the strength of their emissions. These were landfills; hazardous waste treatment, storage, and disposal facilities (TSDFs); publicly-owned treatment works (POTWs); hospital sterilizers; and industrial dry cleaners.

Except for the types of sources noted in Section 5.1.2 Area Sources, sources were included if they emitted, or had a potential to emit, the air toxics listed in Table III-5-1.

Generally, point sources cover emissions which are released into the atmosphere from a combination of stacks, exhaust vents, ducts, pipes, or other confined air streams, and storage tanks. These emissions were aggregated into a facility-wide total for the purposes of this project. For the 1988 TRI data, the facility-wide total also included fugitive emissions which are emissions not released through readily-identifiable, confined air streams. Fugitives include emissions, evaporation, leakage, or releases from the following sources: blending operations; transfer operations; charging and discharging of reaction vessels; storage piles; leaking seals, pumps, flanges, valves, etc.; furnaces or kilns; open vats or pits; crushing, pelletizing or grinding operations; and, loading and unloading operations.

5.1.2 Area Sources

The term area source applies to stationary sources which are usually too small and/or too numerous to be included singly under the definition of point source. For this project, only the following activities were included under the definition of area source:

- architectural coating
- area (residential) oil heating
- area (residential) wood burning
- auto refinishing [specifically, operations under the Standard Industrial Classification (SIC) 7532 (Prentice Hall, 1988)]
- cold degreasing
- consumer solvent use
- dry cleaning (SIC 7215 - coin operated)
  (SIC 7216 - commercial)
- gasoline distribution, retail (SIC 5541) (i.e. gas tank filling)

5.1.3 Mobile Sources

The term mobile source applies to motor vehicles which routinely use the roadways, including motorcycles, light-duty gasoline-fueled cars and trucks, light-duty diesel-fueled cars and trucks, medium-duty gasoline and diesel-fueled trucks, heavy-duty gasoline and diesel-fueled trucks, and gasoline and diesel-fueled buses.

5.1.4 Unified Data Base

In the early stages of the project, it was recognized that there would be difficulty in establishing a common denominator for the emission inventory. Therefore the concept of a unified data base was adopted. The primary goal of the unified data base was to simplify very complex sets of data into a common format specifically directed toward tabular summaries and graphic presentations of the air toxics emissions data. There are both advantages and limitations to assembling the data in such a manner. In doing so, the specific differences of the original data bases may be lost and the summarizations may be oversimplified. This could lead to incorrect interpretations of the data. To avert this situation, the following report, and specifically Section 5.7 Limitations in the Inventory provides detailed information on the origin of the data and attempts to place this emission inventory in its proper perspective.

5.1.4.1 Point source data base

Both New Jersey and New York regulate air toxics emitted from point sources but take somewhat different approaches with respect to reporting criteria and the types of information to be reported. The use of the 1988 TRI data interjects a third set of reporting criteria and information into the emission inventory data base. The EPA Region II POTW inventory provides a fourth approach to point source emissions assessment. And, finally, the assessment of potential emissions from area sources treated as point sources provides additional point source emissions assessment methods. Therefore, the point source data were assembled into a unified data base in a LOTUS 1-2-3 format which included the following information for each substance:

- facility name
- street address (physical location)
- municipality
- zip code
- Universal Transverse Mercator (UTM) coordinates
    - northing
    - easting
- facility-wide emissions data

5.1.4.2 Area and mobile source data base

The area and mobile source activities data were assembled in LOTUS 1-2-3, as well. The source activities were evaluated on a regional basis, as opposed to a point location basis, and the emissions source strength for each activity was entered into a network of grid cells. Refer to Section 5.2 Methodologies for a detailed discussion of this approach.

5.1.5 Tabular and Graphic Presentation

The original scope of the Emission Inventory Subcommittee workplan included the consideration of more than 40 unique chemicals and chemical compound categories. (Refer to the project workplan in Volume VI.) Due to significant resource constraints, the inventory was scaled down to cover the 14 unique chemicals and one chemical category (cadmium) listed in Table III-5-1. Of the substances on this short list, five were chosen for graphical presentation of the data. For each of the five substances, emission density maps were generated to show the combined source strengths for the area and mobile source activities; and bubble maps, to show the individual source strengths for the point sources. Refer to Section 5.5 for a description of the mapping techniques. The five substances mapped were benzene, cadmium and compounds, dichloromethane, formaldehyde, and perchloroethylene.

5.2 SUBSTANCE LIST

As stated previously, the list of toxic substances considered for the emission inventory included more than 40 chemicals and chemical compound categories. Substances were added to the original list based upon consideration of (1) toxicity factors; (2) significant quantities of potential emissions (as identified through the state point source inventories); (3) identification through analysis of the air monitoring samples; and (4) recommendations of other subcommittees. This effort resulted in the two lists found in the Emission Inventory Subcommittee workplan included in Volume VI.

With the realization that resources were not available to prepare the planned comprehensive inventory, emissions information for certain substances were omitted for the following reasons: (1) their relatively low toxicities (specifically barium, cobalt, copper, iron, manganese, molybdenum, vanadium, and zinc); (2) the likelihood that they would not be detectable using the ambient sampling techniques adopted by the project (e.g., for bromoform, p-dichlorobenzene, and 1,1,2-trichloroethane); and, in reference to metals and compounds containing them, (3) the possibility that data base searches for the many compounds that might contain a given metal would yield no sources in the project area.

The final list of 15 substances included in the inventory is found in Table III-5-1. These substances were selected for the following reasons: (1) relatively high quarterly average ambient air concentrations observed in this project; and (2) relatively high unit risk rankings (i.e. quantity of emissions x toxicity factor) in other studies (U.S. EPA, 1985; and U.S. EPA, 1989).

5.3 METHODOLOGIES

A wide variety of methodologies was applied to generate not only the source activities emission inventories, but also the tabular and graphical presentations of the data.

A review of the available information showed that the existing state inventories were restricted to point sources. Developing a comprehensive inventory of air toxics emissions depended in part on contributions to specific pollutant inventories from non-industrial, non-point sources, because these types of sources may contribute significantly to overall air toxics exposures. In a 1985 report, the U.S. EPA (EPA) first emphasized the potential contributions of area sources and mobile sources to air pollution (U.S. EPA, 1985). Therefore, the development of a comprehensive inventory necessitated the generation of information previously unknown or unavailable to the project participants.

For this project, the NJDEP entered into a contract with the consulting firm of Engineering-Science of Fairfax, Virginia, to provide a screening-level air toxics emissions inventory for specific area sources and for mobile sources in Middlesex and Union Counties. One result of the contract was the New Jersey Area Source Emissions System (ASES) (NJDEP, 1989). NJDEP shared the area source emissions estimation procedures with NYSDEC and EPA Region II, which then produced estimates for sources within the New York portion of the project area.

5.3.1 Point Source Inventories

At the outset of this project (Fall 1986), the foundation of the emission inventory was the existing point source data bases of NJDEP and NYSDEC. Similarities and differences between the data bases were evaluated in a search for commonalities between the two. Later, another source of information became available in the form of the Toxic Chemical Release Inventory (TRI). Available expertise allowed development of an inventory for publicly-owned treatment works (POTWs), considered a significant source of potential air toxics emissions. Sections 5.3.1.1 through 5.3.1.5 discuss in detail the emissions assessment methodologies for point sources.

The TRI was used as a primary source of air emissions data for point sources. The state permit inventory data bases were used to supplement the point source inventory for those facilities not included in the TRI, as well as to identify the permit-allowable emission rates for TRI-covered facilities. The POTW inventory, the landfill inventory, and the inventory of treatment, storage, and disposal facilities (TSDFs) for hazardous wastes provided additional information.

The geographical locations of the sources were identified to confirm their presence within the project boundaries. This was accomplished either by UTM coordinates (derived from APEDS or SMS) or, in the case of TRI facilities, by latitude/longitude coordinates converted to UTMs. These data fields were an integral component of the emissions mapping effort.

The point source inventory data are presented in Tables III-5-2 through III-5-16 in the appendix of this volume. In the summary of the point source data, the data for isomers of xylene (i.e., m-xylene, o-xylene, and p-xylene) were aggregated with "xylene mixed isomers" for consistency in presentation with the area and mobile source data.

5.3.1.1 1988 Toxic Chemical Release Inventory

The Toxic Chemical Release Inventory (TRI) was established pursuant to the Superfund Amendments and Reauthorization Act of 1986 (SARA) (P.L. 99-499), Title III, Section 313. Section 313 requires certain manufacturing facilities within Standard Industrial Classification (SIC) codes 20 through 39 to complete Toxic Chemical Release Inventory reporting Forms (Form R) if certain manufacturing, processing, or use thresholds are met. The 1988 reporting year TRI data base was chosen as the major source of air emissions data for point sources since it coincided with a full calendar year of monitoring data collection. Also, the TRI is considered to be an inventory of actual emissions because the information was provided by the facilities based upon actual operating hours, and either documented emissions estimates or actual emissions.

The SARA reporting thresholds for reporting year 1988 were 50,000 pounds for "manufacturing" and "processing", and 10,000 pounds for "otherwise use." EPA Region II staff generated computer reports for the 15 substances in Table III-5-1 for facilities both in New Jersey and New York. The data are contained within the national Toxic Release Inventory System maintained by EPA at Research Triangle Park, North Carolina. Facilities within the project area were identified by their municipality location. Where available, the latitude/longitude coordinates were converted to UTMs, and this information was entered into the unified data base. When they were not available, United States Geological Survey maps were used to identify, as accurately as possible, the UTM coordinates for the facility.

The 1988 Form R data include both stack air and fugitive air emissions on a facility-wide basis. These emissions were aggregated and converted from pounds per year to tons per year for use in the point source inventory.

5.3.1.2 Air Pollution Enforcement Data System (APEDS)

APEDS is the New Jersey data management computer system containing stationary source air pollution emission data and related enforcement and permitting data. Substance-specific reports, generated in December 1989 and January and March 1990, provided permit-allowable emissions data which were used to supplement the 1988 TRI data base.

NJDEP staff reviewed substance-specific reports and identified all facilities within the project area. Appropriate and available information was entered from the substance-specific reports into the unified data base. The APEDS facility listing also provided UTM coordinates and zip codes.

APEDS substance-specific reports provided emissions information for equipment at the source level. "Source operation" means any process or any identifiable part thereof having the potential to emit any air contaminant either directly or indirectly into the outdoor atmosphere. Governing regulations are found in New Jersey Administrative Code Title 7, Chapter 27, Subchapter 8, Permits, and Certificates, Hearings, and Confidentiality. The maximum allowable emission rate in tons per year for each source was calculated using APEDS information on emissions rates (lbs/year) and hours of operation (hours/year).

The allowable rates for all sources (by substance) at the facility were aggregated for use in the point source inventory. Note that the hours of operation in APEDS are generally the maximum potential hours of operation for the permitted source; therefore, the APEDS emissions are not actual emissions.

5.3.1.3 Source Management System (SMS)/BARAMIS

SMS is the New York State computerized permitting and enforcement system comparable to APEDS. NYSDEC staff reviewed substance-specific reports and identified all facilities within the project area. Appropriate and available information was entered from the substance-specific reports into the unified data base.

The SMS facility listing also provided UTM coordinates and zip codes. SMS substance-specific reports provided emissions information for equipment at the source level. Governing regulations in New York are found in Chapter 6 of the state Compilation of Codes, Rules and Regulations. For New York State sources, the maximum allowable emission rate information is listed on the application form and entered into SMS.

The NYCDEP BARAMIS is a subset of the state SMS. Permit applications for industrial processes, and combustion and incineration sources are reviewed directly by NYCDEP; then the emissions data are entered into BARAMIS and provided to NYSDEC.

5.3.1.4 EPA Region II POTW inventory

This POTW inventory, prepared by EPA Region II, includes facilities in New Jersey and New York. The basis for the POTW inventory was a paper by Baamonde and Martinovich (1987) which devised a methodology for estimating speciated VOC emissions from sewage treatment plants. The requirements for making the calculations in the paper were speciated influent data for each POTW, flow rates, removal efficiencies for each pollutant, and published tables (U.S. EPA, 1986) which show expected rates of volatilization for each pollutant. The data provided by these calculations were acknowledged by the authors as providing order-of-magnitude estimates only. In the aforementioned paper, the authors sought to address only total photochemically-reactive VOC emissions.

For the project POTW inventory, New York City POTW emissions were taken directly from the data developed for the paper by Baamonde et al. Total emissions for New Jersey POTWs were provided by NJDEP in a May 18, 1990, report that was part of its State Implementation Plan (SIP) submittal. In many cases the New Jersey data were significantly different from those developed earlier by Baamonde et al. for the same facilities; in order to maintain consistency between data bases, the New Jersey SIP figures for total VOCs were used.

While the New Jersey SIP data did not include speciated emissions, they did include total VOC emissions for more POTWs than available from Baamonde et al. The following methodology was devised to speciate total VOC emissions based upon the results of Baamonde and Martinovich:

Step 1- Where the total VOCs based on New Jersey SIP data and on the Baamonde et al. data did not agree, the speciated Baamonde et al. data were prorated so that the total VOC level matched the New Jersey SIP level.

Step 2- The speciated Baamonde et al. data were summed for each pollutant and divided by the total VOC emissions to develop a profile of an average POTW (i.e., of the total VOC emissions, "x" percent as toluene, "y" percent as benzene, etc.).

Step 3- The additional New Jersey POTWs included in the New Jersey SIP submittal were speciated according to the average POTW profile from Step 2, based upon the total VOC emissions of the POTW.

The results are presented in Appendix A, Table III-5-A-1.

5.3.1.5 Area sources treated as point sources

Five source categories, all of which are non-traditional sources with respect to air permitting activities, were originally evaluated under the area source assessment procedures. Based upon the physical size of the facilities and the manageable number of facilities within the project area, it was determined that these activities should be included in the point source inventory instead of the area source inventory. Potential emissions for the following activities were evaluated for inclusion within the point source data base:

- landfills
- hazardous waste treatment, storage, and disposal facilities (TSDFs)
- publicly-owned treatment works (POTWs)
- hospital sterilizers
- industrial dry cleaners (SIC 7218)

Air emissions from such activities are substantially fugitive in nature. Therefore, air toxics emission inventories generally do not exist for these source categories. The emission inventory for the activities within New Jersey was developed by Engineering-Science; the data are managed by ASES. Of the five categories listed above, two (dry cleaners and hospital sterilizers) were covered in the NYSDEC SMS. The NJDEP APEDS covered four of the categories (landfills, TSDFs, hospital sterilizers, and industrial dry cleaners), although probably did not include all such sources at the time. The air toxics emissions data for these non-traditional categories are included in the substance-specific summary tables, Tables III-5-4 through III-5-18 in the appendix of this volume.

▸ Landfills emission inventory. Site-specific information on landfills was obtained from the NJDEP, Division of Solid Waste Management, Landfill Engineering (NJDEP, 1987); the NYSDEC Region 2 Air Program; and the New York City Department of Sanitation (Gleason, 1992). Facility name, location, acreage, and depth information was supplemented with regression, or averaged, data when modeling parameters were unavailable. See Emission Inventory Appendix B, Table III-5-B-1 in the appendix of this volume for a complete listing of the facilities evaluated in this inventory and a description of how emission rates were calculated.

▸ Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs) emission inventory. Hazardous waste TSDFs are non-traditional sources; little air toxics emission information existed for this category. The data available concerning amounts of materials handled and handling activities did not detail how much was handled in what way. Only those facilities which were clearly engaged in the processing and treatment of hazardous wastes were included in this inventory. Emission rates were estimated using emission factors derived from EPA documentation (U.S. EPA, 1985a; U.S. EPA, 1985b). (There were no sources in the New York State region of this study.) See Table III-5-C-1 in the appendix of this volume for a listing of the facilities evaluated in this inventory.

▸ Publicly-Owned Treatment Works (POTWs) inventory. As described above in Section 5.3.1.4, the EPA Region II POTW inventory was chosen as the primary source of data for this category, with ASES POTW data used to supplement the EPA data base and to compare with the EPA POTW data as a quality assurance check. See Emission Inventory Appendix A in the appendix of this volume for the list of New Jersey POTWs considered in ASES and all POTWs considered in the project inventory.

▸ Hospital sterilizers inventory. Only hospital sterilizers that use ethylene oxide were considered for the point source inventory. Since ethylene oxide was not considered in the final list of fifteen pollutants for the inventory, these emissions were not reported in the project inventory.

▸ Industrial dry cleaners inventory (SIC 7218). Emissions for industrial dry cleaners are reported in APEDS and SMS. There were no sources in this SIC code within the project area and, therefore, no emissions were reported in the project inventory.

5.3.2 Area Source Inventories

The development of air toxics emissions estimates was based upon methods utilizing demographic data. The data included population and fuel use information. U.S. EPA documents on area source emission inventory preparation were used as general guidelines (U.S. EPA, 1981). Total VOC emissions on a per capita basis were estimated for the activities. Speciation factors from published data (U.S. EPA, 1980a) were used to generate emissions factors for the relevant individual pollutants.

5.3.2.1 NJDEP area source emission inventory - Area Source Emission System (ASES)

New Jersey area source emissions data were assembled to create ASES. To start the process of organizing the data, a grid cell procedure was designed for the study area using square cells of two kilometers (2km) per side. Grid cells were superimposed upon the geographic region based upon boundaries defined as fifths of Universal Transverse Mercator (UTM) 10,000 meter grids. Figure III-5-2 shows the resulting grid cell network. The cells were enumerated by row and column number (starting at the bottom left cell) and entered into a PC-based data management system, the Area Source Emissions System (NJDEP, 1989). Additional identification information was added in the prefix and the suffix of the grid cell code. A prefix of "1" represents Middlesex County, while "2" represents Union County. A suffix of "1" indicates that the entire cell area is within the identified county, while a "9" means that only a portion of the cell area is within the identified county.

Since many emission estimates were based upon population, assignment of cell population within Middlesex and Union counties was rigorously determined using tract-level information and 1986 census updates. Estimates based on population were generated from previously published data (NJDOL, 1987; Hughes, 1987; and Fahley, 1987). Population by census tract was allocated to individual cells based on 1986 and 1988 U.S. Bureau of the Census maps and the defined grid network.

The emission estimates (in 1986 tons per year) for the area source categories are summarized in Table III-5-19 in the appendix of this volume.

▸ Architectural coatings. Air toxics emissions estimates for architectural coating operations were generated on a per capita basis using published VOC and species emission factors (U.S. EPA, 1980a; U.S. EPA, 1981) in conjunction with the population data to generate emissions estimates for toluene and xylene. See Emission Inventory Appendix D for a description of how emission rates were calculated.

▸ Area (residential) wood heating. Air toxics emissions from residential wood heating were estimated using a procedure developed by Lipfert (Lipfert, 1982). Wood use per household was estimated using a logarithmic formula which predicts a maximum per capita consumption at a population density of 5,360 people per square mile. Emissions were determined using the estimated wood use per cell with emissions factors proportional to this use. This category was not evaluated by NYSDEC and, therefore, estimated emissions for Middlesex and Union counties only are presented.

▸ Area (residential) oil heating. In order to estimate air toxics emissions from residential oil heating, 1986 New Jersey fuel use information was allocated to the per capita level within Middlesex and Union counties. Published emission factors for cadmium and formaldehyde (U.S. EPA, 1980a; U.S. EPA, 1981; U.S. EPA, 1983) were converted from a picogram per joule basis to a pound per capita basis using the statewide fuel use data. See Emission Inventory Appendix D for a description of how emission rates were calculated.

▸ Auto refinishing. Air toxics emissions estimates from auto refinishing were determined on a per capita basis. Published VOC and species emission factors (U.S. EPA, 1980a; U.S. EPA, 1981) were used in conjunction with the population data to generate emissions estimates for toluene and xylene. See Emission Inventory Appendix D for a description of how emission rates were calculated.

▸ Cold degreasing. Cold degreasing describes only small parts cleaning operations such as those found in machine shops or garages. The per capita factor for total VOCs was reduced by 50% to account only for on-site emissions (U.S. EPA, 1980b). Speciation was obtained from a national emissions profile contained in Table B-1 of "Control of Volatile Organic Emissions from Solvent Metal Cleaning" (U.S. EPA, 1977). See Emission Inventory Appendix D for a description of how emission rates were calculated.

This category is likely to include activities which are also covered within other parts of the point and area source inventories. Unlike the emissions reported for those other categories, however, emissions from this category are likely to be fugitive in nature and, hence, are regarded as unlikely to be double-counted in the project inventory as a whole.

▸ Consumer solvent use. Air toxics emissions from consumer solvent use were determined on a per capita basis. Published emission factors (U.S. EPA, 1980a; U.S. EPA, 1981; U.S. EPA, 1985) were used in conjunction with the population data to generate emissions estimates for formaldehyde. See Emission Inventory Appendix D for a description of how emission rates were calculated.

▸ Dry cleaning. Air toxics emissions of perchloroethylene from commercial and coin-operated dry cleaning operations were determined on a per capita basis. Published emission factors (U.S. EPA, 1980a; U.S. EPA, 1981) were used in conjunction with the population data to estimate emissions. See Emission

Inventory Appendix D for a description of how emission rates were calculated.

▸Gasoline distribution. Air toxics emissions estimates for gasoline distribution were based upon 1986 New Jersey fuel use data. For gas tank filling, an AP-42 emission factor (U.S. EPA, 1987) was used to generate an estimate for total VOCs by county; these VOCs estimates were reduced to appropriate per capita emission factors (U.S. EPA, 1981) in conjunction with the fuel use data and cell population data. See Emission Inventory Appendix D for a description of how emission rates were calculated.

5.3.2.2 NYSDEC area source emission inventory - Staten Island Area Inventory (SIAIR)

In order to continue with the concept of a unified and consistent data base, NYSDEC followed a procedure similar to the NJDEP ASES for area source categories even though it may have had information on some of the categories in SMS. For consistency, the New Jersey emissions factors were applied to the New York area source types. The area source categories included by NYSDEC were the same as those identified in Section 5.1.2, with the exception of residential wood heating, which was not evaluated for New York.

5.3.3 Mobile Source Inventories

As with area source estimates, mobile source estimates are important because of their potentially large contribution to the overall inventories for particular pollutants. Mobile source inventories for total VOCs have been prepared for years in support of state implementation plans (SIPs) for the attainment of the National Ambient Air Quality Standard for ozone. The interest in air toxics emissions from motor vehicles has resulted in an assortment of emission factors by which the magnitude of the problem may be assessed. Table III-5-3 presents the mobile source emissions inventory for the project. Table III-5-E-1 presents the emission estimates provided by NJDEP, NYSDEC, and EPA Region II. Table III-5-E-2 contains the emission factors used to generate the estimates.

5.3.3.1 NJDEP mobile source inventory

The NJDEP mobile source inventory is managed by ASES. Estimates of emissions from mobile sources were based on numbers generated by NJDEP and the New Jersey Department of Transportation (NJDOT, 1987) for the 1986 Reasonable Further

Progress report for ozone and carbon monoxide (NJDEP, 1987). NJDOT assembled speed and truck fractions information from traffic-counting stations statewide as input for analysis using the model MOBILE3.

MOBILE3 is an EPA computer program that calculates emission factors for hydrocarbons (HC), carbon monoxide, and oxides of nitrogen from gasoline-fueled and diesel-fueled highway motor vehicles. Emission factors are calculated for eight individual vehicle types. Emissions estimates depend on various conditions such as vehicle mix, fleet age, mileage accumulation rates, vehicle speeds, and meteorological data.[1]

MOBILE3 summaries for Middlesex and Union Counties were developed by NJDEP. These summaries included total HC emissions in metric tons per day and vehicle miles traveled per day (VMT) at the county level.

Available emission factors relevant to the pollutants under study were reviewed; the most conservative, most recent emission factors which represented fleetwide emissions (Carey, 1987; Carhart and Walsh, 1987; U.S. EPA, 1985b) were selected for speciation of the emissions. Emission factors provided on a grams per mile basis were multiplied by countywide VMT; and those provided on a percent of HC basis, by countywide HC to generate countywide emissions for each chemical.

For each chemical, the speciated emissions totals for Middlesex and Union Counties were divided by the combined total populations of those counties to yield a per capita emission factor. Emissions were allocated to grid cells by multiplying the per capita emission factor by population of the cell. See Emission Inventory Appendix E in the appendix of this volume for the mobile source emission factors and the resulting emissions estimates.

The NJDEP emission estimates (in 1986 tons per year) for the mobile source inventory are presented in Table III-5-E-1.

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[1] MOBILE3 has been superseded by the MOBILE4 and MOBILE4.1 editions of the model released in 1989 and 1991, respectively. MOBILE3 estimates hydrocarbons (HC) not VOC; whereas MOBILE4 and MOBILE4.1 estimate VOC as well as HC. NJDEP used the MOBILE3 HC estimate as a VOC estimate.

5.3.3.2 NYSDEC mobile source inventory

NYSDEC developed a mobile source inventory for Staten Island; it is managed by the SIAIR data base. NYSDEC estimated VMT and VOC emissions as described below.

Estimates of VMT for Staten Island were obtained from the New York Metropolitan Transportation Council. Staten Island was divided into three zones and the VMT were apportioned into 1km x 1km grid cells. Data were provided by street type--expressway, arterial, or local. For mapping purposes, the 1km x 1km grids were combined to form 2km x 2km grid cell values.

Estimates of total HC mobile source emissions per day for Staten Island were based upon NYSDOT data, a run of MOBILE3 (NYSDEC, 1989), and an EPA emission report for light-duty gasoline-fueled vehicles within the New York City Metropolitan Area (Butensky, 1990). Since mobile source HC emissions are in direct proportion with the VMT, the emissions were apportioned to the grid cells based on the VMT data.

NYSDEC used the same VMT-based (grams per mile) and composition-based (% of total HC) pollutant-specific emission factors as NJDEP. These factors were multiplied by the HC per cell or VMT per cell to arrive at pounds pollutant per cell. The resulting emission estimates are presented in Table III-5-E-1.

5.3.3.3 EPA Region II mobile source inventory

EPA Region II also developed a mobile source inventory for the study region. It was used as a quality assurance check of the state inventories; and as a source of an emission estimate for hexane, which was not included in the state inventories.

The emissions estimates developed by EPA Region II are found in Emission Inventory Appendix E. The EPA Region II mobile source emissions inventory covered all of Union County, Staten Island, and Brooklyn, and portions of Middlesex (88.1%), Hudson (77.8%), Essex (72.9%), and Monmouth (30.4%) Counties. (See Table III-5-E-1.) This is a larger area than that covered by the state inventories. The values for the percent of the county included were based upon the population of the covered municipalities according to 1988 census data (USDOC, 1988).

The generation of the EPA Region II mobile source emissions estimates proceeded as described below.

1. New Jersey (NJDOT, 1990) and New York (NYSDEC, 1989) mobile source data in terms of annual mean HC emissions were

assembled as VOC tons per day (TPD) per county[2] (Butensky, 1990). Table III-5-E-3 presents VOC data for light-duty gasoline vehicles within five counties in New Jersey (Essex, Hudson, Middlesex, Monmouth, and Union) and two boroughs of New York City (Brooklyn and Staten Island).

2. The percent of each county to be used in the estimates was established by summing populations of covered municipalities within each county of interest, and dividing by the total population for that county.

3. The countywide emissions of the specific pollutants were estimated using an average composition profile for tailpipe emissions from gasoline vehicles (U.S. EPA, 1990) as follows:

   countywide VOC x emission factor for specific pollutant = countywide emissions of specific pollutant.

   See Table III-5-E-4.

4. Estimated emissions for the covered portions of the county were generated as follows:

   countywide emissions of specific pollutant x % of county covered = quantity of specific pollutant emitted in covered portion of county.

5. Within the covered municipalities of each county, emissions of specific pollutants were apportioned to cells assuming that VOC emissions were in direct and constant proportion with population, and that VOCs were uniform throughout a covered municipality. Tables III-5-E-5 through 11 present in pounds per day and tons per year the results for each covered municipality in New Jersey, and for Staten Island and Brooklyn.

The resulting emissions estimates are presented in Table III-5-E-1.

5.3.3.4 SI/NJ UATAP mobile source inventory

The level of detail available for the NYSDEC emissions estimate for Staten Island was different from that for the NJDEP estimates for Middlesex and Union Counties. To provide consistency in the development of the area and mobile source inventory, per capita pollutant-specific emission factors derived from the New Jersey emissions estimates for Middlesex and Union

[2] The EPA Region II estimate did not distinguish between total HC and total VOC.

Counties were used to allocate emissions to each cell in Staten Island based on cell population. Note that, since the combined population of Middlesex and Union Counties is 2.8 times that of Staten Island, this per capita approach results in mobile source emissions estimates that are 2.8 times higher for the New Jersey portion of the study area than for Staten Island. Table III-5-E-1 contains the estimates prepared by NYSDEC, as well as those calculated using the derived per capita emission factors.

Table III-5-E-2 contains per capita emission factors derived from the New Jersey emission estimates for the New Jersey counties and, for comparison, those derived from the New York and the EPA Region II estimates for Staten Island.

The NYSDEC and EPA Region II mobile source inventories provided a comparison and quality assurance check of the approach adopted for the project inventory. Table III-5-E-2 shows that the NYSDEC-derived factors are 3.1 to 7.8 times higher than the EPA-derived factors; and 1.1 to 2.2 times higher than the NJDEP-derived factors. Table III-5-35 and Figures III-5-21 and 22 demonstrate the differences in the area and mobile source emission estimates for benzene for each cell in the study area when the NJDEP and NYSDEC approaches to estimation of Staten Island emissions are used.

5.4 MICROINVENTORY

Microinventories were developed for each of the air monitoring sites in the study area over the course of approximately one year, from the fall of 1988 to the end of summer of 1989.

5.4.1 Introduction

A microinventory is the identification of all stationary sources of air pollution within a defined area around each air monitor. Its purpose is to help explain potential anomalies in monitoring data that may be attributable to the impact of sources close to the monitors, and, thus reflect local air quality rather than project-wide patterns of air quality.

For this project, the microinventories were to include all sources within one kilometer (1km) of each monitor. In all cases, the microinventories included areas slightly beyond the circle of 1km radius.

5.4.2 Methodology

For each of the 15 monitoring sites in the SI/NJ UATAP study area, a team of surveyors was assembled. The teams generally consisted of representatives from EPA, NYSDEC, and/or NJDEP. For all sites except the Carteret, NJ, site, at least one of the surveyors (usually a NYSDEC or NJDEP representative) was a certified air pollution inspector with credentials to allow him/her to enter any facility.

Prior to the survey team's conducting a microinventory at any site, the EPA compiled a list of sources within a three-kilometer radius around the monitor. From the state inventories, NJDEP and NYSDEC provided EPA with printouts of all major and minor VOC sources, and some particulate sources, listed for the counties included in the SI/NJ UATAP study. A major source was defined as one that emitted, or had the potential to emit, 100 tons or more per year of any individual substance. A minor source was defined as one that emitted, or had the potential to emit, less than 100 tons per year of any individual substance.

The inventories used were the NYSDEC SMS, the New York City gasoline station inventory, and the NJDEP APEDS. From the state data, EPA developed a unified spreadsheet containing the name, address, SIC code, universal transverse mercator coordinates (UTMs), and total VOC and particulate emissions for each minor source, and speciated emissions for each major source within the study area. From the spreadsheet, sources within three kilometers of the monitor (determined from UTMs) were extracted. This list provided the team with a sense of the types and numbers of sources it could expect to find around each site.

While only sources within 1km of the monitors were to be included in the microinventories, it was found after the third microinventory (Carteret) that UTMs provided in APEDS or SMS were generally not accurate to within one kilometer. This was demonstrated by comparison of a plot of the Carteret sources by their listed UTM coordinates, to a map drawn from their observed locations; see Figures III-5-7 and 8 in the appendix of this volume. To compensate for these inaccuracies, sources from APEDS and SMS that were within three kilometers of the project monitor were included in the computer-generated field report for each microinventory.

Also prior to conducting each microinventory, the team marked on a map the monitor location and the area (the circle with a 1km radius circle) to be surveyed (Note: To avoid copyright infringement, EPA Region II created microinventory maps on its Geographical Information System for use in this report.)

At each microinventory site, the team met at the monitor location. Special note of sources directly near the monitor was made. At very commercial sites, the team often split into groups to cover smaller areas. Within each microinventory area, the staff walked and/or drove every block, and went beyond the boundary of the 1km radius to make certain no sources were missed. The name, address, and type of each VOC and/or particulate source were noted. Whenever a source could not be identified (e.g., stacks were observed on the roof of a nondescript building), an inspector entered the facility to obtain the necessary information. As information on the facilities was collected, the exact location of each source was noted on the microinventory area maps.

After the surveys were completed, EPA developed microinventory site summaries. A discussion of the results follows in this section of this report. The microinventory maps and listings of the identified minor and major sources within 1km of the air monitoring sites are presented in Figures III-5-5 through 19, and associated Tables III-5-20 through 33, respectively, located in the appendix of this volume. The table for each site includes a qualitative assessment of the microinventory for the site, noting whether the area surveyed was residential, commercial, industrial, or mixed in character.

5.4.3 Microinventory Results

A general summary of the microinventories is presented in the table below in chronological order beginning with the first survey conducted. The table includes the number of sources found within the 1km radius at each site, the number of sources appearing in the state point source data base(s), and the percent of the number of sources in the state inventories versus the number of sources found in the field.

Site name	# OF SOURCES FOUND	# IN STATE INVENTORY	% IN STATE INVENTORY
Travis, SI	8	4	50
Port Richmond, SI	56	9	16
Carteret, New Jersey	40	21	53
Elizabeth, NJ	119	49	41
Sewaren, NJ	31	17	55
Great Kills, SI	25	9	36
Tottenville, SI	13	4	44
Highland Park, NJ	16	7	44
Piscataway, NJ	0	0	na
Rossville, SI	15	4	27
Pumping Station (near Staten Island Mall), SI	11	5	45
Eltingville (Annadale), SI	5	1	20
Susan Wagner H.S. (Westerleigh), SI	17	3	18
Dongan Hills, SI	27	7	26
Clifton (Bayley Seton Hospital), SI	51	8	16
Overall summary of 15 sites	434	148	34

The process of performing the microinventories produced several valuable results beyond the inventories themselves. For example, it was discovered that both the APEDS and SMS data bases did contain information on all major sources in the area. However, the inventories only captured about 34% of all sources within the microinventory areas. Dry cleaners, auto refinishers, and bakeries were consistently missing from both data bases. Certain minor source categories were unregulated at the time when the microinventories were conducted and, therefore, would not have been found in the state data bases. Thus, the reported capture rates do not reflect the performance of the state agencies in permitting regulated sources. Some sources unregulated at the time of the microinventories are now subject to air pollution control regulations and captured by the state data bases.

A second result was the discovery of potential violations. Because each team included a certified air pollution inspector, the identification of illegal activities allowed for immediate action. In some cases, illegal operations (e.g., an unpermitted rock crushing operation at one site, and open burning at other sites) were encountered and shut down on the spot. In other cases, obvious violations were noted (e.g., large gas stations without Stage I or Stage II vapor recovery systems); or potential violators were noted and the information was passed on to EPA and state enforcement groups. This exercise provided a valuable link between inventory groups and enforcement programs, which often do not have much contact.

One of the major goals of the microinventory work was to enable evaluations of causal relationships between high or unusual ambient air concentrations and the influences of local sources. In an informal validation of its usefulness towards this end, the microinventory revealed the presence of two dry cleaners, emitters of perchloroethylene, within a block of a monitor for which unusually high concentrations of perchloroethylene were reported.

5.5 EMISSIONS MAPPING

5.5.1 Mapping Approach

The SI/NJ UATAP Mapping System was designed specifically for this project. The mapping system, created by Roch Baamonde, used a combination of Lotus 1-2-3, Graphwriter, and Freelance software packages in a PC environment.

The data used in mapping each of the pollutants, both for area/mobile and point sources, are attached in Tables III-5-34 through 40. Table III-5-40 presents the area and mobile source emissions inventory data for the five pollutants mapped. The emissions quantities were aggregated by substance for each grid cell (within Middlesex and Union Counties and Staten Island) for all area source activities and mobile sources. For point sources, the data were awarded priority in the following descending order: TRI data, APEDS/SMS data, POTW Inventory data, and ASES data. Thus, if TRI data were available for a facility, they were used; if not, APEDS or SMS were checked, and so forth.

5.5.2 Point and Area/Mobile Source Mapping

The five pollutants mapped were benzene, cadmium, formaldehyde, methylene chloride (dichloromethane) and perchloroethylene (tetrachloroethylene). Two types of maps were made: (1) the maps of combined emission densities from area and mobile sources, and (2) the bubble maps showing the location and relative magnitude of emissions from point sources. The origins of the emissions estimates used in the mapping activity are described in Section 5.3.

The data were compiled in a spreadsheet format in Lotus 1-2-3. Named ranges from the spreadsheets were then read directly into graphs created by Graphwriter. Two types of graphs were generated: (1) X-Y graphs for area/mobile source maps, and (2) bubble graphs for point source maps.

Note that these maps do not represent the ambient air quality modeling impacts of the contributing sources. The emissions density and bubble maps represent only those sources and/or source categories identified and evaluated in this study, and the relative magnitudes of the emissions densities in the area. Additionally, particularly in the cases of area and mobile sources, the quantities are estimated (not actual or known) air toxics emissions as described throughout this report. Section 5.1.2 identifies the eight (stationary) area source categories evaluated.

5.5.2.1 Area/mobile source maps

The area/mobile source maps were created on a grid of 2km x 2km cells, with UTM-easting values as the x-axis and UTM-northing values as the y-axis. The marker used was a square with an area of 4 square kilometers (i.e., 2km x 2km); the UTM values used in the mapping were the midpoints of each 2 x 2 cell. The shading of each cell represents its emission density categorized as one of the following ranges: >0 and ≤5 TPY, >5 and ≤10, >10 and ≤15,

>15 and ≤20, >20 and ≤30, and >30 TPY. (Note: Table III-5-40 lists the shading category numerically, since differences in shading became difficult to distinguish following photoreproduction of the maps.) Using Freelance, the graph was overlaid onto a digitized map of the study area. The resulting maps provided a fairly accurate depiction of the area. The emission density maps are Figures III-5-21, 24, 26, 28, and 30.

5.5.2.2 Point source maps

Point source maps were created by reading the data directly from Lotus spreadsheets into Graphwriter to create a graph which was then overlaid in Freelance onto the map. The bubble graph is similar to the X-Y graph in that it places points according to their X and Y locations; however, it also reads a third data element--the magnitude of emissions. It creates circles (bubbles) at the points that reflect the relative magnitudes of emissions. Thus, facilities with lower emissions for a pollutant are shown as smaller bubbles; and those with higher emissions, as larger bubbles. Since the software could create only 36 bubbles at a time, pollutants like dichloromethane, for which 80 facilities were reported, were addressed by making three separate graphs, combining them, and hand-labeling the facilities in excess of the 36 labeled automatically.

The bubble graphs were overlaid onto a map of the study area. Since some of the emissions maps are too dense to read clearly, the point source data are provided in Tables III-5-34 and III-5-36 through 39, interleaved with the bubble maps, Figures III-5-20, 23, 25, 27, and 29.

5.5.3 <u>Comparison of the Results from Different Approaches to Estimation of Area and Mobile Source Emissions</u>

As part of the mapping effort for area sources, the different approaches used to generate the area and mobile source emissions estimates were compared. Specifically, New Jersey applied population-based emission factors for estimating mobile source emissions, while New York used VMT data. New Jersey also used population-based factors for emissions from gasoline stations. For the New York region within the study area, NYSDEC used throughput and controls data for each station to generate the emissions as point sources, then aggregated these emissions for all the stations, and apportioned the aggregate on the basis of the population within each cell in Staten Island. Since (a) throughput and VMT data were not available for New Jersey, and (b) consistency was regarded as important in generating the project emission inventory, the area and mobile sources emissions for the New York area were re-developed according to the New Jersey population-based methods.

Table III-5-35 presents the results from the two methods when applied to benzene emissions in Staten Island; in this table the shaded column presents the net difference in each cell, in tons per year, between the results of the New York approach and the New Jersey approach. On an individual cell basis, the differences ranged from 0 to 25 TPY; but the difference of 193 TPY across Staten Island as a whole was 35 percent, considered acceptable when working with estimated emissions, particularly those of air toxics. The results are shown graphically in Figures III-5-21 and III-5-22.

5.6 QUALITY ASSURANCE/QUALITY CONTROL

The quality of the data was assessed by comparing the following: (1) multiple inventory data bases which include the same sources, and/or (2) various emissions estimating techniques. The relative levels of precision, accuracy, representativeness, and completeness of the data bases were not assessed.

5.6.1 Microinventories

The microinventory surveys, the first emission inventory activity, supported the QA effort. They identified deficiencies in the state point source air toxics inventories. The results of the microinventories indicated that APEDS and SMS included all of the major sources which were identified through the field surveys; however, minor sources (e.g. dry cleaners, auto refinishers, and bakeries) were often absent from these data bases. Note that certain minor source categories were unregulated at the time when the microinventories were conducted and, therefore, would not have been found in the state data bases.

5.6.2 Point Source Data Quality Assurance

The foundation of the air toxics emissions data for point sources was the 1988 TRI. The point source data base for this project was assembled by EPA Region II and forwarded to the States for review and addition of sources not covered by the TRI reporting criteria. This data set included POTW emissions as prepared by Baamonde. Point sources found in APEDS and SMS, as well as those area sources treated as point sources in the project, were added to complete the unified point source data base.

A review of data bases for duplication of records was conducted. Some facilities appeared as two distinct records--e.g., one under a division name within TRI and one under the parent company name in the state data base. When duplications were found, they were eliminated. Additionally, a few errors in TRI-entered emissions data were identified by the States.

To provide additional opportunities for comparison of the data, pollutant-specific emissions information from all of the data sources used--TRI, APEDS and SMS, EPA Region II POTW Inventory, and ASES (for area sources treated as point sources)--were included in the project point source inventory, Tables III-5-4 through 18.

5.6.3 Area Source Data Quality Assurance

The area source emission inventory for New Jersey was developed under contract for NJDEP with a subsequent transfer of methodology and emission factors from NJDEP to NYSDEC. EPA-prescribed methods using simple population-based models were employed to estimate substance usage and emissions factors on a per capita basis for all specified activities except residential wood burning. The emission factors were reviewed for representativeness. They are provided in Emission Inventory Appendix D where they are available for comparison to factors derived by other researchers. Sample calculations were performed to check that the spreadsheets used to generate the estimates were correct; no errors were identified.

APEDS summaries for toluene and xylene included auto refinishing sources. These facilities, identified by SIC codes (7532 - 1987 classification; and, 7531 and 7535 - 1977 classification), were deleted from the point source inventory since they were to be covered by the area source inventory; auto refinishers in APEDS but outside of Middlesex and Union counties were deleted from the point source inventory and not included in the area source inventory.

5.6.4 Mobile Source Data Quality Assurance

Three different approaches were considered in arriving at the project inventory for mobile source emissions. NJDEP employed simple population-based models, and emission factors which were (a) converted from a gram-per-mile basis to a pound-per-person (per capita) basis or (b) derived from total VOC estimates and speciated to a per capita basis; 1986 VMT and population data were used. NYSDEC used grid-level VMT data to allocate VMT and estimated VOC emissions to one-kilometer areas of Staten Island; and the pollutant-specific emission factors (in grams per mile and percent of total hydrocarbons) used by NJDEP. In a third approach, EPA used 1988 population estimates and 1990 VMT/VOC data for larger areas of New Jersey and New York than were covered by the States, and a different set of pollutant-specific emission factors.

For consistency in the project mobile source inventory, emissions for the New York area were estimated using the NJDEP population-based approach.

Per capita emission factors derived from the three estimates of mobile source emissions for Staten Island are provided in Table III-5-E-2 in the appendix of this volume, where they are available for comparison to factors derived by other researchers.

Sample calculations were performed to check that the spreadsheets used to generate the estimates were correct; no errors were identified.

A comparison of the results of the mobile source emission estimation techniques was provided for the case of benzene. The emissions estimates for benzene (in tons per year) as generated by the New Jersey population-based method, the New York VMT-VOC method, and the EPA Region II VMT-VOC method are presented below.

	Mobile source benzene emissions (TPY) by county		
Method	Middlesex*	Union	Staten Island
NJDEP population method	502.09	443.45	336.35
NYSDEC VOC-VMT method	N/A	N/A	532.35
EPA Region II VOC-VMT method	195.90	134.32	150.75

* Estimate is for 88% of total county population

Since the New Jersey population-based method was applied to the development of the area and mobile source inventories, the New Jersey approach was considered the standard for this assessment. The EPA Region II method yielded estimates that were 54% (Staten Island) to 70% (Union County) less than the NJDEP-based estimates; the NYSDEC estimate for Staten Island was 58% higher than the NJDEP-based estimate. The following differences in approach may have contributed to differences in the resulting emissions estimates:

1. The NYSDEC and EPA Region II estimates addressed only light-duty gasoline-fueled vehicles; whereas the NJDEP estimates included diesel-fueled and heavy-duty vehicles, as well.

2. The pollutant-specific emission factors used by EPA Region II were from a newer reference (U.S. EPA, 1990) than the factors used by New Jersey and New York; they may reflect an assumed relatively newer fleet age.

3. While Staten Island's population density is lower than that of nearby New Jersey, it provides major traffic arteries between New Jersey and New York; this may contribute to a higher per capita emission rate for Staten Island (as reflected by the NYSDEC estimate) than that derived from estimates for Middlesex and Union counties.

Differences of this magnitude, less than a factor of 100, are not unusual when estimating air toxics emissions.

5.7 LIMITATIONS OF THE INVENTORY

The usefulness of an emissions inventory is highly dependent upon the type and quality of information presented. In order to provide a comprehensive data base for the three source categories--point, area, and mobile--without compromising data quality, the inventory was limited to fewer chemicals than were addressed by the ambient air monitoring effort.

5.7.1 Limitations of the Data Bases

The limitations of the inventory have been identified so that the useful bounds of the data may be easily discerned. Source-specific data may be requested from the appropriate state. The project inventory was assembled from information (1) available from sources within the state agencies or EPA, or (2) generated by the participating agencies based on data and methodologies available from a wide-ranging variety of sources. There are notable limitations in all of the sources of information utilized in the assembly of this project's air toxics emission inventory. The limitations are discussed below.

5.7.1.1 Point sources

▸TRI. The Toxics Release Inventory (TRI) contains data required of facilities meeting the following three reporting criteria: the (1)the facility's main business activity must be in the manufacturing sector, i.e., have an SIC code in major groups 20 through 39; (2) the facility must have 10 or more full-time employees; and (3) the facility must manufacture, process, or otherwise use listed substances in quantities in excess of a specified threshold. Additionally, the emission estimates need be reported to only two significant figures. Therefore, the larger the estimated emissions, the greater the consequence of this reporting convention.

The advantages to TRI were the following: (1) it was considered a data base of actual releases in that the emissions estimates were generated by the facilities based upon actual operating data for the reporting year; and (2) TRI provided estimates of fugitive air emissions. Fugitive emissions are potentially significant since they may or may not be included in the states point source data bases, fully dependent upon the emissions sources included by the facilities under this heading.

▸APEDS. APEDS, the NJDEP point source data base, provided an inventory of substances based upon maximum permit-allowable emission rates. This is described in Section 5.3.1.2. Therefore, APEDS may provide conservative overestimates of annual air emissions. APEDS may or may not contain fugitive emission rates as discussed above for TRI.

Within New Jersey, certain source operations, or equipment, are grandfathered if they existed prior to regulations covering like sources or equipment. A grandfathered source is generally not subject to the emissions control requirements of like sources placed into operation after the promulgation of an air pollution control regulation. Nevertheless, many grandfathered sources are either permitted or registered; i.e., emissions for the source are known by NJDEP although submission of this information is not required.

The advantage to APEDS is that it provided information for a large number of facilities, both within and outside of the manufacturing sector, not covered by TRI.

▸SMS. SMS, the NYSDEC point source data base, provided an inventory of substances based on emission data for all permitted sources. Data in SMS are obtained from applications for industrial processes, combustion and incineration sources, and gasoline dispensing facilities which are required to install Stage I and Stage II controls.

The advantage to SMS was that it provided information for facilities not covered by TRI.

5.7.1.2 Area sources

The assessment of air toxics for area sources, including those treated as point sources in this project, provided air toxics emissions information not traditionally found in state data bases at the time of the project. The limitations of the project inventory regarding these source types were based in the methodologies and emission factors applied to the estimation of air toxics emissions. Generally, the methodologies followed EPA guidelines for the estimation of volatile organic compounds emissions from such sources, and then involved speciation for air toxics using documented emission factors.

The methods provided a generic approach to estimating air toxics emissions for the activity categories, thereby generating emission estimates that were representative of the activity category, but not necessarily specific to the activities of any individual facility. The inventory could be enhanced by the development and use of source-specific emission factors, e.g., for dry cleaners and landfills.

Also, limitations are imparted by the timeframe of the data supporting the emissions estimates--e.g., population data, fuel use data, landfill volume and VOC emissions, and TSDF data on processing of volatile organics.

Per capita-based emission estimates assume certain activity levels for each source category. It is possible that specific activities did not exist within the project area, or did not occur as extensively as the resulting emissions estimates indicate. Conversely, it is possible that certain activities were more prevalent than indicated by the emissions estimates. This was one reason for conducting the microinventories around the air monitoring stations. Expanded microinventories would identify the actual density of operations for any of the categories.

The area source inventory should be viewed as a screening level inventory that indicates the potential impact of the covered activities on the total air toxics inventory. It is recommended that further investigations be conducted for those activity categories with significant contributions to the project emissions inventory.

5.7.1.3 Mobile sources

The limitations of the mobile source inventory are similar to those discussed above for area sources since the methodologies followed similar approaches. MOBILE3 was the computer model applied to generate estimates of VOCs. Inputs to the model included known and averaged data as well as certain assumptions about the vehicle population. The emission estimates were quantified by grid cell based on population factors.

As is the case for the area source inventory, the mobile source inventory should be viewed as a screening level inventory. This approach did not provide resolution of the data relative to the major roadways within the project area. Where more accurate numbers are required, it would be necessary to resolve the data using models designed for such analysis, e.g., line source models using inputs specific to the area of concern.

5.7.1.4 Comprehensiveness

The comprehensiveness of source coverage is an important consideration. As identified through the microinventories, there were gaps in the state data bases inherent to the permitting regulations upon which the data bases were founded. Also, there were limitations in the information generated through the point, area, and mobile source inventory efforts. Certain source categories were not or could not be evaluated in this study. For example, while air toxics emissions from publicly-owned treatment works have been estimated, there is no comparable information on privately-owned treatment works within the study area.

5.7.1.5 Temporal variations

There was no attempt to evaluate temporal variations in the data. An assessment of peak environmental releases was not possible. No distinction was made between releases from continuous operations and from batch-type operations. The inventory is a snapshot in time representing annual releases of air toxics for the period roughly estimated as 1986 through 1989. New sources came into operation during this time, while many sources ceased operations.

5.7.2 Limited Substance List

The limited number of substances addressed may be the most significant limitation of the inventory. A review of the coverage of source categories, the number of facilities within those categories, and/or the detail of the area and mobile source data indicates that compiling a comprehensive inventory for all of the chemicals addressed by the ambient monitoring effort, particularly across state lines, is a substantial endeavor.

However, comparison to the results of the ambient air sampling campaign shows that this emission inventory did succeed in including those project chemicals found at the highest concentrations in the ambient air of the area studied.

5.8 RESULTS

The air toxics emissions inventory for point, area, and mobile sources for a select group of substances has been evaluated and assembled into a final data base for this project. The results are presented in Tables III-5-4 through III-5-19. A summary of the contributions from these three groups of sources is found in Table III-5-3. As noted in other urban air toxics studies (e.g., U.S. EPA, 1985), area and mobile sources contributed significantly to the total inventory and comprised the dominant source of emissions for certain pollutants.

Point sources were identified as the only sources of carbon tetrachloride and chloroform, and the dominant sources of toluene (63%), n-hexane (71%), dichloromethane (91%), 1,1,1-trichloroethane (72%), trichloroethylene (80%), and cadmium (93%).

Motor vehicles were determined to be the dominant source of emissions of benzene (88%), formaldehyde (75%), and xylene (55%). Also, it was estimated that a large quantity of toluene, 1,757 tons per year (29% of total), was generated by mobile sources within the study area.

Area sources were responsible for the majority of the perchloroethylene emissions (66%). The overwhelming majority was attributed to dry cleaning while the remainder was attributed to cold degreasing operations. See Table III-5-19.

Another comparison of the total emissions of the inventoried pollutants in this study area is given in Figure III-5-3. Overall, toluene (6,015 tpy) and xylenes (3,578 tpy) are the pollutants with the highest rates of emissions.

Some questions may be raised concerning the representativeness of those aspects of the mobile source inventory which were based on the population-based models since both Staten Island and the adjacent areas of New Jersey are major transportation corridors whose traffic volumes may be unrelated to the size of the resident population. The NJDEP population-based method used in this study yields estimates for mobile source benzene emissions that are 2.2 to 3.3 times those obtained using the EPA Region II method.

The microinventory work identified deficiencies in the existing state point source air toxics inventories. The state data bases captured an average of 34% of the sources reported at the 15 sites where microinventories were performed. The uncaptured sources were classified as minor (dry cleaners, auto refinishers, and bakeries). Some of these minor sources were subject to existing state regulations; others were not. However all these sources were considered to be important potential contributors to air toxics emissions burdens in the areas of the monitors. The microinventory work demonstrated a need to improve the overall quality of emissions inventories and the importance of realtime coordination between inventory work groups and field enforcement units.

One of the most important discoveries of the microinventory activity as well as the study was that relatively high perchloroethylene concentrations at one monitoring site appeared to be attributable to releases from two dry cleaners situated within one block of the sampler. This finding appeared to reaffirm the significant contribution that small local ground-based sources are likely to make to the ambient air concentrations.

5.9 GENERAL SUMMARY

The types of information, sources of information, methodologies to develop emission estimates, and presentation of the emission inventory were selected to provide a useful air toxics emissions resource. This emission inventory contains information previously not available from the state emission inventories, and describes tools to expand upon the inventory.

Summary assessments of the air toxics emission inventory in terms of the magnitudes of the emissions and their distribution across the point, area, and mobile source categories are presented in Table III-5-3 and Figures III-5-3 and 4.

The development of the microinventories was important beyond their contribution to the inventory for this project. Enforcement programs and inventory programs often do not have an active dialogue regarding air pollution sources; rather, enforcement programs usually receive inventory information from which facility audits are performed. Conducting the microinventories placed the inventory staff into the field to assess actual source densities, and involved enforcement programs staff in an inventory process.

The 1988 TRI was the preferred data base for the point source inventory in this project. It was supplemented by the state permitting data bases and emissions estimates developed for area sources treated as point sources.

Conservative estimation techniques were applied to the development of the area and mobile source inventories so that the air toxics data presented for the sources included in this study are more likely to be at the upper bound of the emissions range than at the lower bound. Emissions inventory evaluations conducted as quality assurance components of this effort indicate that the data are reasonable. Where the summary data indicate significant contributions by the area and mobile source categories, further investigations and a more refined analysis should be conducted to validate the implications.

The objectives of the emission inventory component of this project were (1) the development of an air toxics emission inventory that included point, area, and mobile sources; and (2) the evaluation of general abatement strategies for toxic air pollutants. This emission inventory may be used in support of the second objective.

5.10 ACKNOWLEDGEMENTS

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Figure III-5-1: Boundaries for the SI/NJ point and area/mobile source emissions inventories

—— Area and mobile sources boundary
--- Point sources boundary

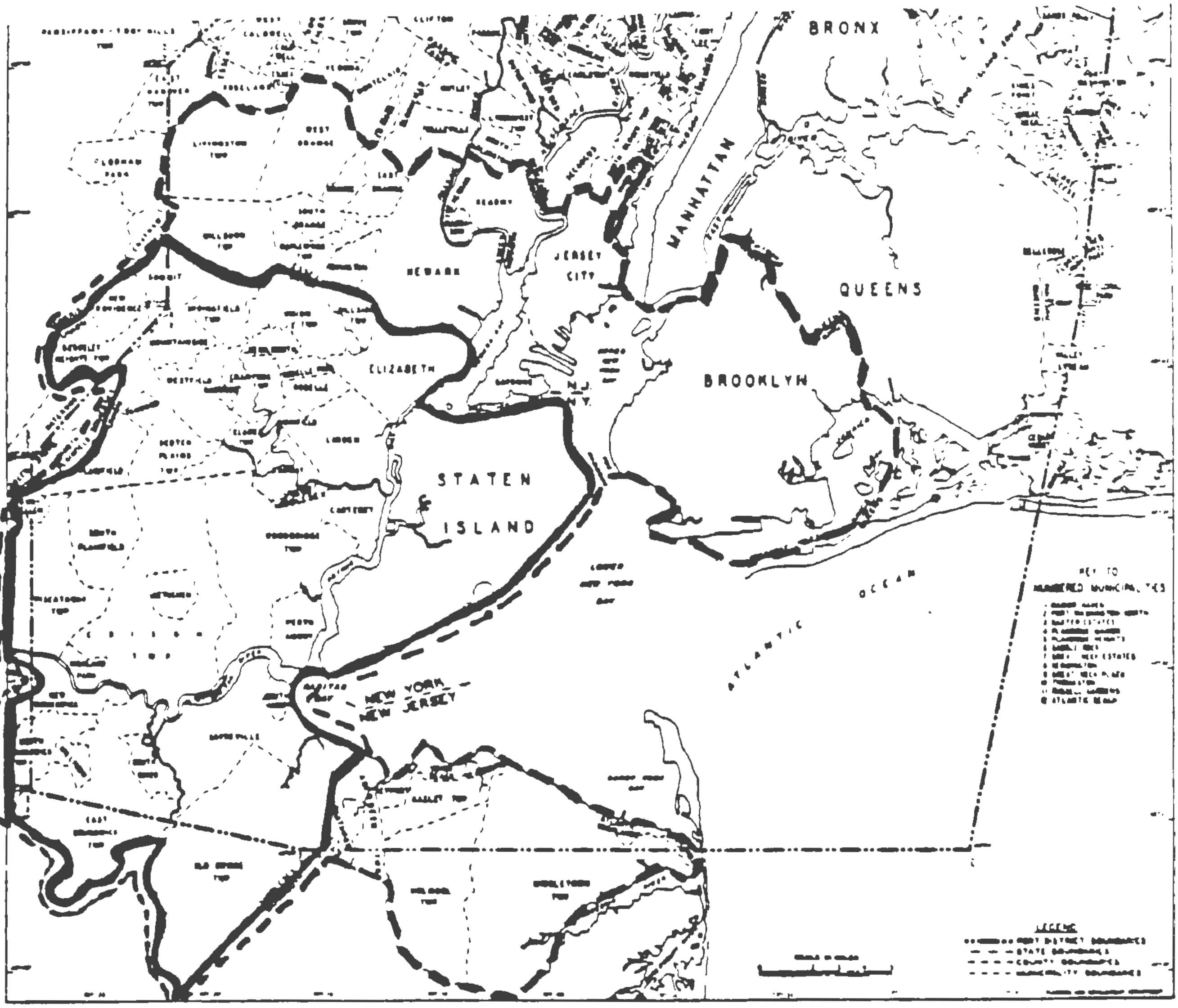

Table III-5-1: Emission inventory toxic chemicals list

CAS NUMBER[1]	CHEMICAL
71-43-2	Benzene[2]
7440-43-9	Cadmium & compounds[2]
56-23-5	Carbon tetrachloride
67-66-3	Chloroform
75-09-2	Dichloromethane[2] (Methylene chloride)
50-00-0	Formaldehyde[2]
110-54-3	n-Hexane
127-18-4	Tetrachloroethylene[2] (Perchloroethylene)
108-88-3	Toluene
71-55-6	1,1,1-Trichloroethane
79-01-6	Trichloroethylene
1330-20-7	Xylene, mixed isomers
108-38-3	m-Xylene
95-47-6	o-Xylene
106-42-3	p-Xylene

[1] CAS - Chemical Abstracts Service Registry Number.

[2] Substances for which source strengths are graphically presented through mapping.

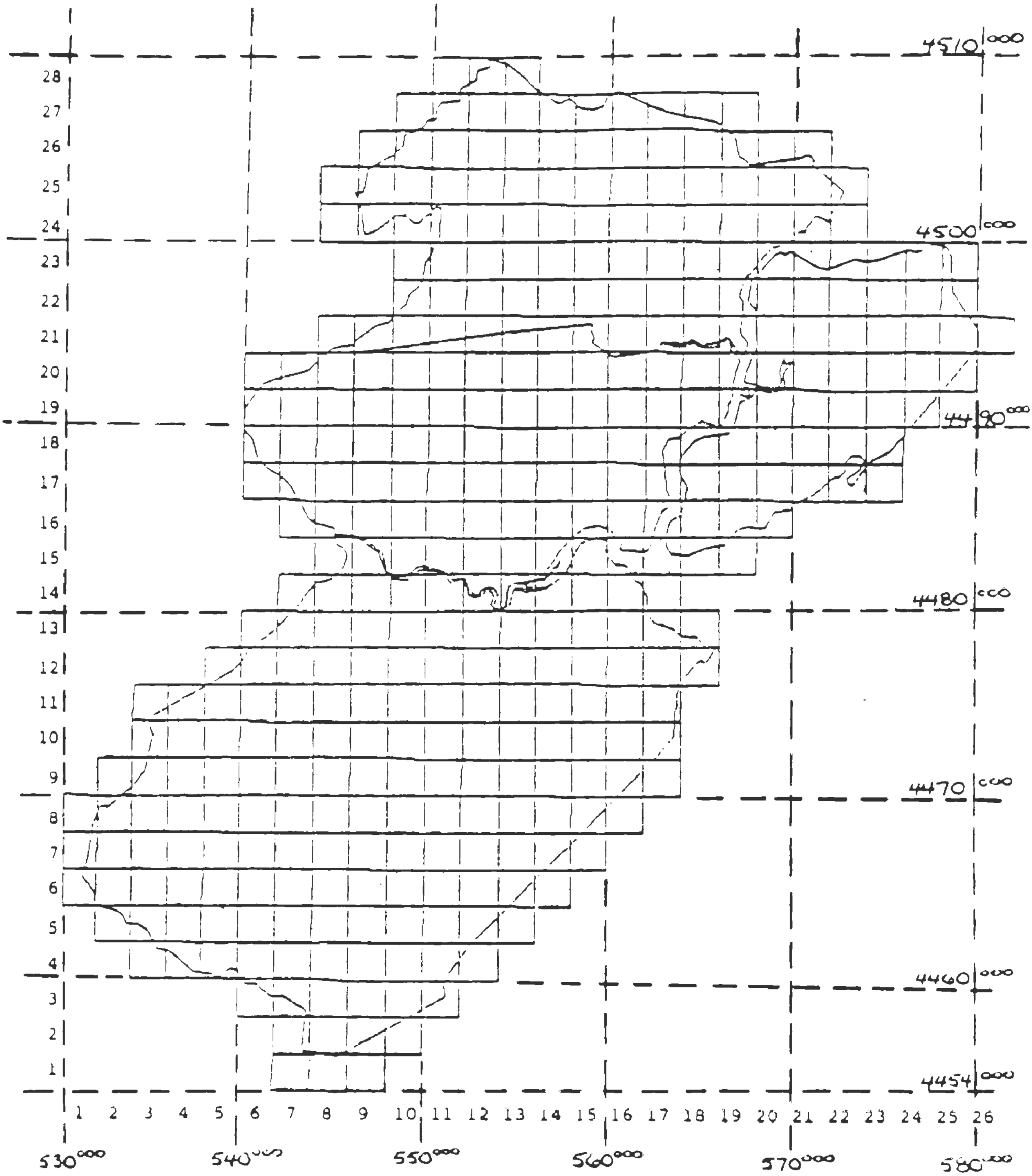

Figure III-5-2. Area and Mobile Source Grid Cell Map (showing UTM-easting and UTM-northing coordinates).

Table III-5-2: Chemicals addressed for each category of the emissions inventory

Chemical	Mobile Sources	Area Sources treated as Point Sources			Point Sources	AREA SOURCES							
	Mobile Sources	POTWs	Land-fills	Haz. Waste	Point Sources	Area resid. oil heating	Archit. coating	Auto Refinish	Cold degreasing	Area wood heating	Consumer solvent use	Dry Cleaning	Gasoline distribution & retail
benzene	X	X		X	X				X				X
carbon tetrachloride		X			X								
trichloromethane		X			X								
dichloromethane		X			X				X				
tetrachloroethylene		X	X	X	X				X			X	
toluene	X	X	X	X	X		X	X	X				X
1,1,1-trichloroethane		X			X				X				
trichloroethylene		X		X	X				X				
xylenes	X			X	X		X	X	X				X
o-xylene					X								
m-xylene					X								
p-xylene					X								
n-hexane	X				X								
cadmium & compounds					X	X							
formaldehyde	X				X	X				X	X		

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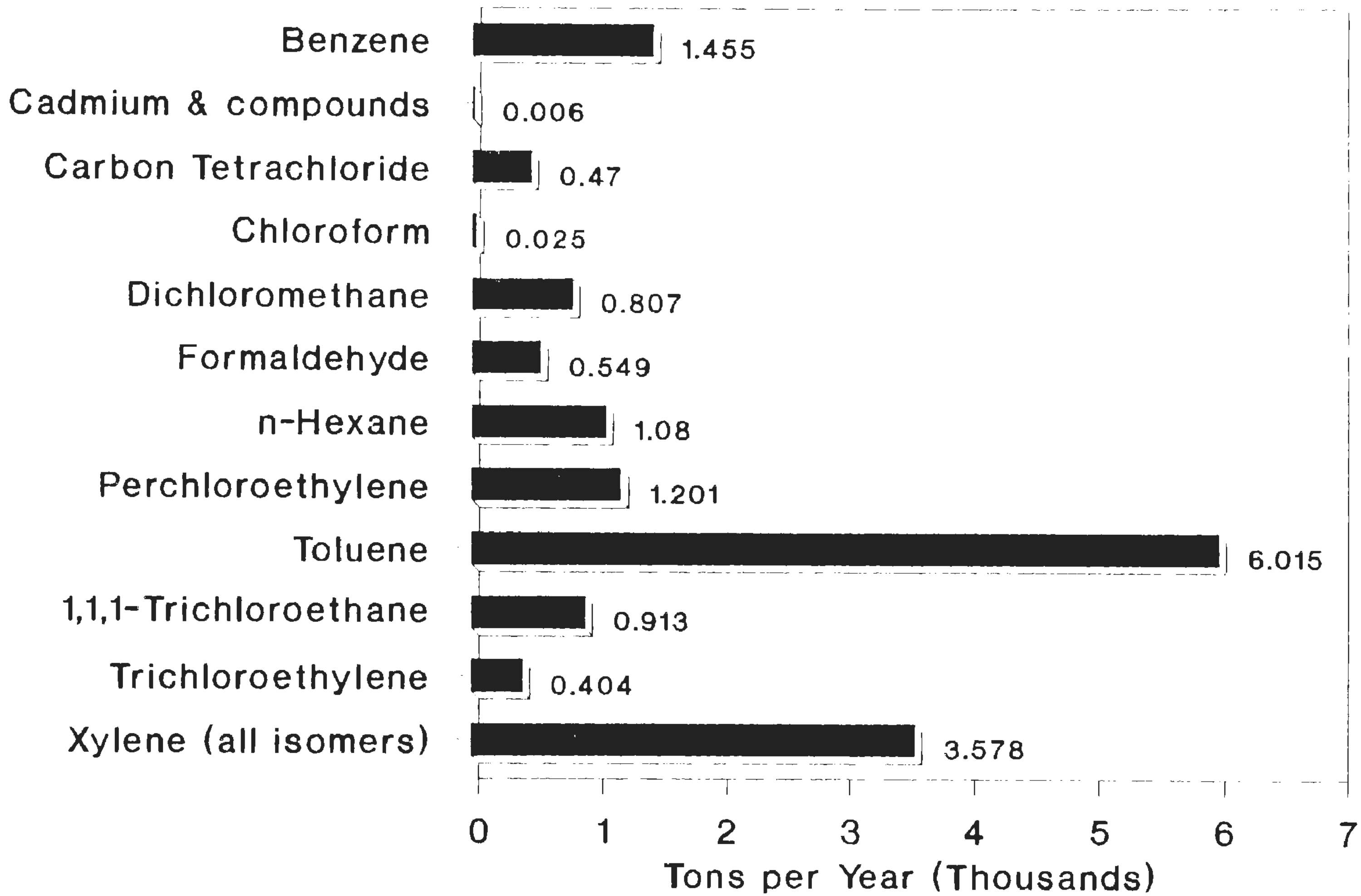

Figure III-5-3. Annual air toxics emissions from evaluated source categories (for years 1986 - 1988).

Staten Island/New Jersey Urban Air Toxics Assessment Project

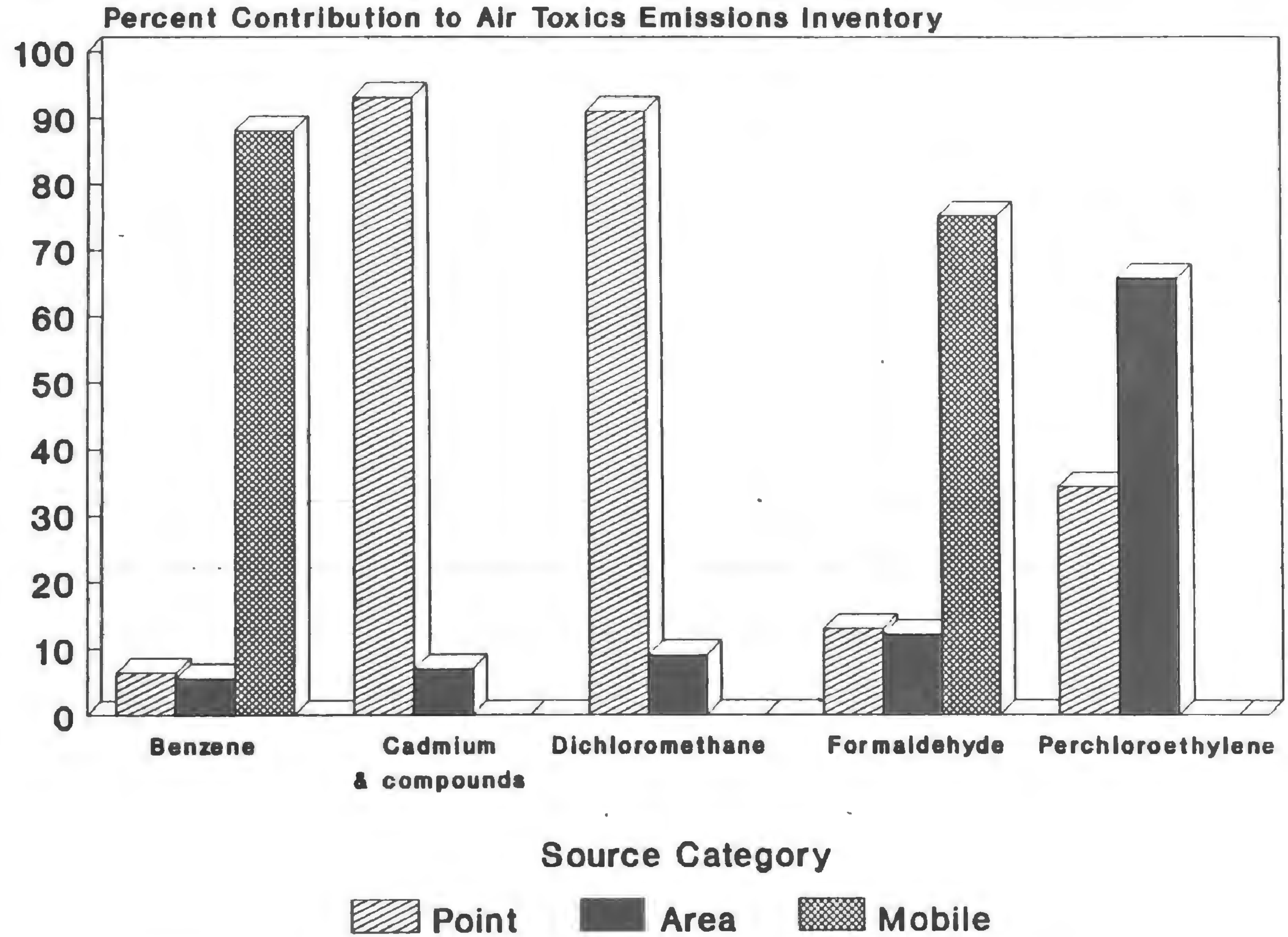

Figure III-5-4. Source category contributions to the air toxics emissions inventory.

Table III-5-3: Summary of source category contributions to the air toxics emission inventory (Estimated air emissions in tons per year, tpy)

	Benzene	Cadmium	Carbon Tetrachloride	Chloroform	Dichloro-methane	Formaldehyde	n-Hexane	Perchloro-ethylene	Toluene	1,1,1-Trichloro-ethane	Trichloro-ethylene	Xylene (all isomers)[1]
AREA SOURCES[2]	79.75	0.42	0.00	0.00	72.77	65.38	NA[3]	789.52	492.03	260.14	79.14	503.65
% of total	(5.5%)	(7.0%)	(0.0%)	(0.0%)	(9.0%)	(12.0%)		(65.7%)	(8.2%)	(28.5%)	(19.6%)	(14.0%)
MOBILE SOURCES[2]	1,281.89	0.00	0.00	0.00	0.00	412.58	317.55	0.00	1,757.48	0.00	0.00	1,961.87
% of total	(88.1%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(75.1%)	(29.4%)	(0.0%)	(29.2%)	(0.0%)	(0.0%)	(54.8%)
POINT SOURCES[4]	93.08	5.56	469.73	25.22	734.58	70.76	779.27	411.80	3,765.20	653.00	323.86	1,112.51
% of total	(6.4%)	(93.0%)	(100.0%)	(100.0%)	(91.0%)	(12.9%)	(71.0%)	(34.3%)	(62.6%)	(71.5%)	(80.1%)	(31.1%)
TOTAL TPY	1,454.72	5.98	469.73	25.22	807.35	548.72	1,096.82	1,201.32	6,014.71	913.14	403.00	3,578.03

[1] "Xylene (all isomers)" includes xylene (mixed isomers) (CAS# 1330-20-7), m-xylene (CAS# 108-38-3), o-xylene (CAS# 95-47-6), and p-xylene (CAS# 106-42-3).

[2] Table III-5-19.

[3] "NA" means data were not available.

[4] Tables III-5-4 through III-5-18.

6. SOURCE IDENTIFICATION

6.1 INTRODUCTION

Measured air quality data at the monitoring sites were related to potential local sources or more remote upwind locations through the use of meteorological data. Meteorological models were applied in order to achieve this goal of source identification.

A methodology was developed which used a pollutant rose model and a surface trajectory model. The pollutant rose model was used in assessing long-term air toxics transport patterns, while the surface trajectory model was used to evaluate short-term or episodic periods.

Preliminary modeling studies were performed using the pollutant rose and back trajectory techniques on volatile organic compound (VOC) data from the project. These studies were used as a basis for further work which focused more on source identification through the use of emission inventories.

The enhanced pollutant rose analysis focused on the same volatile organic species as the preliminary work, but expanded the site base to include more sampling locations throughout Staten Island and nearby New Jersey. The surface trajectory analysis was expanded as well; specific pollutants were considered, and potential source area-receptor relationships were identified.

The outputs generated by the pollutant rose and surface trajectory models were reflective of the quality of the pollutant and meteorological data used as inputs. Errors or problems with these data affect the validity of pollutant rose and surface trajectory results.

6.2 POLLUTANT ROSE ANALYSIS DESCRIPTION

6.2.1 Pollutant Rose Model

Data inputs to the pollutant rose model consisted of air quality data and wind direction data for the period October 1987 through September 1989. The air quality data represented 24-hour average concentrations for the pollutant sampled on an every-sixth-day basis. For these sampling periods, 24-hour resultant concentration vectors were calculated using wind direction data reduced to the eight compass point classification system: N, NE, E, SE, S, SW, W, NW. Wind direction data were obtained from Newark International Airport.

These vector values were put into a LOTUS 1-2-3 spreadsheet prepared to perform the required calculations. Results of the spreadsheet calculations were imported to a GRAPHWRITER horizontal bar chart, and printed.

The pollutant rose model was designed to accept wind direction data representative of a three-hour average wind direction vector. Eight such values per 24-hour period are used and matched with the 24-hour concentrations. This introduces a source of error into the calculations: pairing a 24-hour concentration with eight different wind direction vectors, each representing a specific three-hour time interval. Instead, a 24-hour wind direction vector was computed (in essence using a constant-direction wind for the entire 24 hours) and used in conjunction with the observed 24-hour site concentration; this method was regarded as more consistent with the 24-hour average concept. Individual errors or inconsistencies should be smoothed out as the number of data points increases. Accordingly, output obtained using two years of data as input, as opposed to six months or one year of data, was regarded as more reliable.

6.2.2 Selection of Sites and Pollutants

The criteria for selection of data sets for the development of pollution rose methodology were as follows:

The site and pollutant should be representative of a more general set for the project.

The sites generally should provide spatial coverage of the entire study area.

Meteorological data should be appropriate for each site.

The pollutant should have a full data set for each site selected.

Pollutants should be selected from each of the aromatic and the chlorinated hydrocarbon groups of VOCs.

The following additional criterion was used in selecting candidates for the enhanced pollutant rose analysis:

Such sites/pollutants combinations that were repeatedly among the highest three or four in the site-concentration rank order tables of annual averages for each chemical (Tables III-3-28 through 48).

The results of the initial pollutant rose analyses, which concentrated primarily on relationships between pollutant and meteorological data, are described in the appendix of this volume. The results of the enhanced pollutant rose analyses, which focused more on source identification, are described below.

6.3 SOURCE IDENTIFICATION USING POLLUTANT ROSE ANALYSIS

Site concentration rank order tables from Section 3 of this volume were examined. Project sites that were repeatedly in the highest three or four in concentration year by year for VOC data were identified. Pollutant roses were prepared for these sites and pollutants with the goal of developing associations between the site concentrations and source areas of the pollutants (source-receptor relationships). The following are the sites and pollutants chosen as subjects for this portion of the pollutant rose analysis.

Pollutant rose	Pollutant	Sites
A	benzene (year 1)	Dongan Hills Elizabeth Port Richmond Eltingville Carteret Bayley Seton
B	benzene (year 2)	same as "A"
C	toluene (year 1)	same as "A"
D	toluene (year 2)	same as "A"
E	trichloroethane	Port Richmond Elizabeth Carteret Sewaren Dongan Hills
F	dichloromethane	Port Richmond Travis
G	chloroform	Port Richmond Travis
H	carbon tetrachloride	Elizabeth Carteret Tottenville Sewaren

I	trichloroethylene	Port Richmond Travis Elizabeth Carteret

The roses for individual sites are depicted as bar charts found in the appendix of this volume; these charts include information on concentrations and number of observations for each of the eight compass directions. The roses designated Roses A through I are maps depicting individual roses for multiple sites. Only Roses A, C, F, and I are discussed below; the others are in the appendix of this volume.

Each pollutant rose was examined and those wind directions with discernable concentration peaks were considered for analysis using the emission inventories. A peak concentration direction was generally defined as a wind direction associated with a concentration value 25% or higher than the next highest ranked wind direction. For example, if a pollutant rose contains a northeast petal with concentration of 1.30 ppb and the next highest concentration is only 1.00 ppb, then northeast is to be considered a peak concentration direction since 1.30 is more than 25% higher than 1.00.

The sector of interest--that portion of the study area located within the peak concentration direction sector--was identified. For example, if the peak concentration direction is northeast, then the sector of interest would be to the northeast of the monitor (approximately 22-68 compass degrees clockwise from the north) and extending to the perimeter of the study area.

The project emission inventory was then examined for sources located within the sector of interest.

The three parts of the project emission inventory -- the microinventory, point source inventory, and mobile/area source mapping inventory -- provide information in different terms. The microinventory is comprised of point and area sources located within one kilometer of a monitoring site; total, not specified, VOC emission data in tons per year (tpy) are listed. The point source inventory includes point sources farther away but capable of affecting the monitors in the project area; this listing is in tpy on a pollutant-by-pollutant basis. The mobile/area source mapping inventory lists emissions pollutant-by-pollutant in tpy densities based on 2 x 2-km square areas.

Sources in the inventory are described in terms of the relative magnitudes of their potential impacts on the monitors. This is identified as relative source impact (R.S.I.). A dispersion model was used to compute impacts using assumed source and meteorological parameters and different combinations of wind speeds and atmospheric stabilities. The equation of best fit (with concentration and distance to receptor as the variables) for the resulting data was identified.

Relative source strengths were computed by using emission rates of the sources and the equation of best fit. The actual numbers provided for R.S.I. are dimensionless; they are used as a basis for evaluating relative source contributions to monitored concentrations.

Four of the nine enhanced pollutant rose analyses are presented below. These are Rose A (benzene, year 1), Rose C (toluene, year 1), Rose F (dichloromethane), and Rose I (trichloroethylene). These four were selected because they were representatives of (a) pollutants of the aromatic (benzene, toluene) and chlorinated (dichloromethane, trichloroethylene) subgroups, and (b) pollutants associated with pronounced pollutant concentration/wind direction relationships. These four roses are presented as Maps III-6-2 through 5. The five additional pollutant rose analyses are presented in the appendix of this volume.

6.3.1 Pollutant Rose A - Benzene, Year 1 (Map III-6-2)

An inspection of this rose associates low concentrations with southeasterly winds, except at the Elizabeth monitoring site. In general, this wind direction indicates an over-water trajectory; there are no major sources of benzene in Lower New York Bay and Raritan Bay.

6.3.1.1 Elizabeth, south/southeast sector

The Elizabeth pollutant rose associates south and southeast winds with the highest benzene concentrations (2.02 ppb and 2.11 ppb, respectively). Only those emission inventory sources located in a sector to the south and southeast of the Elizabeth monitor were included.

The microinventory sources for this sector include the Exxon Bayway refinery, NJDOT Bayway Center, Reichold Chemical Corp., Crown Petroleum, and The Elizabethtown Gas Production Plant.

From the point source inventory for benzene in this sector are the following:

Source	Emissions tpy	Distance km	R.S.I.
Exxon Bayway Refinery	25.00	2.1	16.44
Merck and Company	8.45	6.5	2.93
Amerada Hess and Company	2.9	10.5	0.77

The benzene mobile/area source emission density map[1] shows a high emission density, >20-25 tpy, to the southeast of Elizabeth, particularly in the vicinity of the Goethals Bridge.

This analysis indicates that the principal contributors to the high concentrations of benzene in the vicinity of the Elizabeth monitor were the Exxon refinery and mobile sources.

6.3.1.2 Eltingville, north sector

North winds at Eltingville were associated with benzene concentrations nearly two times higher than the next highest wind direction (3.05 ppb versus 1.66 ppb, with a west wind). The benzene mobile/area source emission density map indicates highest densities, 30 tpy, in the corridor north of the Eltingville monitor. Richmond Parkway is quite close to the monitoring site, with several highway intersections nearby. This fact, coupled with a lack of benzene point sources (the closest in the point source inventory is a POTW in South Brooklyn, <1 tpy), implicates mobile/area sources as the chief contributors to the high concentrations.

6.3.1.3 Implication of mobile sources as sources of high concentrations at the Elizabeth and Eltingville monitors

An inspection of Rose A indicates that the peak directions of south/southeast for Elizabeth and north for Eltingville point to the same general source area for emissions of benzene. The absence of point sources in this common area, the large mobile/area source densities, and the greater contribution of mobile than area sources to those densities implicate mobile sources as primary contributors to the high measured benzene concentrations. Another example of the domination of mobile sources on benzene impact is observed with the Carteret and Elizabeth portions of Rose A. A group of point sources is

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[1] Figure III-5-22 was the map used; mobile source emissions were VMT-based for Staten Island, population-based for New Jersey. The VMT-based estimates were regarded as better for source identification; however, the difference in estimation method leaves New Jersey mobile sources appearing less influential than Staten Island mobile sources.

situated in a north-south orientation between Elizabeth and Carteret. While the south segment of the Elizabeth rose is large, the north segment of the Carteret rose is not; from the perspective of relative source impact, this suggests that sources close to the Elizabeth monitor have the greatest effect. Since the southeast segment of the rose for Elizabeth represents the largest concentration and points toward the Goethals Bridge and Staten Island Expressway, the implication is that mobile sources are responsible for most of the benzene impact at the monitor.

6.3.2 Pollutant Rose C - Toluene, Year 1
(Map III-6-3)

6.3.2.1 Eltingville, north sector

The relationship between high concentration (9.02 ppb) and north wind at Eltingville that was observed for year 1 benzene is repeated here for year 1 toluene. The only toluene point source in the emission inventory that might affect the monitor is the Oakwood Beach POTW; but its location east of the monitor and toluene emissions of only 0.22 tpy suggest that it does not play a role in explaining the high concentrations observed at Eltingville. Using the benzene mobile/area source emission density map[2] to estimate the toluene mobile/area source emissions yields a density as high as 50 tpy for this sector.[3] Thus, mobile/area sources are implicated as the major contributors to toluene impact at this monitor.

6.3.2.2 Carteret, southwest sector

Peak toluene concentrations (5.43 ppb) at Carteret were associated with southwest winds. Based on the mapped benzene mobile/area source emissions estimate of 9 tpy, toluene mobile/area source emissions are estimated at 15 tpy. Three sources were located in the emission inventory: Carteret Bus Service/Gas Station, Anchor Abrasives Corp. (sand-blasting)--

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[2] See footnote 1.

[3] The contributions to the toluene per capita emission factor are 0.690 lbs/person/year from area sources, and 2.466 lbs/person/yr from mobile sources; and for benzene, 0.1126 and 1.799 lb/person/yr, respectively. Thus, the toluene mobile/area source emissions are estimated at 1.65 times the mapped benzene mobile/area source emissions. The mobile source emissions account for 78% of the toluene mobile/area source emissions, and 94% of the benzene mobile/area source emissions.

three times more distant from the monitor than Carteret Bus Service/Gas Station in a north-south alignment--and GATX Terminals. The toluene emissions listed for GATX Terminals is 2.19 tpy; emissions estimates were not available for the other two sources listed in the microinventory.

GATX Terminals is as far north of the monitor as Anchor Abrasives is south, but there is no elevation in concentration associated with north winds at Carteret. This indicates that point sources are not the principal cause of the high concentrations at Carteret. The more likely cause for high concentrations on southwesterly winds at this monitor is vehicular emissions from the New Jersey Turnpike, approximately two kilometers away to the west and southwest.

6.3.3 Pollutant Rose F - Dichloromethane (Map III-6-4)

The concentrations of dichloromethane at Port Richmond on northeast winds were nearly twice the concentration of the next highest direction (2.09 ppb versus 1.11 ppb for north winds). At the Travis monitor, north, northeast, and south winds were associated with high concentrations; no sector was prominent.

The northeast wind peak at Port Richmond was investigated using the micro, point source, and mobile/area source mapping inventories.

In the microinventory there is a large cluster of sources to the northeast of the monitor. Most notable are the Port Richmond POTW and Antique Brass Works. The latter source is probably insignificant, but it is located only one block northeast of the monitor. The cluster also includes several auto refinishing facilities, but the inventory does not contain any emissions data for these sources.

The point source inventory for dichloromethane lists the following sources in the northeast sector:

Source	Emissions (tpy)	Distance (km)	R.S.I.
Newtown Creek POTW	68.88	18.1	13.40
City of Bayonne POTW	4.18	2.5	2.49

Emissions density for dichloromethane to the northeast of the monitor is shown as zero in the area/mobile source mapping inventory. Emission densities for the entire region are generally less than 0.5 tpy; thus point sources and not mobile/area sources are primary contributors to dichloromethane impacts at the monitors.

The primary sources of dichloromethane likely to have caused the high concentrations at the Port Richmond monitor during northeast winds are POTWs.

6.3.4 Pollutant Rose I - Trichloroethylene (Map III-6-5)

Concentration peaks are very well defined at two of the four sites considered in this pollutant rose. The concentrations on north and northeast winds (0.27 and 0.28 ppb, respectively) at Travis were associated with trichloroethylene concentrations three times higher than the next highest concentration-direction (0.09 ppb with west winds). At Port Richmond, a striking northeast peak appeared (as occurred with some of the other chlorinated compounds); it was nearly four times the value of the next high concentration-direction (0.42 ppb versus 0.12 ppb, with north winds).

6.3.4.1 Travis, north/northeast sectors

Trichloroethylene sources to the north and northeast of Travis were investigated using the micro and point source inventories.

In the microinventory, there is a dry cleaning establishment, an auto refinishing shop, and a concrete/asphalt plant within 1 km of the monitor. Quantified emissions from these sources are either zero or not available.

The point source inventory for trichloroethylene lists the following in the north/northeast sector:

Source	Emissions (tpy)	Distance (km)	R.S.I.
Hudson Tool & Die Co.	52.88	17.4	10.52
Mulberry Metal Products	19.23	14.7	4.21
Essex/Union POTW	10.67	6.4	3.74
Gordon Terminal Service	9.67	11.9	2.39
Rahway Valley POTW	2.54	1.4	2.10
P.D. Oil & Chemical Storage	7.97	11.9	1.97
Newtown Creek POTW	7.55	25.7	1.21
Peerless Tube Co.	6.65	23.1	1.13
Webcraft Chemical Craig Adhesive	5.04	17.4	1.00
Red Hook POTW	1.14	23.3	0.19

A link between high concentrations, the Essex/Union POTW, Rahway Valley POTW, and industrial applications is shown here. The auto refinishing shop listed in the microinventory and, hence, within 1 km of the monitor, might have a significant impact, since trichloroethylene is used as a solvent/degreaser at such businesses; but without quantifiable emissions data, the connection with high concentrations at the monitor cannot be verified.

6.3.4.2 Port Richmond, northeast sector

In the microinventory, there is a large cluster of sources to the northeast of the monitor, most notably the Port Richmond POTW and Antique Brass Works. The microinventory also contains several auto refinishing shops, but emissions data are unavailable.

The point source inventory for trichloroethylene lists the following in the northeast sector:

Source	Emissions (tpy)	Distance (km)	R.S.I.
Gordon Term Svce. Co.	9.67	2.9	5.30
PD Oil & Chem. Storage	7.97	3.0	4.28
Newtown Creek POTW	7.55	16.5	1.55
Red Hook POTW	1.14	14.1	0.26
26 Ward POTW	0.72	20.3	0.13
Port Richmond POTW	0.13	1.2	0.11

Industrial/chemical sources of trichloroethylene appear to have caused the high concentrations at the Port Richmond monitor. POTWs are represented, but the lower emission rates are much lower and/or are they are located much farther from the monitor.

6.4 SURFACE TRAJECTORY ANALYSES DESCRIPTION

6.4.1 Surface Trajectory Model

A surface trajectory model was used to depict movement of atmospheric packets or parcels of air backward in time given a parcel terminal point. This trajectory model is intended to identify source areas of toxic air pollutants with the goal of relating specific source areas to pollutant concentrations at established receptor locations. This is accomplished by using surface wind speeds and directions from several nearby meteorological stations.

Due to the uncertainty regarding whether or not surface winds are representative of meteorological conditions aloft during the nighttime, the results presented should be thought of as more general air trajectories relating concentrations with source areas rather than particular point sources. However, due to the relatively small area analyzed, horizontal and not vertical transport is most likely to be the controlling factor. Thus, this model is regarded as appropriate for the intended level of analysis.

The surface trajectory model is a LOTUS spreadsheet which computes the movement of air parcels given inputs such as UTM coordinates for the parcel terminal point, UTM coordinates for the meteorological stations, and wind speed and direction data to match the hours of the trajectory. Then computations of the movement of parcel location with time were made, and the UTM coordinates of parcel location were entered into the results section. The table of results was then imported to a FREELANCE grid map of the project area, and the parcel positions and movement were depicted graphically.

6.4.2 Selection of sites, pollutants, and dates

The initial surface trajectory analysis consisted of six trajectories, selected on a general basis of aromatic/chlorinated hydrocarbon concentration variations and air stagnation periods. These initial trajectories were analyzed more from a meteorological perspective than for purposes of source identification. The results of these analyses are described in the appendix of this volume.

6.5 SOURCE IDENTIFICATION USING SURFACE TRAJECTORY ANALYSIS

6.5.1 Introduction

The surface trajectory analysis presented here includes an examination of both aromatic and chlorinated hydrocarbons. Benzene and toluene (aromatic compounds) were chosen as potential tracers for automotive sources and refineries; chloroform and carbon tetrachloride (chlorinated compounds), as potential tracers for chemical/industrial plants; and tetrachloroethylene, as a known tracer for sewage treatment plants and dry cleaners.

All of the project sites were considered in the selection process. Those sites which exhibited very high concentrations of the pollutant of interest on one or more occasions were chosen, and trajectories were run for the dates in question. This resulted in the generation of more than 25 surface trajectories. Fourteen trajectories are discussed below--10 for tetrachloroethylene, three for benzene and toluene, and one for chloroform and carbon tetrachloride; they are Maps III-6-6 through 20.

6.5.2 Chloroform and Carbon Tetrachloride (Map III-6-6)

Concentrations of chloroform were high at Port Richmond, Travis, and the Pump Station on March 11-12, 1989; additionally, concentrations of carbon tetrachloride were high at Tottenville. The gentle southwest to southeast trajectory covers a portion of the Fresh Kills Landfill before arriving at the monitoring site.

A source-receptor relationship for Akzo Chemicals and high concentrations is exhibited for chloroform; while it is suspected that the landfill may contribute to these concentrations, the absence of landfill emissions data for chloroform in the emission inventory render relative contributions of the chemical plant and the landfill difficult to assess. In the point source inventory for chloroform, only Akzo Chemicals had emissions greater than 1 tpy in the south/southeast sector; located 21.4 km from the Pump Station monitor, its chloroform emissions are listed as 2.75 tpy. Although the Port Richmond POTW estimated emissions are 0.39 tpy, its short distance from the Port Richmond monitor (1.2 km) identifies it as a potential contributor to the high concentration at Port Richmond.

In the point source inventory for carbon tetrachloride for this sector, only Hercules, Inc., had emissions greater than 1 tpy; located 11.0 km from the Tottenville monitor, its carbon tetrachloride emissions are listed as 447.74 tpy--an order of magnitude higher than the next-highest ranked source for the entire emissions inventory. A source-receptor relationship between the Hercules facility and the Tottenville monitor is indicated.

6.5.3 Toluene and Benzene

6.5.3.1 High concentrations of toluene and benzene (Map III-6-7)

The maximum concentration of toluene (25.15 ppb) for the entire project was recorded at the Eltingville monitor on October 15-16, 1987; the benzene concentration was very high (7.25 ppb), as well. Segments of the trajectory all fit into a relatively narrow 45-degree sector stretching from north-northeast to north-northwest of the monitoring site. The micro, point source, and mobile/area source (for benzene only) inventories were examined to locate sources within this sector.

Sources in the microinventory include the Fresh Kills Landfill and two dry cleaners, but no quantified emissions; and a gas station with emissions of 1.74 tpy total VOCs.

The point source inventory for benzene lists the following in the 45-degree sector with emissions greater than 1 tpy:

Source	Emissions (tpy)	Distance (km)	R.S.I.
Exxon Bayway Refinery	25.00	8.4	7.51
Orbis Products, Corp.	13.14	14.4	2.91
Huls America, Inc.	5.09	12.3	1.23
Troy Chemical Co.	1.31	17.7	0.26
Spencer Kellogg Prod.	1.10	18.9	0.21

The point source inventory for toluene lists the following in the 45-degree sector with emissions greater than 40 tpy:

Source	Emissions (tpy)	Distance (km)	R.S.I.
Radel Leather Co.	519.25	23.7	86.77
General Motors Corp. CPC	107.10	9.5	30.00
Seton Co./Radel Tanning	111.88	23.7	18.70
Exxon Bayway Refinery	50.00	8.4	15.02
Ashland Chemical	61.89	19.0	11.72
CWC Industries, Inc.	47.10	19.1	8.89

The mobile/area source mapping inventory for benzene indicates emissions of benzene in the 10-20 tpy range due north of the monitor, with a few pockets of 20-30 tpy emissions 2 to 10 km northeast and northwest of the monitor. These values are comparable, in magnitude and distance from the monitor, with those found in the point source inventory.

The refinery and mobile sources each contribute to the benzene impact at the Eltingville monitor. The greater area of 20-30 tpy emissions as compared to comparable point source emissions suggests mobile sources as the primary contributors to monitored benzene impacts.

Using the benzene mobile/area source emission density map to estimate the toluene mobile/area source emissions yields a density as high as 50 tpy for this sector. Thus, for toluene, a mix of industrial, refinery, and mobile sources is implicated.

The next two trajectories are presented for comparison; they are days of low benzene and low toluene concentrations at the Eltingville monitor.

6.5.3.2 Low benzene concentration
(Map III-6-8)

Trajectory segments for this low benzene concentration day, August 4-5, 1988, are predominantly from the south/southwest, south, and southeast. This is in direct opposition to the high benzene trajectory, which featured northwest through northeast trajectory segments. The Bayway Refinery's connection with the high benzene concentrations discussed in section 6.5.3.1 is indicated here, since none of the trajectory segments for this low day pass anywhere near that refinery.

6.5.3.3 Low toluene concentration
(Map III-6-9)

The trajectory for this day, October 9-10, 1988, when toluene concentrations were low is well-channeled from the southwesterly direction, passing directly over Perth Amboy, New Jersey. As in the case of the benzene analysis presented above, this trajectory bears no resemblance to the one for high toluene. This trajectory is from a completely different direction; like the trajectory for the low benzene day, it does not sweep over the Bayway Refinery. The point source inventory contains only two sources of toluene greater than 20 tpy in the southwest sector: Hercules, Inc., and National Metallizing. These sources are quite remote with respect to the Eltingville monitor, the sources being located 18.8 and 35.3 km away, respectively.

6.5.4 Tetrachloroethylene
(Maps III-6-10 through 20)

The example of tetrachloroethylene (perchloroethylene, PCE), with higher annual average concentrations than those reported for 14 other urban areas in the 1989 Urban Air Toxics Monitoring Project (UATMP) study, demonstrates how the source identification conclusion can vary when a limited analysis is used. This is a direct consequence of this source identification's dependence on the meteorology of the given day and on an emission inventory of annual averages not reflecting daily or peak emissions activity of the sources covered.

Surface trajectories were generated for three sets of dates, and used for source identification. The Pump Station, Carteret, and Travis monitors were selected based on the following criteria: location of monitors, quantity of quality-assured data, and sampling location where high PCE concentrations were observed. Carteret is regarded as representative of conditions in the industrial corridor of northeastern New Jersey; and Travis and the Richmond Road Pump Station, as representative of Staten

Island. At least one year of valid PCE data were available for all three sites. The Pump Station satisfies the third criterion; PCE concentrations recorded there were among the highest anywhere in the project area.

6.5.4.1 Part A: high vs. low concentrations selection of dates (Maps III-6-10 through 13)

The trajectory associated with high concentrations of PCE at all sites is from northeast to southeast (July 21-22,1989; Map III-6-10). The emissions inventory revealed that the largest emitters for all PCE sources northeast through southeast of the three-site monitor cluster were the following, all located in Brooklyn: Acme Steel Co. at 33.95 tons/year, northeast of the monitors; the Newtown Creek POTW at 7.70 tpy, also northeast of the monitors; and the Coney Island POTW at 5.92 tpy, east of the monitor cluster. It is reasonable to assume that, on this day at least, the high concentrations of PCE at the monitors were caused primarily by these sources.

The surface trajectory associated with low concentrations of PCE at all sites is from the west (May 28-29,1989; Map III-6-11). Meteorology may explain this. Although there are several sources of PCE to the west of the monitor cluster, westerly trajectories are often associated with greater air dispersion, both horizontally and vertically; this could tend to lower concentrations as the contaminant plume heads into Staten Island.

The hybrid days (June 15-16,1989 and June 21-22,1989; Maps III-6-12 and III-6-13), those days when concentrations were high at one or two monitors and low at the remaining monitors, showed no conclusive pattern. Southeast to northeasterly trajectories were observed on both of these days.

Table III-6-5: Synopsis of the Part A surface trajectory analysis for PCE

Dates		Pump Station	Carteret	Travis	Trajectory
7/21-22	1989	H	H	H	NE to SE
5/28-29	1989	L	L	L	W
6/15-16	1989	L	H	H	NE to SE
6/21-22	1989	H	L	L	NE to SE

6.5.4.2 Part B: rank order selection of dates (Maps III-6-14 through 16)

A different set of high- and low-concentration dates were selected to test the generalization of the part A source identification conclusion to other days of high concentration.

January 4-5, 1989 - Selected as one of the five low concentration days at both the Pump Station and Travis.

January 16-17, 1989 - Selected as one of the five highest concentration days at both the Pump Station and Carteret.

January 23-24, 1989 - These dates did not appear on either list, however 1/22-23 appeared on the high concentration list for both the Pump Station and Travis. Since 1/22-23 was previously analyzed and was shown to be part of a regional air stagnation time period, the next day, 1/23-24, 1989, was analyzed instead.

The three surface trajectories are depicted graphically as Maps III-6-14 through 16. Table III-6-6 below lists each of the three days along with the relative PCE concentrations and the prevailing surface trajectory.

Table III-6-6: Synopsis of the part B surface trajectory analysis for PCE

Dates	Pump Station	Carteret	Travis	Trajectory
1/4-5 1989	1L	--	2L	NW
1/16-17 1989	4H	5H	--	W to SW
1/23-24 1989	1H	--	3H	N,W,S (Varied)

Key: 1L=first lowest, 2L=second lowest, 4H=fourth highest, etc.

The first trajectory listed in Table III-6-6 is the low concentration day trajectory (Map III-6-14). The prevalent trajectory of northwest shows agreement with the Part A analysis, which associates low PCE levels with west or northwest trajectories.

The second trajectory associates relatively high PCE concentrations at two of the monitors with a west to southwesterly wind trajectory (Map III-6-15). Note that this differs from the result in Part A, showing that there is more than one source area associated with high PCE concentrations. While these days were not maximum or peak PCE days, the PCE concentrations were high enough on the list to warrant some investigation. The emission inventories revealed several sources of PCE to the west-southwest of the monitor cluster; they are the POTWs listed below.

Source	Emissions (tpy)	Distance (km) to Pump Station	R.S.I.
Middlesex County POTW	23.11	22.2	4.01
Rahway Valley POTW	8.10	3.6	3.93
Middlesex County,SA POTW	5.81	14.3	1.29
Woodbridge POTW #1	0.21	8.1	0.06

It is reasonable to conclude that there is a source-receptor relationship between these POTWs and the monitor cluster.

The final trajectory in this analysis is an air stagnation period trajectory, as evidenced by the varied trajectory on 1/23-24, 1989 (Map III-6-16). It is most likely that the high concentrations of PCE in the ambient air were not caused by a single dominating point source, but by a pronounced meteorological inversion trapping all pollutants near the surface with resulting very high concentrations throughout the project area.

6.5.4.3 Part C : peak versus valley selection of dates (Maps III-6-17 through III-6-20)

High at Travis/low at Carteret. Seven of the eight segments of the trajectory for this day, Feb. 15-16, 1989 (Trajectory 1, Map III-6-17), were contained within a sector bounded by approximately 270 through 005 degrees (west through north). Sources within this sector were identified using the project emission inventories.

In the microinventory, three sources are located within the sector under consideration. These are a rock crusher, a transfer/recycle facility, and Fresh Kills Landfill. Just beyond the sector and to the northeast of the monitor are two more sources: a dry cleaner and an auto refinishing shop.

In the point source inventory the only source in the sector with emissions greater than 1 tpy is the nearby Rahway Valley POTW; emissions are 8.10 tpy, location is 1.7 km from the Travis monitor.

From the mobile/area source mapping inventory for PCE, emissions within this sector are generally less than 10 tpy per 2-km area, except for the region immediately north and north/northwest of the monitor, where PCE emissions range up to 15 tpy.

The west to north trajectory tracks over the northern portion of Fresh Kills Landfill before reaching the Travis monitor. This, coupled with the very low concentrations observed across the Arthur Kill at Carteret and the information contained in the mobile/area source mapping inventory, indicates that the area sources--in this case cold-degreasing and dry cleaning--are a major contributor to the high PCE concentrations measured at the Travis monitor. Also contributing, although probably to a lesser extent, is Rahway Valley POTW.

Fourth highest at Travis/third lowest at Carteret, and second highest at Travis. These trajectories are for February 27-28, 1989 (Trajectory 2, Map III-6-18), and November 30-December 1, 1988 (Trajectory 3, Map III-6-19), respectively. They are to be used as a basis for comparison to the Trajectory 1. Trajectory 2 is a day similar to Trajectory 1 in that concentrations are relatively high at Travis and relatively low at Carteret. However, the latter trajectory is composed of two distinct, tight channels-- one from the west, the other from the northeast. Trajectory 3 trajectory features a day of very high concentrations at Travis; it, too, is composed of two channels--one from the west, the other from the south--that are not as tight as the Trajectory 2.

The same sources that have been indicated previously (several POTWs to the west, and POTWs, Acme Steel and PD Oil/Chemical Storage to the northeast) are present in this analysis. The following is a rationalization of the simultaneous high concentrations at Travis and low concentrations at Carteret. The Travis impacts are primarily caused by the sources to the west, in New Jersey. The sources to the west are much closer to the monitors in question than are the sources to the northeast, but their emissions are of similar magnitudes. The trajectory in this scenario is simply from source area to Travis, bypassing Carteret, which is too far south (compared to Travis) to be affected much by the POTW sources in New Jersey. The impacts from the Brooklyn cluster of sources cannot be dismissed since these sources have been present in other analyses of high concentration days (and are present on this day), but their impact is much greater when the trajectories are persistently from the northeast.

Trajectories 1, 2, and 3 all exhibit a pronounced flow from the west for a good part of the day.

High Carteret/low Travis. Each segment of the trajectory for October 30-31, 1988 (Trajectory 4, Map III-6-20) was contained within a sector roughly 75 degrees in arc bounded by the north/northeast and northwest.

Five quantifiable VOC sources were located in the micro-inventory; none of these listed any emissions of perchloroethylene. Pollutants emitted by the largest sources within the sector of concern were gasoline, aromatic hydrocarbons, hexane, and methylene chloride (dichloromethane); perchloroethylene was not listed. There are three dry cleaning establishments in the area, but only one is within the sector of interest; the inventory does not contain emissions data for that facility.

In the point source inventory, the Rahway Valley POTW is the only source located within this sector; emissions are 8.10 tpy, location is 1.2 km from the monitor.

The mobile/area source mapping inventory indicates a general area of PCE emissions of 5 to 10 tpy immediately north and northwest of the Carteret monitor. Emissions are greater (10 to 15 tpy) near the northeastern boundary of the sector. Thus, area sources (cold degreasing and dry cleaning) are implicated as the major contributor to the PCE concentrations at Carteret in this scenario. Subordinate to area sources is a POTW source, which corroborates a link between perchloroethylene and POTW sources.

Table III-6-7: Synopsis of the part C surface trajectory analysis for PCE

Dates	Pump Station	Carteret	Travis	Trajectory
2/15-16 1989	--	L	H	W to N
2/27-28 1989	--	3L	4H	W and NE (distinct channels)
11/30 - 12/1 1988	--	--	2H	W and S (distinct channels)
10/30-31 1988	--	H	L	NW to NE

6.6 SUMMARY

6.6.1 Pollutant Rose Analysis

The enhanced pollutant rose analysis was performed to investigate source/receptor relationships (pollutant monitors functioned as the receptors) by first identifying concentration peaks and then investigating emission inventories for potential sources or source areas located upwind of the monitors in question.

Seven pollutants were examined in the enhanced analysis: benzene and toluene from the aromatic group, and 1,1,1-trichloroethane, dichloromethane, chloroform, carbon tetrachloride, and trichloroethylene from the chlorinated group.

Sites were chosen on the basis of consistently high concentration of the pollutants of interest. Therefore, some pollutant rose maps contain sites that were omitted in other roses.

6.6.1.1 Aromatics

Both benzene and toluene were consistently traced to mobile sources, refineries, and, to some extent, nearby gasoline stations. For toluene, more general industrial sources were implicated, with some contributions from POTWs and mobile sources. The areas near the Goethals Bridge and along Route 440/ Richmond Parkway were consistently pointed out as major source areas of benzene and toluene.

6.6.1.2 Chlorinated hydrocarbons

Sources of chlorinated compounds differed with the particular chemical; this was unlike the aromatic group of chemicals, which could be traced to mobile sources and refineries.

Trichloroethylene and 1,1,1-trichloroethane were consistently linked with industrial sources and sources such as auto refinishing shops. This probably arises from the use of these chemicals as solvents and degreasers.

Chloroform and dichloromethane, on the other hand, were often traced to POTWs with some contribution from area sources.

Finally, carbon tetrachloride seemed to arise from sources not contained in any of the other pollutant inventories, suggesting a very specific manufacturing process or use for this chemical.

The monitor at Port Richmond exhibited major peaks on northeast winds for three chlorinated compounds: 1,1,1-trichloroethane, trichloroethylene, and dichloromethane. It appears that nearby sources are the major contributors. Auto refinishers in particular probably contribute most to the impacts of the first two pollutants; while two nearby POTWs, Port Richmond and Bayonne, seem to be the primary causes for the high concentrations of dichloromethane.

6.6.2 Surface Trajectory Analysis

This portion of surface trajectory work included analysis of four trajectories for days of high concentrations of benzene, toluene, carbon tetrachloride, and chloroform; and 10 trajectories for high concentrations of perchloroethylene.

The results for the benzene, toluene, carbon tetrachloride, and chloroform trajectories corroborated the pollutant rose findings. Sources identified as contributing most to the high concentrations of benzene were mobile sources and refineries; the same was the case for toluene, but with some input from other industrial sources. Carbon tetrachloride was connected with very well-defined industrial source types, while concentrations of chloroform were linked to POTWs. While Fresh Kills Landfill was suspected as a source of chloroform, the emission inventory did not contain information to assess its relative contribution to emissions of this chemical.

For the PCE analysis, most of the dates selected were high PCE concentration days for one or more monitors. However, several days that featured low measured concentrations of PCE at one or more locations were also analyzed for use as a basis for comparison with trajectories representative of high concentration days.

Analyses indicated POTWs and several industrial sources as the primary contributors to PCE impact; while Fresh Kills Landfill was a suspected source, the emission inventory did not support it as a source more important than area sources. Several trajectories indicated northeasterly wind patterns and associated sources, while others pointed toward sources to the west of Staten Island, in the New Jersey portion of the study area. These findings are consistent with those of the pollutant rose PCE analyses.

6.7 CONCLUSIONS

The pollutant rose and surface trajectory analyses have attempted to identify sources and source areas of various air pollutants. Since meteorological conditions often figure significantly in the ambient impact of these pollutants, it must not be assumed that the sources and source areas identified in these analyses cause high concentrations in the study area at all times, but rather that their effects depend on the meteorological scenario at the times of measurement.

In keeping with this principle, it must be recognized that many sources and source areas may have gone undetected in these analyses due to the variable nature of meteorology and the limited nature of the air toxics sampling program used for the project.

The limitations of the emission inventory affect the source identification results. The following features of the inventory were of particular importance in assessing relative source contributions: (1) the unavailability of emission factors for chemicals (additional to tetrachloroethylene and toluene) expected to be emitted from Fresh Kills landfill, (2) the method-dependence of the mobile source emissions estimates, and (3) the lack of pollutant-specific emissions for many microinventory sources closest to the monitors.

These limitations notwithstanding, mobile sources (autos and trucks) and refineries are the major contributors to the highest concentrations of benzene and toluene at the project monitors. POTWs, industrial sources, and area sources are the primary sources of the highest concentrations of chlorinated hydrocarbons at the project monitors.

6.8 ACKNOWLEDGMENT

This section was prepared by Mr. William Barrett, Mr. Richard Ruvo, Mr. Ray Werner, and Mr. Henry Feingersh of the U.S. Environmental Protection Agency Region II; with assistance from Vito Pagnotti of the New York State Department of Environmental Conservation, Ms. Joann Held of the New Jersey Department of Environmental Protection and Energy, and Greg Allande of the U.S. Environmental Protection Agency Region II.

6.8 REFERENCES

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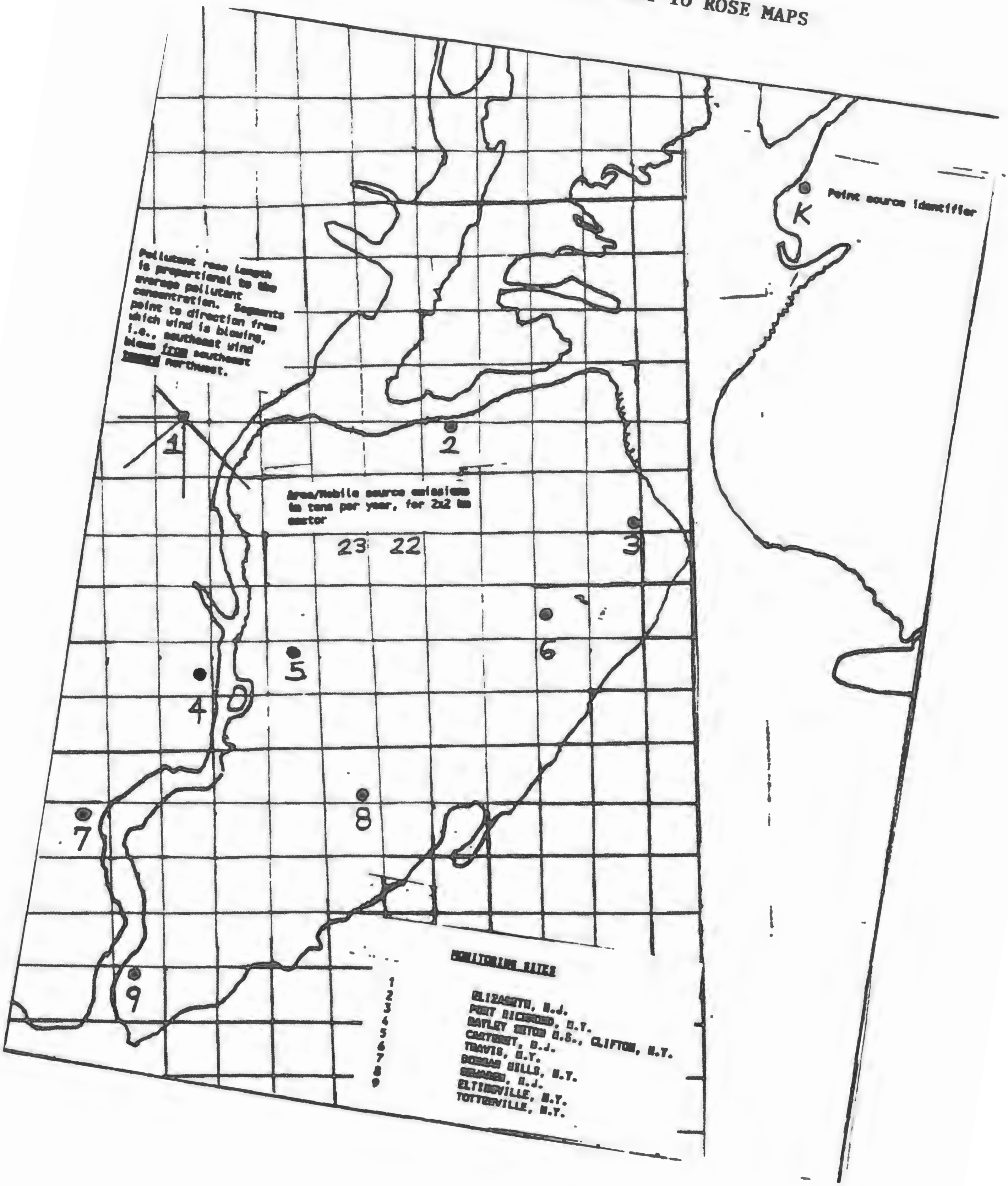
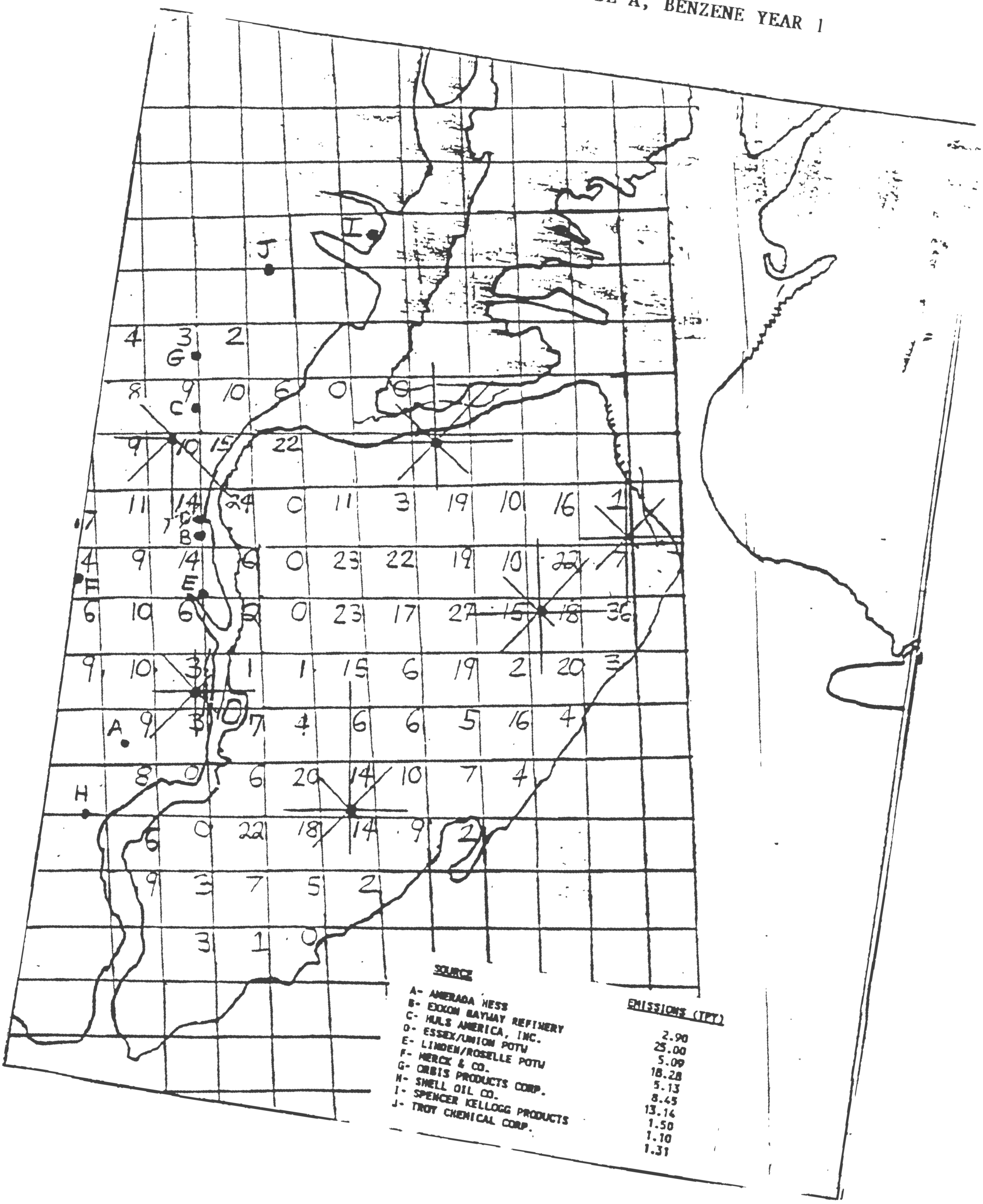
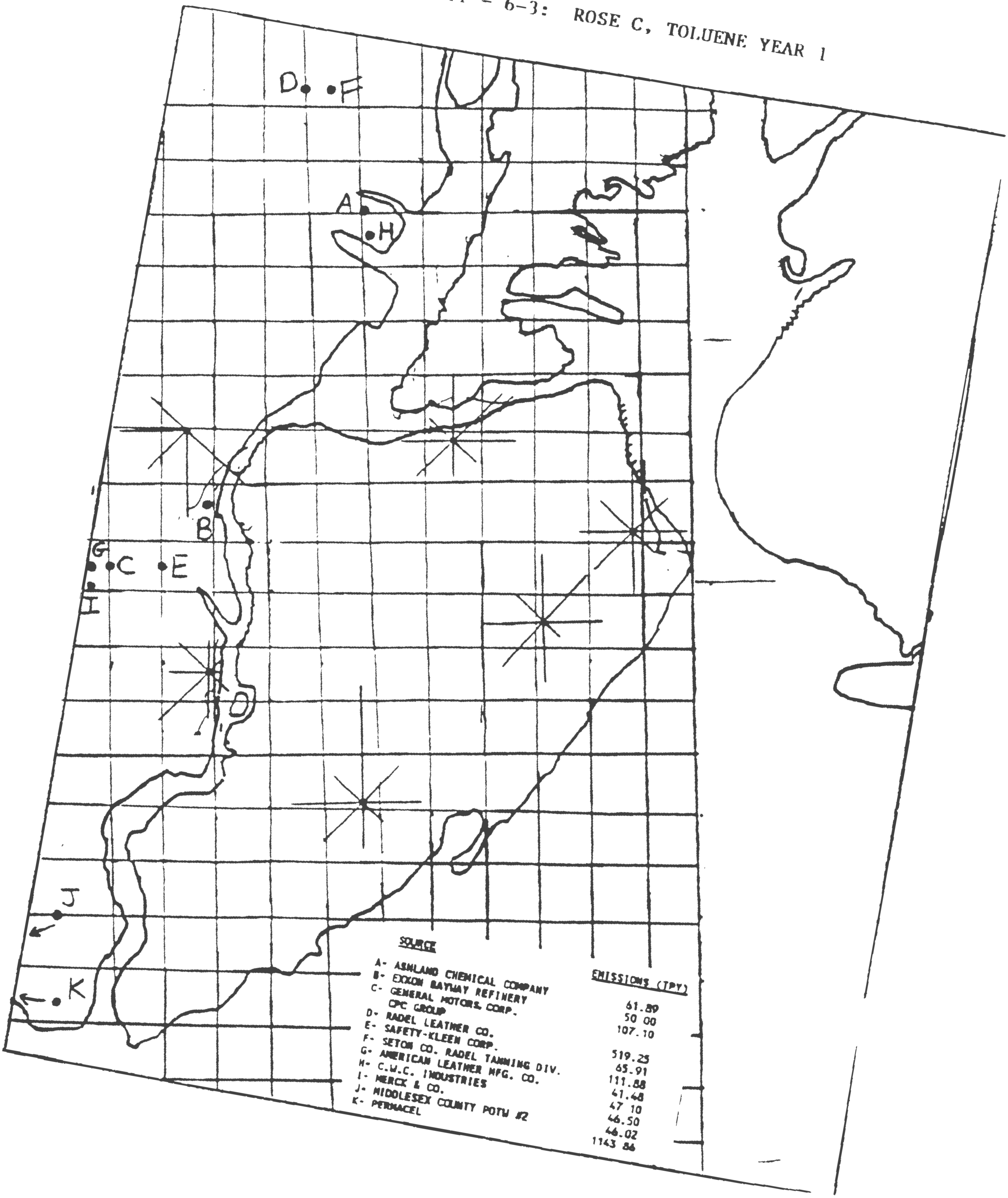
MAP III - 6-1: KEY TO ROSE MAPS



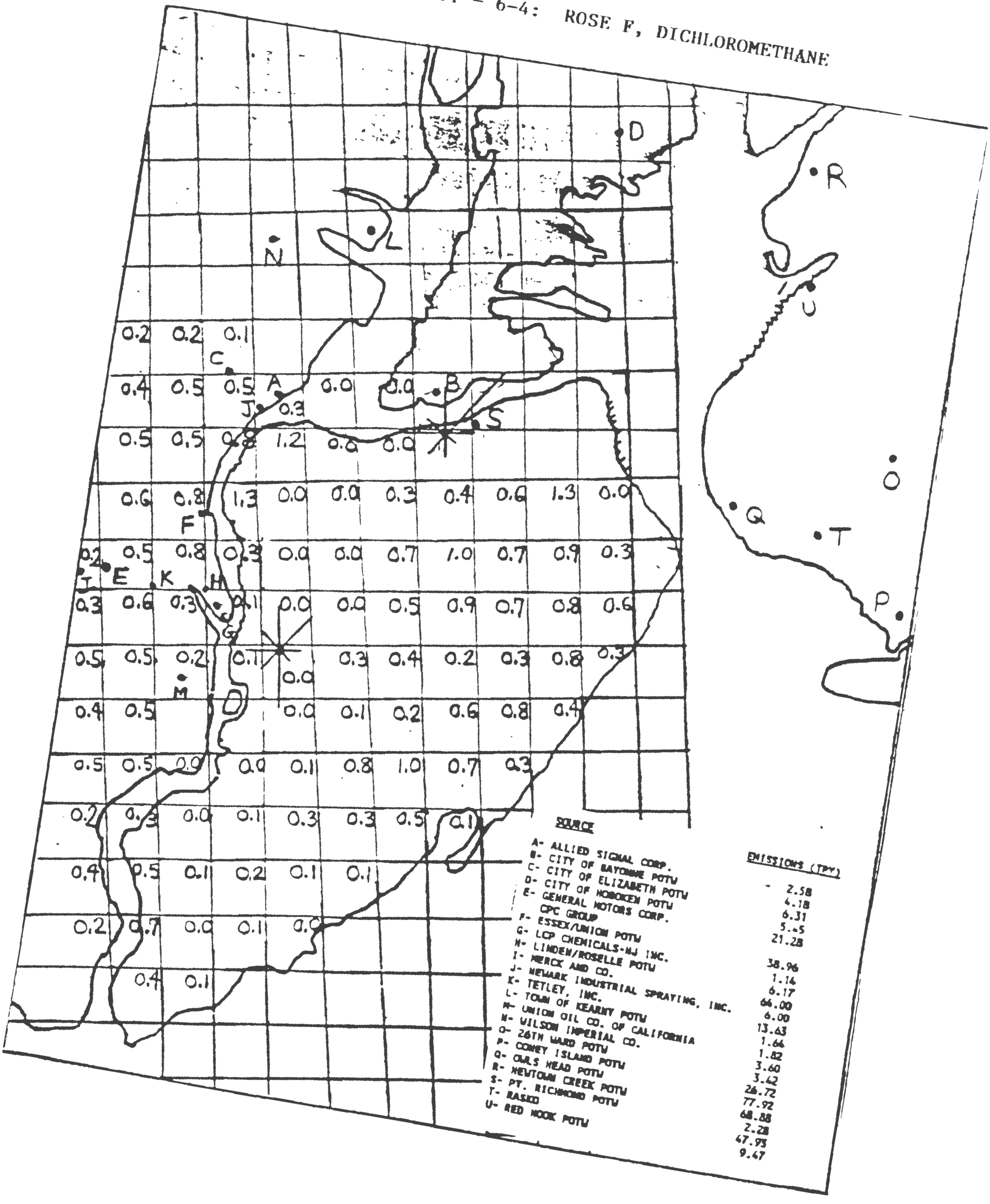
MAP III - 6-2: ROSE A, BENZENE YEAR 1



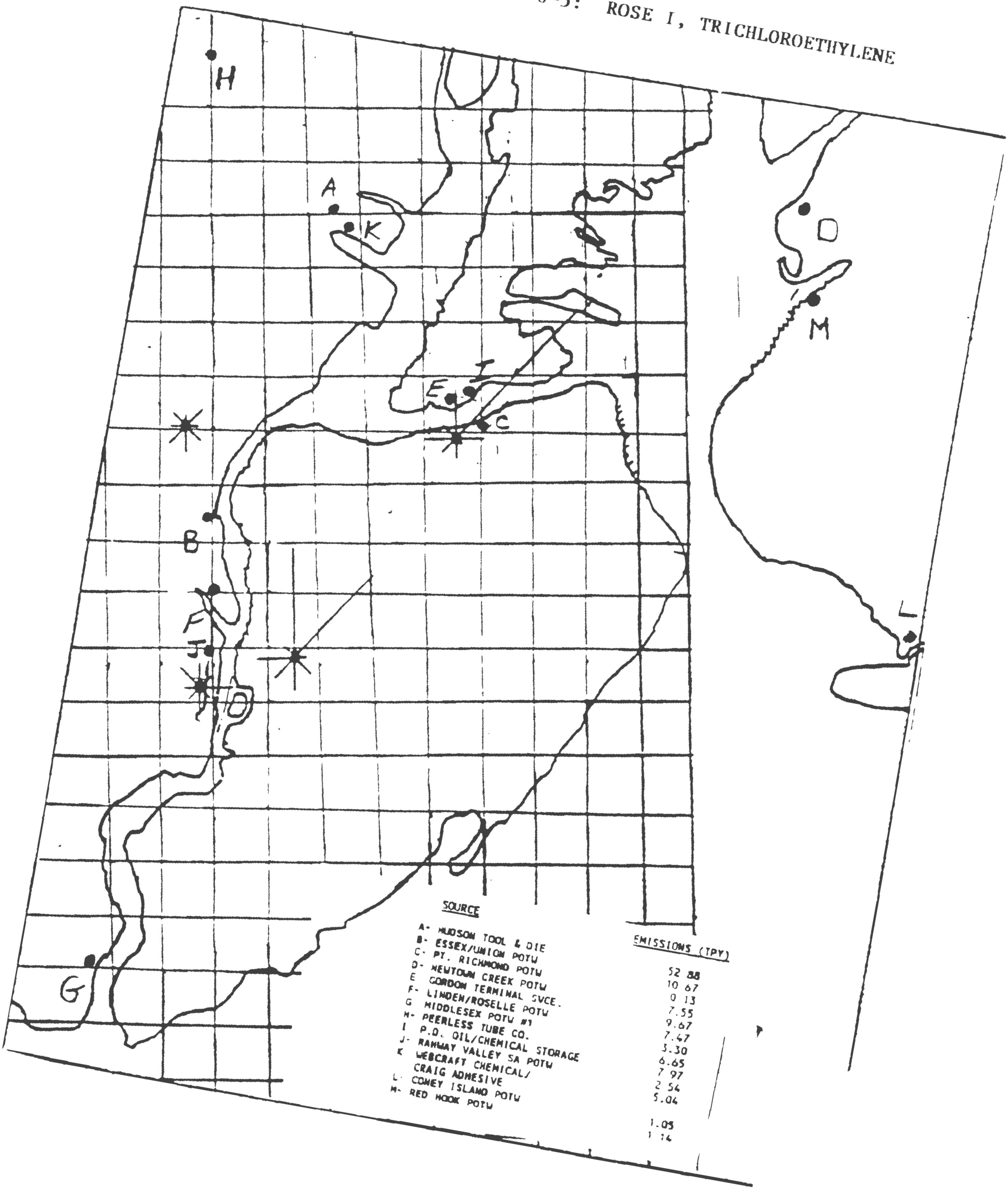
MAP III - 6-3: ROSE C, TOLUENE YEAR 1



MAP III - 6-4: ROSE F, DICHLOROMETHANE



MAP III - 6-5: ROSE I, TRICHLOROETHYLENE



MAP III-6-6

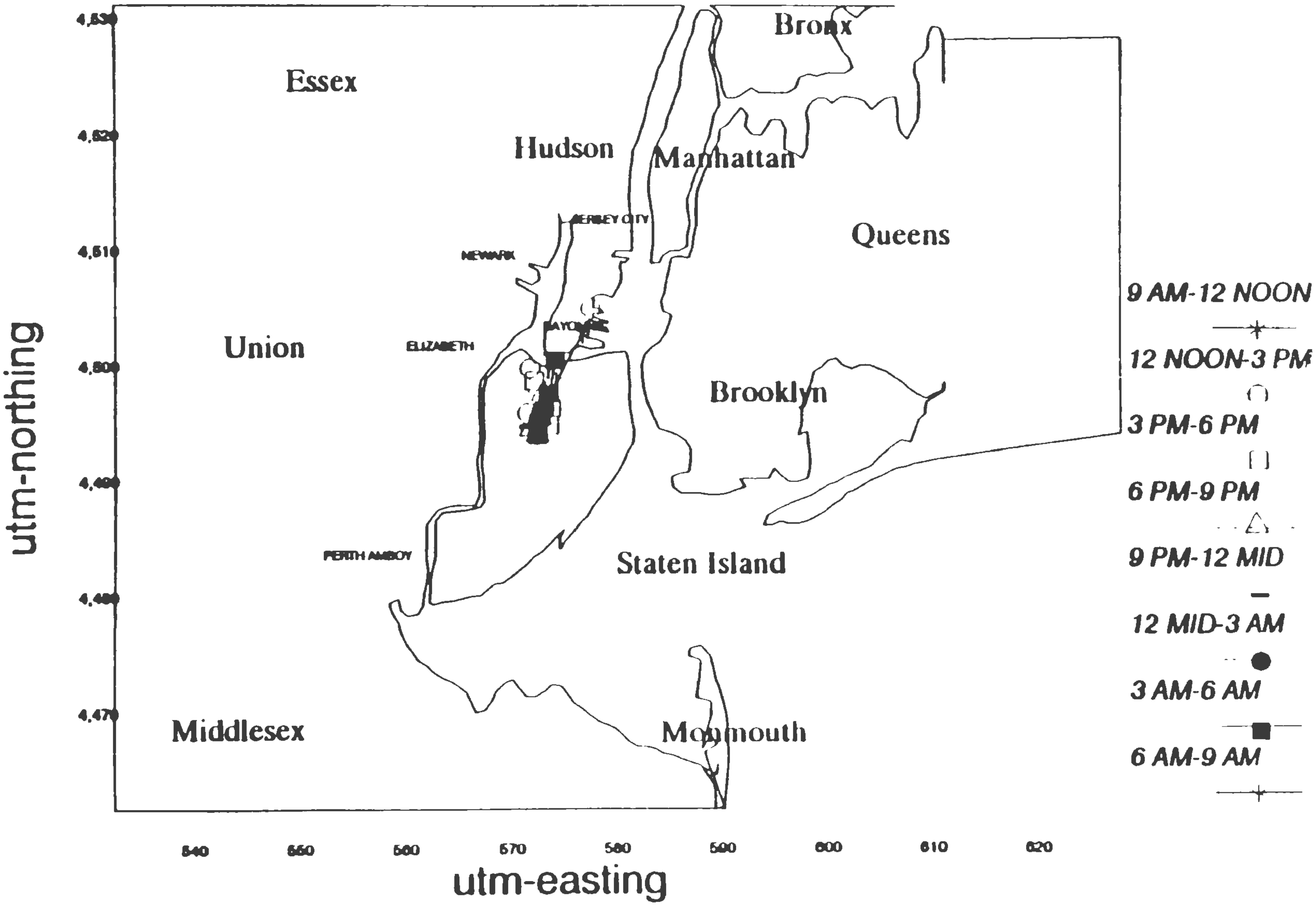
SURFACE TRAJECTORY PLOT - 3/11 - 12/89

Ending Point: Richmond Rd. Pump Station

MET DATA FROM STATIONS # 1 - 5

SURFACE TRAJECTORY PLOT - 10/15-16/87

Ending Point: Richmond Rd. Pump Station

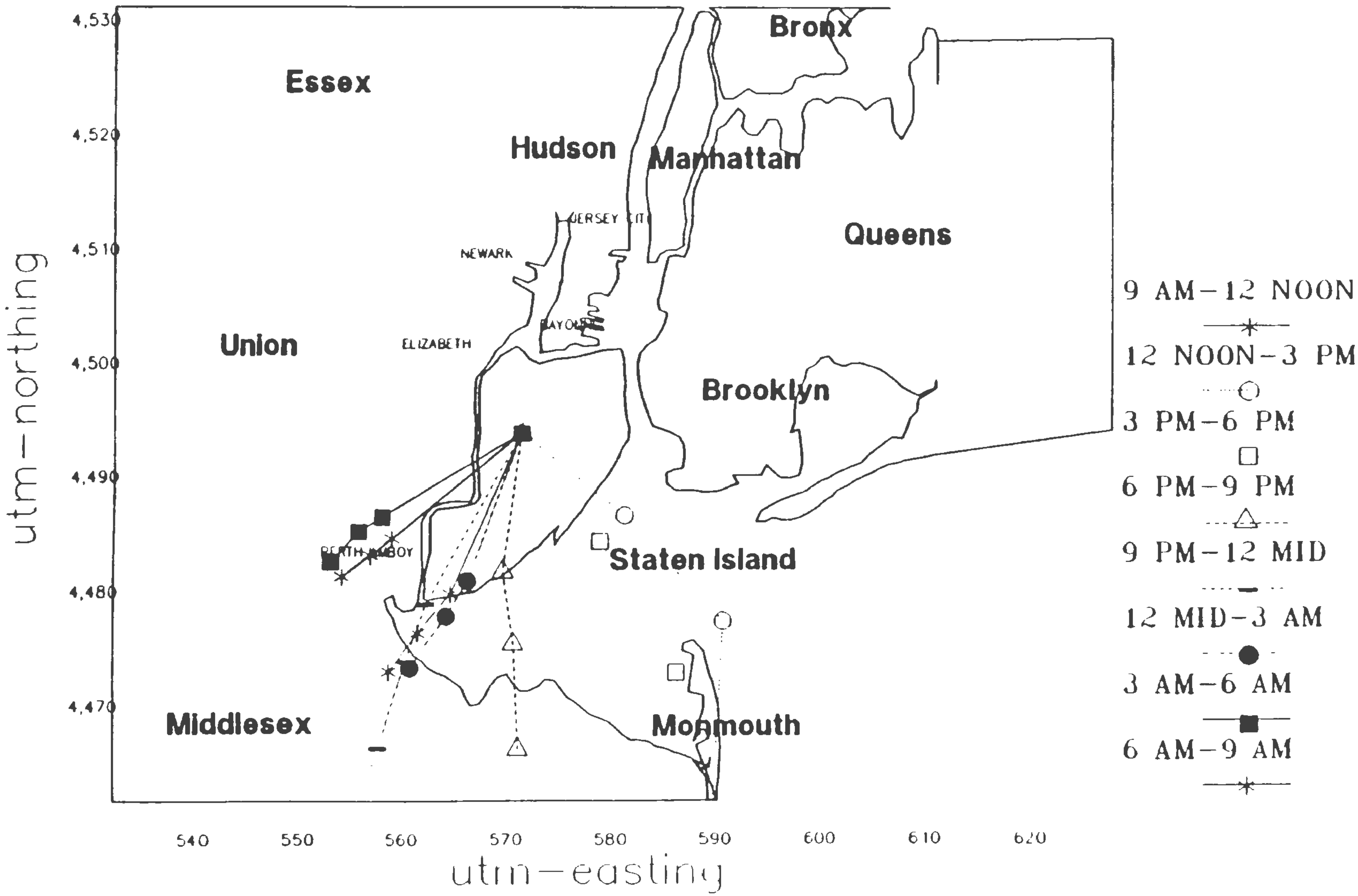


MET DATA FROM STATIONS #1-5

<u>**MAP III-6-8**</u>

SURFACE TRAJECTORY PLOT - 8/04 - 05/88

Ending Point: Richmond Rd. Pump Station

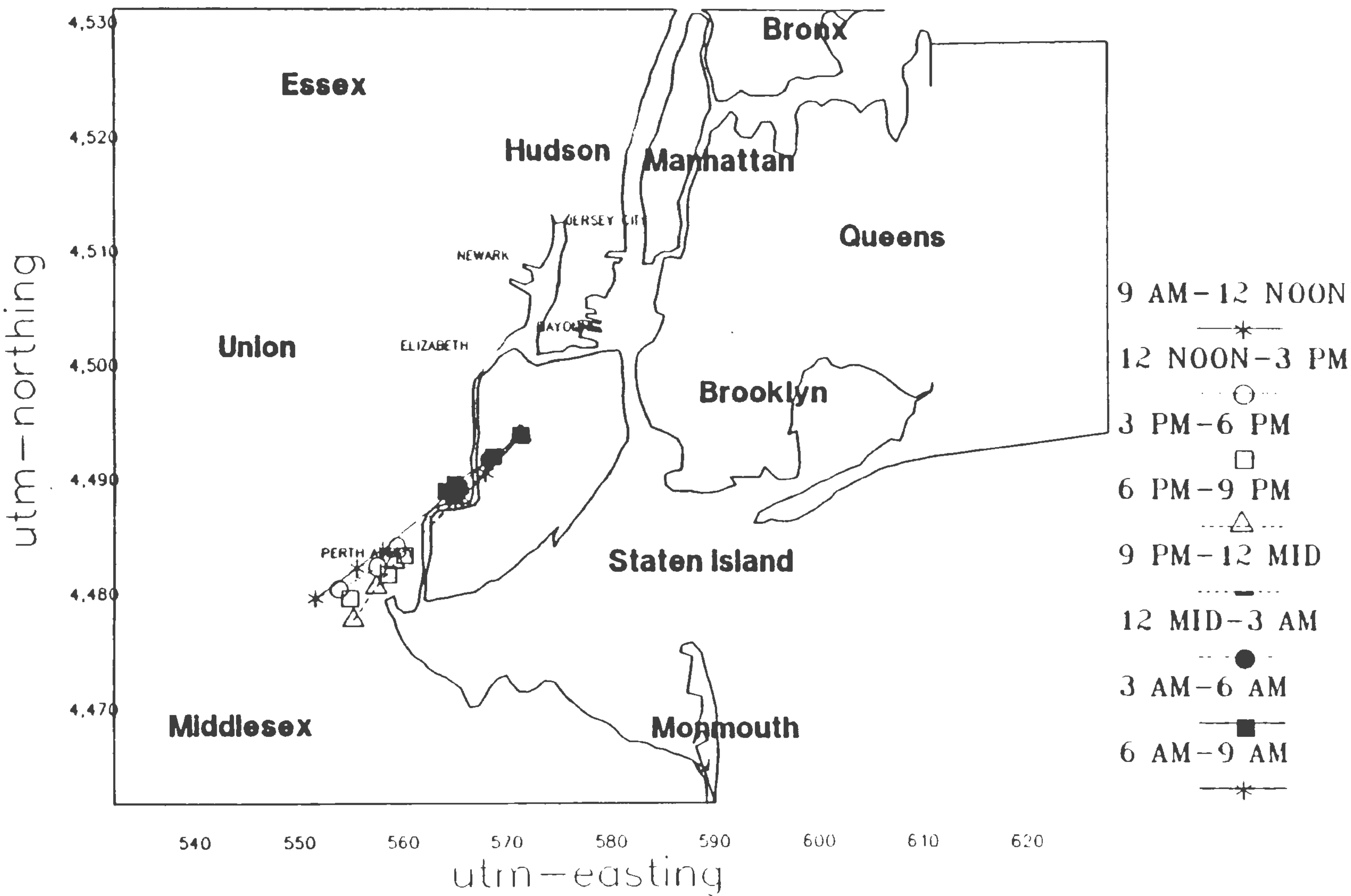


MET DATA FROM STATIONS #1-7

MAP III-6-9

SURFACE TRAJECTORY PLOT - 10/09 - 10/88

Ending Point: Richmond Rd. Pump Station

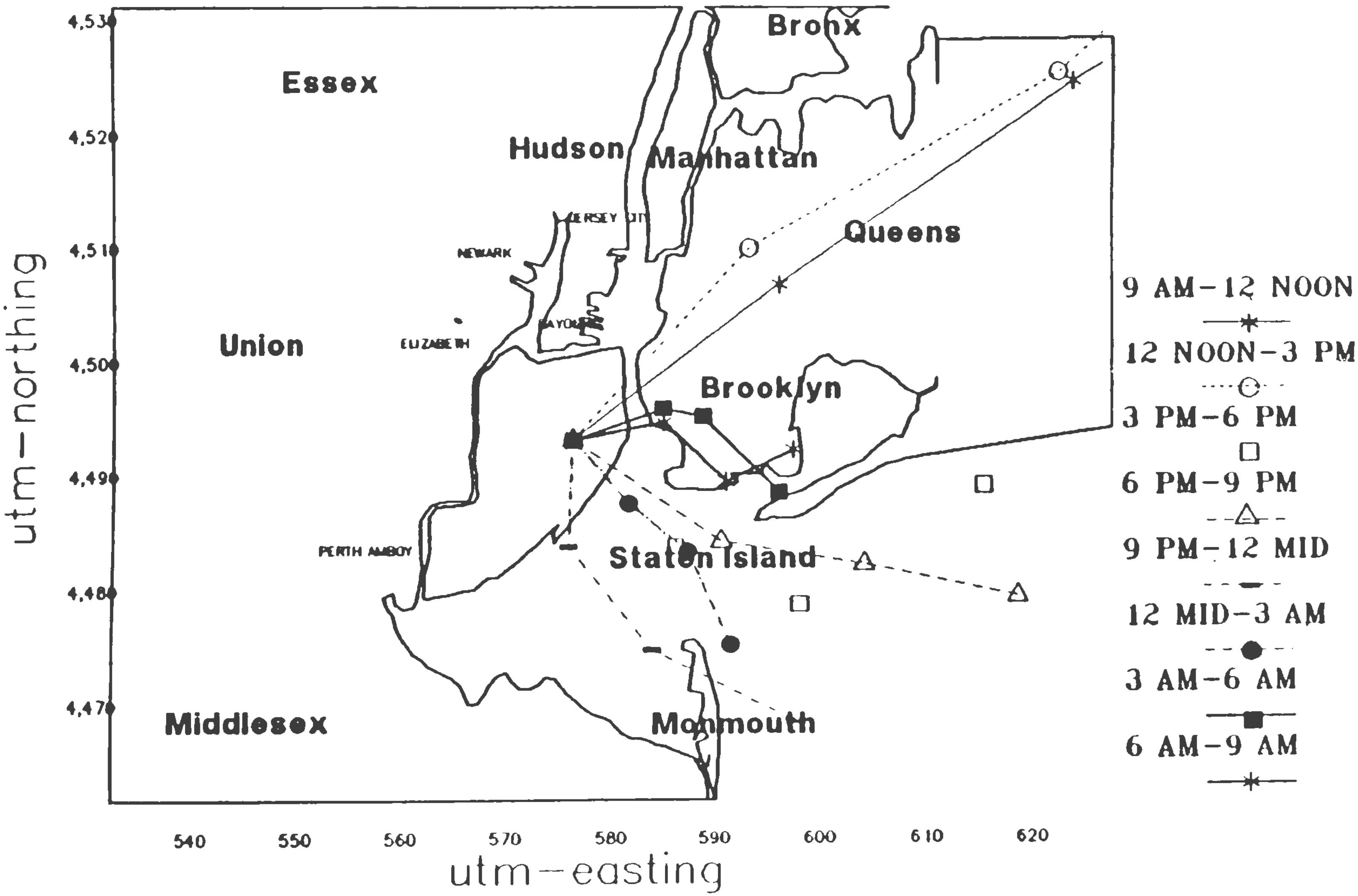


MET DATA STATION # 1 - 5

MAP III-6-10

SURFACE TRAJECTORY PLOT - 7/21-22/89

Ending Point: Susan Wagner High School



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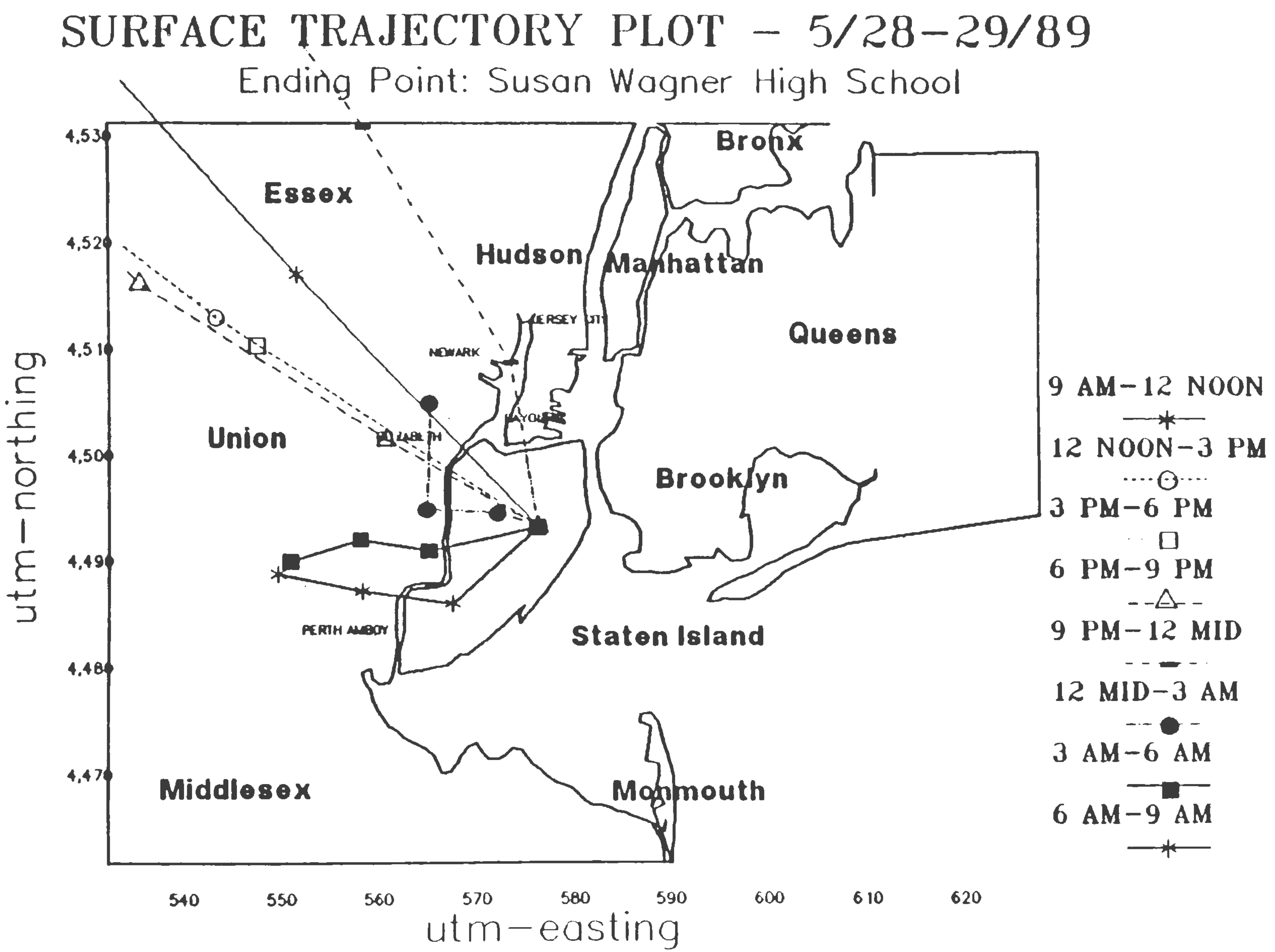
MAP III-6-11

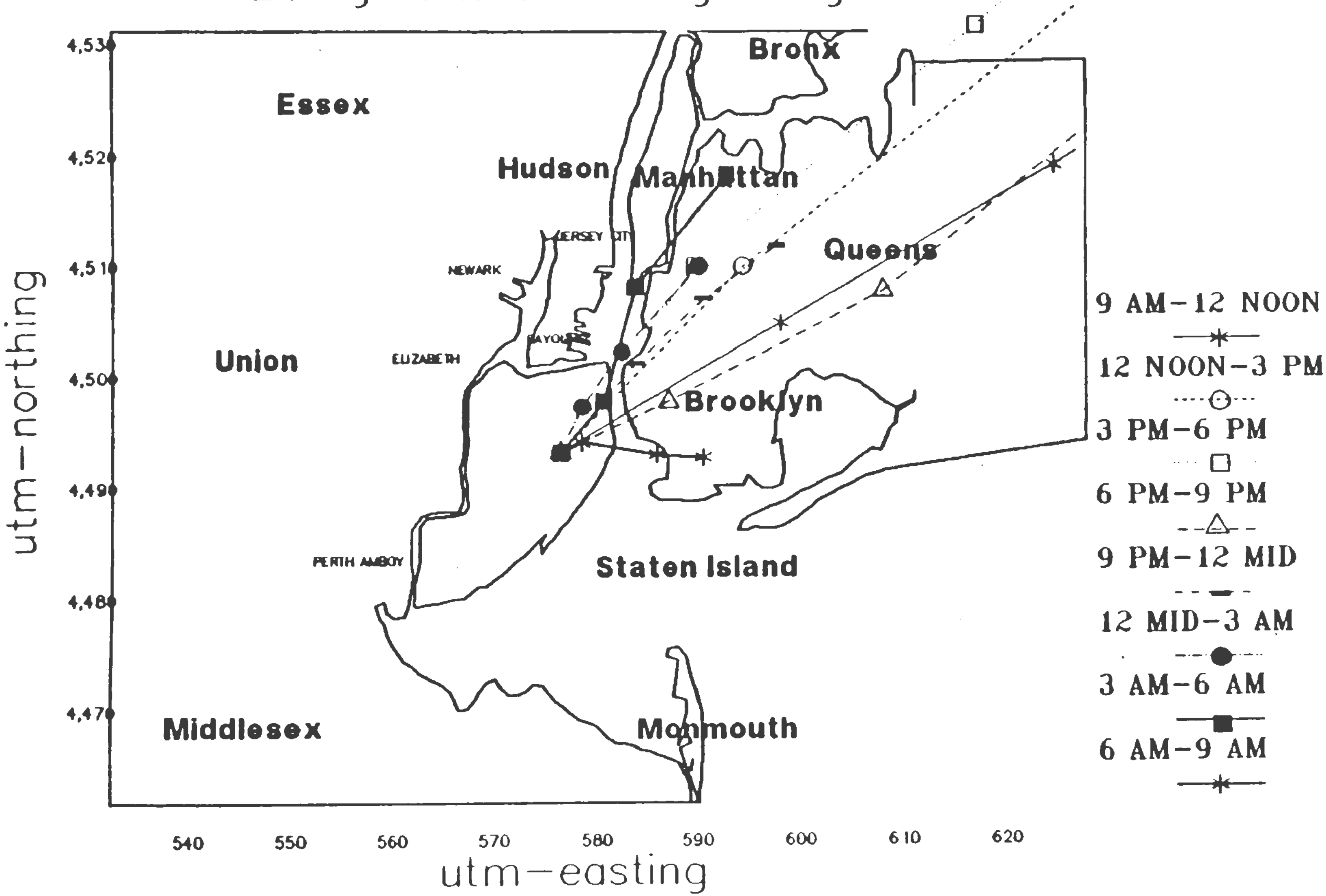


MET DATA FROM STATIONS #1-5, 7

MAP III-6-12

SURFACE TRAJECTORY PLOT – 6/15-16/89

Ending Point: Susan Wagner High School

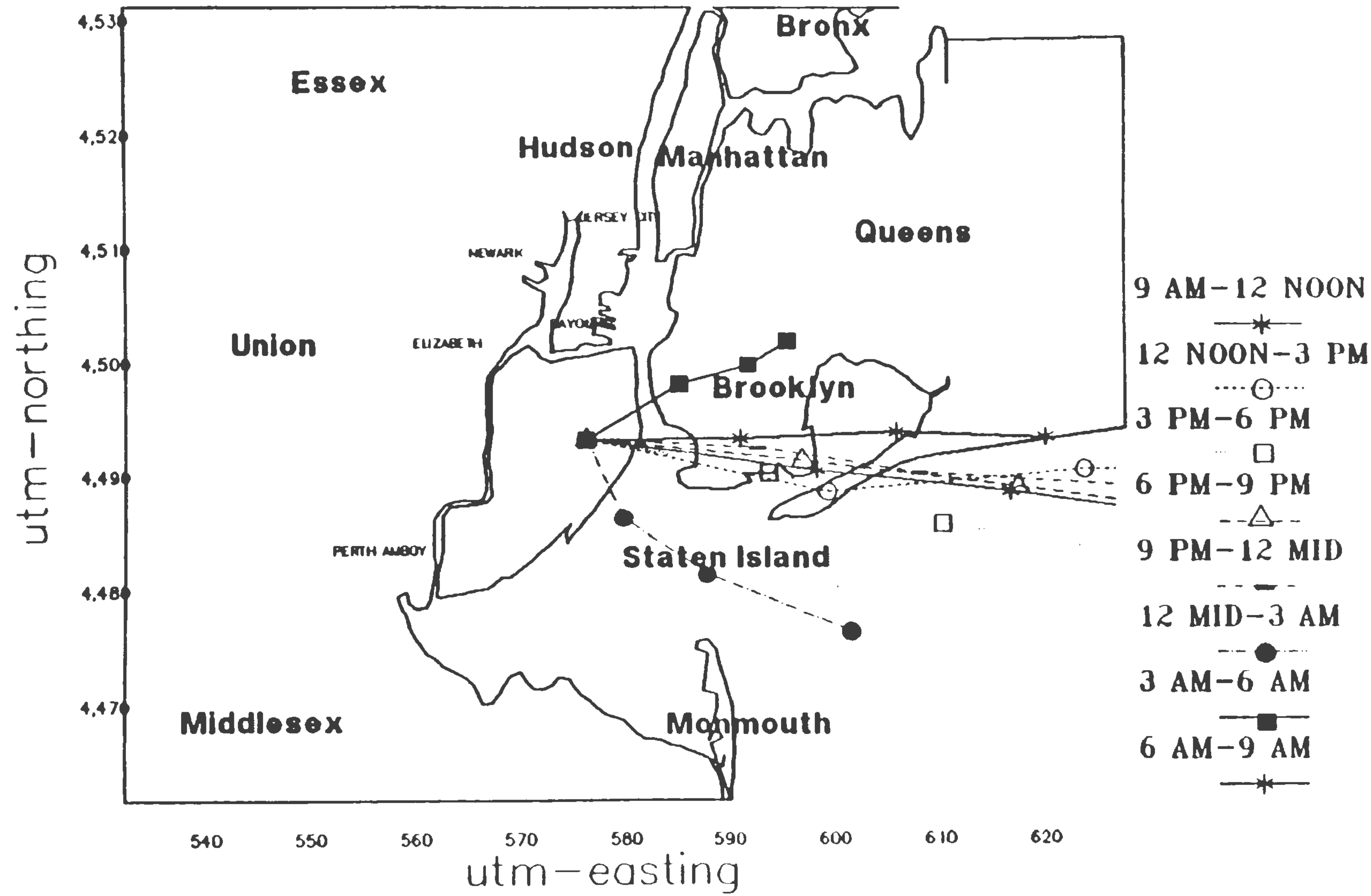


MET DATA FROM STATIONS #1-5, 7

MAP III-6-13

SURFACE TRAJECTORY PLOT - 6/21-22/89

Ending Point: Susan Wagner High School

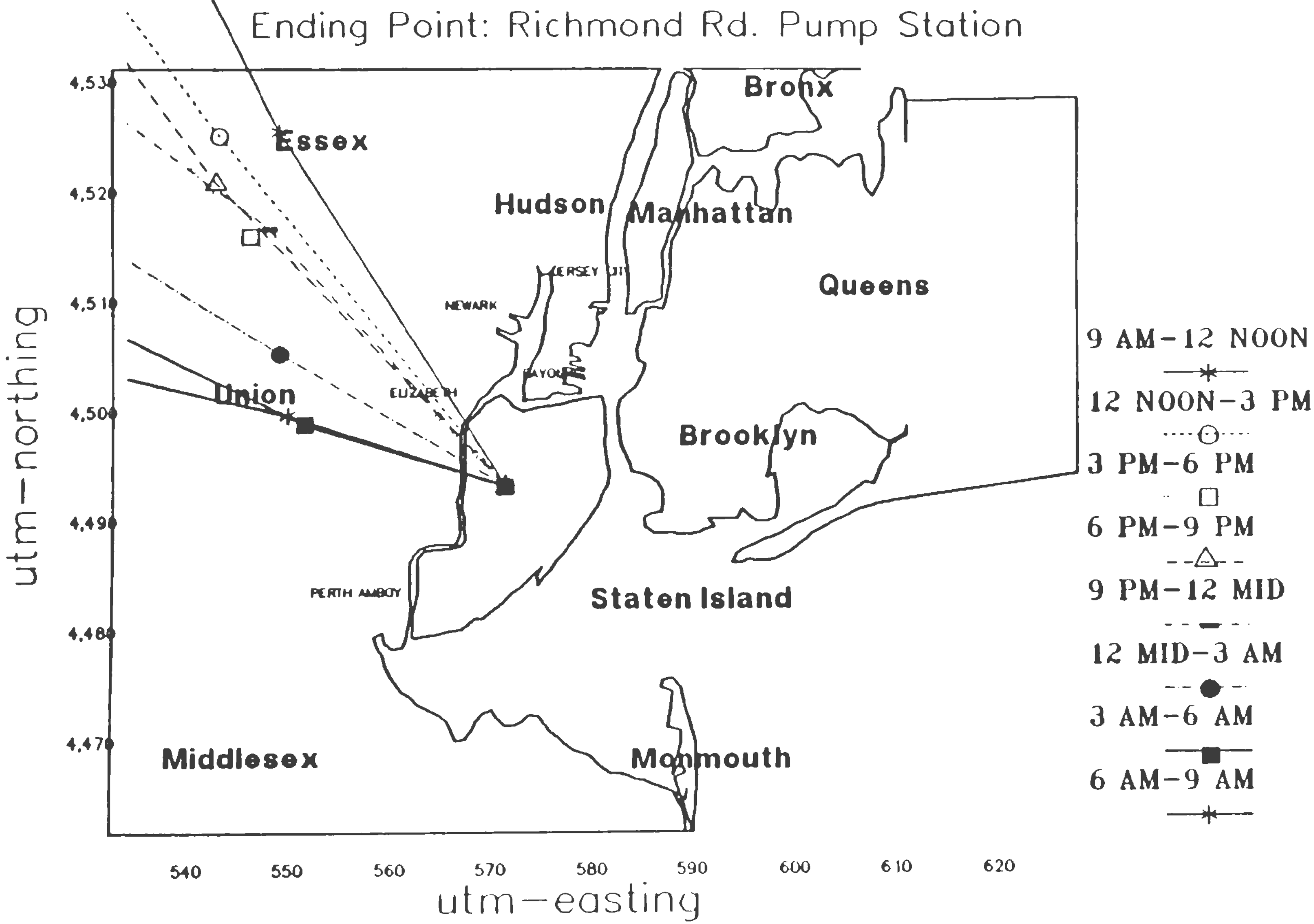


MET DATA FROM STATIONS #1-5, 7

MAP III-6-14

SURFACE TRAJECTORY PLOT - 1/4-5/89

Ending Point: Richmond Rd. Pump Station

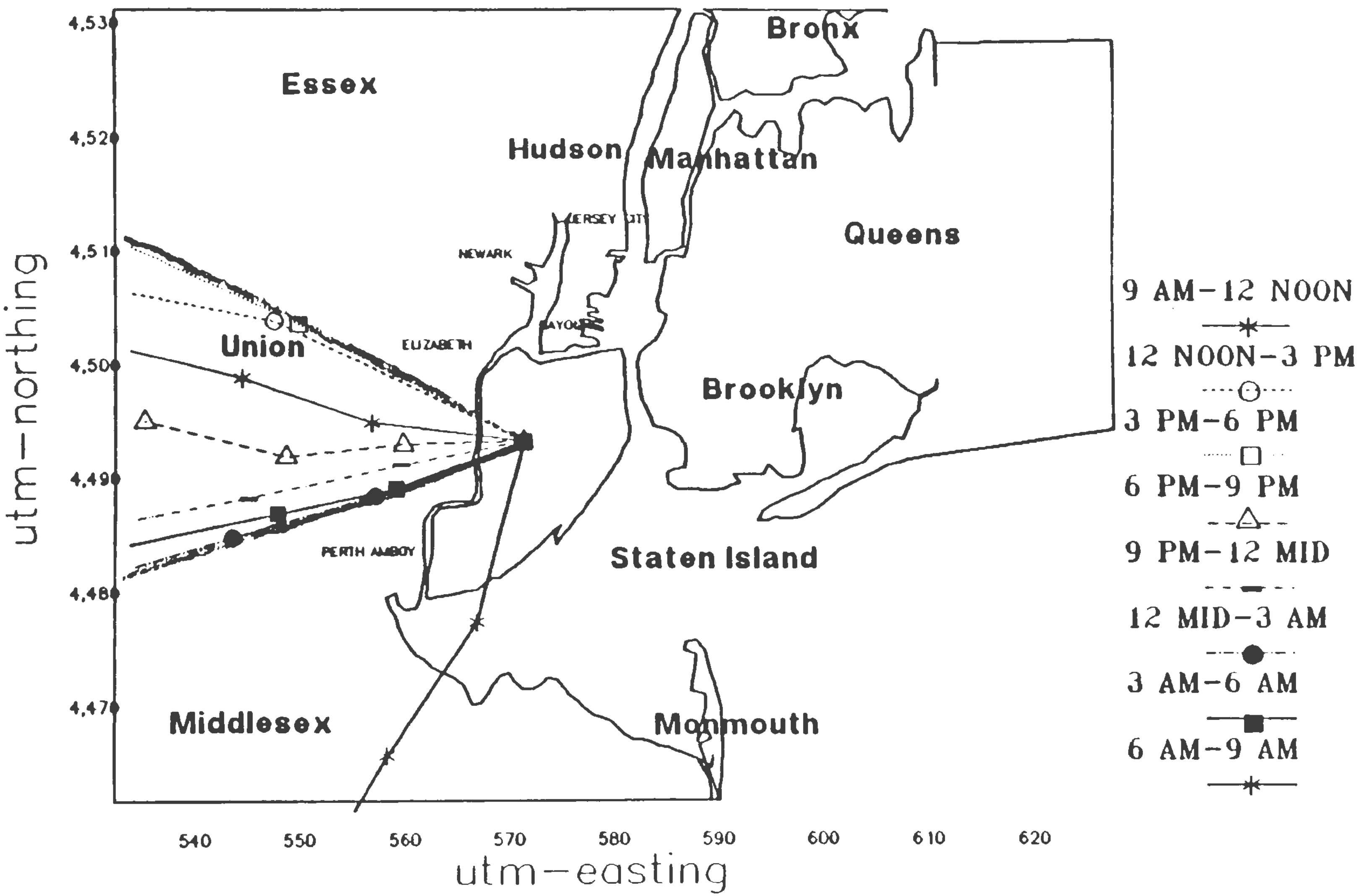


MET DATA FROM STATIONS #1-7

MAP III-6-15

SURFACE TRAJECTORY PLOT - 1/16-17/89

Ending Point: Richmond Rd. Pump Station

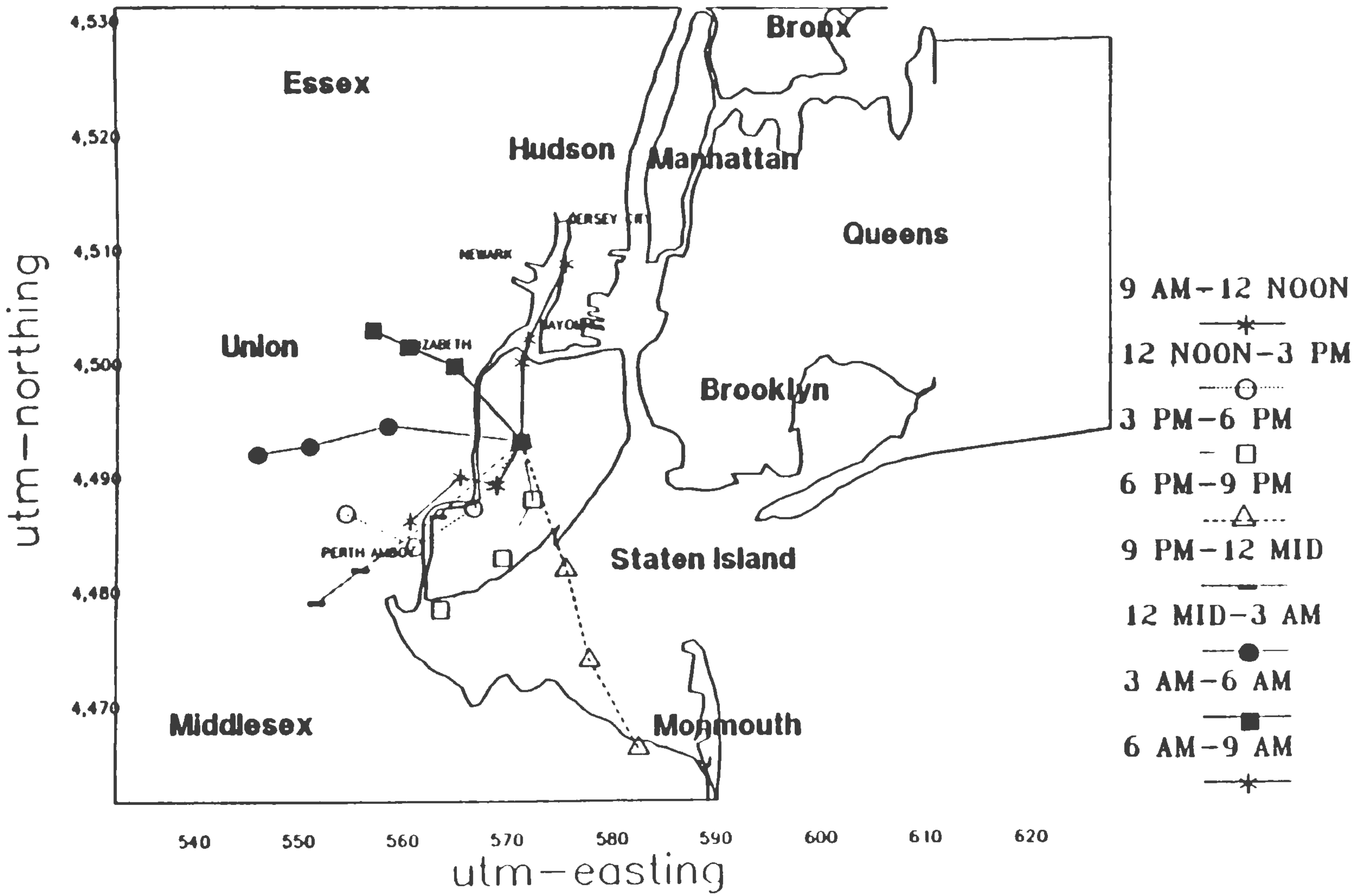


MET DATA FROM STATIONS #1-7

MAP III-6-16

SURFACE TRAJECTORY PLOT – 1/23–24/89

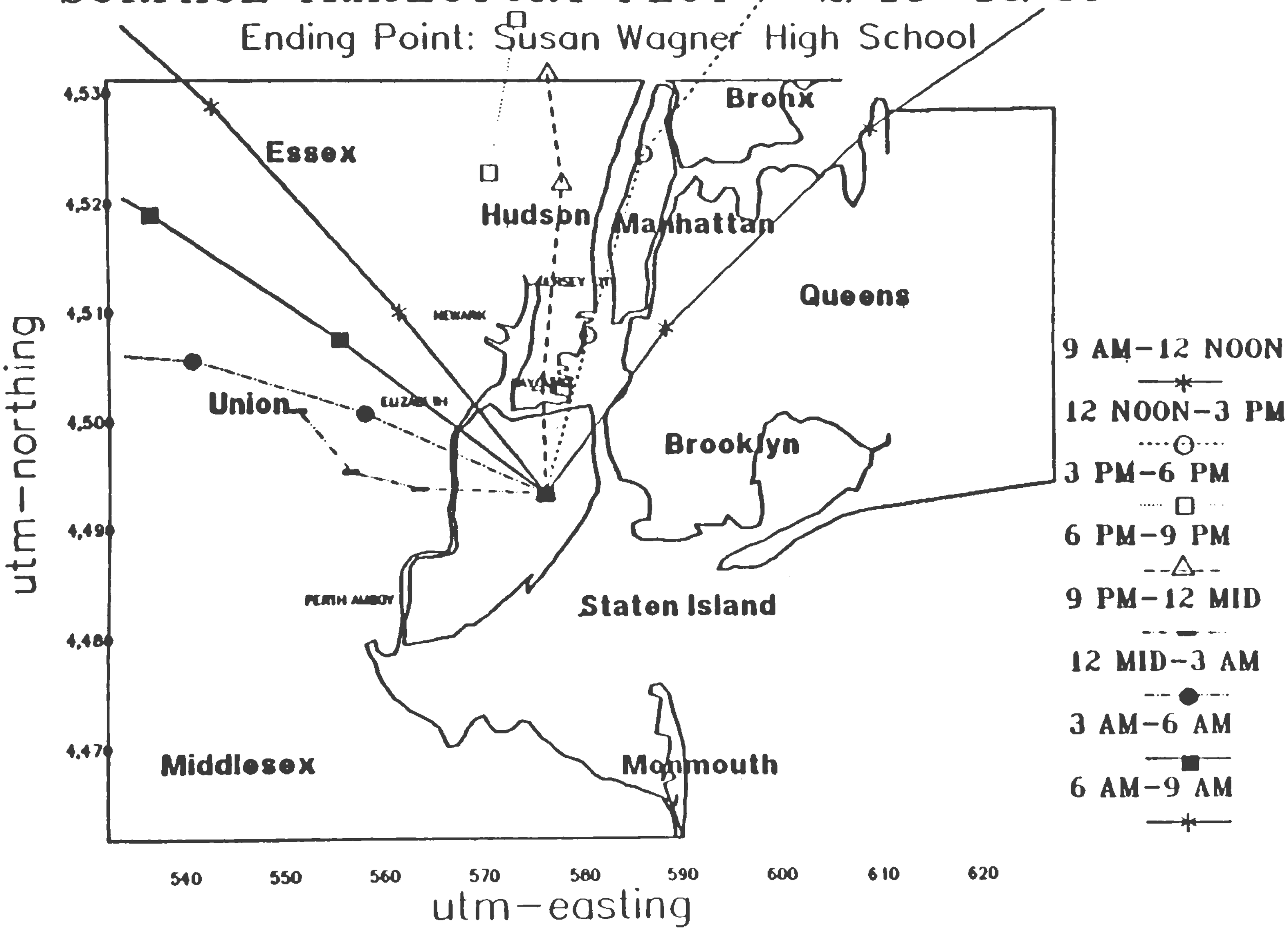
Ending Point: Richmond Rd. Pump Station



MET DATA FROM STATIONS #1–7

MAP III-6-17

SURFACE TRAJECTORY PLOT - 2/15-16/89

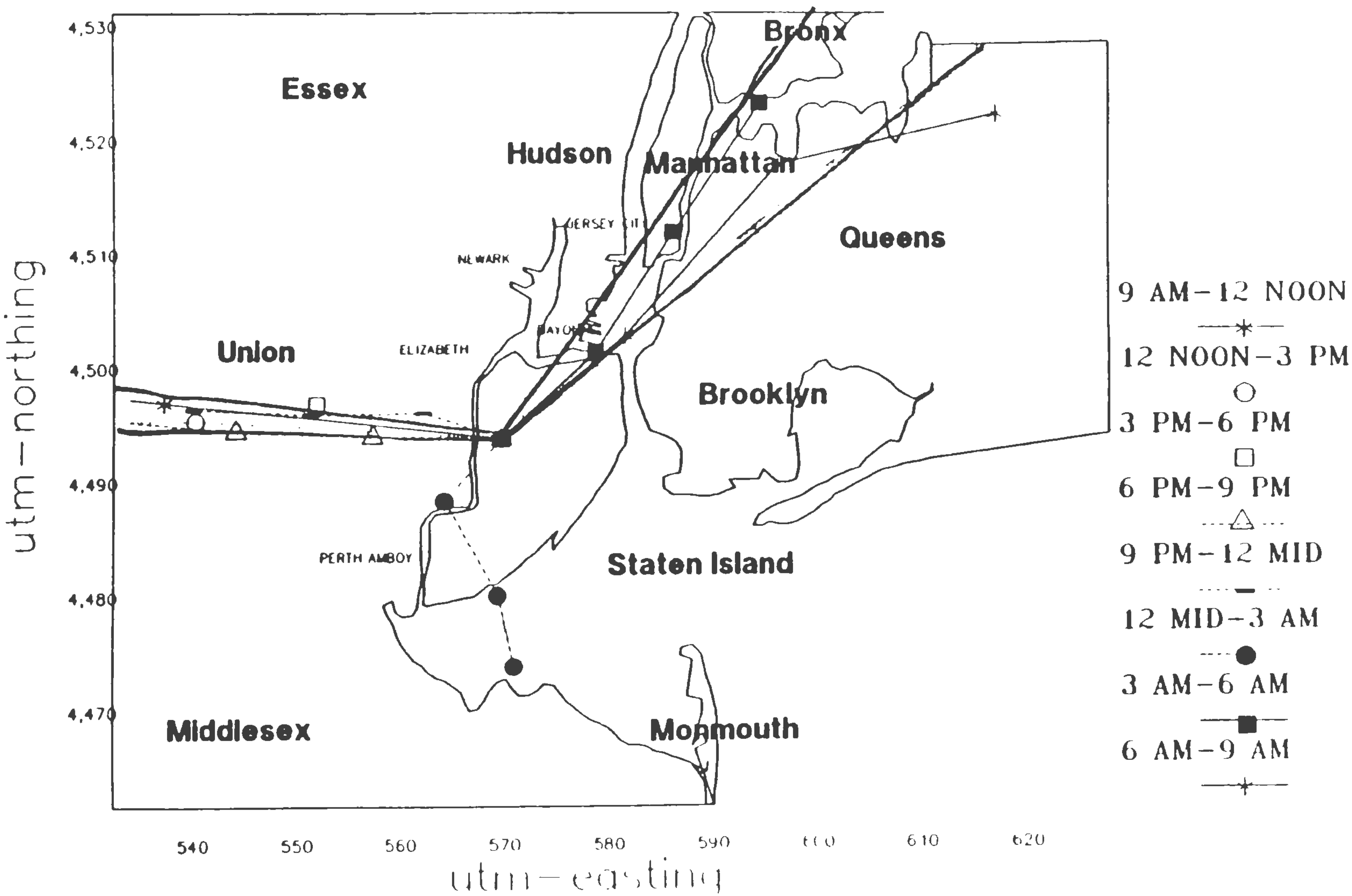


MET DATA FROM STATIONS #1-7

MAP III-6-18

SURFACE TRAJECTORY PLOT - 2/27-28/89

Ending Point: Travis SI, PS 26

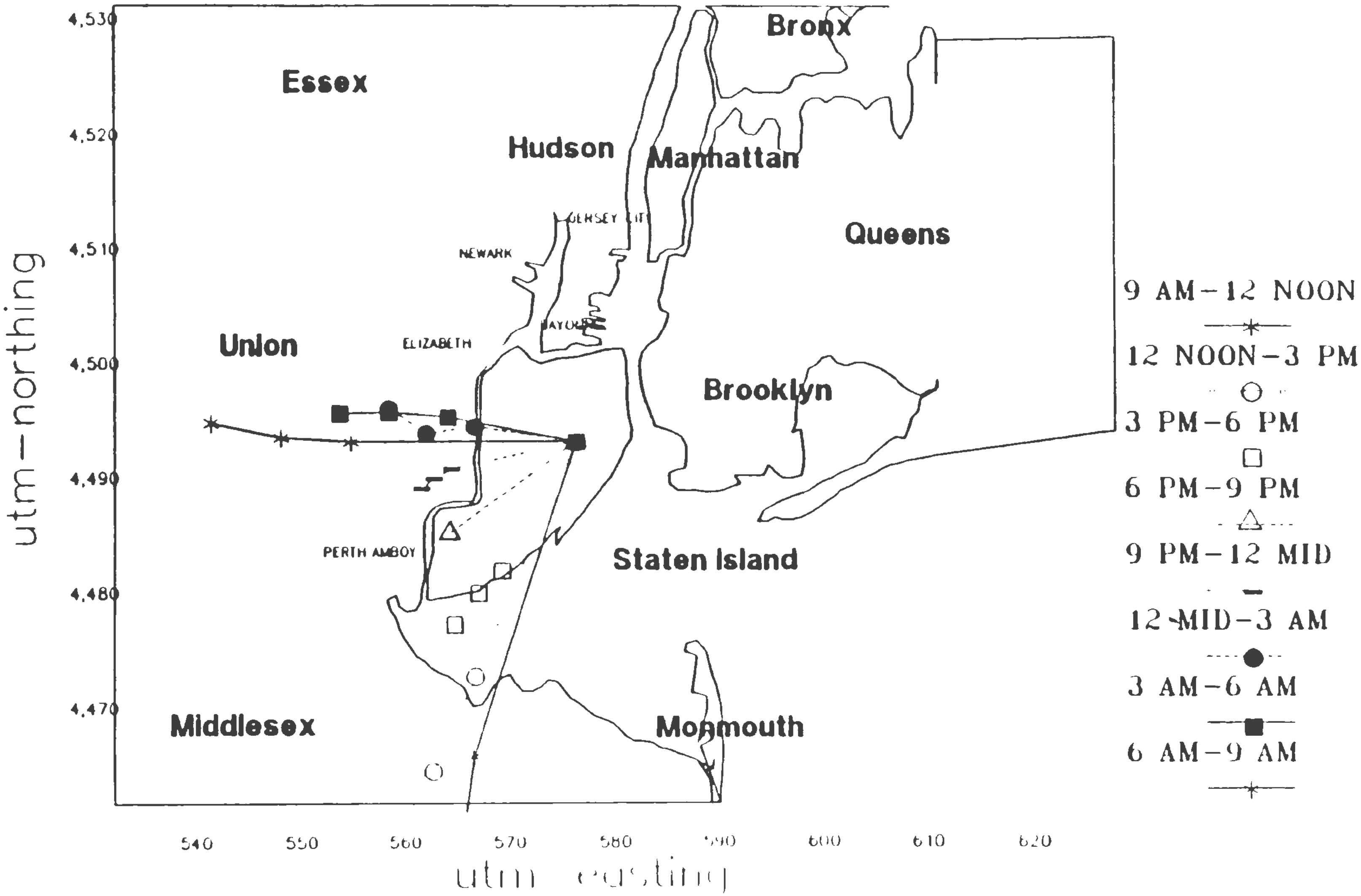


MET DATA FROM STATIONS #1-7

MAP III-6-19

SURFACE TRAJECTORY PLOT – 11/30/88–12/01/88

Ending Point: Susan Wagner High School



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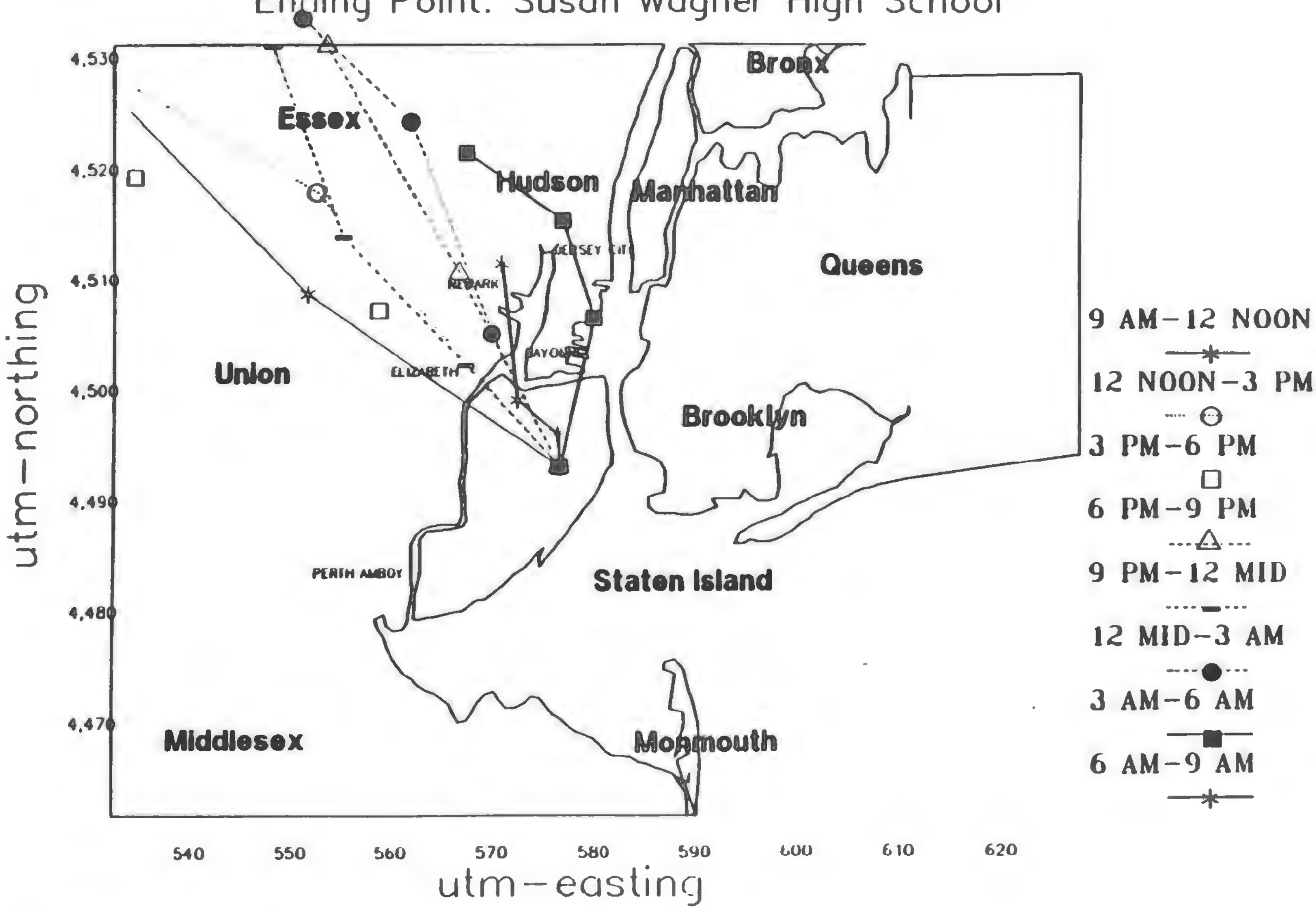
MAP III-6-20

SURFACE TRAJECTORY PLOT - 10/30-31/88

Ending Point: Susan Wagner High School



MET DATA FROM STATIONS # 1-7

APPENDICES FOR VOLUME III, PART A

DATA MANAGEMENT APPENDICES

TABLES OF QUARTERLY AND ANNUAL AVERAGES

TABLES III-3-7 - III-3-27

Table III-3-7

DICHLOROMETHANE - CH2Cl2 (METHYLENE CHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.63	14	0.57	13	0.44	10	0.39	50	0.52
PS 26	2	10	0.89	13	0.89	13	0.40	4	0.69	40	0.71
PORT RICHMOND PO	5	13	0.62	14	0.86	15	0.61	4	0.82	46	0.71
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

DICHLOROMETHANE - CH2Cl2 (METHYLENE CHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	11	0.39	12	0.69	12	0.53	15	0.31	50	0.47
PS 26	2	13	0.63	13	0.95	13	0.94	15	1.16	54	0.93
PORT RICHMOND PO	5	14	0.62	13	0.70	12	1.70	15	0.52	54	0.85
PUMPING STATION	7	14	0.70	13	0.93	13	0.63	15	0.78	55	0.76
GREAT KILLS	4	14	0.49	12	0.61	12	0.41	15	0.49	53	0.50
TOTTENVILLE	9	11	0.62	13	0.71	13	0.57	15	0.50	52	0.60
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

Table III-3-8

TRICLOROMETHANE - CHCl3 (CHLOROFORM)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	10	0.01	12	0.01	12	0.06	15	0.04	49	0.03
ELIZABETH	A					3	0.02	15	0.02	18	0.02
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.02	14	0.08	13	0.04	10	0.08	50	0.05
PS 26	2	10	0.05	13	0.10	13	0.06	4	0.10	40	0.07
PORT RICHMOND PO	5	10	0.05	14	0.13	15	0.07	4	0.13	43	0.09
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.05	82	0.04	86	0.02	82	0.03	337	0.04
ELTINGVILLE	3	88	0.07	57	0.05	88	0.02	69	0.03	302	0.04
DONGAN HILLS	6	86	0.05	55	0.05	87	0.02	68	0.03	296	0.04

TRICLOROMETHANE - CHCl3 (CHLOROFORM)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	0.01	11	0.01	13	0.03	14	0.02	53	0.02
ELIZABETH	A	15	0.01	14	0.01	15	0.03	14	0.03	58	0.02
SEWAREN	C			10	0.01	12	0.02	14	0.03	36	0.02
PISCATAWAY	D			13	0.01	15	0.02	14	0.03	42	0.02
SUSAN WAGNER HS	1	11	0.05	12	0.12	12	0.05	15	0.05	50	0.07
PS 26	2	13	0.07	13	0.16	13	0.05	15	0.10	54	0.10
PORT RICHMOND PO	5	14	0.07	13	0.11	12	0.06	15	0.07	54	0.08
PUMPING STATION	7	14	0.12	13	0.18	13	0.09	15	0.19	55	0.15
GREAT KILLS	4	14	0.06	12	0.08	12	0.05	15	0.05	53	0.06
TOTTENVILLE	9	11	0.05	13	0.11	13	0.05	15	0.06	52	0.07
BAYLEY SETON HOSPITAL	8	83	0.04	87	0.04	8	0.04	19	0.01	197	0.03
ELTINGVILLE	3	79	0.04	71	0.04	7	0.04	20	0.01	177	0.04
DONGAN HILLS	6	75	0.03	83	0.04	6	0.05	18	0.01	182	0.03

Table III-3-9

TETRACHLOROMETHANE - CCl4 (CARBON TETRACHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	FIRST YEAR OCT 1987 - SEPT 1988 ARITH. MEAN (ppb)
CARTERET	B	13	0.08	15	0.16	14	0.17	15	0.15	57	0.14
ELIZABETH	A					2	0.19	15	0.18	17	0.18
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.03	13	0.04	13	0.05	10	0.06	49	0.04
PS 26	2	10	0.03	13	0.06	13	0.10	4	0.12	40	0.07
PORT RICHMOND PO	5	10	0.03	14	0.06	15	0.07	4	0.07	43	0.06
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.11	82	0.09	86	0.08	81	0.06	336	0.09
ELTINGVILLE	3	88	0.14	57	0.11	87	0.10	68	0.08	300	0.11
DONGAN HILLS	6	86	0.11	55	0.11	86	0.08	66	0.06	293	0.09

TETRACHLOROMETHANE - CCl4 (CARBON TETRACHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	SECOND YEAR OCT 1988 - SEPT 1989 ARITH. MEAN (ppb)
CARTERET	B	15	0.09	11	0.11	13	0.12	14	0.15	53	0.12
ELIZABETH	A	15	0.11	14	0.12	15	0.13	14	0.15	58	0.13
SEWAREN	C			10	0.09	13	0.13	14	0.22	37	0.15
PISCATAWAY	D			13	0.10	15	0.12	14	0.12	42	0.11
SUSAN WAGNER HS	1	11	0.05	12	0.12	12	0.09	15	0.11	50	0.09
PS 26	2	13	0.09	13	0.10	13	0.09	15	0.13	54	0.10
PORT RICHMOND PO	5	14	0.07	13	0.08	12	0.08	15	0.11	54	0.09
PUMPING STATION	7	14	0.08	13	0.12	13	0.08	15	0.12	55	0.10
GREAT KILLS	4	14	0.06	12	0.12	12	0.11	15	0.10	53	0.10
TOTTENVILLE	9	11	0.09	13	0.21	13	0.14	15	0.18	52	0.16
BAYLEY SETON HOSPITAL	8	83	0.11	87	0.13	8	0.11	19	0.02	197	0.11
ELTINGVILLE	3	79	0.12	71	0.20	7	0.11	20	0.03	177	0.14
DONGAN HILLS	6	75	0.11	83	0.16	6	0.11	18	0.02	182	0.12

Table III-3-10

1,1 DICHLOROETHANE - CH_3CHCl_2 (ETHYLIDENE CHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8			81	0.01	82	0.01	82	0.01	245	0.01
ELTINGVILLE	3			58	0.01	84	0.01	69	0.01	211	0.01
DONGAN HILLS	6			57	0.01	83	0.01	68	0.01	208	0.01

1,1 DICHLOROETHANE - CH_3CHCl_2 (ETHYLIDENE CHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.01	87	0.01	8	0.01	19	0.01	197	0.01
ELTINGVILLE	3	79	0.01	71	0.01	7	0.01	20	0.01	177	0.01
DONGAN HILLS	6	75	0.01	83	0.01	6	0.01	18	0.01	182	0.01

Table III-3-11

1,2 DICHLOROETHANE - ClCH2CH2Cl (ETHYLENE DICHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	FIRST YEAR OCT 1987 - SEPT 1988 ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.02	14	0.03	13	0.03	10	0.04	50	0.03
PS 26	2	10	0.03	13	0.03	13	0.02	4	0.02	40	0.03
PORT RICHMOND PO	5	10	0.03	14	0.04	15	0.04	4	0.08	43	0.04
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	88	0.07	82	0.03	86	0.02	82	0.03	338	0.04
ELTINGVILLE	3	88	0.06	57	0.03	88	0.02	69	0.01	302	0.03
DONGAN HILLS	6	86	0.05	55	0.04	87	0.02	68	0.02	296	0.03

1,2 DICHLOROETHANE - ClCH2CH2Cl (ETHYLENE DICHLORIDE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	SECOND YEAR OCT 1988 - SEPT 1989 ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.03	87	0.03	8	0.02	19	0.02	197	0.03
ELTINGVILLE	3	79	0.02	71	0.03	7	0.01	20	0.01	177	0.02
DONGAN HILLS	6	74	0.02	83	0.03	6	0.01	18	0.01	181	0.02

Table III-3-12

TRICHLOROETHYLENE - $ClCH{=}CHCl_2$ (TRICHLOROETHENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.07	15	0.05	14	0.07	15	0.04	57	0.06
ELIZABETH	A					2	0.07	13	0.06	15	0.06
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.01	14	0.05	13	0.02	10	0.02	50	0.03
PS 26	2	10	0.06	13	0.17	13	0.03	4	0.04	40	0.08
PORT RICHMOND PO	5	10	0.03	14	0.08	15	0.03	4	0.02	43	0.05
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.08	82	0.07	85	0.07	82	0.08	336	0.08
ELTINGVILLE	3	88	0.09	57	0.10	87	0.08	69	0.06	301	0.08
DONGAN HILLS	6	86	0.08	55	0.08	86	0.06	68	0.06	295	0.07

TRICHLOROETHYLENE - $ClCH{=}CHCl_2$ (TRICHLOROETHENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	0.03	11	0.03	13	0.05	14	0.07	53	0.05
ELIZABETH	A	15	0.04	14	0.01	15	0.04	14	0.07	58	0.04
SEWAREN	C			10	0.04	13	0.04	14	0.05	37	0.04
PISCATAWAY	D			13	0.04	15	0.04	14	0.07	42	0.05
SUSAN WAGNER HS	1	11	0.04	12	0.10	12	0.16			35	0.10
PS 26	2	13	0.04	13	0.12	13	0.20			39	0.12
PORT RICHMOND PO	5	14	0.04	13	0.09	12	0.27			39	0.13
PUMPING STATION	7	14	0.09	13	0.17	13	0.56			40	0.27
GREAT KILLS	4	14	0.04	12	0.07	12	0.12			38	0.07
TOTTENVILLE	9	11	0.03	13	0.08	13	0.13			37	0.08
BAYLEY SETON HOSPITAL	8	83	0.09	87	0.08	8	0.05	19	0.02	197	0.08
ELTINGVILLE	3	79	0.07	71	0.08	7	0.04	20	0.03	177	0.06
DONGAN HILLS	6	75	0.07	83	0.08	6	0.04	18	0.02	182	0.07

Table III-3-13

1,1,1 TRICHLOROETHANE - CH3CCl3 (METHYL CHLOROFORM)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.33	13	0.42	14	0.52	15	0.61	55	0.35
ELIZABETH	A					3	0.86	15	0.69	18	0.72
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	12	0.40	14	0.55	13	0.47	10	0.33	49	0.45
PS 26	2	10	0.65	13	0.67	13	0.42	4	0.52	40	0.57
PORT RICHMOND PO	5	10	0.69	14	0.81	15	0.47	4	0.41	43	0.63
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.42	81	0.44	86	0.34	82	0.40	336	0.40
ELTINGVILLE	3	88	0.48	57	0.51	88	0.31	69	0.27	302	0.39
DONGAN HILLS	6	86	0.37	55	0.44	87	0.25	68	0.26	296	0.32

1,1,1 TRICHLOROETHANE - CH3CCl3 (METHYL CHLOROFORM)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	0.57	11	0.70	13	0.49	14	0.51	53	0.56
ELIZABETH	A	15	0.72	14	0.76	15	0.38	14	0.48	58	0.58
SEWAREN	C			10	0.82	13	0.39	14	0.52	37	0.56
PISCATAWAY	D			13	0.55	15	0.30	14	0.38	42	0.40
SUSAN WAGNER HS	1	11	0.33	12	0.43	12	0.40	15	0.42	50	0.40
PS 26	2	13	0.39	13	0.50	13	0.43	15	0.56	54	0.47
PORT RICHMOND PO	5	13	0.43	13	0.54	12	0.62	15	0.51	53	0.52
PUMPING STATION	7	14	0.42	13	0.52	13	0.53	15	0.51	55	0.49
GREAT KILLS	4	14	0.34	12	0.38	12	0.36	15	0.31	53	0.35
TOTTENVILLE	9	11	0.30	13	0.47	13	0.33	15	0.35	52	0.36
BAYLEY SETON HOSPITAL	8	81	0.50	87	0.49	8	0.57	19	0.22	195	0.47
ELTINGVILLE	3	78	0.38	71	0.41	7	0.28	20	0.20	176	0.37
DONGAN HILLS	6	72	0.42	83	0.41	6	0.33	18	0.19	179	0.39

Table III-3-14

1,1,2 TRICHLOROETHANE - CH2ClCHCl2

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.02	14	0.02	13	0.02	10	0.02	50	0.02
PS 26	2	10	0.02	13	0.02	13	0.02	4	0.02	40	0.02
PORT RICHMOND PO	5	10	0.02	14	0.02	15	0.02	4	0.02	43	0.02
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

1,1,2 TRICHLOROETHANE - CH2ClCHCl2

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.02	87	0.01	8	0.02	19	0.02	197	0.02
ELTINGVILLE	3	79	0.02	71	0.01	7	0.01	20	0.02	177	0.02
DONGAN HILLS	6	75	0.02	83	0.01	6	0.02	18	0.02	182	0.02

Table III-3-15

TETRACHLOROETHYLENE - Cl2C=CCl2 (TETRACHLOROETHENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.08	15	0.15	14	0.23	15	0.20	57	0.17
ELIZABETH	A					3	0.38	15	0.30	18	0.31
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.17	14	0.23	13	0.16	10	0.17	50	0.18
PS 26	2	9	0.42	13	0.23	13	0.13	4	0.30	39	0.25
PORT RICHMOND PO	5	9	0.34	14	0.30	15	0.25	4	0.21	42	0.28
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	84	0.34	74	0.35	79	0.26	79	0.37	316	0.33
ELTINGVILLE	3	86	0.33	52	0.35	79	0.24	68	0.26	285	0.29
DONGAN HILLS	6	83	0.67	48	0.66	79	0.51	67	0.77	276	0.66

TETRACHLOROETHYLENE - Cl2C=CCl2 (TETRACHLOROETHANE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	0.10	11	0.05	13	0.24	14	0.26	53	0.17
ELIZABETH	A	15	0.15	14	0.11	15	0.27	14	0.30	58	0.21
SEWAREN	C			10	0.11	13	0.21	14	0.28	37	0.21
PISCATAWAY	D			13	0.09	15	0.13	14	0.18	42	0.13
SUSAN WAGNER HS	1	11	0.12	12	0.18	12	0.23	15	0.17	50	0.18
PS 26	2	13	0.14	13	0.17	13	0.23	15	0.21	54	0.19
PORT RICHMOND PO	5	14	0.18	13	0.17	12	0.32	15	0.28	54	0.24
PUMPING STATION	7	14	0.62	13	0.72	13	1.49	15	1.49	55	1.09
GREAT KILLS	4	14	0.16	12	0.14	12	0.20	15	0.27	53	0.20
TOTTENVILLE	9	11	0.23	13	0.20	13	0.22	15	0.17	52	0.20
BAYLEY SETON HOSPITAL	8	83	0.26	86	0.30	8	0.25	19	0.18	196	0.27
ELTINGVILLE	3	79	0.21	70	0.23	7	0.09	20	0.17	176	0.21
DONGAN HILLS	6	75	0.61	82	0.72	6	0.44	18	0.84	181	0.68

Table III-3-16

TRIBROMOMETHANE - $CHBr_3$ (BROMOFORM)

		QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988		FIRST YEAR OCT 1987 - SEPT 1988	
SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

TRIBROMOMETHANE - $CHBr_3$ (BROMOFORM)

		QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989		SECOND YEAR OCT 1988 - SEPT 1989	
SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.01	86	0.01	8	0.01	19	0.01	196	0.01
ELTINGVILLE	3	79	0.01	69	0.01	7	0.01	20	0.01	175	0.01
DONGAN HILLS	6	75	0.01	82	0.01	6	0.01	18	0.01	181	0.01

Table III-3-17

HEXANE - C_6H_{14}

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.83	15	0.57	14	0.75	15	1.08	57	0.81
ELIZABETH	A					3	0.92	15	1.52	18	1.42
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	1.09	82	0.99	86	0.49	81	0.60	336	0.79
ELTINGVILLE	3	88	1.32	56	1.19	88	0.61	69	0.64	301	0.93
DONGAN HILLS	6	86	1.10	55	1.22	85	0.48	68	0.54	294	0.81

HEXANE - C_6H_{14}

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	1.01	11	1.55	13	1.12	14	0.73	53	1.08
ELIZABETH	A	15	1.04	12	1.18	15	0.80	14	0.67	56	0.91
SEWAREN	C			10	1.06	12	0.78	14	0.74	36	0.84
PISCATAWAY	D			13	0.83	15	0.34	14	0.37	42	0.50
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.95	87	0.67	8	0.49	19	0.55	197	0.77
ELTINGVILLE	3	79	0.98	71	0.85	7	0.41	16	0.88	173	0.89
DONGAN HILLS	6	75	0.95	83	0.87	6	0.51	16	0.56	180	0.86

Table III-3-18

BENZENE - C6H6 (BENZOL, PHENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	FIRST YEAR OCT 1987 - SEPT 1988 ARITH. MEAN (ppb)
CARTERET	B	13	1.19	15	0.98	14	1.01	15	1.45	57	1.16
ELIZABETH	A					3	1.17	14	1.66	17	1.57
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	1.41	14	2.10	13	0.65	9	0.81	49	1.30
PS 26	2	10	1.37	13	1.73	13	0.58	4	1.32	40	1.23
PORT RICHMOND PO	5	10	1.58	14	2.13	15	0.98	4	1.74	43	1.56
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	1.70	82	1.55	84	0.81	81	0.92	334	1.25
ELTINGVILLE	3	88	1.93	57	1.90	86	0.80	68	0.85	299	1.35
DONGAN HILLS	6	86	1.99	55	2.24	85	0.87	66	1.08	292	1.51

BENZENE - C6H6 (BENZOL, PHENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	SECOND YEAR OCT 1988 - SEPT 1989 ARITH. MEAN (ppb)
CARTERET	B	15	1.67	11	2.25	13	1.28	14	0.84	53	1.48
ELIZABETH	A	15	1.72	14	1.86	15	1.25	14	0.96	58	1.45
SEWAREN	C			10	1.74	12	0.95	14	0.92	36	1.16
PISCATAWAY	D			13	1.79	15	0.57	14	0.65	42	0.97
SUSAN WAGNER HS	1	11	0.62	12	1.07	12	0.69	15	0.69	50	0.77
PS 26	2	13	1.03	13	1.46	13	1.17	15	1.39	54	1.27
PORT RICHMOND PO	5	14	1.16	13	1.52	12	1.52	15	1.21	54	1.34
PUMPING STATION	7	14	0.97	13	1.28	13	1.11	15	1.26	55	1.16
GREAT KILLS	4	14	0.91	12	1.09	12	0.84	15	0.86	53	0.92
TOTTENVILLE	9	11	0.79	13	1.04	13	0.67	15	0.91	52	0.86
BAYLEY SETON HOSPITAL	8	83	1.62	87	1.40	8	0.72	15	0.63	193	1.40
ELTINGVILLE	3	79	1.60	70	1.61	6	0.62	16	0.82	171	1.50
DONGAN HILLS	6	75	2.09	83	2.12	6	0.76	13	0.74	177	1.96

Table III-3-19

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	2.83	14	1.70	14	3.01	15	5.02	56	3.18
ELIZABETH	A					3	2.90	15	5.24	18	4.85
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	1.88	14	2.32	13	1.46	10	2.07	50	1.93
PS 26	2	10	3.22	13	3.20	13	2.17	4	3.29	40	2.88
PORT RICHMOND PO	5	9	3.74	14	4.65	15	2.67	4	3.63	42	3.65
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	4.71	82	4.24	79	2.65	79	4.14	327	3.96
ELTINGVILLE	3	88	5.70	57	5.19	79	2.71	68	3.68	292	4.32
DONGAN HILLS	6	86	5.19	55	5.67	78	2.86	67	4.18	286	4.41

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	4.18	11	5.57	13	2.82	14	2.90	53	3.80
ELIZABETH	A	15	4.59	14	4.23	15	2.83	14	2.82	58	3.62
SEWAREN	C			10	4.14	12	2.05	14	2.69	36	2.88
PISCATAWAY	D			13	3.42	15	1.27	14	1.80	42	2.11
SUSAN WAGNER HS	1	11	1.76	12	3.13	12	2.13	15	2.57	50	2.42
PS 26	2	13	3.21	13	4.55	13	3.38	15	4.32	54	3.88
PORT RICHMOND PO	5	14	3.56	13	4.72	12	4.36	15	4.39	54	4.25
PUMPING STATION	7	14	3.52	13	4.26	13	3.49	15	4.17	55	3.87
GREAT KILLS	4	14	2.78	12	3.27	12	2.58	15	2.95	53	2.89
TOTTENVILLE	9	11	2.56	13	3.34	13	2.17	15	3.09	52	2.81
BAYLEY SETON HOSPITAL	8	83	3.48	86	3.16	8	2.39	16	2.22	193	3.19
ELTINGVILLE	3	79	3.55	71	3.60	7	1.95	19	3.09	176	3.45
DONGAN HILLS	6	75	4.09	83	4.46	6	2.59	18	2.99	182	4.10

Table III-3-20

o-XYLENE - 1,2-(CH3)2C6H4 (1,2-DIMETHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.33	15	0.27	14	0.34	15	0.49	57	0.36
ELIZABETH	A					3	0.26	14	0.55	17	0.50
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.33	14	0.33	13	0.20	10	0.27	50	0.28
PS 26	2	10	0.53	13	0.48	13	0.28	4	0.47	40	0.43
PORT RICHMOND PO	5	10	0.81	14	0.89	15	0.43	4	0.59	43	0.68
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.53	82	0.33	74	0.24	77	0.35	320	0.37
ELTINGVILLE	3	88	0.61	57	0.42	77	0.25	67	0.30	289	0.40
DONGAN HILLS	6	86	0.63	55	0.52	77	0.28	66	0.38	284	0.46

o-XYLENE - 1,2-(CH3)2C6H4 (1,2-DIMETHYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	0.53	11	0.48	13	0.29	14	0.29	53	0.40
ELIZABETH	A	15	0.52	13	0.45	15	0.26	14	0.34	57	0.40
SEWAREN	C			10	0.49	12	0.24	14	0.24	36	0.31
PISCATAWAY	D			13	0.29	15	0.12	14	0.33	42	0.24
SUSAN WAGNER HS	1	11	0.24	12	0.38	12	0.28	15	0.28	50	0.30
PS 26	2	13	0.40	13	0.50	13	0.40	15	0.46	54	0.44
PORT RICHMOND PO	5	11	0.46	13	0.61	12	0.58	15	0.53	51	0.55
PUMPING STATION	7	11	0.38	13	0.50	13	0.47	15	0.49	52	0.46
GREAT KILLS	4	11	0.36	12	0.43	12	0.35	15	0.33	50	0.37
TOTTENVILLE	9	8	0.26	13	0.38	13	0.28	15	0.34	49	0.32
BAYLEY SETON HOSPITAL	8	83	0.42	84	0.38	8	0.25	19	0.23	194	0.38
ELTINGVILLE	3	79	0.40	67	0.41	7	0.21	20	0.27	173	0.38
DONGAN HILLS	6	75	0.53	80	0.56	6	0.28	18	0.25	179	0.51

Table III-3-21

m&p-XYLENES - 1,3-(CH3)2C6H4 & 1,4-(CH3)2C6H4 (1,3-DIMETHYL BENZENE & 1,4-DIMETHYL BENZENE)

		QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988		FIRST YEAR OCT 1987 - SEPT 1988	
SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	13	0.87	14	0.57	14	0.86	15	1.51	56	0.96
ELIZABETH	A					3	0.83	15	1.71	18	1.56
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	1.29	14	1.19	13	0.70	10	0.83	50	1.02
PS 26	2	10	1.80	13	1.50	13	0.92	4	1.55	40	1.39
PORT RICHMOND PO	5	10	2.45	14	2.66	15	1.33	4	1.83	43	2.07
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8			52	1.94	75	1.38	77	2.14	204	1.81
ELTINGVILLE	3			29	2.02	77	1.38	67	1.88	173	1.68
DONGAN HILLS	6			27	2.38	76	1.61	65	2.31	168	2.00

m&p-XYLENES - 1,3-(CH3)2C6H4 & 1,4-(CH3)2C6H4 (1,3-DIMETHYL BENZENE & 1,4-DIMETHYL BENZENE)

		QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989		SECOND YEAR OCT 1988 - SEPT 1989	
SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	15	1.59	11	1.55	13	0.76	14	0.76	53	1.16
ELIZABETH	A	15	1.61	13	1.34	15	0.49	14	0.82	57	1.06
SEWAREN	C			10	1.34	12	0.48	14	0.82	36	0.85
PISCATAWAY	D			13	0.81	15	0.25	14	0.54	42	0.52
SUSAN WAGNER HS	1	11	0.78	12	1.17	12	0.88	15	0.87	50	0.92
PS 26	2	13	1.30	13	1.61	13	1.27	15	1.49	54	1.42
PORT RICHMOND PO	5	14	1.54	13	1.93	12	1.89	15	1.71	54	1.76
PUMPING STATION	7	14	1.22	13	1.64	13	1.53	15	1.62	55	1.50
GREAT KILLS	4	14	1.20	12	1.39	12	1.13	15	1.08	53	1.19
TOTTENVILLE	9	11	0.93	13	1.22	13	0.89	15	1.10	52	1.04
BAYLEY SETON HOSPITAL	8	83	2.06	85	1.67	8	1.17			176	1.83
ELTINGVILLE	3	79	2.00	69	1.87	7	0.77			155	1.89
DONGAN HILLS	6	75	2.59	81	2.47	6	1.30			162	2.48

Table III-3-22

STYRENE - $C_6H_5CH=CH_2$ (VINYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8			82	0.10	74	0.06	77	0.08	233	0.08
ELTINGVILLE	3			57	0.12	77	0.05	67	0.07	201	0.08
DONGAN HILLS	6			55	0.12	77	0.07	66	0.08	198	0.09

STYRENE - $C_6H_5CH=CH_2$ (VINYL BENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.09	84	0.08	8	0.05	19	0.05	194	0.08
ELTINGVILLE	3	79	0.09	68	0.09	7	0.03	20	0.06	174	0.08
DONGAN HILLS	6	74	0.12	80	0.11	6	0.05	18	0.06	178	0.11

Table III-3-23

ETHYL BENZENE - C6H5CH2CH3

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.19	14	0.24	13	0.11	10	0.15	50	0.18
PS 26	2	9	0.34	13	0.36	13	0.18	4	0.34	39	0.29
PORT RICHMOND PO	5	9	0.53	14	0.59	15	0.27	4	0.41	42	0.45
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8			82	0.92	75	0.45	78	0.62	235	0.67
ELTINGVILLE	3			57	1.25	77	0.46	67	0.56	201	0.71
DONGAN HILLS	6			55	1.49	76	0.53	66	0.67	197	0.85

ETHYL BENZENE - C6H5CH2CH3

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.57	85	0.49	8	0.33	19	0.28	195	0.50
ELTINGVILLE	3	79	0.57	68	0.55	7	0.24	20	0.39	174	0.53
DONGAN HILLS	6	75	0.72	81	0.71	6	0.34	18	0.33	180	0.66

Table III-3-24

CHLOROBENZENE - C6H5Cl

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	0.71 (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.01	14	0.01	13	0.02	10	0.02	50	0.01
PS 26	2	9	0.02	13	0.02	13	0.02	4	0.03	39	0.02
PORT RICHMOND PO	5	9	0.01	14	0.02	15	0.02	4	0.02	42	0.02
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	87	0.01	82	0.01	78	0.01	80	0.01	327	0.01
ELTINGVILLE	3	88	0.01	57	0.01	77	0.02	69	0.01	291	0.01
DONGAN HILLS	6	86	0.01	55	0.01	77	0.01	68	0.01	286	0.01

CHLOROBENZENE - C6H5Cl

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.01	86	0.01	8	0.02	19	0.01	196	0.01
ELTINGVILLE	3	79	0.01	69	0.01	7	0.01	20	0.01	175	0.01
DONGAN HILLS	6	75	0.01	82	0.01	6	0.01	18	0.01	181	0.01

Table III-3-25

o-DICHLOROBENZENE - 1,2-Cl2C6H4 (1,2-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.02	14	0.02	13	0.02	10	0.02	50	0.02
PS 26	2	10	0.02	13	0.02	13	0.02	4	0.02	40	0.02
PORT RICHMOND PO	5	10	0.02	14	0.02	15	0.02	4	0.01	43	0.02
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

o-DICHLOROBENZENE - 1,2-Cl2C6H4 (1,2-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.01	84	0.01	8	0.01	19	0.01	194	0.01
ELTINGVILLE	3	79	0.01	68	0.01	7	0.01	20	0.01	174	0.01
DONGAN HILLS	6	75	0.01	80	0.01	6	0.01	18	0.01	179	0.01

Table III-3-26

m-DICHLOROBENZENE - 1,3-Cl2C6H4 (1,3-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	FIRST YEAR OCT 1987 - SEPT 1988 ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.03	14	0.04	13	0.03	10	0.05	50	0.04
PS 26	2	10	0.06	13	0.04	13	0.03	4	0.07	40	0.04
PORT RICHMOND PO	5	10	0.06	14	0.07	15	0.06	4	0.09	43	0.07
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

m-DICHLOROBENZENE - 1,3-Cl2C6H4 (1,3-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	SECOND YEAR OCT 1988 - SEPT 1989 ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.01	84	0.07	8	0.01	19	0.01	194	0.04
ELTINGVILLE	3	78	0.01	67	0.08	7	0.01	20	0.01	172	0.04
DONGAN HILLS	6	75	0.01	80	0.08	6	0.01	18	0.01	179	0.04

Table III-3-27

p-DICHLOROBENZENE - 1,4-Cl2C6H4 (1,4-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1987 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1988 # OF SAMPLES	ARITH. MEAN (ppb)	FIRST YEAR OCT 1987 - SEPT 1988 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1	13	0.01	14	0.01	13	0.01	10	0.01	50	0.01
PS 26	2	10	0.01	13	0.01	13	0.01	4	0.01	40	0.01
PORT RICHMOND PO	5	10	0.01	14	0.01	15	0.01	4	0.01	43	0.01
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8										
ELTINGVILLE	3										
DONGAN HILLS	6										

p-DICHLOROBENZENE - 1,4-Cl2C6H4 (1,4-DICHLOROBENZENE)

SITE	SITE #	QUARTER BEGINNING OCTOBER 1988 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JANUARY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING APRIL 1989 # OF SAMPLES	ARITH. MEAN (ppb)	QUARTER BEGINNING JULY 1989 # OF SAMPLES	ARITH. MEAN (ppb)	SECOND YEAR OCT 1988 - SEPT 1989 # OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B										
ELIZABETH	A										
SEWAREN	C										
PISCATAWAY	D										
SUSAN WAGNER HS	1										
PS 26	2										
PORT RICHMOND PO	5										
PUMPING STATION	7										
GREAT KILLS	4										
TOTTENVILLE	9										
BAYLEY SETON HOSPITAL	8	83	0.17	84	0.15	8	0.17	19	0.15	194	0.16
ELTINGVILLE	3	79	0.18	67	0.15	7	0.16	20	0.15	173	0.16
DONGAN HILLS	6	74	0.19	80	0.15	7	0.17	18	0.15	179	0.17

RANK ORDERING OF SITES BY ANNUAL AVERAGE CONCENTRATION

TABLES III-3-28 - III-3-48

Table III-3-28

DICHLOROMETHANE - CH_2Cl_2 (METHYLENE CHLORIDE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	46	0.71
PS 26	2	40	0.71
SUSAN WAGNER HS	1	50	0.52
ELTINGVILLE	3		
BAYLEY SETON HOSPITAL	8		
DONGAN HILLS	6		
CARTERET	B		
ELIZABETH	A		
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PS 26	2	54	0.93
PORT RICHMOND PO	5	54	0.85
PUMPING STATION	7	55	0.76
TOTTENVILLE	9	52	0.60
GREAT KILLS	4	53	0.50
SUSAN WAGNER HS	1	50	0.47
ELTINGVILLE	3		
BAYLEY SETON HOSPITAL	8		
DONGAN HILLS	6		
ELIZABETH	A		
CARTERET	B		
PISCATAWAY	D		
SEWAREN	C		

Table III-3-29

TRICLOROMETHANE - $CHCl_3$ (CHLOROFORM)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.09
PS 26	2	40	0.07
SUSAN WAGNER HS	1	50	0.05
BAYLEY SETON HOSPITAL	8	337	0.04
ELTINGVILLE	3	302	0.04
DONGAN HILLS	6	296	0.04
CARTERET	B	49	0.03
ELIZABETH	A	18	0.02
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PUMPING STATION	7	55	0.15
PS 26	2	54	0.10
PORT RICHMOND PO	5	54	0.08
TOTTENVILLE	9	52	0.07
SUSAN WAGNER HS	1	50	0.07
GREAT KILLS	4	53	0.06
ELTINGVILLE	3	177	0.04
BAYLEY SETON HOSPITAL	8	197	0.03
DONGAN HILLS	6	182	0.03
CARTERET	B	53	0.02
ELIZABETH	A	58	0.02
SEWAREN	C	36	0.02
PISCATAWAY	D	42	0.02

Table III-3-30

TETRACHLOROMETHANE - CCl_4 (CARBON TETRACHLORIDE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	17	0.18
CARTERET	B	57	0.14
ELTINGVILLE	3	300	0.11
BAYLEY SETON HOSPITAL	8	336	0.09
DONGAN HILLS	6	293	0.09
PS 26	2	40	0.07
PORT RICHMOND PO	5	43	0.06
SUSAN WAGNER HS	1	49	0.04
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
TOTTENVILLE	9	52	0.16
SEWAREN	C	37	0.15
ELTINGVILLE	3	177	0.14
ELIZABETH	A	58	0.13
DONGAN HILLS	6	182	0.12
CARTERET	B	53	0.12
BAYLEY SETON HOSPITAL	8	197	0.11
PISCATAWAY	D	42	0.11
PS 26	2	54	0.10
GREAT KILLS	4	53	0.10
PUMPING STATION	7	55	0.10
PORT RICHMOND PO	5	54	0.09
SUSAN WAGNER HS	1	50	0.09

Table III-3-31

1,1 DICHLOROETHANE - CH_3CHCl_2 (ETHYLIDENE CHLORIDE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	245	0.01
DONGAN HILLS	6	208	0.01
ELTINGVILLE	3	211	0.01
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	197	0.01
DONGAN HILLS	6	182	0.01
ELTINGVILLE	3	177	0.01
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-32

1,2 DICHLOROETHANE - $ClCH_2CH_2Cl$ (ETHYLENE DICHLORIDE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.04
BAYLEY SETON HOSPITAL	8	338	0.04
SUSAN WAGNER HS	1	50	0.03
ELTINGVILLE	3	302	0.03
DONGAN HILLS	6	296	0.03
PS 26	2	40	0.03
PUMPING STATION	7		
CARTERET	B		
ELIZABETH	A		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	197	0.03
DONGAN HILLS	6	181	0.02
ELTINGVILLE	3	177	0.02
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-33

TRICHLOROETHYLENE - $ClCH=CHCl_2$ (TRICHLOROETHENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PS 26	2	40	0.08
ELTINGVILLE	3	301	0.08
BAYLEY SETON HOSPITAL	8	336	0.08
DONGAN HILLS	6	295	0.07
CARTERET	B	57	0.06
ELIZABETH	A	15	0.06
PORT RICHMOND PO	5	43	0.05
SUSAN WAGNER HS	1	50	0.03
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PUMPING STATION	7	40	0.27
PORT RICHMOND PO	5	39	0.13
PS 26	2	39	0.12
SUSAN WAGNER HS	1	35	0.10
BAYLEY SETON HOSPITAL	8	197	0.08
TOTTENVILLE	9	37	0.08
GREAT KILLS	4	38	0.07
DONGAN HILLS	6	182	0.07
ELTINGVILLE	3	177	0.06
PISCATAWAY	D	42	0.05
CARTERET	B	53	0.05
SEWAREN	C	37	0.05
ELIZABETH	A	58	0.04

Table III-3-34

1,1,1 TRICHLOROETHANE - CH_3CCl_3 (METHYL CHLOROFORM)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	18	0.72
PORT RICHMOND PO	5	43	0.63
PS 26	2	40	0.57
CARTERET	B	55	0.48
SUSAN WAGNER HS	1	49	0.45
BAYLEY SETON HOSPITAL	8	336	0.40
ELTINGVILLE	3	302	0.39
DONGAN HILLS	6	296	0.32
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
SEWAREN	C		
PISCATAWAY	D		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	58	0.58
CARTERET	B	53	0.56
SEWAREN	C	37	0.56
PORT RICHMOND PO	5	53	0.52
PUMPING STATION	7	55	0.49
BAYLEY SETON HOSPITAL	8	195	0.47
PS 26	2	54	0.47
SUSAN WAGNER HS	1	50	0.40
PISCATAWAY	D	42	0.40
DONGAN HILLS	6	179	0.39
ELTINGVILLE	3	176	0.37
TOTTENVILLE	9	52	0.36
GREAT KILLS	4	53	0.35

Table III-3-35

1,1,2 TRICHLOROETHANE - $CH_2ClCHCl_2$

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.02
SUSAN WAGNER HS	1	50	0.02
PS 26	2	40	0.02
PUMPING STATION	7		
GREAT KILLS	4		
TOTTENVILLE	9		
SEWAREN	C		
BAYLEY SETON HOSPITAL	8		
ELIZABETH	A		
CARTERET	B		
PISCATAWAY	D		
ELTINGVILLE	3		
DONGAN HILLS	6		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	197	0.02
DONGAN HILLS	6	182	0.02
ELTINGVILLE	3	177	0.02
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-36

TETRACHLOROETHYLENE - $CL_2C=CCl_2$ (TETRACHLOROETHENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	276	0.66
BAYLEY SETON HOSPITAL	8	316	0.33
ELIZABETH	A	18	0.31
ELTINGVILLE	3	285	0.29
PORT RICHMOND PO	5	42	0.28
PS 26	2	39	0.25
SUSAN WAGNER HS	1	50	0.18
CARTERET	B	57	0.17
TOTTENVILLE	9		
GREAT KILLS	4		
PUMPING STATION	7		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PUMPING STATION	7	55	1.09
DONGAN HILLS	6	181	0.68
BAYLEY SETON HOSPITAL	8	196	0.27
PORT RICHMOND PO	5	54	0.24
ELTINGVILLE	3	176	0.21
ELIZABETH	A	58	0.21
SEWAREN	C	37	0.21
GREAT KILLS	4	53	0.20
TOTTENVILLE	9	52	0.20
PS 26	2	54	0.19
SUSAN WAGNER HS	1	50	0.18
CARTERET	B	53	0.17
PISCATAWAY	D	42	0.13

Table III-3-37

TRIBROMOMETHANE - $CHBr_3$ (BROMOFORM)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B		
ELIZABETH	A		
SEWAREN	C		
PISCATAWAY	D		
SUSAN WAGNER HS	1		
PS 26	2		
PORT RICHMOND PO	5		
PUMPING STATION	7		
GREAT KILLS	4		
TOTTENVILLE	9		
BAYLEY SETON HOSPITAL	8		
ELTINGVILLE	3		
DONGAN HILLS	6		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	196	0.01
DONGAN HILLS	6	181	0.01
ELTINGVILLE	3	175	0.01
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-38

HEXANE - C_6H1_4

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	18	1.42
ELTINGVILLE	3	301	0.93
DONGAN HILLS	6	294	0.81
CARTERET	B	57	0.81
BAYLEY SETON HOSPITAL	8	336	0.79
PORT RICHMOND PO	5		
TOTTENVILLE	9		
SUSAN WAGNER HS	1		
PUMPING STATION	7		
PS 26	2		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
CARTERET	B	53	1.08
ELTINGVILLE	3	173	0.89
ELIZABETH	A	56	0.91
DONGAN HILLS	6	180	0.86
SEWAREN	C	36	0.84
BAYLEY SETON HOSPITAL	8	197	0.77
PISCATAWAY	D	42	0.50
PORT RICHMOND PO	5		
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PS 26	2		
SUSAN WAGNER HS	1		

Table III-3-39

BENZENE - C6H6 (BENZOL, PHENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	17	1.57
PORT RICHMOND PO	5	43	1.56
DONGAN HILLS	6	292	1.51
ELTINGVILLE	3	299	1.35
SUSAN WAGNER HS	1	49	1.30
BAYLEY SETON HOSPITAL	8	334	1.25
PS 26	2	40	1.23
CARTERET	B	57	1.16
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
SEWAREN	C		
PISCATAWAY	D		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	177	1.96
ELTINGVILLE	3	171	1.50
CARTERET	B	53	1.48
ELIZABETH	A	58	1.45
BAYLEY SETON HOSPITAL	8	193	1.40
PORT RICHMOND PO	5	54	1.34
PS 26	2	54	1.27
PUMPING STATION	7	55	1.16
SEWAREN	C	36	1.16
PISCATAWAY	D	42	0.97
GREAT KILLS	4	53	0.92
TOTTENVILLE	9	52	0.86
SUSAN WAGNER HS	1	50	0.77

Table III-3-40

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
ELIZABETH	A	18	4.85
DONGAN HILLS	6	286	4.41
ELTINGVILLE	3	292	4.32
BAYLEY SETON HOSPITAL	8	327	3.96
PORT RICHMOND PO	5	43	3.65
CARTERET	B	56	3.18
PS 26	2	40	2.88
SUSAN WAGNER HS	1	50	1.93
TOTTENVILLE	9		
GREAT KILLS	4		
PUMPING STATION	7		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	54	4.25
DONGAN HILLS	6	182	4.10
PS 26	2	54	3.88
PUMPING STATION	7	55	3.87
CARTERET	B	53	3.80
ELIZABETH	A	58	3.62
ELTINGVILLE	3	176	3.45
BAYLEY SETON HOSPITAL	8	193	3.19
GREAT KILLS	4	53	2.89
SEWAREN	C	36	2.88
TOTTENVILLE	9	52	2.81
SUSAN WAGNER HS	1	50	2.42
PISCATAWAY	D	42	2.11

Table III-3-41

o-XYLENE - 1,2-$(CH_3)_2C_6H_4$ (1,2-DIMETHYL BENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.68
ELIZABETH	A	17	0.50
DONGAN HILLS	6	284	0.46
PS 26	2	40	0.43
ELTINGVILLE	3	289	0.41
BAYLEY SETON HOSPITAL	8	320	0.37
CARTERET	B	57	0.36
SUSAN WAGNER HS	1	50	0.28
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	51	0.55
DONGAN HILLS	6	179	0.51
PUMPING STATION	7	52	0.46
PS 26	2	54	0.44
ELIZABETH	A	57	0.40
CARTERET	B	53	0.40
ELTINGVILLE	3	173	0.38
BAYLEY SETON HOSPITAL	8	194	0.38
GREAT KILLS	4	50	0.37
TOTTENVILLE	9	49	0.32
SUSAN WAGNER HS	1	50	0.30
SEWAREN	C	36	0.31
PISCATAWAY	D	42	0.24

Table III-3-42

m&p-XYLENES - 1,3-$(CH_3)_2C_6H_4$ & 1,4-(CH3)2C6H4
(1,3-DIMETHYL BENZENE & 1,4-DIMETHYL BENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	2.07
DONGAN HILLS	6	168	2.00
BAYLEY SETON HOSPITAL	8	204	1.81
ELTINGVILLE	3	173	1.68
ELIZABETH	A	18	1.56
PS 26	2	40	1.39
SUSAN WAGNER HS	1	50	1.02
CARTERET	B	56	0.96
PUMPING STATION	7		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	162	2.48
ELTINGVILLE	3	155	1.89
BAYLEY SETON HOSPITAL	8	176	1.83
PORT RICHMOND PO	5	54	1.76
PUMPING STATION	7	55	1.50
PS 26	2	54	1.42
GREAT KILLS	4	53	1.19
CARTERET	B	53	1.16
ELIZABETH	A	57	1.06
TOTTENVILLE	9	52	1.04
SUSAN WAGNER HS	1	50	0.92
SEWAREN	C	36	0.85
PISCATAWAY	D	42	0.52

Table III-3-43

STYRENE - $C_6H_5CH=CH_2$ (VINYL BENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	198	0.09
BAYLEY SETON HOSPITAL	8	233	0.08
ELTINGVILLE	3	201	0.08
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	178	0.11
BAYLEY SETON HOSPITAL	8	194	0.08
ELTINGVILLE	3	174	0.08
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-44

ETHYL BENZENE - $C_6H_5CH_2CH_3$

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	197	0.85
ELTINGVILLE	3	201	0.71
BAYLEY SETON HOSPITAL	8	235	0.67
PORT RICHMOND PO	5	42	0.45
PS 26	2	39	0.29
SUSAN WAGNER HS	1	50	0.18
GREAT KILLS	4		
PISCATAWAY	D		
PUMPING STATION	7		
TOTTENVILLE	9		
CARTERET	B		
SEWAREN	C		
ELIZABETH	A		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	180	0.66
ELTINGVILLE	3	174	0.53
BAYLEY SETON HOSPITAL	8	195	0.50
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-45

CHLOROBENZENE - C_6H_5Cl (PHENYLCHLORIDE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	42	0.02
PS 26	2	39	0.02
SUSAN WAGNER HS	1	50	0.01
ELTINGVILLE	3	291	0.01
BAYLEY SETON HOSPITAL	8	327	0.01
DONGAN HILLS	6	286	0.01
PUMPING STATION	7		
CARTERET	B		
ELIZABETH	A		
TOTTENVILLE	9		
GREAT KILLS	4		
PISCATAWAY	D		
SEWAREN	C		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	196	0.01
DONGAN HILLS	6	181	0.01
ELTINGVILLE	3	175	0.01
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-46

o-DICHLOROBENZENE - 1,2-$Cl_2C_6H_4$ (1,2-DICHLOROBENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.02
SUSAN WAGNER HS	1	50	0.02
PS 26	2	40	0.02
PUMPING STATION	7		
GREAT KILLS	4		
TOTTENVILLE	9		
SEWAREN	C		
BAYLEY SETON HOSPITAL	8		
ELIZABETH	A		
CARTERET	B		
PISCATAWAY	D		
ELTINGVILLE	3		
DONGAN HILLS	6		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	194	0.01
DONGAN HILLS	6	179	0.01
ELTINGVILLE	3	174	0.01
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-47

m-DICHLOROBENZENE - 1,3-$Cl_2C_6H_4$ (1,3-DICHLOROBENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PORT RICHMOND PO	5	43	0.07
SUSAN WAGNER HS	1	50	0.04
PS 26	2	40	0.04
SEWAREN	C		
CARTERET	B		
PISCATAWAY	D		
ELIZABETH	A		
PUMPING STATION	7		
GREAT KILLS	4		
TOTTENVILLE	9		
BAYLEY SETON HOSPITAL	8		
ELTINGVILLE	3		
DONGAN HILLS	6		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
BAYLEY SETON HOSPITAL	8	194	0.04
DONGAN HILLS	6	172	0.04
ELTINGVILLE	3	173	0.04
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

Table III-3-48

p-DICHLOROBENZENE - 1,4-$Cl_2C_6H_4$ (1,4-DICHLOROBENZENE)

FIRST YEAR
OCT 1987 - SEPT 1988

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
PS 26	2	40	0.01
SUSAN WAGNER HS	1	50	0.01
PORT RICHMOND PO	5	43	0.01
CARTERET	B		
PUMPING STATION	7		
PISCATAWAY	D		
SEWAREN	C		
ELIZABETH	A		
GREAT KILLS	4		
TOTTENVILLE	9		
BAYLEY SETON HOSPITAL	8		
ELTINGVILLE	3		
DONGAN HILLS	6		

SECOND YEAR
OCT 1988 - SEPT 1989

SITE	SITE #	# OF SAMPLES	ARITH. MEAN (ppb)
DONGAN HILLS	6	179	0.17
BAYLEY SETON HOSPITAL	8	194	0.16
ELTINGVILLE	3	173	0.16
PORT RICHMOND PO	5		
GREAT KILLS	4		
TOTTENVILLE	9		
PS 26	2		
PISCATAWAY	D		
PUMPING STATION	7		
CARTERET	B		
SUSAN WAGNER HS	1		
SEWAREN	C		
ELIZABETH	A		

RANK ORDERING OF SITES BY QUARTERLY AVERAGE CONCENTRATION

TABLES III-3-49 - III-3-69

Table III-3-49

DICHLOROMETHANE - CH_2Cl_2 (METHYLENE CHLORIDE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PS 26	0.89	PS 26	0.89	PORT RICHMOND PO	0.61	PORT RICHMOND PO	0.82
SUSAN WAGNER HS	0.63	PORT RICHMOND PO	0.86	SUSAN WAGNER HS	0.44	PS 26	0.69
PORT RICHMOND PO	0.62	SUSAN WAGNER HS	0.57	PS 26	0.40	SUSAN WAGNER HS	0.39
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		BAYLEY SETON HOSP	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		ELTINGVILLE	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		DONGAN HILLS	
CARTERET		CARTERET		CARTERET		CARTERET	
GREAT KILLS		PUMPING STATION		ELIZABETH		ELIZABETH	
PUMPING STATION		SEWAREN		PUMPING STATION		PUMPING STATION	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PISCATAWAY		GREAT KILLS		GREAT KILLS		GREAT KILLS	
ELIZABETH		ELIZABETH		PISCATAWAY		PISCATAWAY	
SEWAREN		PISCATAWAY		SEWAREN		SEWAREN	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PUMPING STATION	0.70	PS 26	0.95	PORT RICHMOND PO	1.70	PS 26	1.16
PS 26	0.63	PUMPING STATION	0.93	PS 26	0.94	PUMPING STATION	0.78
PORT RICHMOND PO	0.62	TOTTENVILLE	0.71	PUMPING STATION	0.63	PORT RICHMOND PO	0.52
TOTTENVILLE	0.62	PORT RICHMOND PO	0.70	TOTTENVILLE	0.57	TOTTENVILLE	0.50
GREAT KILLS	0.49	SUSAN WAGNER HS	0.69	SUSAN WAGNER HS	0.53	GREAT KILLS	0.49
SUSAN WAGNER HS	0.39	GREAT KILLS	0.61	GREAT KILLS	0.41	SUSAN WAGNER HS	0.31
ELTINGVILLE		ELTINGVILLE		DONGAN HILLS		ELTINGVILLE	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		DONGAN HILLS	
DONGAN HILLS		DONGAN HILLS		ELTINGVILLE		BAYLEY SETON HOSP	
CARTERET		ELIZABETH		CARTERET		CARTERET	
ELIZABETH		CARTERET		ELIZABETH		ELIZABETH	
SEWAREN		PISCATAWAY		SEWAREN		SEWAREN	
PISCATAWAY		SEWAREN		PISCATAWAY		PISCATAWAY	

Table III-3-50

TRICLOROMETHANE - $CHCl_3$ (CHLOROFORM)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
ELTINGVILLE	0.07	PORT RICHMOND PO	0.13	PORT RICHMOND PO	0.07	PORT RICHMOND PO	0.13
PORT RICHMOND PO	0.05	PS 26	0.10	PS 26	0.06	PS 26	0.10
PS 26	0.05	SUSAN WAGNER HS	0.08	CARTERET	0.06	SUSAN WAGNER HS	0.08
BAYLEY SETON HOSP	0.05	DONGAN HILLS	0.05	SUSAN WAGNER HS	0.04	CARTERET	0.04
DONGAN HILLS	0.05	ELTINGVILLE	0.05	BAYLEY SETON HOSP	0.02	BAYLEY SETON HOSP	0.03
SUSAN WAGNER HS	0.02	BAYLEY SETON HOSP	0.04	DONGAN HILLS	0.02	DONGAN HILLS	0.03
CARTERET	0.01	CARTERET	0.01	ELIZABETH	0.02	ELTINGVILLE	0.03
PUMPING STATION		PUMPING STATION		ELTINGVILLE	0.02	ELIZABETH	0.02
SEWAREN		ELIZABETH		PUMPING STATION		PUMPING STATION	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
ELIZABETH		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PISCATAWAY		SEWAREN		SEWAREN		SEWAREN	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
PUMPING STATION	0.12	PUMPING STATION	0.18	PUMPING STATION	0.09	PUMPING STATION	0.19
PORT RICHMOND PO	0.07	PS 26	0.16	PORT RICHMOND PO	0.06	PS 26	0.10
PS 26	0.07	SUSAN WAGNER HS	0.12	DONGAN HILLS	0.05	PORT RICHMOND PO	0.07
GREAT KILLS	0.06	PORT RICHMOND PO	0.11	PS 26	0.05	TOTTENVILLE	0.06
SUSAN WAGNER HS	0.05	TOTTENVILLE	0.11	TOTTENVILLE	0.05	GREAT KILLS	0.05
TOTTENVILLE	0.05	GREAT KILLS	0.08	GREAT KILLS	0.05	SUSAN WAGNER HS	0.05
ELTINGVILLE	0.04	DONGAN HILLS	0.04	SUSAN WAGNER HS	0.05	ELIZABETH	0.03
BAYLEY SETON HOSP	0.04	ELTINGVILLE	0.04	BAYLEY SETON HOSP	0.04	PISCATAWAY	0.03
DONGAN HILLS	0.03	BAYLEY SETON HOSP	0.04	ELTINGVILLE	0.04	SEWAREN	0.03
ELIZABETH	0.01	CARTERET	0.01	ELIZABETH	0.03	CARTERET	0.02
CARTERET	0.01	ELIZABETH	0.01	CARTERET	0.03	ELTINGVILLE	0.01
SEWAREN		SEWAREN	0.01	SEWAREN	0.02	BAYLEY SETON HOSP	0.01
PISCATAWAY		PISCATAWAY	0.01	PISCATAWAY	0.02	DONGAN HILLS	0.01

Table III-3-51

TETRACHLOROMETHANE - CCl_4 (CARBON TETRACHLORIDE)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
ELTINGVILLE	0.14	CARTERET	0.16	ELIZABETH	0.19	ELIZABETH	0.18
DONGAN HILLS	0.11	ELTINGVILLE	0.11	CARTERET	0.17	CARTERET	0.15
BAYLEY SETON HOSP	0.11	DONGAN HILLS	0.11	ELTINGVILLE	0.10	PS 26	0.12
CARTERET	0.08	BAYLEY SETON HOSP	0.09	PS 26	0.10	ELTINGVILLE	0.08
PORT RICHMOND PO	0.03	PORT RICHMOND PO	0.06	BAYLEY SETON HOSP	0.08	PORT RICHMOND PO	0.07
PS 26	0.03	PS 26	0.06	DONGAN HILL	0.08	SUSAN WAGNER HS	0.06
SUSAN WAGNER HS	0.03	SUSAN WAGNER HS	0.04	PORT RICHMOND PO	0.07	DONGAN HILLS	0.06
TOTTENVILLE		TOTTENVILLE		SUSAN WAGNER HS	0.05	BAYLEY SETON HOSP	0.06
PISCATAWAY		PISCATAWAY		TOTTENVILLE		TOTTENVILLE	
PUMPING STATION		PUMPING STATION		GREAT KILLS		GREAT KILLS	
GREAT KILLS		GREAT KILLS		PUMPING STATION		PUMPING STATION	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		PISCATAWAY		PISCATAWAY	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
ELTINGVILLE	0.12	TOTTENVILLE	0.21	TOTTENVILLE	0.14	SEWAREN	0.22
ELIZABETH	0.11	ELTINGVILLE	0.20	SEWAREN	0.13	TOTTENVILLE	0.18
BAYLEY SETON HOSP	0.11	DONGAN HILLS	0.16	ELIZABETH	0.13	CARTERET	0.15
DONGAN HILLS	0.11	BAYLEY SETON HOSP	0.13	CARTERET	0.12	ELIZABETH	0.15
CARTERET	0.09	GREAT KILLS	0.12	PISCATAWAY	0.12	PS 26	0.13
PS 26	0.09	ELIZABETH	0.12	BAYLEY SETON HOSP	0.11	PUMPING STATION	0.12
TOTTENVILLE	0.09	PUMPING STATION	0.12	DONGAN HILLS	0.11	PISCATAWAY	0.12
PUMPING STATION	0.08	SUSAN WAGNER HS	0.12	ELTINGVILLE	0.11	SUSAN WAGNER HS	0.11
PORT RICHMOND PO	0.07	CARTERET	0.11	GREAT KILLS	0.11	PORT RICHMOND PO	0.11
GREAT KILLS	0.06	PS 26	0.10	PS 26	0.09	GREAT KILLS	0.10
SUSAN WAGNER HS	0.05	PISCATAWAY	0.10	SUSAN WAGNER HS	0.09	ELTINGVILLE	0.03
PISCATAWAY		SEWAREN	0.09	PUMPING STATION	0.08	DONGAN HILLS	0.02
SEWAREN		PORT RICHMOND PO	0.08	PORT RICHMOND PO	0.08	BAYLEY SETON HOSP	0.02

Table III-3-52

1,1 DICHLOROETHANE - CH_3CHCl_2 (ETHYLIDENE CHLORIDE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
CARTERET		BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01
ELIZABETH		DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01
SEWAREN		ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PISCATAWAY		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
SUSAN WAGNER HS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
PS 26		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PORT RICHMOND PO		PS 26		PS 26		PS 26	
PUMPING STATION		PISCATAWAY		PISCATAWAY		PISCATAWAY	
GREAT KILLS		PUMPING STATION		PUMPING STATION		PUMPING STATION	
TOTTENVILLE		CARTERET		CARTERET		CARTERET	
BAYLEY SETON HOSP		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
ELTINGVILLE		SEWAREN		SEWAREN		SEWAREN	
DONGAN HILLS		ELIZABETH		ELIZABETH		ELIZABETH	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01
ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-53

1,2 DICHLOROETHANE - $ClCH_2CH_2Cl$ (ETHYLENE DICHLORIDE)

QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988	
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.07	PORT RICHMOND PO	0.04	PORT RICHMOND PO	0.04	PORT RICHMOND PO	0.08
ELTINGVILLE	0.06	DONGAN HILLS	0.04	SUSAN WAGNER HS	0.03	SUSAN WAGNER HS	0.04
DONGAN HILLS	0.05	SUSAN WAGNER HS	0.03	BAYLEY SETON HOSP	0.02	BAYLEY SETON HOSP	0.03
PORT RICHMOND PO	0.03	ELTINGVILLE	0.03	DONGAN HILLS	0.02	PS 26	0.02
PS 26	0.03	BAYLEY SETON HOSP	0.03	ELTINGVILLE	0.02	DONGAN HILLS	0.02
SUSAN WAGNER HS	0.02	PS 26	0.03	PS 26	0.02	ELTINGVILLE	0.01
GREAT KILLS		PUMPING STATION		PUMPING STATION		PUMPING STATION	
PISCATAWAY		CARTERET		CARTERET		CARTERET	
PUMPING STATION		ELIZABETH		ELIZABETH		ELIZABETH	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
CARTERET		GREAT KILLS		GREAT KILLS		GREAT KILLS	
SEWAREN		PISCATAWAY		PISCATAWAY		PISCATAWAY	
ELIZABETH		SEWAREN		SEWAREN		SEWAREN	

QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989	
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.03	BAYLEY SETON HOSP	0.03	BAYLEY SETON HOSP	0.02	BAYLEY SETON HOSP	0.02
DONGAN HILLS	0.02	DONGAN HILLS	0.03	DONGAN HILLS	0.01	DONGAN HILLS	0.01
ELTINGVILLE	0.02	ELTINGVILLE	0.03	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-54

TRICHLOROETHYLENE - $ClCH=CHCl_2$ (TRICHLOROETHENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
ELTINGVILLE	0.09	PS 26	0.17	ELTINGVILLE	0.08	BAYLEY SETON HOSP	0.08
BAYLEY SETON HOSP	0.08	ELTINGVILLE	0.10	BAYLEY SETON HOSP	0.07	ELTINGVILLE	0.06
DONGAN HILLS	0.08	PORT RICHMOND PO	0.08	CARTERET	0.07	ELIZABETH	0.06
CARTERET	0.07	DONGAN HILLS	0.08	ELIZABETH	0.07	DONGAN HILLS	0.06
PS 26	0.06	BAYLEY SETON HOSP	0.07	DONGAN HILLS	0.06	CARTERET	0.04
PORT RICHMOND PO	0.03	SUSAN WAGNER HS	0.05	PORT RICHMOND PO	0.03	PS 26	0.04
SUSAN WAGNER HS	0.01	CARTERET	0.05	PS 26	0.03	PORT RICHMOND PO	0.02
TOTTENVILLE		GREAT KILLS		SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02
PISCATAWAY		PUMPING STATION		TOTTENVILLE		PUMPING STATION	
PUMPING STATION		TOTTENVILLE		GREAT KILLS		TOTTENVILLE	
GREAT KILLS		PISCATAWAY		PUMPING STATION		GREAT KILLS	
SEWAREN		ELIZABETH		PISCATAWAY		PISCATAWAY	
ELIZABETH		SEWAREN		SEWAREN		SEWAREN	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.09	PUMPING STATION	0.17	PUMPING STATION	0.56	CARTERET	0.07
PUMPING STATION	0.09	PS 26	0.12	PORT RICHMOND PO	0.27	SEWAREN	0.07
DONGAN HILLS	0.07	SUSAN WAGNER HS	0.10	PS 26	0.20	ELIZABETH	0.07
ELTINGVILLE	0.07	PORT RICHMOND PO	0.09	SUSAN WAGNER HS	0.16	PISCATAWAY	0.05
PORT RICHMOND PO	0.04	DONGAN HILLS	0.08	TOTTENVILLE	0.13	ELTINGVILLE	0.03
SUSAN WAGNER HS	0.04	TOTTENVILLE	0.08	GREAT KILLS	0.12	DONGAN HILLS	0.02
ELIZABETH	0.04	BAYLEY SETON HOSP	0.08	CARTERET	0.05	BAYLEY SETON HOSP	0.02
PS 26	0.04	ELTINGVILLE	0.08	BAYLEY SETON HOSP	0.05	TOTTENVILLE	
GREAT KILLS	0.04	GREAT KILLS	0.07	ELTINGVILLE	0.04	GREAT KILLS	
TOTTENVILLE	0.03	SEWAREN	0.04	DONGAN HILLS	0.04	PS 26	
CARTERET	0.03	PISCATAWAY	0.04	ELIZABETH	0.04	PUMPING STATION	
PISCATAWAY		CARTERET	0.03	SEWAREN	0.04	SUSAN WAGNER HS	
SEWAREN		ELIZABETH	0.01	PISCATAWAY	0.04	PORT RICHMOND PO	

Table III-3-55

1,1,1 TRICHLOROETHANE - CH_3CCl_3 (METHYL CHLOROFORM)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
PORT RICHMOND PO	0.69	PORT RICHMOND PO	0.81	ELIZABETH	0.86	ELIZABETH	0.69
PS 26	0.65	PS 26	0.67	CARTERET	0.52	CARTERET	0.61
ELTINGVILLE	0.48	SUSAN WAGNER HS	0.55	PORT RICHMOND PO	0.47	PS 26	0.52
BAYLEY SETON HOSP	0.42	ELTINGVILLE	0.51	SUSAN WAGNER HS	0.47	PORT RICHMOND PO	0.41
SUSAN WAGNER HS	0.40	DONGAN HILLS	0.44	PS 26	0.42	BAYLEY SETON HOSP	0.40
DONGAN HILLS	0.37	BAYLEY SETON HOSP	0.44	BAYLEY SETON HOSP	0.34	SUSAN WAGNER HS	0.33
CARTERET	0.33	CARTERET	0.42	ELTINGVILLE	0.31	ELTINGVILLE	0.27
PUMPING STATION		PUMPING STATION		DONGAN HILLS	0.25	DONGAN HILLS	0.26
ELIZABETH		ELIZABETH		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
GREAT KILLS		GREAT KILLS		PISCATAWAY		PUMPING STATION	
PISCATAWAY		PISCATAWAY		PUMPING STATION		SEWAREN	
SEWAREN		SEWAREN		SEWAREN		PISCATAWAY	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
ELIZABETH	0.72	SEWAREN	0.82	PORT RICHMOND PO	0.62	PS 26	0.56
CARTERET	0.57	ELIZABETH	0.76	BAYLEY SETON HOSP	0.57	SEWAREN	0.52
BAYLEY SETON HOSP	0.50	CARTERET	0.70	PUMPING STATION	0.53	PUMPING STATION	0.51
PORT RICHMOND PO	0.43	PISCATAWAY	0.55	CARTERET	0.49	CARTERET	0.51
PUMPING STATION	0.42	PORT RICHMOND PO	0.54	PS 26	0.43	PORT RICHMOND PO	0.51
DONGAN HILLS	0.42	PUMPING STATION	0.52	SUSAN WAGNER HS	0.40	ELIZABETH	0.48
PS 26	0.39	PS 26	0.50	SEWAREN	0.39	SUSAN WAGNER HS	0.42
ELTINGVILLE	0.38	BAYLEY SETON HOSP	0.49	ELIZABETH	0.38	PISCATAWAY	0.38
GREAT KILLS	0.34	TOTTENVILLE	0.47	GREAT KILLS	0.36	TOTTENVILLE	0.35
SUSAN WAGNER HS	0.33	SUSAN WAGNER HS	0.43	TOTTENVILLE	0.33	GREAT KILLS	0.31
TOTTENVILLE	0.30	DONGAN HILLS	0.41	DONGAN HILLS	0.33	BAYLEY SETON HOSP	0.22
SEWAREN		ELTINGVILLE	0.41	PISCATAWAY	0.30	ELTINGVILLE	0.20
PISCATAWAY		GREAT KILLS	0.38	ELTINGVILLE	0.28	DONGAN HILLS	0.19

Table III-3-56

1,1,2 TRICHLOROETHANE - $CH_2ClCHCl_2$

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.02
SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02
PS 26	0.02	PS 26	0.02	PS 26	0.02	PS 26	0.02
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	
CARTERET		CARTERET		CARTERET		CARTERET	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		ELTINGVILLE	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		DONGAN HILLS	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.02	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.02	BAYLEY SETON HOSP	0.02
DONGAN HILLS	0.02	DONGAN HILLS	0.01	DONGAN HILLS	0.02	DONGAN HILLS	0.02
ELTINGVILLE	0.02	ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.02
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-57

TETRACHLOROETHYLENE - $Cl_2C=CCl_2$ (TETRACHLOROETHENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
DONGAN HILLS	0.67	DONGAN HILLS	0.66	DONGAN HILLS	0.51	DONGAN HILLS	0.77
PS 26	0.42	BAYLEY SETON HOSP	0.35	ELIZABETH	0.38	BAYLEY SETON HOSP	0.37
PORT RICHMOND PO	0.34	ELTINGVILLE	0.35	BAYLEY SETON HOSP	0.26	ELIZABETH	0.30
BAYLEY SETON HOSP	0.34	PORT RICHMOND PO	0.30	PORT RICHMOND PO	0.25	PS 26	0.30
ELTINGVILLE	0.33	SUSAN WAGNER HS	0.23	ELTINGVILLE	0.24	ELTINGVILLE	0.26
SUSAN WAGNER HS	0.17	PS 26	0.23	CARTERET	0.23	PORT RICHMOND PO	0.21
CARTERET	0.08	CARTERET	0.15	SUSAN WAGNER HS	0.16	CARTERET	0.20
GREAT KILLS		GREAT KILLS		PS 26	0.13	SUSAN WAGNER HS	0.17
PUMPING STATION		PISCATAWAY		GREAT KILLS		TOTTENVILLE	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		GREAT KILLS	
PISCATAWAY		PUMPING STATION		PISCATAWAY		PUMPING STATION	
SEWAREN		SEWAREN		PUMPING STATION		PISCATAWAY	
ELIZABETH		ELIZABETH		SEWAREN		SEWAREN	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PUMPING STATION	0.62	PUMPING STATION	0.72	PUMPING STATION	1.49	PUMPING STATION	1.49
DONGAN HILLS	0.61	DONGAN HILLS	0.72	DONGAN HILLS	0.44	DONGAN HILLS	0.84
BAYLEY SETON HOSP	0.26	BAYLEY SETON HOSP	0.30	PORT RICHMOND PO	0.32	ELIZABETH	0.30
TOTTENVILLE	0.23	ELTINGVILLE	0.23	ELIZABETH	0.27	PORT RICHMOND PO	0.28
ELTINGVILLE	0.21	TOTTENVILLE	0.20	BAYLEY SETON HOSP	0.25	SEWAREN	0.28
PORT RICHMOND PO	0.18	SUSAN WAGNER HS	0.18	CARTERET	0.24	GREAT KILLS	0.27
GREAT KILLS	0.16	PORT RICHMOND PO	0.17	SUSAN WAGNER HS	0.23	CARTERET	0.26
ELIZABETH	0.15	PS 26	0.17	PS 26	0.23	PS 26	0.21
PS 26	0.14	GREAT KILLS	0.14	TOTTENVILLE	0.22	BAYLEY SETON HOSP	0.18
SUSAN WAGNER HS	0.12	SEWAREN	0.11	SEWAREN	0.21	PISCATAWAY	0.18
CARTERET	0.10	ELIZABETH	0.11	GREAT KILLS	0.20	TOTTENVILLE	0.17
PISCATAWAY		PISCATAWAY	0.09	PISCATAWAY	0.13	SUSAN WAGNER HS	0.17
SEWAREN		CARTERET	0.05	ELTINGVILLE	0.09	ELTINGVILLE	0.17

Table III-3-58

TRIBROMOMETHANE - $CHBr_3$ (BROMOFORM)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
CARTERET		CARTERET		CARTERET		CARTERET	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
PS 26		PS 26		PS 26		PS 26	
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP	
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		ELTINGVILLE	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		DONGAN HILLS	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01
ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-59

HEXANE - C_6H_{14}

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
ELTINGVILLE	1.32	DONGAN HILLS	1.22	ELIZABETH	0.92	ELIZABETH	1.52
DONGAN HILLS	1.10	ELTINGVILLE	1.19	CARTERET	0.75	CARTERET	1.08
BAYLEY SETON HOSP	1.09	BAYLEY SETON HOSP	0.99	ELTINGVILLE	0.61	ELTINGVILLE	0.64
CARTERET	0.83	CARTERET	0.57	BAYLEY SETON HOSP	0.49	BAYLEY SETON HOSP	0.60
PORT RICHMOND PO		PORT RICHMOND PO		DONGAN HILLS	0.48	DONGAN HILLS	0.54
TOTTENVILLE		TOTTENVILLE		PORT RICHMOND PO		PORT RICHMOND PO	
PS 26		PS 26		TOTTENVILLE		TOTTENVILLE	
PISCATAWAY		PISCATAWAY		SUSAN WAGNER HS		SUSAN WAGNER HS	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
SUSAN WAGNER HS		SUSAN WAGNER HS		PS 26		PS 26	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
SEWAREN		SEWAREN		PISCATAWAY		PISCATAWAY	
ELIZABETH		ELIZABETH		SEWAREN		SEWAREN	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
ELIZABETH	1.04	CARTERET	1.55	CARTERET	1.12	ELTINGVILLE	0.88
CARTERET	1.01	ELIZABETH	1.18	ELIZABETH	0.80	SEWAREN	0.74
ELTINGVILLE	0.98	SEWAREN	1.06	SEWAREN	0.78	CARTERET	0.73
DONGAN HILLS	0.95	DONGAN HILLS	0.87	DONGAN HILLS	0.51	ELIZABETH	0.67
BAYLEY SETON HOSP	0.95	ELTINGVILLE	0.85	BAYLEY SETON HOSP	0.49	DONGAN HILLS	0.56
TOTTENVILLE		PISCATAWAY	0.83	ELTINGVILLE	0.41	BAYLEY SETON HOSP	0.55
PS 26		BAYLEY SETON HOSP	0.67	PISCATAWAY	0.34	PISCATAWAY	0.37
PISCATAWAY		PS 26		PS 26		PS 26	
PUMPING STATION		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
PORT RICHMOND PO		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
SUSAN WAGNER HS		PUMPING STATION		PUMPING STATION		PUMPING STATION	
SEWAREN		GREAT KILLS		GREAT KILLS		GREAT KILLS	
GREAT KILLS		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	

Table III-3-60

BENZENE - C_6H_6 (BENZOL, PHENE)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
DONGAN HILLS	1.99	DONGAN HILLS	2.24	ELIZABETH	1.17	PORT RICHMOND PO	1.74
ELTINGVILLE	1.93	PORT RICHMOND PO	2.13	CARTERET	1.01	ELIZABETH	1.66
BAYLEY SETON HOSP	1.70	SUSAN WAGNER HS	2.10	PORT RICHMOND PO	0.98	CARTERET	1.45
PORT RICHMOND PO	1.58	ELTINGVILLE	1.90	DONGAN HILLS	0.87	PS 26	1.32
SUSAN WAGNER HS	1.41	PS 26	1.73	BAYLEY SETON HOSP	0.81	DONGAN HILLS	1.08
PS 26	1.37	BAYLEY SETON HOSP	1.55	ELTINGVILLE	0.80	BAYLEY SETON HOSP	0.92
CARTERET	1.19	CARTERET	0.98	SUSAN WAGNER HS	0.65	ELTINGVILLE	0.85
GREAT KILLS		PUMPING STATION		PS 26	0.58	SUSAN WAGNER HS	0.81
PISCATAWAY		SEWAREN		GREAT KILLS		PUMPING STATION	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PUMPING STATION		GREAT KILLS		PISCATAWAY		GREAT KILLS	
SEWAREN		PISCATAWAY		PUMPING STATION		PISCATAWAY	
ELIZABETH		ELIZABETH		SEWAREN		SEWAREN	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
DONGAN HILLS	2.09	CARTERET	2.25	PORT RICHMOND PO	1.52	PS 26	1.39
ELIZABETH	1.72	DONGAN HILLS	2.12	CARTERET	1.28	PUMPING STATION	1.26
CARTERET	1.67	ELIZABETH	1.86	ELIZABETH	1.25	PORT RICHMOND PO	1.21
BAYLEY SETON HOSP	1.62	PISCATAWAY	1.79	PS 26	1.17	ELIZABETH	0.96
ELTINGVILLE	1.60	SEWAREN	1.74	PUMPING STATION	1.11	SEWAREN	0.92
PORT RICHMOND PO	1.16	ELTINGVILLE	1.61	SEWAREN	0.95	TOTTENVILLE	0.91
PS 26	1.03	PORT RICHMOND PO	1.52	GREAT KILLS	0.84	GREAT KILLS	0.86
PUMPING STATION	0.97	PS 26	1.46	DONGAN HILLS	0.76	CARTERET	0.84
GREAT KILLS	0.91	BAYLEY SETON HOSP	1.40	BAYLEY SETON HOSP	0.72	ELTINGVILLE	0.82
TOTTENVILLE	0.79	PUMPING STATION	1.28	SUSAN WAGNER HS	0.69	DONGAN HILLS	0.74
SUSAN WAGNER HS	0.62	GREAT KILLS	1.09	TOTTENVILLE	0.67	SUSAN WAGNER HS	0.69
PISCATAWAY		SUSAN WAGNER HS	1.07	ELTINGVILLE	0.62	PISCATAWAY	0.65
SEWAREN		TOTTENVILLE	1.04	PISCATAWAY	0.57	BAYLEY SETON HOSP	0.63

Table III-3-61

TOLUENE - $C_6H_5CH_3$ (METHYL BENZENE)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
ELTINGVILLE	5.70	DONGAN HILLS	5.67	CARTERET	3.01	ELIZABETH	5.24
DONGAN HILLS	5.19	ELTINGVILLE	5.19	ELIZABETH	2.90	CARTERET	5.02
BAYLEY SETON HOSP	4.71	PORT RICHMOND PO	4.65	DONGAN HILLS	2.86	DONGAN HILLS	4.18
PORT RICHMOND PO	3.74	BAYLEY SETON HOSP	4.24	ELTINGVILLE	2.71	BAYLEY SETON HOSP	4.14
PS 26	3.22	PS 26	3.20	PORT RICHMOND PO	2.67	ELTINGVILLE	3.68
CARTERET	2.83	SUSAN WAGNER HS	2.32	BAYLEY SETON HOSP	2.65	PORT RICHMOND PO	3.63
SUSAN WAGNER HS	1.88	CARTERET	1.70	PS 26	2.17	PS 26	3.29
GREAT KILLS		GREAT KILLS		SUSAN WAGNER HS	1.46	SUSAN WAGNER HS	2.07
PISCATAWAY		PUMPING STATION		TOTTENVILLE		TOTTENVILLE	
TOTTENVILLE		TOTTENVILLE		GREAT KILLS		GREAT KILLS	
PUMPING STATION		PISCATAWAY		PUMPING STATION		PUMPING STATION	
SEWAREN		SEWAREN		PISCATAWAY		PISCATAWAY	
ELIZABETH		ELIZABETH		SEWAREN		SEWAREN	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
ELIZABETH	4.59	CARTERET	5.57	PORT RICHMOND PO	4.36	PORT RICHMOND PO	4.39
CARTERET	4.18	PORT RICHMOND PO	4.72	PUMPING STATION	3.49	PS 26	4.32
DONGAN HILLS	4.09	PS 26	4.55	PS 26	3.38	PUMPING STATION	4.17
PORT RICHMOND PO	3.56	DONGAN HILLS	4.46	ELIZABETH	2.83	ELTINGVILLE	3.09
ELTINGVILLE	3.55	PUMPING STATION	4.26	CARTERET	2.82	TOTTENVILLE	3.09
PUMPING STATION	3.52	ELIZABETH	4.23	DONGAN HILLS	2.59	DONGAN HILLS	2.99
BAYLEY SETON HOSP	3.48	SEWAREN	4.14	GREAT KILLS	2.58	GREAT KILLS	2.95
PS 26	3.21	ELTINGVILLE	3.60	BAYLEY SETON HOSP	2.39	CARTERET	2.90
GREAT KILLS	2.78	PISCATAWAY	3.42	TOTTENVILLE	2.17	ELIZABETH	2.82
TOTTENVILLE	2.56	TOTTENVILLE	3.34	SUSAN WAGNER HS	2.13	SEWAREN	2.69
SUSAN WAGNER HS	1.76	GREAT KILLS	3.27	SEWAREN	2.05	SUSAN WAGNER HS	2.57
PISCATAWAY		BAYLEY SETON HOSP	3.16	ELTINGVILLE	1.95	BAYLEY SETON HOSP	2.22
SEWAREN		SUSAN WAGNER HS	3.13	PISCATAWAY	1.27	PISCATAWAY	1.80

Table III-3-62

o-XYLENE - 1,2-$(CH_3)_2C_6H_4$ (1,2-DIMETHYL BENZENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PORT RICHMOND PO	0.81	PORT RICHMOND PO	0.89	PORT RICHMOND PO	0.43	PORT RICHMOND PO	0.59
DONGAN HILLS	0.63	DONGAN HILLS	0.52	CARTERET	0.34	ELIZABETH	0.55
ELTINGVILLE	0.61	PS 26	0.48	PS 26	0.28	CARTERET	0.49
PS 26	0.53	ELTINGVILLE	0.42	DONGAN HILLS	0.28	PS 26	0.47
BAYLEY SETON HOSP	0.53	SUSAN WAGNER HS	0.33	ELIZABETH	0.26	DONGAN HILLS	0.38
SUSAN WAGNER HS	0.33	BAYLEY SETON HOSP	0.33	ELTINGVILLE	0.25	BAYLEY SETON HOSP	0.35
CARTERET	0.33	CARTERET	0.27	BAYLEY SETON HOSP	0.24	ELTINGVILLE	0.30
PUMPING STATION		PUMPING STATION		SUSAN WAGNER HS	0.20	SUSAN WAGNER HS	0.27
ELIZABETH		ELIZABETH		PUMPING STATION		PUMPING STATION	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
DONGAN HILLS	0.53	PORT RICHMOND PO	0.61	PORT RICHMOND PO	0.58	PORT RICHMOND PO	0.53
CARTERET	0.53	DONGAN HILLS	0.56	PUMPING STATION	0.47	PUMPING STATION	0.49
ELIZABETH	0.52	PS 26	0.50	PS 26	0.40	PS 26	0.46
PORT RICHMOND PO	0.46	PUMPING STATION	0.50	GREAT KILLS	0.35	TOTTENVILLE	0.34
BAYLEY SETON HOSP	0.42	SEWAREN	0.49	CARTERET	0.29	ELIZABETH	0.34
ELTINGVILLE	0.40	CARTERET	0.48	DONGAN HILLS	0.28	PISCATAWAY	0.33
PS 26	0.40	ELIZABETH	0.45	ELIZABETH	0.28	GREAT KILLS	0.33
PUMPING STATION	0.38	GREAT KILLS	0.43	TOTTENVILLE	0.28	CARTERET	0.29
GREAT KILLS	0.36	ETINGVILLE	0.41	SUSAN WAGNER HS	0.28	SUSAN WAGNER HS	0.28
TOTTENVILLE	0.26	BAYLEY SETON HOSP	0.38	BAYLEY SETON HOSP	0.25	ELTINGVILLE	0.27
SUSAN WAGNER HS	0.24	SUSAN WAGNER	0.38	SEWAREN	0.24	DONGAN HILLS	0.25
PISCATAWAY		TOTTENVILLE	0.38	ELTINGVILLE	0.21	SEWAREN	0.24
SEWAREN		PISCATAWAY	0.29	PISCATAWAY	0.12	BAYLEY SETON HOSP	0.23

Table III-3-63

m&p-XYLENES - 1,3-$(CH_3)_2C_6H_4$ & 1,4-$(CH_3)_2C_6H_4$ (1,3-DIMETHYL BENZENE & 1,4-DIMETHYL BENZENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PORT RICHMOND PO	2.45	PORT RICHMOND PO	2.66	DONGAN HILLS	1.61	DONGAN HILLS	2.31
PS 26	1.80	DONGAN HILLS	2.38	BAYLEY SETON HOSP	1.38	BAYLEY SETON HOSP	2.14
SUSAN WAGNER HS	1.29	ELTINGVILLE	2.02	ELTINGVILLE	1.38	ELTINGVILLE	1.88
CARTERET	0.87	BAYLEY SETON HOSP	1.94	PORT RICHMOND PO	1.33	PORT RICHMOND PO	1.83
PUMPING STATION		PS 26	1.50	PS 26	0.92	ELIZABETH	1.71
TOTTENVILLE		SUSAN WAGNER HS	1.19	CARTERET	0.86	PS 26	1.55
PISCATAWAY		CARTERET	0.57	ELIZABETH	0.83	CARTERET	1.51
BAYLEY SETON HOSP		PUMPING STATION		SUSAN WAGNER HS	0.70	SUSAN WAGNER HS	0.83
ELIZABETH		ELIZABETH		GREAT KILLS		GREAT KILLS	
SEWAREN		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
GREAT KILLS		GREAT KILLS		PISCATAWAY		PISCATAWAY	
ELTINGVILLE		PISCATAWAY		SEWAREN		SEWAREN	
DONGAN HILLS		SEWAREN		PUMPING STATION		PUMPING STATION	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
DONGAN HILLS	2.59	DONGAN HILLS	2.47	PORT RICHMOND PO	1.89	PORT RICHMOND PO	1.71
BAYLEY SETON HOSP	2.06	PORT RICHMOND PO	1.93	PUMPING STATION	1.53	PUMPING STATION	1.62
ELTINGVILLE	2.00	ELTINGVILLE	1.87	DONGAN HILLS	1.30	PS 26	1.49
ELIZABETH	1.61	BAYLEY SETON HOSP	1.67	PS 26	1.27	TOTTENVILLE	1.10
CARTERET	1.59	PUMPING STATION	1.64	BAYLEY SETON HOSP	1.17	GREAT KILLS	1.08
PORT RICHMOND PO	1.54	PS 26	1.61	GREAT KILLS	1.13	SUSAN WAGNER HS	0.87
PS 26	1.30	CARTERET	1.55	TOTTENVILLE	0.89	ELIZABETH	0.82
PUMPING STATION	1.22	GREAT KILLS	1.39	SUSAN WAGNER HS	0.88	SEWAREN	0.82
GREAT KILLS	1.20	ELIZABETH	1.34	ELTINGVILLE	0.77	CARTERET	0.76
TOTTENVILLE	0.93	SEWAREN	1.34	CARTERET	0.76	PISCATAWAY	0.54
SUSAN WAGNER HS	0.78	TOTTENVILLE	1.22	ELIZABETH	0.49	BAYLEY SETON HOSP	
PISCATAWAY		SUSAN WAGNER HS	1.17	SEWAREN	0.48	ELTINGVILLE	
SEWAREN		PISCATAWAY	0.81	PISCATAWAY	0.25	DONGAN HILLS	

Table III-3-64

STYRENE - $C_6H_5CH{=}CH_2$ (VINYL BENZENE)

	QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
CARTERET		DONGAN HILLS	0.07	BAYLEY SETON HOSP	0.07	BAYLEY SETON HOSP	0.08
ELIZABETH		BAYLEY SETON HOSP	0.06	DONGAN HILLS	0.07	DONGAN HILLS	0.08
SEWAREN		ELTINGVILLE	0.05	ELTINGVILLE	0.06	ELTINGVILLE	0.07
PISCATAWAY		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
SUSAN WAGNER HS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
PS 26		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PORT RICHMOND PO		PS 26		PS 26		PS 26	
PUMPING STATION		PISCATAWAY		PISCATAWAY		PISCATAWAY	
GREAT KILLS		PUMPING STATION		PUMPING STATION		PUMPING STATION	
TOTTENVILLE		CARTERET		CARTERET		CARTERET	
BAYLEY SETON HOSP		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
ELTINGVILLE		SEWAREN		SEWAREN		SEWAREN	
DONGAN HILLS		ELIZABETH		ELIZABETH		ELIZABETH	

	QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989	
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. ME (ppb)	# OF SAMPLES
DONGAN HILLS	0.12	DONGAN HILLS	0.11	BAYLEY SETON HOSP	0.05	ELTINGVILLE	0.06	
BAYLEY SETON HOSP	0.09	ELTINGVILLE	0.09	DONGAN HILLS	0.05	DONGAN HILLS	0.06	
ELTINGVILLE	0.09	BAYLEY SETON HOSP	0.08	ELTINGVILLE	0.03	BAYLEY SETON HOSP	0.05	
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS		
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		
PS 26		PS 26		PS 26		PS 26		
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY		
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION		
CARTERET		CARTERET		CARTERET		CARTERET		
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		
SEWAREN		SEWAREN		SEWAREN		SEWAREN		
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH		

Table III-3-65

ETHYL BENZENE - $C_6H_5CH_2CH_3$

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
PORT RICHMOND PO	0.53	DONGAN HILLS	1.49	DONGAN HILLS	0.53	DONGAN HILLS	0.67
PS 26	0.34	ELTINGVILLE	1.25	ELTINGVILLE	0.46	BAYLEY SETON HOSP	0.62
SUSAN WAGNER HS	0.19	BAYLEY SETON HOSP	0.92	BAYLEY SETON	0.45	ELTINGVILLE	0.56
PUMPING STATION		PORT RICHMOND PO	0.59	PORT RICHMOND PO	0.27	PORT RICHMOND PO	0.41
GREAT KILLS		PS 26	0.36	PS 26	0.18	PS 26	0.34
TOTTENVILLE		SUSAN WAGNER HS	0.24	SUSAN WAGNER HS	0.11	SUSAN WAGNER HS	0.15
SEWAREN		GREAT KILLS		GREAT KILLS		GREAT KILLS	
BAYLEY SETON HOSP		PISCATAWAY		PISCATAWAY		PISCATAWAY	
ELIZABETH		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PISCATAWAY		CARTERET		CARTERET		CARTERET	
ELTINGVILLE		SEWAREN		SEWAREN		SEWAREN	
DONGAN HILLS		ELIZABETH		ELIZABETH		ELIZABETH	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
DONGAN HILLS	0.72	DONGAN HILLS	0.71	DONGAN HILLS	0.34	ELTINGVILLE	0.39
BAYLEY SETON HOSP	0.57	ELTINGVILLE	0.55	BAYLEY SETON HOSP	0.33	DONGAN HILLS	0.33
ELTINGVILLE	0.57	BAYLEY SETON HOSP	0.49	ELTINGVILLE	0.24	BAYLEY SETON HOSP	0.28
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-66

CHLOROBENZENE - C_6H_5Cl (PHENYLCHLORIDE)

QUARTER BEGINNING OCTOBER 1987

SITE	ARITH. MEAN (ppb)
PS 26	0.02
PORT RICHMOND PO	0.01
SUSAN WAGNER HS	0.01
DONGAN HILLS	0.01
BAYLEY SETON HOSP	0.01
ELTINGVILLE	0.01
PUMPING STATION	
CARTERET	
SEWAREN	
TOTTENVILLE	
GREAT KILLS	
ELIZABETH	
PISCATAWAY	

QUARTER BEGINNING JANUARY 1988

SITE	(ppb)
PORT RICHMOND PO	0.02
PS 26	0.02
SUSAN WAGNER HS	0.01
ELTINGVILLE	0.01
BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01
PUMPING STATION	
CARTERET	
ELIZABETH	
TOTTENVILLE	
GREAT KILLS	
PISCATAWAY	
SEWAREN	

QUARTER BEGINNING APRIL 1988

SITE	ARITH. MEAN (ppb)
ELTINGVILLE	0.02
PORT RICHMOND PO	0.02
PS 26	0.02
SUSAN WAGNER HS	0.02
DONGAN HILLS	0.01
ELTINGVILLE	0.01
PUMPING STATION	
CARTERET	
ELIZABETH	
TOTTENVILLE	
GREAT KILLS	
PISCATAWAY	
SEWAREN	

QUARTER BEGINNING JULY 1988

SITE	ARITH. MEAN (ppb)
PS 26	0.03
PORT RICHMOND PO	0.02
SUSAN WAGNER HS	0.02
DONGAN HILLS	0.01
BAYLEY SETON HOSP	0.01
ELTINGVILLE	0.01
PUMPING STATION	
CARTERET	
SEWAREN	
TOTTENVILLE	
GREAT KILLS	
ELIZABETH	
PISCATAWAY	

QUARTER BEGINNING OCTOBER 1988

SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01
ELTINGVILLE	0.01
PORT RICHMOND PO	
GREAT KILLS	
TOTTENVILLE	
PS 26	
PISCATAWAY	
PUMPING STATION	
CARTERET	
SUSAN WAGNER HS	
SEWAREN	
ELIZABETH	

QUARTER BEGINNING JANUARY 1989

SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01
ELTINGVILLE	0.01
PORT RICHMOND PO	
GREAT KILLS	
TOTTENVILLE	
PS 26	
PISCATAWAY	
PUMPING STATION	
CARTERET	
SUSAN WAGNER HS	
SEWAREN	
ELIZABETH	

QUARTER BEGINNING APRIL 1989

SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.02
DONGAN HILLS	0.01
ELTINGVILLE	0.01
PORT RICHMOND PO	
GREAT KILLS	
TOTTENVILLE	
PS 26	
PISCATAWAY	
PUMPING STATION	
CARTERET	
SUSAN WAGNER HS	
SEWAREN	
ELIZABETH	

QUARTER BEGINNING JULY 1989

SITE	ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01
ELTINGVILLE	0.01
PORT RICHMOND PO	
GREAT KILLS	
TOTTENVILLE	
PS 26	
PISCATAWAY	
PUMPING STATION	
CARTERET	
SUSAN WAGNER HS	
SEWAREN	
ELIZABETH	

Table III-3-67

o-DICHLOROBENZENE - 1,2-$Cl_2C_6H_4$ (1,2-DICHLOROBENZENE)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02	SUSAN WAGNER HS	0.02
PS 26	0.02	PS 26	0.02	PS 26	0.02	PS 26	0.02
PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.02	PORT RICHMOND PO	0.01
CARTERET		CARTERET		CARTERET		PISCATAWAY	
ELIZABETH		ELIZABETH		ELIZABETH		CARTERET	
PISCATAWAY		PISCATAWAY		PISCATAWAY		SEWAREN	
SEWAREN		SEWAREN		SEWAREN		ELIZABETH	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP	
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		ELTINGVILLE	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		DONGAN HILLS	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01	DONGAN HILLS	0.01
ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-68

m-DICHLOROBENZENE - 1,3-$Cl_2C_6H_4$ (1,3-DICHLOROBENZENE)

SITE	QUARTER BEGINNING OCTOBER 1987 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1988 ARITH. MEAN (ppb)
PS 26	0.06	PORT RICHMOND PO	0.07	PORT RICHMOND PO	0.06	PORT RICHMOND PO	0.09
PORT RICHMOND PO	0.06	SUSAN WAGNER HS	0.04	SUSAN WAGNER HS	0.03	PS 26	0.07
SUSAN WAGNER HS	0.03	PS 26	0.04	PS 26	0.03	SUSAN WAGNER HS	0.05
SEWAREN		PISCATAWAY		PISCATAWAY		PISCATAWAY	
CARTERET		CARTERET		CARTERET		CARTERET	
PISCATAWAY		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP	
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		ELTINGVILLE	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		DONGAN HILLS	

SITE	QUARTER BEGINNING OCTOBER 1988 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JANUARY 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING APRIL 1989 ARITH. MEAN (ppb)	SITE	QUARTER BEGINNING JULY 1989 ARITH. MEAN (ppb)
BAYLEY SETON HOSP	0.01	DONGAN HILLS	0.08	BAYLEY SETON HOSP	0.01	BAYLEY SETON HOSP	0.01
DONGAN HILLS	0.01	ETINGVILLE	0.08	DONGAN HILLS	0.01	DONGAN HILLS	0.01
ELTINGVILLE	0.01	BAYLEY SETON HOSP	0.07	ELTINGVILLE	0.01	ELTINGVILLE	0.01
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

Table III-3-69

p-DICHLOROBENZENE - 1,4-$Cl_2C_6H_4$ (1,4-DICHLOROBENZENE)

QUARTER BEGINNING OCTOBER 1987		QUARTER BEGINNING JANUARY 1988		QUARTER BEGINNING APRIL 1988		QUARTER BEGINNING JULY 1988	
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
PORT RICHMOND PO	0.01	SUSAN WAGNER HS	0.01	SUSAN WAGNER HS	0.01	SUSAN WAGNER HS	0.01
SUSAN WAGNER HS	0.01	PS 26	0.01	PORT RICHMOND PO	0.01	PORT RICHMOND PO	0.01
PS 26	0.01	PORT RICHMOND PO	0.01	PS 26	0.01	PS 26	0.01
PUMPING STATION		CARTERET		PISCATAWAY		PISCATAWAY	
GREAT KILLS		ELIZABETH		CARTERET		CARTERET	
TOTTENVILLE		PISCATAWAY		SEWAREN		SEWAREN	
SEWAREN		SEWAREN		ELIZABETH		ELIZABETH	
BAYLEY SETON HOSP		PUMPING STATION		PUMPING STATION		PUMPING STATION	
ELIZABETH		GREAT KILLS		GREAT KILLS		GREAT KILLS	
CARTERET		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PISCATAWAY		BAYLEY SETON HOSP		BAYLEY SETON HOSP		BAYLEY SETON HOSP	
ELTINGVILLE		ELTINGVILLE		ELTINGVILLE		ELTINGVILLE	
DONGAN HILLS		DONGAN HILLS		DONGAN HILLS		DONGAN HILLS	

QUARTER BEGINNING OCTOBER 1988		QUARTER BEGINNING JANUARY 1989		QUARTER BEGINNING APRIL 1989		QUARTER BEGINNING JULY 1989	
SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)	SITE	ARITH. MEAN (ppb)
DONGAN HILLS	0.19	BAYLEY SETON HOSP	0.15	BAYLEY SETON HOSP	0.17	BAYLEY SETON HOSP	0.15
ELTINGVILLE	0.18	DONGAN HILLS	0.15	DONGAN HILLS	0.17	DONGAN HILLS	0.15
BAYLEY SETON HOSP	0.17	ELTINGVILLE	0.15	ELTINGVILLE	0.16	ELTINGVILLE	0.15
PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO		PORT RICHMOND PO	
GREAT KILLS		GREAT KILLS		GREAT KILLS		GREAT KILLS	
TOTTENVILLE		TOTTENVILLE		TOTTENVILLE		TOTTENVILLE	
PS 26		PS 26		PS 26		PS 26	
PISCATAWAY		PISCATAWAY		PISCATAWAY		PISCATAWAY	
PUMPING STATION		PUMPING STATION		PUMPING STATION		PUMPING STATION	
CARTERET		CARTERET		CARTERET		CARTERET	
SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS		SUSAN WAGNER HS	
SEWAREN		SEWAREN		SEWAREN		SEWAREN	
ELIZABETH		ELIZABETH		ELIZABETH		ELIZABETH	

EMISSION INVENTORY APPENDICES

Emission Inventory and Microinventory Tables and Maps

Point source emission inventory by chemical	Tables III-5-4 through 18
Area and mobile source emissions summary	Table III-5-19
Area and mobile source emissions inventory	Emissions Inventory Appendices A through E
Microinventory	Figures III-5-5 through 19, Tables III-5-20 through 33
Emissions mapping maps and tables	Figures III-5-20 through 30, Tables III-5-34 through 40

Point Source Emission Inventories
Tables III-5-4 through 18

This section contains the point source emission inventories presented as separate tables for the following chemicals:

benzene
cadmium and compounds
carbon tetrachloride (tetrachloromethane)
chloroform (trichloromethane)
dichloromethane (methylene chloride)
formaldehyde
n-hexane
perchloroethylene (tetrachloroethylene, tetrachloroethene)
toluene
1,1,1-trichloroethane
trichloroethylene (1,1,2-trichloroethene)
xylenes (mixed)
m-xylene
o-xylene
p-xylene

Table III-5-4: Benzene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2	1.53	20.28		A T	1.53
AMERADA HESS CORP	750 CLIFF RD	PORT READING	07064	4490.0	564.0	2.90			T	2.90
AMERICAN HOME PRODUCTS CORP.	567 RIDGE ROAD	MONMOUTH JCT.	08852	4468.8	536.1		0.04		A	0.04
BLOCK DRUG COMPANY, INC.	257 CORNELISON AVE	JERSEY CITY	07302	4467.0	543.0		0.28		A	0.28
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.03		0.77	E P	0.03
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.06	E	0.06
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.03	E	0.03
CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0		0.68		A	0.68
CHEVRON USA INC.	1200 STATE STREET	PERTH AMBOY	08861	4488.5	561.9	0.30			T	0.30
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.14			P	0.14
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	0.21		ND[1]	E P	0.21
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	0.18			P	0.18
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.10		ND	E P	0.10
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	0.16		ND	E P	0.16
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.06			P	0.06
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.05		1.26	E P	0.05
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	25.00			T	25.00
FORD MOTOR CO	939 U.S. RTE. #1	EDISON	08818	4485.2	553.2	0.25			T	0.25
GATX TERMINALS CORP.	78 LAFAYETTE STREET	CARTERET	07008	4492.7	566.7		0.05		A	0.05
GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	0.25			T	0.25
GETTY PETROLEUM CORP.	RT 36 & AVENUE D	ATLANTIC HIGHLANDS	07716				0.26		A	0.26
HERCULES INCORPORATED	MINISINK & CHEESEQUAKE RD	SAYREVILLE	08872	4477.5	555.6		0.88		A	0.88
HULS AMERICA, INC. (EX-NUODEX)	830 MAGNOLIA AVENUE	ELIZABETH	07201	4501.8	567.3		5.09		A	5.09
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.04	E	0.04
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9			18.28	E	18.28
KIN-BUC, INC. (LANDFILL)	MEADOW ROAD	EDISON	08817	4481.2	552.5		0.02		A	0.02
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	5.13		2.92	E P	5.13
LINPRO COMPANY POTW, THE				4464.0	533.2			0.18	E	0.18
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9		0.03	0.25	A E	0.03
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4	8.45	29.42		A T	8.45
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	0.89		22.53	E P	0.89
MIDDLESEX COUNTY POTW 2				4483.0	550.8	2.13		0.02	E P	2.13
NEWPORT CITY DEVELOPMENT CO	145 12TH STREET	JERSEY CITY	07372	4508.9	581.3		0.11		A	0.11

[1] ND means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit-allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-4: Benzene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			0.09	E	0.09
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.04		0.25	E P	0.04
ORBIS PRODUCTS CORPORATION	55 VIRGINIA STREET	NEWARK	07114	4504.2	567.2		13.14		A	13.14
PERK CHEMICAL CO., INC.		ELIZABETH	07207	4499.8	568.5			0.03	E	0.03
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.28		7.42	E P	0.28
SHELL OIL COMPANY	1300 ROUTE 27	NORTH BRUNSWICK	08902	4480.7	543.8		0.09		A	0.09
SHELL OIL COMPANY	111 STATE STREET	SEWAREN	07077	4487.8	562.8	1.50			T	1.50
SOLVENTS RECOVERY SERVICE OF N		LINDEN	07036	4496.0	563.2			0.19	E	0.19
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.11			T	0.11
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			0.27	E	0.27
SPENCER KELLOGG PRODUCTS	400 DOREMUS AVE	NEWARK	07105	4507.5	573.9		1.10		A	1.10
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.05			T	0.05
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.03			T	0.03
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			0.49	E	0.49
TOWNSHIP OF SOUTH ORANGE VILLAGE	WALTON AVE. PUMPING STA.	SOUTH ORANGE	07079	4510.0	561.7		0.02		A	0.02
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.03		1.34	E P	0.03
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.01		0.32	E P	0.01
TROY CHEMICAL CORPORATION	ONE AVENUE L	NEWARK	07105	4507.3	570.2		1.31		A	1.31
WESTGATE TWO DEVELOPERS INC (LANDF)	RAHWAY ROAD	EDISON	08818	4494.0	552.7		0.20		A	0.20
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	0.31			P	0.31
										93.08

[1] ND means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit-allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-5: Cadmium and cadmium compounds point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	[illegible] (TPY)	ENGINEERING [illegible][A] (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC.	500 JERSEY AVE.	NEW BRUNSWICK	08903	4480.9	545.1	0.13	0.40		A T	0.13
FRANKLIN PLASTICS	113 PASSAIC AVE.	KEARNY	07032	4511.8	590.7	0.25			T	0.25
GENERAL COLOR CO. INC.	24 AVENUE B	NEWARK	07114	4505.4	570.5	0.50			T	0.50
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8		0.18		A	0.18
METZ METALLURGICAL CORP.	3900 S. CLINTON AVE.	SOUTH PLAINFIELD	07080	4484.5	548.4	0.38	DEL[1]		A T	0.38
OKONITE COMPANY, THE	US ROUTE 1	NORTH BRUNSWICK	08902	4477.9	543.6		0.02		A	0.02
PLASTICS COLOR CHIP INC	2 CAMPUS COURT	SOMERSET	08875	4483.4	542.2	0.25			T	0.25
PREMIUM PLASTICS, INC.	300 RYDERS LANE	EAST BRUNSWICK	08816	4475.5	548.9		0.01		A	0.01
PROLERIZED SCHIABO NEU COMPANY	FOOT OF LINDEN AVENUE	JERSEY CITY	07303	4504.4	577.3		0.50		A	0.50
RARITAN RIVER STEEL COMPANY	MARKET AND ELM STREETS	PERTH AMBOY	08861	4484.3	561.0		0.01		A	0.01
ARGUS DIVISION	633 COURT STREET	BROOKLYN	11231	4502.7	584.4	3.33			T	3.33
										5.56

[1] "DEL" means permits have been deleted.

[A] APEDS 03/15/90 - permit allowable emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-6: Carbon tetrachloride point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC	MEADOW ROAD	EDISON	08817	4482.1	552.2		0.02		A	0.02
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.01		0.45	E P	0.01
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.04	E	0.04
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.02	E	0.02
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.04			P	0.04
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	0.06		ND[1]	E P	0.06
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	0.05			P	0.05
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.03		ND	E P	0.03
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	0.05		ND	E P	0.05
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.02			P	0.02
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.02		0.73	E P	0.02
EXXON BAYWAY REFINERY	1400 PARK AVE.	LINDEN	07036	4497.9	567.4	1.05	0.02		A T	1.05
HERCULES, INC.	SOUTH MINNISINK AVE.	PARLIN	08859	4477.4	556.2	447.74	296.20		A T	447.74
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8		0.44		A	0.44
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.02	E	0.02
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9			10.58	E	10.58
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1			1.69	E	1.69
LINPRO COMPANY POTW, THE				4464.0	533.2			0.10	E	0.10
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9		0.01		A	0.01
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	0.27		13.04	E P	0.27
MIDDLESEX COUNTY POTW 2				4483.0	550.8	1.23		0.01	E P	1.23
OKONITE COMPANY, THE	ROUTE 1	NORTH BRUNSWICK	08902	4477.9	543.6	0.25			T	0.25
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			0.05	E	0.05
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.01		0.14	E P	0.01
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9			4.29	E	4.29
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			0.15	E	0.15
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.02			P	0.02
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.01			P	0.01
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			0.28	E	0.28
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.01		0.77	E P	0.01
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.00		0.19	E P	0.00
NEWTOWN CREEK POTW	329-69 GREENPOINT AVE	BROOKLYN		4509.0	587.3	1.08			P	1.08
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	0.09			P	0.09
										469.73

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-7: Chloroform point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2		2.75		A	2.75
ALLIED-SIGNAL, INC.	10 NORTH AVE. EAST	ELIZABETH	07201	4501.3	570.2	4.00	1.30		A T	4.00
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.02		0.23	E P	0.02
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.02	E	0.02
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.01	E	0.01
CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3		1.15		A	1.15
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.11			P	0.11
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	0.16		ND[1]	E P	0.16
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	0.14			P	0.14
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.08		ND	E P	0.08
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	0.12		ND	E P	0.12
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.05			P	0.05
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.04		0.37	E P	0.04
GORDON TERMINAL SERVICE CO.	FOOT OF HOOK ROAD	BAYONNE	07002	4500.6	576.2		2.53		A	2.53
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.01	E	0.01
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	1.50		5.42	E P	1.50
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	0.06		0.87	E P	0.06
LINPRO COMPANY POTW, THE				4464.0	533.2			0.05	E	0.05
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9		0.02		A	0.02
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4		0.08		A	0.08
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	0.69		6.67	E P	0.69
MIDDLESEX COUNTY POTW 2				4483.0	550.8	0.63		0.00	E P	0.63
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			0.03	E	0.03
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.03		0.07	E P	0.03
P.D. OIL & CHEMICAL STORAGE, INC.	FOOT OF EAST 22ND STREET	BAYONNE	07002	4500.9	575.9		6.57		A	6.57
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.05		2.20	E P	0.05
SCHERING CORP	1011 MORRIS AVE	UNION	07083	4505.1	561.3		0.07		A	0.07
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.27			P	0.27
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			0.08	E	0.08
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.04			P	0.04

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-7: Chloroform point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.03			P	0.03
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			0.14	E	0.14
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.02		0.40	E P	0.02
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.01		0.10	E P	0.01
NEWTOWN CREEK POTW	329-69 GREENPOINT AVE	BROOKLYN		4509.0	587.3	2.72			P	2.72
OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.22			P	0.22
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	0.09			P	0.09
PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	0.39			P	0.39
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	0.24			P	0.24
										25.22

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-8: Dichloromethane point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
A C COMPACTING PRESSES, INC.	1577 LIVINGSTON AVENUE	NORTH BRUNSWICK	08902	4478.2	544.0		0.58		A	0.58
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2		1.08		A	1.08
ALLIED SIGNAL INC.	10 NORTH AVE EAST	ELIZABETH	07201	4501.3	570.2	2.58	4.81		A T	2.58
AMERICAN HOME PRODUCTS CORP.	567 RIDGE ROAD	MONMOUTH JCT.	08852	4468.8	536.1		1.26		A	1.26
BANKS BROTHERS INC.	24 FEDERAL PLAZA	BLOOMFIELD	07003	4517.3	568.7	36.30			T	36.30
BEECHAM LABORATORIES	101 POSSUMTOWN RD	PISCATAWAY	08854	4489.4	543.6	14.49	65.18		A T	14.49
BELL TELEPHONE LABORATORIES	600 MOUNTAIN AVENUE	NEW PROVIDENCE	07974	4503.6	550.7		0.01		A	0.01
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.95		2.05	E P	0.95
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.17	E	0.17
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.07	E	0.07
CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0		0.44		A	0.44
CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3	5.66	117.56		A T	5.66
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	4.18			P	4.18
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	6.31		ND[1]	E P	6.31
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	5.45			P	5.45
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	3.03		ND	E P	3.03
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	4.79		ND	E P	4.79
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	1.99			P	1.99
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	1.56		3.34	E P	1.56
CPS CHEMICAL CORP, INC	OLD WATERWORKS RD	OLD BRIDGE	08857	4475.7	557.2	2.35	2.67		A T	2.35
CROWN METAL FINISHING CO. INC.	40 BORIGHT AVE	KENILWORTH	07033	4503.1	559.0	30.24			T	30.24
DELEET MERCHANDISING CORP	26 BLANCHARD ST	NEWARK	07105	4508.9	572.2	0.47			T	0.47
DRIVER HARRIS ALLOYS INC	308 MIDDLESEX STREET	HARRISON	07029	4509.8	571.3	9.00			T	9.00
E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7	4.59	26.39		A T	4.59
EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.13			T	0.13
ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.7		0.07		A	0.07
ESSEX SPECIALTY PRODUCTS INC. (ESSEX CHEMICAL CORP.)	1 CROSSMAN RD SOUTH	SAYREVILLE	08872	4480.5	557.3		0.80		A	0.80
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	0.35			T	0.35
E.R. SQUIBB & SONS	1 SQUIBB DRIVE	NORTH BRUNSWICK	08902	4480.1	547.0	12.05	8.92		A T	12.05
FMC CORPORATION	PLAINSBORO ROAD	PLAINSBORO TWP.	08536	4465.1	531.9		1.14		A	1.14
FORD MOTOR CO	939 US ROUTE 1	EDISON	08818	4485.2	553.2	8.63			T	8.63

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-8: Dichloromethane point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	21.28			T	21.28
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.25			T	0.25
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.09	E	0.09
JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.4		0.20		A	0.20
JOHNSON & JOHNSON CO INCU.S.	ROUTE 1 & AARON ROAD	NORTH BRUNSWICK	08902	4477.5	542.5		0.24		A	0.24
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	38.96		48.66	E P	38.96
KERN FOAM PRODUCTS CORP	1253 NEWMARK AVE	SOUTH PLAINFIELD	07080	4491.8	548.4	0.13			T	0.13
KIN-BUC, INC.	MEADOW ROAD	EDISON	08817	4481.2	552.5		0.01		A	0.01
L C P CHEMICALS - NEW JERSEY INC.	FOOT OF SOUTH WOOD AVE.	LINDEN	07036	4494.7	567.3		1.14		A	1.14
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	6.17		7.77	E P	6.17
LINPRO COMPANY POTW, THE				4464.0	533.2			0.48	E	0.48
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9		1.09		A	1.09
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4	64.00	880.29		A T	64.00
MIDDLESEX COUNTY POTW 1 (#15669)	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	27.32	0.00	59.96	A E P	27.32
MIDDLESEX COUNTY POTW 2				4483.0	550.8	8.21		0.04	E P	8.21
MOHAWK LABORATORIES OF NJ	STOUTS LANE	MONMOUTH JUNCTION	08852	4469.8	536.5	21.38			T	21.38
MON-ECO INDUSTRIES INC	5 JOANNA CT	EAST BRUNSWICK	08816	4477.0	550.4	0.25	5.98		A T	0.25
NEW YORK BRONZE POWDER CO. INC.	515-519 DOWD AVENUE	ELIZABETH	07201	4502.3	569.3		0.62		A	0.62
NEWARK INDUSTRIAL SPRAYING INC.	12 AMSTERDAM STREET	NEWARK	07105	4501.6	570.4	6.00			T	6.00
NUTRO LABORATORIES INC	650 SOUTH PLAINFIELD	SOUTH PLAINFIELD	07080	4488.6	549.7	17.79			T	17.79
OAKITE PRODUCTS INC	700 MIDDLESEX AVE	METUCHEN	08840	4486.7	555.1	0.50			T	0.50
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			0.25	E	0.25
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	1.15		0.65	E P	1.15
PDI BUSINESS UNIT OF ICI AMERICAS (PIGMENT DISPERSIONS, INC.)	54 KELLOGG COURT	EDISON	08817	4487.5	550.6	17.00			T	17.00
PRIVATE FORMULATIONS, INC.	460 PLAINFIELD AVENUE	EDISON	08840	4485.7	549.5		19.32		A	19.32
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.87		19.74	E P	0.87
RONA PEARL	4 HOOK ROAD	BAYONNE	07002	4500.5	575.2	0.25			T	0.25
SCHERING CORP	1011 MORRIS AVE	UNION	07083	4505.1	561.3	51.14	140.88		A T	51.14
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	1.39			P	1.39
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			0.71	E	0.71
TETLEY INC	601 WEST LINDEN AVE	LINDEN	07036	4495.3	564.7	13.63			T	13.63
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	1.64			P	1.64

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-8: Dichloromethane point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	1.08			P	1.08
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			1.30	E	1.30
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.98		3.56	E P	0.98
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.39		0.87	E P	0.39
UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	0.90	3.07		A T	0.90
UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3		1.82		A	1.82
VALSPAR CORP	3474 RAND AVE	SOUTH PLAINFIELD	07080	4491.1	549.7	3.36			T	3.36
WILSON IMPERIAL CO	115 CHESTNUT STREET	NEWARK	07105	4508.1	570.0	3.60			T	3.60
26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	3.42			P	3.42
CONEY ISLAND POTW	AVE Z/KNAPP ST	BROOKLYN		4490.6	590.4	26.72			P	26.72
OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.37			P	0.37
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	77.92			P	77.92
INDUSTRIAL FINISHING PRODUCTS	465 LOGAN STREET	BROOKLYN	11208	4512.9	587.2	0.01			T	0.01
NEWTOWN CREEK POTW	329-69 GREENPOINT AVE	BROOKLYN		4509.0	587.3	68.88			P	68.88
PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	2.28			P	2.28
RASKO	1704 MCDONALD AVE	BROOKLYN	11230	4497.4	587.4	47.93			T	47.93
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	9.47			P	9.47
										734.58

[1] "ND" means no data from which air emissions could be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-9: Formaldehyde point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
ADM CORPORATION	100 LINCOLN BLVD.	MIDDLESEX	08846	4491.0	543.0		0.02		A	0.02
AIR PRODUCTS AND CHEMICALS INC.	DAYTON-JANESBURG ROAD	DAYTON	08810	4467.9	543.2	4.03	1.63		A T	4.03
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2	0.13	0.00		A T	0.13
CARDOLITE CORP.	500 DOREMUS AVE.	NEWARK	07105	4507.6	573.7	0.25	1.73		A T	0.25
CHEMOS CORPORATION	225-235 EMMET STREET	NEWARK	07114	4507.7	569.6		0.46		A	0.46
COSMAIR INC.	200-222 TERMINAL AVENUE	CLARK	07066	4299.0	599.0		0.01		A	0.01
DU PONT GRASSELLI PLANT	SOUTHWOOD AVE	LINDEN	07036	4496.1	567.3	8.64			T	8.64
E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7		5.67		A	5.67
EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.25			T	0.25
ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.7		0.01		A	0.01
E.R. SQUIBB & SONS	1 SQUIBB DRIVE	NORTH BRUNSWICK	08902	4480.1	547.0	0.13			T	0.13
HAMILTON INDUSTRIES, INC. (KEARNY INDUSTRIES INC.)	2624 HAMILTON BLVD.	SOUTH PLAINFIELD	07080	4489.3	548.9		7.38		A	7.38
HART PRODUCTS CORP.	173 SUSSEX STREET	JERSEY CITY	07302	4507.0	581.0	0.25			T	0.25
HENKEL CORPORATION	FIRST & ESSEX STREETS	HARRISON	07029	4510.6	570.5		0.08		A	0.08
HENKEL INC	1301 JEFFERSON AVENUE	HOBOKEN	07030	4512.7	581.5		0.54		A	0.54
HOECHST CELANESE CHEMICAL GROUP	354 DOREMUS AVENUE	NEWARK	07105	4507.1	573.9	22.93	3.02		A T	22.93
HULS AMERICA, INC.	830 MAGNOLIA AVE	ELIZABETH	07201	4501.8	567.3	2.52	1.18		A T	2.52
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.25			T	0.25
KENRICH PETROCHEMICALS INC	140 EAST 22ND STREET	BAYONNE	07002	4500.6	576.3		0.62		A	0.62
MANVILLE SALES CORP.	45 STULTS ROAD	DAYTON	08810	4467.5	543.8		0.42		A	0.42
METZ METALLURGICAL CORP.	3900 SOUTH CLINTON AVE	SOUTH PLAINFIELD	07080	4484.5	548.4	0.68	1.24		A T	0.68
PMC, INC. (SPECIALTIES GROUP)	INDUSTRIAL AVE.	FORDS	08863	4484.5	557.2	1.61	1.22		A T	1.61
REICHHOLD CHEMICALS INC.	726 ROCKEFELLAR STREET	ELIZABETH	07202	4497.9	567.7	0.50			T	0.50
REVLON INC.	RT. 27 & TALMADGE RD.	EDISON TOWNSHIP	08817	4486.1	551.9		2.12		A	2.12
RHONE-POULENC INC.	297 JERSEY AVENUE	NEW BRUNSWICK	08903	4481.8	545.9		0.02		A	0.02
SYNRAY CORPORATION	209 N. MICHIGAN AVENUE	KENILWORTH	07033	4503.3	560.2		0.16		A	0.16
TROY CHEMICAL CORP.	ONE AVENUE L	NEWARK	07105	4507.3	570.2	1.28			T	1.28
UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	9.67	16.13		A T	9.67
UNITED STATES GOVERNMENT	CAMP KILMER	EDISON	08818	4484.0	547.0		0.01		A	0.01
UNITED VEIL DYEING & FINISHING CO	28-50 BOSTWICK AVENUE	JERSEY CITY	07305	4506.3	577.3		0.10		A	0.10
WORLD CLASS INTERNATIONAL KITCHENS	1930 EAST ELIZABETH AVE.	LINDEN	07036	4499.9	564.9		0.01		A	0.01
AT&T NASSAU METALS	286 RICHMOND VALLEY ROAD	STATEN ISLAND	10309	4480.0	565.0	0.03			S	0.03
										70.76

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-10: n-Hexane[1] point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2		0.22		A	0.22
AMERICAN HOME PRODUCTS CORP.	567 RIDGE ROAD	MONMOUTH JCT.	08852	4468.8	536.1		0.48		A	0.48
ARISTECH CHEMICAL CORP	1711 WEST ELIZABETH AVE	LINDEN	07036	4496.5	562.2		0.01		A	0.01
BORDEN INC	930 LINCOLN BLVD	MIDDLESEX	08846	4491.2	542.3		8.10		A	8.10
B&S PACKAGING & STORAGE CO. INC.	411 WILSON AVENUE	NEWARK	07105	4508.7	572.4		0.48		A	0.48
CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3		0.95		A	0.95
CONTINENTAL GROUP INC	24 KILMER ROAD	EDISON	08817	4486.6	549.1		71.73		A	71.73
COOK'S INDUSTRIAL LUBRICANTS INC	5 NORTH STILES STREET	LINDEN	07036	4299.0	599.0		3.63		A	3.63
CPS CHEMICAL COMPANY	OLD WATERWORKS ROAD	OLD BRIDGE	08857	4475.7	557.2		2.32		A	2.32
E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7		2.14		A	2.14
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4		7.98		A	7.98
EXXON COMPANY USA	250 EAST 22ND STREET	BAYONNE	07002	4516.6	583.8		0.13		A	0.13
EXXON CORP	1900 E LINDEN AVE	LINDEN	07036	4499.5	565.1		5.43		A	5.43
GATX TERMINALS CORP.	78 LAFAYETTE STREET	CARTERET	07008	4492.7	566.7		35.87		A	35.87
HERMAN MILLER, INC	180 HERROD BLVD	DAYTON	08810	4468.0	544.5		0.72		A	0.72
HERTEL CUTTING TECHNOLOGIES, INC	306 SUSSEX STREET	HARRISON	07029	4510.3	571.2		42.50		A	42.50
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8		0.32		A	0.32
INTREX CORPORATION	1000 FIRST STREET	HARRISON	07029	4509.7	570.6		21.11		A	21.11
MARIND INDUSTRIES	991 & 1001 E LINDEN AVE	LINDEN	07036	4498.6	564.1		0.20		A	0.20
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4		25.48		A	25.48
MOBIL CHEMICAL CO (R&D)	RTE. 27 & VINEYARD RD	EDISON	08818	4485.5	551.5		1.02		A	1.02
NATIONAL PATENT DEVELOPMENT CORP	783 JERSEY AVE	NEW BRUNSWICK	08901	4478.3	541.7		0.46		A	0.46
NATIONAL STARCH & CHEMICAL CORP	1735 WEST FRONT STREET	PLAINFIELD	07063	4492.2	545.8		0.44		A	0.44
SCHERING CORP	2000 GALLOPING HILL RD	KENILWORTH	07033	4503.0	560.3		544.36		A	544.36
SCHERING CORP	1011 MORRIS AVE	UNION	07083	4505.1	561.3		0.50		A	0.50
SHELL OIL COMPANY	111 STATE STREET	SEWAREN	07077	4487.8	562.8		0.64		A	0.64
WAL-JER INC	1052 VALLEY ST	UNION TWP	07083	4507.4	559.7		1.89		A	1.89
W.A.S. TERMINALS INC.	126 PASSAIC STREET	NEWARK	07104	4511.9	570.4		0.16		A	0.16
										779.27

[1] n-HEXANE was not on the SARA Section 313 Toxic Chemical List and was not evaluated in ASES.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-11: Perchloroethylene (Tetrachloroethylene) point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AMERICAN CYANAMID SLF-HAZ	4900 TREMLEY POINT	LINDEN	07036	4496.0	465.5			0.01	E	0.01
ASARCO INC. SLF				4485.5	562.5			0.04	E	0.04
ASHLAND CHEMICAL COMPANY	221 FOUNDRY STREET	NEWARK	07114	4508.5	573.1		1.24		A	1.24
BAYONNE TERMINALS INC.	2ND STREET & HOBART AVE.	BAYONNE	07002	4499.7	574.4		0.16		A	0.16
BFI OF SOUTH JERSEY SLF				4465.5	552.5			0.04	E	0.04
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.20	8.36		E P	0.20
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.67	E	0.67
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.30	E	0.30
BOXAL INC.	5 BASSETT COURT	CRANBURY	08512	4471.6	545.8	50.57	1.55		A T	50.57
B&S PACKAGING & STORAGE CO., INC.	411 WILSON AVENUE	NEWARK	07105	4508.7	572.4		0.06		A	0.06
CARTERET BORO SLF		CARTERET	07008	4494.0	566.5			0.01	E	0.01
CITIES SERVICE LANDFILL		SOUTH BRUNSWICK		4469.5	537.0			0.01	E	0.01
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.89			P	0.89
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	1.34		ND[1]	E P	1.34
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	1.16			P	1.16
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.64		ND	E P	0.64
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	1.02		ND	E P	1.02
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.42			P	0.42
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.33		13.64	E P	0.33
COOKSON PIGMENTS INC.	256 VANDERPOOL STREET	NEWARK	07114	4507.3	569.3		0.13		A	0.13
CYCLE CHEM INC.	217 SOUTH FIRST ST.	ELIZABETH	07206	4299.0	599.0		0.54		A	0.54
DU PONT-WASHINGTON RD. SLF	WASHINGTON ROAD	SAYREVILLE	08872	4480.0	557.0			0.01	E	0.01
ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.7		0.40		A	0.40
EDGEBORO DISPOSAL SLF	EDGEBORO ROAD	EAST BRUNSWICK	08816	4480.0	553.0			0.23	E	0.23
EDISON TOWNSHIP SLF		EDISON	08818	4482.0	554.0			0.02	E	0.02
ELIZABETHTOWN WATER COMPANY	CHARLES STREET	MOUNTAINSIDE	07092	4502.6	555.2		0.40		A	0.40
ELIZABETHTOWN WATER COMPANY	NORTH AVENUE	PLAINFIELD	07061	4497.0	549.2		0.10		A	0.10
ELIZABETHTOWN WATER COMPANY	MORRIS AVE. & RT. 22	UNION	07083				0.23		A	0.23
GLOBAL CORP. SLF	ERNSTON ROAD	OLD BRIDGE	08857	4479.0	561.0			0.03	E	0.03
GORDON TERMINAL SERVICE CO.	FOOT OF HOOK ROAD	BAYONNE	07002	4500.6	576.2		0.10		A	0.10
HEUBACH INC.	HEUBACH AVE.	NEWARK	07114	4507.2	569.7	6.15			T	6.15
HONIG CHEMICAL AND PROCESSING CORP	414 WILSON AVENUE	NEWARK	07105	4507.3	572.6		0.62		A	0.62

[1] "ND" means no data from which air emissions may be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-11: Perchloroethylene (tetrachloroethylene) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
I.L.R. SLF		EDISON	08818	4482.0	556.5			0.09	E	0.09
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.39	E	0.39
JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.4		0.01		A	0.01
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9			198.54	E	198.54
KIN-BUC INC. #1		EDISON TOWNSHIP	08817	4482.5	554.5			0.04	E	0.04
KLEINER METAL SPECIALTIES INC.	4315 NEW BRUNSWICK AVE.	SOUTH PLAINFIELD	07080	4299.0	599.0		1.75		A	1.75
KNIGHTS OF COLUMBUS LANDFILL		MONROE TOWNSHIP		4468.0	548.0			0.01	E	0.01
LINDEN CITY SLF		LINDEN	07036	4494.5	564.0			0.02	E	0.02
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1			31.71	E	31.71
LINPRO COMPANY POTW, THE				4464.0	533.2			1.96	E	1.96
LOTANO LANDFILL		EDISON TOWNSHIP	08817	4494.5	553.5			0.01	E	0.01
MARISOL INC.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9			0.25	E	0.25
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	5.81		244.63	E P	5.81
MIDDLESEX COUNTY POTW 2				4483.0	550.8	23.11		0.18	E P	23.11
MOHAWK LABORATORIES OF NJ	STOUTS LANE	MONMOUTH JUNCTION	08852	4469.8	536.5		0.44		A	0.44
NATIONAL LEAD LANDFILL		PERTH AMBOY	08861	4486.0	562.5			0.01	E	0.01
NL INDUSTRIES INC. SLF		SAYREVILLE	08872	4483.0	559.0			0.01	E	0.01
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			1.01	E	1.01
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.24		2.67	E P	0.24
PERK CHEMICAL CO., INC		ELIZABETH	07207	4499.8	568.5			0.03	E	0.03
PLAINSBORO TWP. SLF EXPANSION		PLAINSBORO TOWNSHIP	08536	4463.5	535.0			0.01	E	0.01
P.D. OIL & CHEMICAL STORAGE, INC.	FOOT OF EAST 22ND STREET	BAYONNE	07002	4500.9	575.9		3.69		A	3.69
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	8.10		80.56	E P	8.10
ROSS FRANK B CO INC	6-10 ASH STREET	JERSEY CITY	07304	4506.8	579.3		0.44		A	0.44
SAYREVILLE BORO SLF		SAYREVILLE	08872	4477.0	554.0			0.01	E	0.01
SOLVENTS RECOVERY SERVICE OF M		LINDEN	07036	4496.0	563.2			0.19	E	0.19
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.07			T	0.07
SOUTH AMBOY CITY LANDFILL		SOUTH AMBOY	08879	4483.0	559.5			0.01	E	0.01
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			2.91	E	2.91
SOUTH BRUNSWICK TOWNSHIP	RT 522 & DAYTON-JAMESBURG RD	DAYTON	08810	4469.0	541.8		0.11		A	0.11
SOUTH BRUNSWICK TWP. SLF		SOUTH BRUNSWICK		4469.0	538.5			0.01	E	0.01
SOUTH PLAINFIELD BORO		SOUTH PLAINFIELD	07080	4490.5	550.5			0.02	E	0.02

[1] "ND" means no data from which air emissions may be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-11: Perchloroethylene (Tetrachloroethylene) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS (TPY)	APEDS[1] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE	UATAP EMISSIONS INVENTORY (TPY)
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.35			T	0.35
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.23			T	0.23
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			5.31	E	5.31
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.21		14.53	E P	0.21
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.08		3.53	E P	0.08
UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3		0.81		A	0.81
UNITED LABEL CORP.	65 CHAMBERS STREET	NEWARK	07105	4508.9	572.2	0.10			T	0.10
W.A.S. TERMINALS INC.	126 PASSAIC STREET	NEWARK	07104	4511.9	570.4		0.90		A	0.90
26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	1.23			P	1.23
ACME STEEL PARTITION CO. INC.	513 PORTER AVENUE	BROOKLYN	11222	4508.5	588.3	33.95			T	33.95
CONEY ISLAND POTW	AVE Z/KNAPP ST	BROOKLYN		4490.6	590.4	5.92			P	5.92
FRESH KILLS LANDFILL	METHANE RECOVERY PLANT	STATEN ISLAND	10314	4498.0	570.0	0.07			S	0.07
FRESH KILLS LANDFILL		STATEN ISLAND	10314	4498.0	570.0			0.31	A	0.31[2]
NEWTOWN CREEK POTW	329-69 GREENPOINT AVE	BROOKLYN		4509.0	587.3	7.70			P	7.70
OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.21			P	0.21
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	0.44			P	0.44
PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	3.29			P	3.29
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	2.02			P	2.02
										411.80

[1] "ND" means no data from which air emissions may be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[2] Estimated emissions for portion of landfill not served by methane-recovery plant; estimate based on volume and area information from Gleason (1992) and the ASES emission factor.

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
ABLON FINISHES INC.	84 WAYDELL ST	NEWARK	07105	4509.7	570.5	0.13			T	0.13
ADCO CHEMICAL CO.	49 RUTHERFORD ST	NEWARK	07105	4506.7	572.7	0.50	9.00		A T	0.50
AIR PRODUCTS AND CHEMICALS INC.	172 BAEKELAND AVE	MIDDLESEX	08846	4490.2	542.0		0.01		A	0.01
AIR-O-PLASTIK CORP.	150 FIELDCREST AVE	EDISON	08837	4485.6	556.2	23.00			T	23.00
AKZO CHEMICALS INC.	500 JERSEY AVENUE	NEW BRUNSWICK	08903	4480.9	545.1		26.99		A	26.99
ALCAN ALUMINUM CORP.	901 LEHIGH AVE	UNION	07083	4503.1	563.6		3.11		A	3.11
ALCAN BUILDING PRODUCTS	11 CRAGWOOD RD	WOODBRIDGE	07095	4489.9	560.7	4.55	1.04		A T	4.55
ALLIED PROCESSING CORPORATION	1050 COMMERCE AVE	UNION	07083	4505.8	560.6		0.54		A	0.54
ALPHA ASSOCIATES INC.	2 AMBOY AVE	WOODBRIDGE	07095	4487.7	561.4	4.80			T	4.80
ALPHA METALS INC.	600 ROUTE 440	JERSEY CITY	07304	4506.9	578.8		0.40		A	0.40
AMERADA HESS CORP.	750 CLIFF RD	PORT READING	07064	4490.0	564.0	10.90	24.53		A T	10.90
AMERCHOL CORP.	136 TALMADGE RD	EDISON	08818	4486.7	551.1	66.94	23.12		A T	66.94
AMERICAN BUS REBUILDERS INC.	330 CENTRAL AVENUE	NEWARK	07107				1.28		A	1.28
AMERICAN CYANAMID CO. WARNERS PLT	4900 TREMLEY POINT	LINDEN	07036	4494.2	567.3	2.23	33.11		A T	2.23
AMERICAN FINISHING & SPRAY CO.,INC.	135 NJ RAILROAD AVENUE	NEWARK	07105	4508.5	569.9		3.28		A	3.28
AMERICAN LEATHER MFG. CO.	2195 ELIZABETH AVE	RAHWAY	07065	4495.8	561.9	41.48	0.38		A T	41.48
AMERICAN NATIONAL CAN CO.	135 NATIONAL RD	EDISON	08817	4486.0	552.5	4.36			T	4.36
ARDMORE CHEMICAL COMPANY	29 RIVERSIDE AVENUE	NEWARK	07104	4512.8	571.0		0.11		A	0.11
ARISTON INC.	485 BLOY ST	HILLSIDE	07205	4505.3	566.0	10.03			T	10.03
ASARCO INC. SLF				4485.5	562.5			0.01	E	0.01
ASHLAND CHEMICAL COMPANY	221 FOUNDRY STREET	NEWARK	07114	4508.5	573.1		61.89		A	61.89
ATLANTIC METAL PRODUCTS, INC.	600 NORTH UNION AVE	HILLSIDE	07205	4505.4	564.0		3.46		A	3.46
AURACHEM CORP.	SOUTH 3RD & SOMERSET STS	HARRISON	07029	4510.0	574.6	0.25			T	0.25
A.J. JERSEY INC.	1515 E. LINDEN AVE	LINDEN	07036	4499.5	564.8		0.02		A	0.02
B & B CUSTOM CABINETS	720 LINCOLN BLVD.	MIDDLESEX	07023				0.17		A	0.17
BEECHAM LABORATORIES	101 POSSUMTOWN RD	PISCATAWAY	08854	4489.4	543.6	1.96	8.15		A T	1.96
BENJAMIN MOORE & CO., INC.	134 LISTER AVENUE	NEWARK	07105	4509.8	573.2		0.44		A	0.44
BETHAM CORP., THE	LINCOLN BLVD & RIVER RD	MIDDLESEX	08846	4486.4	540.4	24.52			T	24.52
BFI OF SOUTH JERSEY SLF				4465.5	552.5			0.01	E	0.01
BOW-ART INTERNATIONAL	325 PINE STREET	ELIZABETH	07206	4500.6	568.8		5.14		A	5.14

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
BORDON INC. - CHEMICAL	930 LINCOLN BLVD	MIDDLESEX	08846	4491.2	542.3	2.15	6.30		A T	2.15
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.36		16.66	E P	0.36
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			1.34	E	1.34
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.60	E	0.60
BOXAL INC.	5 BASSETT COURT	CRANBURY	08512	4471.6	545.8		0.58		A	0.58
BPC INDUSTRIES	125 MONITOR STREET	JERSEY CITY					0.01		A	0.01
BROTHER IN LAW ART CORP.	159 TICHENOR STREET	NEWARK	07105	4508.2	569.9		0.19		A	0.19
B&S PACKAGING & STORAGE CO. INC.	411 WILSON AVENUE	NEWARK	07105	4508.7	572.4		0.03		A	0.03
CARDOLITE CORP.	500 DOREMUS AVENUE	NEWARK	07105	4507.6	573.7	0.50	0.58		A T	0.50
CASCHEM INC.	40 AVENUE A	BAYONNE	07002	4499.8	572.6	1.53	13.49		A T	1.53
CELLOMER DIV.	46 ALBERT AVE	NEWARK	07105	4509.5	572.8	3.72	0.08		A T	3.72
CHASE CHEMICAL CORP. L. P.	280 CHESTNUT ST	NEWARK	07105	4501.6	570.4	13.92			T	13.92
CHEMICAL WASTE MANAGEMENT OF NJ	100 LISTER AVENUE	NEWARK	07105	4510.0	573.0		1.89		A	1.89
CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0		1.96		A	1.96
CHICK'S AUTO BODY INC.	66-68 COLUMBIA AVENUE	KEARNY	07032				0.09		A	0.09
CHICOPEE	2351 US ROUTE 130	SOUTH BRUNSWICK		4468.7	542.1		0.01		A	0.01
CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3	2.54	16.82		A T	2.54
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	1.59			P	1.59
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	2.40			P	2.40
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	2.08			P	2.08
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	1.15			P	1.15
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	1.82			P	1.82
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.76			P	0.76
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.60		27.17	E P	0.60
CLASSIC COACH REPAIR INC	1007 SOUTH ELMORA AVE	ELIZABETH	07207				0.28		A	0.28
CLASSIC LAMINATING CORP.	100 TIFFANY BLVD.	NEWARK CITY	07104	4514.5	570.0		4.91		A	4.91
CLEM'S ORNAMENTAL IRON WORKS INC.	110 11TH STREET	PISCATAWAY	08854				0.44		A	0.44
COLORAMA AUTO BODY CENTER	150 SOUTH AVE	GARWOOD	07027	4500.0	556.5		0.78		A	0.78
COLUMBIA LEATHER & COATING CO INC	10 MARKET STREET	KENILWORTH	07033	4502.9	560.8		1.00		A	1.00
COLUMBIA TERMINALS INC.	49 CENTRAL AVENUE	KEARNY	07032	4507.0	575.0		0.09		A	0.09
CONSTRUCTION SPECIALTIES INC.	55 WINANS AVE.	CRANFORD	07016	4500.6	559.0	8.40			T	8.40

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
CONVERTERS INK CO.	1301 S. PARK AVE	LINDEN	07036	4497.9	566.2	0.25	3.70		A T	0.25
CON-LUX COATINGS INC.	226 TALMADGE RD	EDISON	08818	4487.6	552.9	5.88			T	5.88
COSMAIR INC.	121 NEW ENGLAND	PISCATAWAY	08854	4488.5	544.9	0.15	0.16		A T	0.15
CPS CHEMICAL CORP	OLD WATERWORKS RD	OLD BRIDGE	08857	4475.7	557.2	0.73	2.30		A T	0.73
CRINCOLI WOODWORK CO, INC	160 SPRING STREET	ELIZABETH	07201	4501.5	567.0		0.26		A	0.26
CROMPTON & KNOWLES CORP.	52 AMSTERDAM ST	NEWARK	07105	4507.8	572.2	0.02			T	0.02
CROWN METAL FINISHING CO. INC.	40 BORIGHT AVE	KENILWORTH	07033	4503.1	558.9		2.51		A	2.51
C.W.C. INDUSTRIES INC.	185 FOUNDRY STREET	NEWARK	07105	4508.5	573.5		47.10		A	47.10
DE DIETRICH USA INC	US ROUTE 22 WB & RR CROSS	UNION	07083	4504.7	559.8		0.22		A	0.22
DELEET MERCHANDISING CORP.	26 BLANCHARD ST	NEWARK	07105	4508.9	572.2	0.02	26.98		A T	0.02
DOCK RESINS CORP.	1512 WEST ELIZABETH AVE	LINDEN	07036	4496.4	561.2	0.28	7.00		A T	0.28
DREHER LEATHER MFG. CORP.	42 GARDEN STREET	NEWARK	07105	4508.6	570.1		6.50		A	6.50
DRI PRINT FOILS INC.	329 NEW BRUNSWICK AVE	RAHWAY	07065	4494.5	561.3	57.37	155.51		A T	57.37
DROBACH PETER A. CO, INC.	US HIGHWAY 22 & BALL AVE	UNION	07083	4504.4	560.0		0.01		A	0.01
DRUM SERVICE OF NEWARK INC.	51 STANTON STREET	NEWARK	07114	4508.1	568.9		0.65		A	0.65
DURALAC INC.	84 LISTER AVE	NEWARK	07105	4509.7	573.1	0.38			T	0.38
E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7	9.61	86.01		A T	9.61
EAGLE PLYWOOD & DOOR MFG. CO.	450 OAK TREE AVENUE	SOUTH PLAINFIELD	07080	4491.6	550.5		1.80		A	1.80
EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.50	9.21		A T	0.50
EDGEBORO DISPOSAL SLF	EDGEBORO ROAD	EAST BRUNSWICK	08816	4480.0	553.0			0.08	E	0.08
EDISON TOWNSHIP SLF		EDISON	08818	4482.0	554.0			0.01	E	0.01
ELAN CHEMICAL CO.	268 DOREMUS AVE	NEWARK	07105	4508.2	573.9	0.25	2.05		A T	0.25
EM INDUSTRIES, INC.	FOOT OF EAST 21ST STREET	BAYONNE	07002	4501.3	574.9		0.01		A	0.01
ESSEX SPECIALTY PRODUCTS INC.	1 CROSSMAN RD SOUTH	SAYREVILLE	08872	4480.5	557.3	1.98	7.32		A T	1.98
ETHYL CORP.	880 MAIN ST	SAYREVILLE	08872	4480.2	557.6	78.50			T	78.50
EXHIBIT TECHNOLOGY FOR INDUSTRY	10 JOYCE STREET	WEST ORANGE	07052				0.11		A	0.11
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	50.00			T	50.00
EXXON CHEMICAL AMERICAS	WEST 22ND STREET	BAYONNE	07002	4500.2	576.7		0.06		A	0.06
EXXON COMPANY USA	250 EAST 22ND STREET	BAYONNE	07002	4516.6	583.8		0.04		A	0.04
E.R. SQUIBB & SONS	1 SQUIBB DRIVE	NORTH BRUNSWICK	08902	4480.1	547.0	0.68	0.28		A T	0.68
FAIRMOUNT CHEMICAL CO. INC.	117 BLANCHARD ST	NEWARK	07105	4507.7	573.6	0.50	2.24		A T	0.50

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Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
FERRO INDUSTRIES INC.	99 JERSEY AVE	NEW BRUNSWICK	08901	4481.7	545.9	0.38			T	0.38
FIRMENICH INC.	928-964 DOREMUS AVENUE	NEWARK	07105	4505.6	573.6		0.16		A	0.16
FMC CORPORATION	PLAINSBORO ROAD	PLAINSBORO TWP.	08536	4465.1	531.9		0.12		A	0.12
FORD MOTOR CO EDISON ASSEMBLY PLT	939 US ROUTE 1	EDISON	08818	4485.2	553.2	28.38	0.79		A T	28.38
FRAGRANCE RESOURCES INC	275 CLARK ST	KEYPORT	07735	4474.6	567.2	0.86	3.54		A T	0.86
FRANCIS CHEVROLET INC.	777 LYONS AVENUE	IRVINGTON	07111	4507.9	565.5		0.80		A	0.80
FRANKLIN AUTO BODY	994 STUYVESANT AVENUE	IRVINGTON	07111	4507.1	562.9		0.80		A	0.80
GAF CHEMICALS CORP. LINDEN PLT.	FOOT OF SOUTH WOOD AVE	LINDEN	07036	4495.2	567.3	0.53			T	0.53
GATX TERMINALS CORP.	78 LAFAYETTE STREET	CARTERET	07008	4492.7	566.7		2.19		A	2.19
GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	107.10			T	107.10
GETTY PETROLEUM CORP.	ROUTE 36 & AVENUE D	ATLANTIC HIGHLANDS	07716				0.26		A	0.26
GLOBAL CORP. SLF	ERNSTON ROAD	OLD BRIDGE	08857	4479.0	561.0			0.01	E	0.01
GOMAR MANUFACTURING CO. INC.	1501 WEST BLANCKE ST	LINDEN	07036	4496.6	562.1	1.98			T	1.98
GOODY PRODUCTS INC.	969 NEWARK TURNPIKE	KEARNY	07032	4514.2	572.4	9.55			T	9.55
GRANT, WILLIAM & SONS, INC.	130 FIELDCREST AVENUE	EDISON TWP	08817	4485.6	556.0		0.22		A	0.22
GREEN BROOK CABINET SHOP	260 WAGNER STREET	MIDDLESEX	08846				0.02		A	0.02
HANSOME ENERGY SYSTEMS INC	358 DALZIEL ROAD	LINDEN	07036	4497.0	562.0		0.11		A	0.11
HENKEL CORPORATION	FIRST & ESSEX STREETS	HARRISON	07029	4510.6	570.5		12.32		A	12.32
HERCULES INCORPORATED	MINISINK & CHEESEQUAKE RD	SAYREVILLE	08872	4477.5	555.6		24.70		A	24.70
HERMAN MILLER, INC.	180 HERROD BLVD.	DAYTON	08810	4468.0	544.5		1.74		A	1.74
HEUBACH INC.	HEUBACH AVENUE	NEWARK	07114	4507.2	569.7		0.18		A	0.18
HOFFMAN LAROCHE INC.	HEUBACH AVENUE	NEWARK	07114				46.85		A	46.85
HONIG CHEMICAL & PROCESSING CORP.	414 WILSON AVENUE	NEWARK	07105	4507.3	572.6		0.62		A	0.62
HOWARD MARLBORO GROUP	100 CENTRAL AVENUE	SOUTH KEARNY	07032				8.79		A	8.79
HUDSON CO. AREA VOC-TECH SCHOOLS	525 MONTGOMERY STREET	JERSEY CITY	07030	4507.8	578.8		0.03		A	0.03
HULS AMERICA, INC.	830 MAGNOLIA AVENUE	ELIZABETH	07201	4501.8	567.3		0.16		A	0.16
HULS AMERICA INC.	TURNER PLACE	PISCATAWAY	08854	4482.7	554.0		11.76		A	11.76
INDUSTRIAL PETROCHEMICALS CO, INC.	128 DOREMUS AVENUE	NEWARK	07105	4508.8	573.1		0.04		A	0.04
INTERNAT FLAVORS & FRAGRANCES (R&D)	1515 HIGHWAY 36	UNION BEACH	07735	4476.5	571.5	0.25			T	0.25
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.68	60.66		A T	0.68
INTREX CORPORATION	1000 FIRST STREET	HARRISON	07029	4509.7	570.6		16.58		A	16.58

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Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
I.L.R. SLF		EDISON	08818	4482.0	556.5			0.03	E	0.03
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.77	E	0.77
JOANNES-CHESTERCRAFT INC	2208 B. HAMILTON BLVD	SOUTH PLAINFIELD	07080	4489.9	549.3		0.76		A	0.76
JOHNSON & JOHNSON CO INC	US ROUTE 1 & AARON ROAD	NORTH BRUNSWICK	08902	4477.5	542.5		0.27		A	0.27
JOHNSON & JOHNSON CO., INC.	US ROUTE 1	NORTH BRUNSWICK	08902	4479.6	547.0		1.24		A	1.24
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	15.77		395.42	E P	15.77
KINGSLAND DRUM & BARREL CO., INC.	308 MILLER STREET	NEWARK	07014	4507.3	569.8		12.10		A	12.10
KIN-BUC INC. #1		EDISON TOWNSHIP	08817	4482.5	554.5			0.01	E	0.01
KOP-COAT INC.	480 FRELINGHUYSEN AVE	NEWARK	07114	4505.8	568.1	1.07	0.88		A T	1.07
LINDEN CITY SLF		LINDEN	07036	4494.5	564.0			0.01	E	0.01
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	5.37		63.15	E P	5.37
LINPRO COMPANY POTW, THE				4464.0	533.2			3.90	E	3.90
L.M.T. STEEL PRODUCTS, INC.	550 9TH STREET	HOBOKEN	07030	4511.0	581.6		2.26		A	2.26
MAAS & WALDSTEIN CO.	2121 MC CARTER HWY	NEWARK	07104	4514.0	571.6	12.63	1.80		A T	12.63
MACY/BAMBERGER'S FURNITURE DIST.	401 CLEARVIEW ROAD	EDISON	08837	4486.1	557.1		0.11		A	0.11
MARISOL INC.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9			0.74	E	0.74
MARTIN TROOSKIN T/A ECONOMY SUPPLY	1726 E. ELIZABETH AVENUE	LINDEN	07036	4499.6	564.9		2.82		A	2.82
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4	46.50	101.81		A T	46.50
MID ATLANTIC CONTAINER CORP.	1200 W. BLANCKE ST	LINDEN	07036	4496.9	564.4	5.79	18.31		A T	5.79
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	10.41		487.21	E P	10.41
MIDDLESEX COUNTY POTW 2				4483.0	550.8	46.02		0.36	E P	46.02
MIELACH MILLWORK COMP	9 KILMER COURT	EDISON	08818	4486.7	549.1		3.12		A	3.12
MOBIL CHEM CORP CHEM PRODUCTS DIV	ROUTE 27 & VINEYARD RD	EDISON	08818	4486.7	552.3	0.75	124.73		A T	0.75
MONMOUTH COUNTY BD. OF ED.	ATLANTIC AVENUE	MATAWAN	07747	4474.0	566.1		0.09		A	0.09
MON-ECO INDUSTRIES INC	5 JOANNA CT.	EAST BRUNSWICK	08816	4477.0	550.4	0.25			T	0.25
MULBERRY METAL PRODUCTS INC.	2199 STANLEY TERRACE	UNION	07083	4505.1	561.3	33.62	5.50		A T	33.62
NANES FINISHING ASSEMBLY CORP.	305 THIRD AVENUE WEST	NEWARK	07107	4512.5	568.9		0.26		A	0.26
NATIONAL BUSINESS SYSTEMS INC	800 MONTROSE AVE	SOUTH PLAINFIELD	07080				0.57		A	0.57
NATIONAL CAN CORP.	287 SOUTH RANDOLPH ROAD	PISCATAWAY	08854	4489.6	545.4		7.25		A	7.25
NATIONAL DISTILLERS & CHEMICAL CORP	300 DOREMUS AVENUE	NEWARK	07105	4507.5	573.5		0.13		A	0.13
NATIONAL EQUIPMENT & DESIGN CO	967 LEHIGH AVENUE	UNION	07083	4502.7	563.0		0.52		A	0.52
NATIONAL METALLIZING	ABEEL ROAD	CRANBURY	08515	4465.5	544.2		30.32		A	30.32

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
NATIONAL PATENT DEVELOPMENT CORP.	783 JERSEY AVENUE	NEW BRUNSWICK	08901	4478.3	541.7	2.50	0.18		A T	2.50
NEW BRUNSWICK SCIENTIFIC CO. INC.	44 TALMADGE ROAD	EDISON	08818	4486.7	551.5	1.29			T	1.29
NEW YORK BRONZE POWDER CO. INC.	515-519 DOWD AVENUE	ELIZABETH	07201	4502.3	569.3	0.25			T	0.25
NEWARK INDUSTRIAL SPRAYING INC.	12 AMSTERDAM STREET	NEWARK	07105	4501.6	570.4	2.97			T	2.97
NEWPORT CITY DEVELOPMENT CO.	145 12TH STREET	JERSEY CITY	07372	4508.9	581.3		0.01		A	0.01
NOVICK CHEMICALS	181-183 EMMETT STREET	NEWARK	07114	4507.6	569.9		0.04		A	0.04
NYREX II INC.	390 NYE AVENUE	IRVINGTON	07111				0.05		A	0.05
OFF THE ROAD TIRE CORP.	462 FOREST AVENUE	KEARNY	07032	4513.3	572.7		0.74		A	0.74
OKONITE CO PLANT #31600	US ROUTE 1	NORTH BRUNSWICK	08902	4477.8	552.4	7.58			T	7.58
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			2.01	E	2.01
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.44		5.32	E P	0.44
ORBIS PRODUCTS CORPORATION	55 VIRGINIA STREET	NEWARK	07114	4504.2	567.2		7.04		A	7.04
P HORACE & G BIER - RICHARDS MFG	517 LYONS AVENUE	IRVINGTON	07111	4507.9	564.8	2.60			T	2.60
PARAMOUNT METAL FINISHING CO INC	1515 WEST ELIZABETH AVE	LINDEN	07036	4496.4	562.2		1.80		A	1.80
PARKER HANNIFIN CORPORATION	601 NASSAU STREET	NORTH BRUNSWICK	08902	4479.2	544.4		2.47		A	2.47
PAUL C. STECK INC.	12-20 AMSTERDAM STREET	NEWARK	07105	4507.9	572.1		0.66		A	0.66
PENICK CORPORATION	2151 MILLBURN AVENUE	MAPLEWOOD	07040				1.57		A	1.57
PENICK CORP.	158 MT. OLIVET AVENUE	NEWARK	07114	4504.4	567.3	15.14	4.06		A T	15.14
PERK CHEMICAL CO., INC.		ELIZABETH	07207	4499.8	568.5			0.08	E	0.08
PERMACEL	US ROUTE 1	NORTH BRUNSWICK	08902	4479.6	546.7	1143.86	1964.84		A T	1,143.86
PMC, INC. (SPECIALTIES GROUP)	INDUSTRIAL AVENUE	FORDS	08863	4484.5	557.2		0.58		A	0.58
POLAROME MFG. CO. INC.	363 SOUTH STREET	NEWARK	07105	4507.4	573.6	1.00	1.99		A T	1.00
PRO AUTO COLLISION INC.	37 PARK STREET	ORANGE	07050				0.50		A	0.50
PROSPECT INDUSTRIAL CORP	1202 AIRPORT ROAD	NORTH BRUNSWICK	08902	4479.5	543.8		78.64		A	78.64
RADEL LEATHER CO.	849 BROADWAY	NEWARK	07104	4513.5	571.0	519.25			T	519.25
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	13.66		160.43	E P	13.66
RBH DISPERSIONS INC.	L-5 FACTORY LANE	MIDDLESEX	08846	4488.6	542.2	8.88	9.32		A T	8.88
REICHHOLD CHEMICALS INC.	726 ROCKEFELLER STREET	ELIZABETH	07202	4497.9	567.7	0.34	8.80		A T	0.34
REVLON INC.	60 STULTS ROAD	DAYTON	08810				0.24		A	0.24
REVLON INC.	55 TALMADGE ROAD	EDISON	08818	4485.6	552.4	1.06	2.29		A T	1.06

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
RHONE-POULENC INC.	297 JERSEY AVENUE	NEW BRUNSWICK	08903	4481.8	545.9	56.50	1.89		A T	56.50
ROLOC FILM PROCESSING INC.	29 RIVERSIDE AVENUE	NEWARK	07104	4513.2	571.0		7.66		A	7.66
ROYAL WIRE GOODS MFG CORP.	319 ST. PAUL'S AVENUE	JERSEY CITY	07306	4510.2	578.8		1.26		A	1.26
RUSSEL STANLEY EAST INC.	CONVERY BLVD	WOODBRIDGE	07095	4486.7	546.9	35.04	35.00		A T	35.04
SAFETY-KLEEN CORP	1200 SYLVAN STREET	LINDEN	07036	4495.9	563.3		65.91		A	65.91
SCHERING CORP	2000 GALLOPING HILL RD	KENILWORTH	07033	4503.0	560.3		0.15		A	0.15
SCHERING CORP	1011 MORRIS AVENUE	UNION	07083	4505.1	561.3	1.22	8.17		A T	1.22
SERVILLO ASSOCIATES INC.	34 EXCHANGE PLACE	JERSEY CITY	07303	4507.5	581.7		0.25		A	0.25
SERVILLO ASSOCIATES INC.	210 PASSAIC STREET	NEWARK	07104				1.76		A	1.76
SETON CO. RADEL TANNING DIV.	849 BROADWAY	NEWARK	07104	4513.5	571.0	111.88	2.24		A T	111.88
SHELL OIL COMPANY	1300 ROUTE 27	NORTH BRUNSWICK	08902	4480.7	543.8		0.22		A	0.22
SHELL OIL COMPANY	111 STATE STREET	SEWAREN	07077	4487.8	562.8		3.61		A	3.61
SOLVENTS RECOVERY SERVICE		LINDEN	07036	4496.0	563.2			0.56	E	0.56
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVENUE	BRIDGEWATER	08807	4489.0	536.6	0.37			P	0.37
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			5.79	E	5.79
SOUTH PLAINFIELD BORO POTW		SOUTH PLAINFIELD	07080	4490.5	550.5			0.01	E	0.01
SPENCER KELLOGG PRODUCTS	400 DOREMUS AVENUE	NEWARK	07105	4507.5	573.9	0.25	3.70		A T	0.25
STACOR CORP.	285 EMMET STREET	NEWARK	07114	4507.7	569.6	10.35			T	10.35
STEEL CRAFT FLUORESCENT COMPANY	191 MURRAY STREET	NEWARK	07114	4508.3	570.2		0.03		A	0.03
SYNRAY CORPORATION	209 N. MICHIGAN AVENUE	KENILWORTH	07033	4503.3	560.2	2.88	0.53		A T	2.88
TACHONICS CORPORATION	107 MORGAN LANE	PLAINSBORO	08536	4464.4	534.3		3.82		A	3.82
TECHNICAL COATING CO., INC.	500 CHANCELLOR AVENUE	IRVINGTON	07111				14.11		A	14.11
TENAX FINISHING PRODUCTS CO.	390 ADAMS STREET	NEWARK	07114	4507.3	570.6	0.50	1.75		A T	0.50
TEVCO INC.	690 MONTROSE AVENUE	SOUTH PLAINFIELD	07080	4490.4	548.7	1.17			T	1.17
TINGLEY RUBBER CORP.	200 SOUTH AVENUE	SOUTH PLAINFIELD	07080	4488.8	549.9		0.06		A	0.06
TITAN ADHESIVES COMPANY, INC.	590 BELLEVILLE TURNPIKE	KEARNY	07032	4513.3	573.7		0.75		A	0.75
TOWN OF KEARNY POTW	39 CENTRAL AVENUE	KEARNY	07032	4507.2	574.9	0.63			P	0.63
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.41			P	0.41
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			10.57	E	10.57

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS[F] (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
TOWNSHIP OF WOODBRIDGE POTW	1 CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.37		28.94	E P	0.37
TOWNSHIP OF WOODBRIDGE POTW	21 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.15		7.03	E P	0.15
TRANSCO PRODUCTS CORP.	609 W. ELIZABETH AVENUE	LINDEN	07036	4497.0	563.4	5.22			T	5.22
TRANSFER PRINT FOILS INC.	9 COTTERS LANE	EAST BRUNSWICK	08816	4477.2	549.3	75.33	0.13		A T	75.33
TREMLEY POINT INDUSTRIES	4700 TREMLEY POINT ROAD	LINDEN	07036	4494.9	566.7		0.02		A	0.02
TRIPLE K METAL PRODUCTS CO, INC.	209 WOOD AVENUE	MIDDLESEX	08846	4490.2	542.1		0.01		A	0.01
TROY CHEMICAL CORP.	ONE AVENUE L	NEWARK	07105	4507.3	570.2	0.50	0.04		A T	0.50
UDO FINISHING CO.	49 VESEY STREET	NEWARK	07105	4508.1	571.9	5.59			T	5.59
UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	31.27	45.73		A T	31.27
UNION CARBIDE INDUSTRIAL GASES INC	INDUSTRIAL AVENUE	KEASBEY	08832	4485.2	558.2		0.25		A	0.25
UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3		0.80		A	0.80
WAL-JER INC	1052 VALLEY STREET	UNION TWP	07083	4507.4	559.7		0.76		A	0.76
WARNER MFG CORP.	100 3RD AVENUE	KEARNY	07032	4512.2	572.4		0.20		A	0.20
WEBCRAFT CHEMICALS, CRAIG ADHESIVE	80 WHEELER POINT ROAD	NEWARK	07105	4508.9	572.2	17.90			T	17.90
WEBCRAFT TECHNOLOGIES	US ROUTE 1 & ADAMS STATION	NORTH BRUNSWICK	08902	4476.7	542.9	12.41	1.43		A T	12.41
WHITTAKER CORP NO. BRUNSWICK DIV	1430-1470 JERSEY AVE	NORTH BRUNSWICK	08902	4480.2	543.9	0.93	0.01		A T	0.93
WILSON IMPERIAL CO.	115 CHESTNUT STREET	NEWARK	07105	4508.1	570.0	1.63	1.32		A T	1.63
WOOD TEXTURES INC.	300 MCGAW DRIVE	EDISON	08837	4485.6	556.4		1.38		A	1.38
ZAGATA FABRICATORS, INC.	2001 JERNEE MILL ROAD	SAYREVILLE	08872	4476.8	554.8		5.86		A	5.86
AMBERG & HINZMANN WOODWORK GRP INC	165 SIXTH STREET	BROOKLYN	11215	4502.2	585.7	6.84			T	6.84
ARGUS DIV.	633 COURT STREET	BROOKLYN	11231	4502.7	584.4	0.38			T	0.38
CONEY ISLAND POTW	AVE Z/KNAPP STREET	BROOKLYN		4490.6	590.4	0.24			P	0.24
DELTA METAL PRODUCTS CO.	476 FLUSHING AVENUE	BROOKLYN	11205	4505.4	588.1	5.75			T	5.75
FYN PAINT & LACQUER CO. INC.	229 KENT AVENUE	BROOKLYN	11211	4507.5	587.4	0.75			T	0.75
GLOSS FLO CORP.	135 JACKSON STREET	BROOKLYN	11211	4507.4	589.4	8.75			T	8.75
HARCO CHEMICAL COATINGS INC.	208 DUPONT STREET	BROOKLYN	11222	4509.6	588.5	10.00			T	10.00
INDUSTRIAL FINISHING PRODUCTS INC.	465 LOGAN STREET	BROOKLYN	11208	4512.9	587.2	0.30			T	0.30
INDUSTRIAL FINISHING PRODUCTS INC.	214 40TH STREET	BROOKLYN	11232	4512.9	587.2	0.50			T	0.50
INDUSTRIAL FINISHING PRODUCTS INC.	820-840 REMSEN AVENUE	BROOKLYN	11236	4512.9	587.2	0.36			T	0.36
JEFSTEEL BUSINESS EQUIP. CORP.	1345 HALSEY STREET	BROOKLYN	11237	4506.0	592.4	4.23			T	4.23

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-12: Toluene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS (TPY)[F]	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
NATIONAL DRUM & BARREL CORP.	35 BEADEL STREET	BROOKLYN	11222	4508.5	589.3	11.23			T	11.23
NEWTOWN CREEK POTW	329-369 GREENPOINT AVENUE	BROOKLYN		4509.0	587.3	7.81			P	7.81
N.Y. HARDBOARD & PLYWOOD CORP.	129 30TH STREET	BROOKLYN	11232	4500.4	584.4	41.26			T	41.26
N.Y. HARDBOARD & PLYWOOD CORP.	230-234 25TH STREET	BROOKLYN	11215	4502.2	585.7	37.01			T	37.01
OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.22			P	0.22
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	0.13			P	0.13
R & A SPECIALTY CHEMICAL CO.	812 EAST 43RD STREET	BROOKLYN	11210	4497.5	589.1	0.75			T	0.75
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	3.61			P	3.61
TECH PRODUCTS, INC.	105 WILLOW AVENUE	STATEN ISLAND	10305			0.35			S	0.35
ULANO CORP.	601 BERGEN ST	BROOKLYN	11217	4501.8	587.3	0.38			T	0.38
ULANO CORP.	280 BERGEN ST	BROOKLYN	11217	4503.8	586.2	150.13			T	150.13
VAN GUARD CORP.	10 JAVA ST	BROOKLYN	11222	4508.6	589.0	4.10			T	4.10
W.E.W. CONTAINER & INLAND PAPER CO	200 BRADFORD ST	BROOKLYN	11207	4502.3	593.4	4.38			T	4.38
										3,784.47

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-13: 1,1,1-Trichloroethane[1] point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2		8.21		A	8.21
ALLIED SIGNAL INC	10 NORTH AVE EAST	ELIZABETH	07201	4501.3	570.2	0.09			T	0.09
ALPHA METALS INC	600 ROUTE 440	JERSEY CITY	07304	4506.9	578.8	0.25			T	0.25
ASHLAND CHEMICAL INC.	1106 HARRISON AVENUE	KEARNY	07032	4511.1	572.8		0.88		A	0.88
ATLANTIC METAL PRODUCTS, INC.	600 NORTH UNION AVE	HILLSIDE	07205	4505.4	564.0		0.42		A	0.42
ATLANTIC METAL PRODUCTS INC	21 FADEM ROAD	SPRINGFIELD	07081	4503.7	557.9		0.05		A	0.05
AURACHEM CORP	SO. 3RD & SOMERSET ST	HARRISON	07029	4510.0	574.6	0.25			T	0.25
A.K. STAMPING CO INC	1159 ROUTE 22	MOUNTAINSIDE	07092	4503.2	555.4		0.02		A	0.02
BAGCRAFT CORP OF AMERICA	10 MINUE AVE	CARTERET	07008	4504.6	570.2	11.61			T	11.61
BAYONNE TERMINALS INC.	2ND STREET & HOBART AVE.	BAYONNE	07002	4499.7	574.4		0.07		A	0.07
BELL TELEPHONE LABORATORIES	600 MOUNTAIN AVENUE	NEW PROVIDENCE	07974	4503.6	550.7		0.01		A	0.01
BLOCK DRUG CO INC.	1 NEW ENGLAND AVENUE	PISCATAWAY	08854	4487.2	546.8		2.76		A	2.76
BORDEN INC CHEMICAL DIV	930 LINCOLN BLVD	MIDDLESEX	08846	4491.2	542.3	1.70			T	1.70
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.43			P	0.43
BOXAL INC.	5 BASSETT COURT	CRANBURY	08512	4471.6	545.8		0.08		A	0.08
BRINTEC CORP	1010 JERSEY AVE	NEW BRUNSWICK	08902	4480.2	544.9	46.71			T	46.71
CAPTIVE PLASTICS	251 CIRCLE DRIVE NORTH	PISCATAWAY	08854	4489.5	544.2	0.38			T	0.38
CENTRIC CLUTCH CO.	MAIN STREET AT ROUTE 9	WOODBRIDGE	07095	4488.7	559.9		0.54		A	0.54
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	1.89			P	1.89
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	2.85			P	2.85
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	2.46			P	2.46
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	1.37			P	1.37
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	2.16			P	2.16
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.90			P	0.90
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.71			P	0.71
COOK'S INDUSTRIAL LUBRICANTS INC	5 NORTH STILES STREET	LINDEN	07036	4299.0	599.0		18.85		A	18.85
CORONA LIGHTING (DIV OF LIGHTOLIER)	3 KILMER ROAD	EDISON	08817	4485.4	549.7		4.56		A	4.56
CYCLE CHEM INC.	217 SOUTH FIRST ST	ELIZABETH	07206	4299.0	599.0	0.39			A	0.39
DELEET MERCHANDISING CORP	26 BLANCHARD ST	NEWARK	07105	4508.9	572.2	0.05			T	0.05
DOWER FINISHING & RESEARCH CO.	53-61 2ND AVENUE	KEARNY	07032	4512.0	572.3		10.80		A	10.80
DRANETZ TECHNOLOGIES	1000 NEW DURHAM RD	EDISON	08818	4483.9	550.1	9.60			T	9.60
DREW CHEMICAL	1106 HARRISON AVE	KEARNY	07032	4510.8	572.9	0.16			T	0.16

[1] 1,1,1-Trichloroethane was not evaluated in ASES.

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-13: 1,1,1-Trichloroethane point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
DUREX INC	5 STAHUBER AVENUE	UNION	07083	4506.1	560.7	0.13			T	0.13
EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.25			T	0.25
ELASTIC STOP NUT CO		UNION TOWNSHIP	07083			19.85			T	19.85
ELECTRICAL INDUSTRIES CORP	675 CENTRAL AVE	MURRAY HILL	07974	4505.2	550.5	0.25	0.05		A T	0.25
ELIZABETHTOWN WATER COMPANY	MORRIS AVE & RT 22	UNION	07083				0.04		A	0.04
EM INDUSTRIES INC.	FOOT OF EAST 21ST STREET	BAYONNE	07002	4501.3	574.9		0.09		A	0.09
ENGELHARD CORP	700 BLAIR ROAD	CARTERET	07008	4492.6	564.0	0.38			T	0.38
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	5.00			T	5.00
E.F. BRITTEN & CO	22 SOUTH AVE	CRANFORD	07016	4500.0	558.4	3.94			T	3.94
E.R. SQUIBB & SONS	ROUTE 1 & COLLEGE FARM RD.	NORTH BRUNSWICK	08902	4480.1	547.5		0.95		A	0.95
FERGUSON PROPELLER INC	1132 CLINTON ST	HOBOKEN	07030	4510.5	581.7	0.13			T	0.13
GARY SCREW MACHINE CORP	1010 JERSEY AVENUE	NEW BRUNSWICK	08903	4479.9	544.1	46.71	3.21		A T	46.71
GORDON TERMINAL SERVICE CO.	FOOT OF HOOK ROAD	BAYONNE	07002	4500.6	576.2		14.45		A	14.45
HARVARD INDUSTRIES	2330 VAUXHALL ROAD	UNION	07083	4505.3	561.5	19.85			T	19.85
HATCO CORP	KING GEORGE POST ROAD	FORDS	08863	4485.6	557.8	1.10	7.39		A T	1.10
HUDSON TOOL & DIE CO	18 MALVERN STREET	NEWARK	07015	4508.9	572.2	0.01			T	0.01
HUFFMAN KOOS	1800 LOWER ROAD	LINDEN	07036	4495.8	564.7		2.52		A	2.52
H.B. FULLER CO	59 BRUNSWICK AVE	EDISON	08818	4487.3	549.2	1.73			T	1.73
INTERNATIONAL BUSINESS MACHINES	CULVER ROAD	SOUTH BRUNSWICK		4469.3	540.8		0.12		A	0.12
IRONBOUND METAL PRODUCTS INC.	212 WRIGHT STREET	NEWARK	07114	4507.0	567.7		0.02		A	0.02
JAFCO INDUSTRIES INC.	131 LINCOLN BLVD	MIDDLESEX	08846	4491.7	542.9		3.67		A	3.67
JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.4		0.09		A	0.09
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	0.06			P	0.06
L&R MANUFACTURING CO.	FOOT OF JOHN HAY AVENUE	KEARNY	07032	4512.7	572.4		0.49		A	0.49
MACY/BAMBERGER'S FURNITURE DIST.	401 CLEARVIEW ROAD	EDISON	08837	4486.1	557.1		1.87		A	1.87
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9		0.23		A	0.23
METEX CORP.	970 NEW DURHAM RD	EDISON	08818	4487.5	553.3	6.85			T	6.85
MICRO STAMPING CORP	71 NEWARK WAY	MAPLEWOOD	07040	4507.2	559.0	1.70			T	1.70
MICROWAVE SEMICONDUCTOR CORP	100 SCHOOL HOUSE RD	SOMERSET	08873	4485.7	538.5	4.95			T	4.95
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	12.35			P	12.35
MIDDLESEX COUNTY POTW 2				4483.0	550.8	61.13			P	61.13
MIDEAST ALUMINUM INDUSTRIES INC.	ROUTE 130	SOUTH BRUNSWICK	08810	4469.4	542.4		1.60		A	1.60

[1] 1,1,1-Trichloroethane was not evaluated in ASES.

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-13: 1,1,1-Trichloroethane point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
MOHAWK LABORATORIES OF NJ	STOUTS LANE	MONMOUTH JUNCTION	08852	4469.8	536.5	2.30			T	2.30
MON-ECO INDUSTRIES INC.	5 JOANNA CT.	EAST BRUNSWICK	08816	4477.0	550.4	0.25			T	0.25
NANES FINISHING ASSEMBLY CORP.	305 THIRD AVE WEST	NEWARK	07107	4512.5	568.9		0.75		A	0.75
NATIONAL MANUFACTURING CO	12 RIVER ROAD	CHATHAM	07928	4508.5	552.2	1.05			T	1.05
NATIONAL STARCH & CHEMICAL	225 BELLEVILLE AVENUE	BLOOMFIELD	07003	4516.5	568.3		3.23		A	3.23
NATIONAL STARCH & CHEMICAL CORP	1735 WEST FRONT STREET	PLAINFIELD	07063	4492.2	545.8	0.19			T	0.19
NORTH AMERICAN PHILLIPS LIGHTING	1764 NEW DURHAM ROAD	SOUTH PLAINFIELD	07080	4492.0	551.0		0.48		A	0.48
OAKITE PRODUCTS INC	700 MIDDLESEX AVE	METUCHEN	08840	4486.7	555.1	0.25			T	0.25
OHAUS CORP	29 HANOVER RD	FLORHAM PARK	07932	4515.3	552.1	3.45			T	3.45
OKONITE CO PLANT #3	1600 US ROUTE 1	NORTH BRUNSWICK	08902	4477.8	552.4	16.53			T	16.53
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.52			P	0.52
PARAMOUNT PLATING CO INC	1501 WEST ELIZABETH AVE	LINDEN	07036	4497.8	563.2		0.05		A	0.05
PARKER HANNIFIN CORPORATION	601 NASSAU STREET	NORTH BRUNSWICK	08902	4479.2	544.4		0.52		A	0.52
PRIVATE FORMULATIONS INC.	460 PLAINFIELD AVENUE	EDISON	08840	4485.7	549.5		4.16		A	4.16
P.D. OIL & CHEMICAL STORAGE, INC.	FOOT OF EAST 22ND STREET	BAYONNE	07002	4500.9	575.9		67.14		A	67.14
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.93			P	0.93
RBH DISPERSIONS INC.	L-5 FACTORY LN	MIDDLESEX	08846	4488.6	542.2	0.25			T	0.25
RED DEVIL INC	2400 VAUXHALL RD	UNION	07083	4506.2	560.9	15.05			T	15.05
REVLON INC.	60 STULTS ROAD	DAYTON	08810				0.02		A	0.02
REVLON INC.	196 COIT ST	IRVINGTON	07111	4299.0	599.0	15.25			T	15.25
RONA PEARL	4 HOOK ROAD	BAYONNE	07002	4500.5	575.2	0.25			T	0.25
SCHERING CORP	2000 GALLOPING HILL RD	KENILWORTH	07033	4503.0	560.3	10.74			T	10.74
SIMPLEX CEILING CORP	50 HARRISON ST	HOBOKEN	07030	4507.1	583.9	7.00			T	7.00
SLI AVIONIC SYSTEMS CORP	7-11 VREELAND ROAD	FLORHAM PARK	07932	4515.4	553.1	2.53			T	2.53
SOLAR COMPOUNDS CORP.	1201 W. BLANCKE ST	LINDEN	07036	4496.8	562.3	7.50			T	7.50
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.17			P	0.17
SOUTH BRUNSWICK TOWNSHIP	RT.522 & DAYTON-JAMESBURG RD	DAYTON	08810	4469.0	541.8		2.29		A	2.29
SPRINGFIELD METAL PRODUCTS CO	8 COMMERCE STREET	SPRINGFIELD	07081				3.00		A	3.00
STEEL CRAFT FLUORESCENT CO.	191 MURRAY STREET	NEWARK	07114	4508.3	570.2		1.15		A	1.15
TECHNICAL WIRE PRODUCTS	129 DERMODY ST	CRANFORD	07016	4500.1	560.9	21.50			T	21.50
TECKNIT INC	135 BRYANT AVE	CRANFORD	07016	4500.3	560.6		2.10		A	2.10

[1] 1,1,1-Trichloroethane was not evaluated in ASES.

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-13: 1,1,1-Trichloroethane point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
THERMONATIONAL IND (LR METAL TREATING DIV.)	3651 SO CLINTON AVE	SOUTH PLAINFIELD	07080	4490.2	548.3	15.01			T	15.01
TOPCO INC	107 TRUMBULL STREET	ELIZABETH	07206	4499.9	569.1	6.50			T	6.50
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.74			P	0.74
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.49			P	0.49
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.44			P	0.44
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.17			P	0.17
TRYCO TOOL & MFG	363 SOUTH JEFFERSON ST	ORANGE	07050	4513.7	563.7	4.75			T	4.75
T&E INDUSTRIES INC.	215 WATCHUNG AVENUE	ORANGE	07050	4514.6	564.8		0.15		A	0.15
UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3		0.44		A	0.44
U.S. FUJI ELECTRIC	240 CIRCLE DRIVE NORTH	PISCATAWAY	08854	4487.9	543.3	4.62			T	4.62
VAN WATERS & ROGERS INC.	160 ESSEX AVENUE EAST	WOODBRIDGE	07095	4491.7	562.4		0.20		A	0.20
WEBCRAFT CHEMICALS, CRAIG ADHESIVE	80 WHEELER POINT ROAD	NEWARK	07105	4508.9	572.2	4.98			T	4.98
26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	0.42			P	0.42
EDISON PRICE INC	409 EAST 60TH ST	MANHATTAN	10022	4512.2	587.7	10.53			T	10.53
FELDWARE INC	250 AVE W	BROOKLYN	11223	4494.1	586.9	0.13			T	0.13
INDUSTRIAL FINISHING PRODUCTS	465 LOGAN STREET	BROOKLYN	11208	4512.9	587.2	0.10			T	0.10
INDUSTRIAL FINISHING PRODUCTS	320-340 REMSEN AVE	BROOKLYN	11236	4512.9	587.2	0.05			T	0.05
INDUSTRIAL FINISHING PRODUCTS	214 40TH ST	BROOKLYN	11232	4512.9	587.2	0.01			T	0.01
NEWTOWN CREEK POTW	329-369 GREENPOINT AVE	BROOKLYN		4509.0	587.3	7.26			P	7.26
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	35.29			P	35.29
PERFECT FINISHING CO	200 VARICK ST	MANHATTAN	10014	4482.9	542.4	4.75			T	4.75
PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	1.03			P	1.03
RASKO	1704 MCDONALD AVE	BROOKLYN	11230	4497.4	587.4	16.22			T	16.22
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	4.28			P	4.28
UNITED RESIN PRODUCTS INC	100 SUTTON STREET	BROOKLYN	11222	4508.5	588.3	0.13			T	0.13
										653.00

[1] 1,1,1-Trichloroethane was not evaluated in ASES.

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-14: Trichloroethylene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY WIDE EMISSIONS (TPY)[F]	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
ALLIED-SIGNAL INC	10 NORTH AVE EAST	ELIZABETH	07201	4501.3	570.2		0.62		A	0.62
AT&T TECHNOLOGIES INC.	100 CENTRAL AVE.	KEARNY	07032	4508.8	575.0		0.14		A	0.14
BAYONNE TERMINALS INC.	2ND STREET & HOBART AVE.	BAYONNE	07002	4499.7	574.4		0.22		A	0.22
BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.11		1.97	E P	0.11
BOROUGH OF SAYREVILLE POTW 1				4479.3	563.2			0.16	E	0.16
BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0			0.07	E	0.07
CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.51			P	0.51
CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	0.76		ND[1]	E P	0.76
CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	0.66			P	0.66
CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.37		ND	E P	0.37
CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	0.58		ND	E P	0.58
CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.24			P	0.24
CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.19		3.22	E P	0.19
CYCLE CHEM INC.	217 SOUTH FIRST ST.	ELIZABETH	07206	4299.0	599.0		0.93		A	0.93
ELIZABETHTOWN WATER COMPANY	CHARLES STREET	MOUNTAINSIDE	07092	4502.6	555.2		0.40		A	0.40
ELIZABETHTOWN WATER COMPANY	NORTH AVENUE	PLAINFIELD	07061	4497.0	549.2		0.06		A	0.06
ELIZABETHTOWN WATER COMPANY	MORRIS AVE & RT 22	UNION	07083				0.22		A	0.22
ENGELHARD CORP	700 BLAIR ROAD	CARTERET	07008	4492.6	564.0		0.02		A	0.02
E.R. SQUIBB & SONS	ROUTE 1 & COLLEGE FARM RD.	NORTH BRUNSWICK	08902	4480.1	547.5		56.94		A	56.94
GENERAL PLASTICS - DIV OF PMC INC.	55 LAFRANCE AVE.	BLOOMFIELD	07003	4514.4	568.3		0.86		A	0.86
GIBSON ASSOCIATES, INC	90 MYRTLE STREET	CRANFORD	07016	4499.8	560.3	0.00			T	0.00
GORDON TERMINAL SERVICE CO.	FOOT OF HOOK ROAD	BAYONNE	07002	4500.6	576.2		9.67		A	9.67
HUDSON TOOL & DIE CO	18 MALVERN STREET	NEWARK	07015	4508.9	572.2	52.88	0.47		A T	52.88
JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0			0.09	E	0.09
JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.4		0.46		A	0.46
JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	10.67		46.79	E P	10.67
KIN-BUC, INC	MEADOW ROAD	EDISON	08817	4481.2	552.5		0.00		A	0.00
LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1			7.47	E	7.47
LINPRO COMPANY POTW, THE				4464.0	533.2			0.46	E	0.46
MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9	0.36	0.13		A T	0.13
MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	3.30		57.65	E P	3.30
MIDDLESEX COUNTY POTW 2				4483.0	550.8	5.45		0.04	E P	5.45

[1] "ND" means no data from which air emissions may be estimated.

[A] APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-14: Trichloroethylene point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
MULBERRY METAL PRODUCTS INC.	2199 STANLEY TERR	UNION	07083	4505.1	561.3	19.23			T	19.23
NATIONAL MANUFACTURING CO	12 RIVER ROAD	CHATHAM	07928	4508.5	552.2	18.05			T	18.05
OLD BRIDGE MUA BROWNTOWN POTW				4472.1	558.8			0.24	E	0.24
OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.14		0.63	E P	0.14
PEERLESS TUBE CO.	58 LOCUST AVE.	BLOOMFIELD	07003	4515.1	567.1		6.65		A	6.65
PERK CHEMICAL CO., INC.		ELIZABETH	07207	4499.8	568.5			0.01	E	0.01
POLYMER EXTRUDED PRODUCTS	297 FERRY STREET	NEWARK	07105	4508.5	571.8	0.13			T	0.13
P.D. OIL & CHEMICAL STORAGE, INC.	FOOT OF EAST 22ND STREET	BAYONNE	07002	4500.9	575.9		7.97		A	7.97
RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	2.54		18.98	E P	2.54
SOLVENTS RECOVERY SERVICE OF N		LINDEN	07036	4496.0	563.2			0.10	E	0.10
SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.15			P	0.15
SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0			0.69	E	0.69
STOLT TERMINALS INC	920 STATE STREET	PERTH AMBOY	08862	4484.8	561.3		0.16		A	0.16
TELEDYNE ADAMS	1110 SPRINGFIELD RD	UNION	07083	4504.5	559.0	16.90	1.30		A T	16.90
TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.20			P	0.20
TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.13			P	0.13
TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6			1.25	E	1.25
TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.12		3.43	E P	0.12
TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.05		0.83	E P	0.05
U.S. FUJI ELECTRIC	240 CIRCLE DRIVE NORTH	PISCATAWAY	08854	4487.9	543.3	12.03	3.43		A T	12.03
WCI HOME COMFORT DIV	2170 HWY 27	EDISON	08818	4486.5	552.2	54.62	0.40		A T	54.62
WEBCRAFT CHEMICALS, CRAIG ADHESIVE	80 WHEELER POINT ROAD	NEWARK	07105	4508.9	572.2	5.04				5.04
WEBCRAFT TECHNOLOGIES	225 FORREST AVE	METUCHEN	08840	4486.8	552.4	5.09				5.09
WEBCRAFT TECHNOLOGIES	U.S. RTE. #1 ADAMS STATION	NORTH BRUNSWICK	08902	4476.7	542.9	7.02				7.02
26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	0.72			P	0.72
CONEY ISLAND POTW	AVE Z/KNAPP ST	BROOKLYN		4490.6	590.4	1.05			P	1.05
NEWTOWN CREEK POTW	329-69 GREENPOINT AVE	BROOKLYN		4509.0	587.3	7.55			P	7.55
OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	0.13			P	0.13
PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	0.13			P	0.13
RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	1.14			P	1.14
										323.86

1 "ND" means no data from which air emissions may be estimated.

A APEDS 12/28/89 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

F FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

S SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
ABLON FINISHES INC.	84 WAYDELL ST	NEWARK	07105	4509.7	570.5	0.13			T	0.13
ACCURATE BUSHING CO INC	800 JEFFERSON AVE	UNION	07083	4504.2	559.0		0.12		A	0.12
ADCO CHEMICAL CO.	49 RUTHERFORD ST	NEWARK	07105	4506.7	572.7	1.53	0.21		A T	1.53
ADVANCE FOILS INC	800 BOND ST	ELIZABETH	07201	4501.0	568.3		2.08		A	2.08
AIR PRODUCTS AND CHEMICALS INC.	172 BAEKELAND AVE	MIDDLESEX	08846	4490.2	542.0		0.15		A	0.15
AIR-O-PLASTIK CORP.	150 FIELDCREST AVE	EDISON	08837	4485.6	556.2	5.63			T	5.63
AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2		6.97		A	6.97
ALCAN ALUMINUM CORP	901 LEHIGH AVE	UNION	07083	4503.1	563.6		1.30		A	1.30
ALCAN BUILDING PRODUCTS	11 CRAGWOOD RD	WOODBRIDGE	07095	4489.9	560.7	10.26	2.33		A T	10.26
ALLIED PROCESSING CORPORATION	1050 COMMERCE AVE	UNION	07083	4505.8	560.6		0.12		A	0.12
ALPHA ASSOCIATES INC.	2 AMBOY AVE	WOODBRIDGE	07075	4487.7	561.4	46.50	1999.40		A T	46.50
ALSTEN	34 EXCHANGE PLACE	JERSEY CITY	07302				0.24		A	0.24
AMERADA HESS CORP.	750 CLIFF RD	PORT READING	07064	4490.0	564.0	13.85			T	13.85
AMERICAN ABRASIVE METALS CO.	460 COIT ST	IRVINGTON	07111	4506.5	562.8	6.70			T	6.70
AMERICAN CYANAMID CO	4900 TREMLEY POINT	LINDEN	07036	4494.2	567.3		16.26		A	16.26
AMERICAN FINISHING & SPRAY CO INC	135 NJ RAILROAD AVE	NEWARK	07105	4508.5	569.9		3.62		A	3.62
AMERICAN LEATHER MFG. CO.	2195 ELIZABETH AVE	RAHWAY	07065	4495.8	561.9	10.83			T	10.83
AMERICAN NATIONAL CAN CO.	135 NATIONAL RD	EDISON	08817	4485.9	552.5		0.02		A	0.02
AMERICAN NATIONAL CAN CO.	108 PIERSON AVE	EDISON	08818	4486.1	555.3	9.87	190.75		A T	9.87
AMERICAN NATIONAL CAN CO.	GEORGES RD	MONMOUTH JUNCTION	08852	4473.1	541.3		3.68		A	3.68
ANTI HYDRO CO.	265-277 BADGER AVE	NEWARK	07108	4505.4	567.7	0.50	0.12		A T	0.50
ARNOLD DESKS INC	1409 CHESTNUT AVE	HILLSIDE	07205	4506.4	564.7		1.78		A	1.78
ASHLAND CHEMICAL CO	221 FOUNDRY ST	NEWARK	07114	4508.5	573.1		1.71		A	1.71
AT&T COMMUNICATIONS	21 COLONIAL DR	PISCATAWAY	08854	4488.6	545.1		0.08		A	0.08
A.J. JERSEY INC.	1515 E. LINDEN AVE	LINDEN	07036	4499.5	564.8		0.02		A	0.02
B & B CUSTOM CABINETS	720 LINCOLN BLVD	MIDDLESEX	07023				0.03		A	0.03
BENJAMIN MOORE & CO. - NEWARK	134 LISTER AVE	NEWARK	07105	4509.8	573.2	0.08	0.44		A T	0.08
BESSEMER PROCESSING CO, INC	133 HAYNES AVE	NEWARK	07114	4505.3	568.4		64.00		A	64.00
BETHAM CORP., THE	LINCOLN BLVD & RIVER RD	MIDDLESEX	08846	4486.4	540.4	0.62			T	0.62
BORDEN INC	930 LINCOLN BLVD	MIDDLESEX	08846	4491.2	542.3		1.20		A	1.20
BOXAL INC.	5 BASSETT COURT	CRANBURY	08512	4471.6	545.8	0.66			T	0.66

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
BUSCH INC	39 DAVIS ST	SOUTH PLAINFIELD	07080				0.05		A	0.05
CARDOLITE CORP.	500 DOREMUS AVE	NEWARK	07105	4507.6	573.7	0.50	0.15		A T	0.50
CASCHEM INC.	40 AVENUE A	BAYONNE	07002	4499.8	572.6	5.42	5.80		A T	5.42
CDI DISPERSION CORP.	27 HAYES AVE.	NEWARK	07114	4507.7	569.7	0.38	9.00		A T	0.38
CELLOMER DIV.	46 ALBERT AVE	NEWARK	07105	4509.5	572.8	2.20	28.88		T	2.20
CHEMICAL WASTE MGMNT OF NJ INC	100 LISTER AVE	NEWARK	07105	4510.0	573.0		0.01		A	0.01
CHEM-FLEUR INC	200 PULASKI ST	NEWARK	07105	4507.8	570.8		0.16		A	0.16
CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0		1.60		A	1.60
CHICOPEE	2351 US ROUTE 130	SOUTH BRUNSWICK		4468.7	542.1		0.06		A	0.06
CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3		0.26		A	0.26
COLUMBIA TERMINALS INC	49 CENTRAL AVE	SOUTH KEARNY	07032	4507.0	575.0		3.10		A	3.10
CONSTRUCTION SPECIALTIES INC.	55 WINANS AVE	CRANFORD	07016	4500.6	559.0	5.93			T	5.93
CON-LUX COATINGS INC.	226 TALMADGE RD	EDISON	08818	4487.6	552.9	4.43			T	4.43
CROMPTON & KNOWLES CORP.	52 AMSTERDAM ST	NEWARK	07105	4507.8	572.2	0.03	0.08		A T	0.03
CROSSFIELD PRODUCTS CORP	140 VALLEY ROAD	ROSELLE PARK	07204	4501.1	560.6		0.40		A	0.40
CROWN METAL FINISHING CO. INC.	40 BORIGHT AVE	KENILWORTH	07033	4503.1	559.0	17.21	2.18		A T	17.21
CRYOFAB INC	540 N MICHIGAN AVE	KENILWORTH	07033	4503.8	559.8		0.01		A	0.01
DANIEL PRODUCTS CO.	400 CLAREMONT AVE	JERSEY CITY	07304	4507.5	578.1	0.75			T	0.75
DE DIETRICH USA INC	US RT 22 WB & RR CROSS	UNION	07083	4504.7	559.8		0.23		A	0.23
DEGEN CO.	200 KELLOG ST	JERSEY CITY	07305	4506.9	575.5	0.25			T	0.25
DELEET MERCHANDISING CORP.	26 BLANCHARD ST	NEWARK	07105	4508.9	572.2	0.01	6.96		A T	0.01
DOCK RESINS CORP.	1512 WEST ELIZABETH AVE	LINDEN	07036	4496.4	561.2	0.03	8.39		A T	0.03
DOWER FINISHING & RESEARCH CO.	53-61 2ND AVENUE	KEARNY	07032	4512.0	572.3		9.00		A	9.00
DRI PRINT FOILS INC.	329 NEW BRUNSWICK AVE	RAHWAY	07065	4494.5	561.3	15.65	70.67		A T	15.65
DRUM SERVICE OF NEWARK INC	51 STANTON ST	NEWARK		4508.1	568.9		0.65		A	0.65
DURALAC INC.	84 LISTER AVE	NEWARK	07105	4509.7	573.1	0.38			T	0.38
DUREX INC	5 STAHUBER AVENUE	UNION	07083	4506.1	560.7		5.54		A	5.54
E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7	5.03	73.14		A T	5.03

[A] APEDS 02/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.25	3.94		A T	0.25
ELAN CHEMICAL CO.	268 DOREMUS AVE	NEWARK	07105	4508.2	573.9	0.25	1.65		A T	0.25
ENGLERT INC	1200 AMBOY AVE	PERTH AMBOY	08862	4485.9	561.4		3.18		A	3.18
EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	38.05			T	38.05
EXXON COMPANY USA	250 EAST 22ND STREET	BAYONNE	07002	4516.6	583.8		5.39		A	5.39
EXXON CORP	1100 US ROUTE 1	LINDEN	07036	4498.5	564.9		0.26		A	0.26
FERRO MERCHANDISING EQUIPMENT CORP	690 WAINWRIGHT ST	UNION	07083	4502.1	565.4		0.14		A	0.14
FIRMENICH INC	928-964 DOREMUS AVE	NEWARK	07105	4505.6	573.6		0.23		A	0.23
FORD MOTOR CO EDISON ASSEMBLY PLT	939 U.S. RTE. #1	EDISON	08818	4485.2	553.2	125.75	1140.68		A T	125.75
GATX TERMINALS CORP.	78 LAFAYETTE STREET	CARTERET	07008	4492.7	566.7		0.15		A	0.15
GENERAL DYNAMICS CORP	150 AVENEL ST.	WOODBRIDGE	07095	4492.0	561.2	2.25			T	2.25
GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	165.43	DEL(0.28)		A T	165.43
GREEN BROOK CABINET SHOP	260 WAGNER ST	MIDDLESEX	08846				0.06		A	0.06
H REISMAN	377 CRANE ST	ORANGE	07050	4513.2	565.3		10.07		A	10.07
HANDY STORE FIXTURES INC	337 SHERMAN AVE	NEWARK	07114	4508.2	570.0		1.85		A	1.85
HANSOME ENERGY SYSTEMS INC	358 DALZIEL ROAD	LINDEN	07036	4497.0	562.0		0.98		A	0.98
HATCO CORP	KING GEORGE POST ROAD	FORDS	08863	4485.6	557.8		0.04		A	0.04
HEUBACH INC	HEUBACH AVE	NEWARK	07114	4507.2	569.7		0.25		A	0.25
HOWELL ELECTRIC MOTORS	900 NORTH AVE	PLAINFIELD	07061				6.97		A	6.97
HUDSON COUNTY AREA VO-TECH SCHOOLS	525 MONTGOMERY ST	JERSEY CITY	07030	4507.8	578.8		0.05		A	0.05
HULS AMERICA, INC.	830 MAGNOLIA AVE	ELIZABETH	07201	4501.8	567.3		1.87		A	1.87
INDUSTRIAL PETROCHEMICALS CO INC	128 DOREMUS AVE	NEWARK	07105	4508.8	573.1		0.04		A	0.04
INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.25	1.54		A T	0.25
INTERNATIONAL PAINT (USA) INC.	2270 MORRIS AVE	UNION	07083	4505.1	560.5	1.13	0.14		A T	1.13
J B ROSS	409 JOYCE KILMER AVE	NEW BRUNSWICK	08903	4479.4	547.6		0.60		A	0.60
JOHN C. DOLPH CO.	NEW RD	MONMOUTH JUNCTION	08852	4469.6	538.3	3.52	26.38		A T	3.52
JOHNSON & JOHNSON CO INC	U.S. HIGHWAY 1 & AARON ROAD	NORTH BRUNSWICK	08902	4477.5	542.5	104.17	58.08		A T	104.17
KARNAK CHEMICAL CORP	330 CENTRAL AVE	CLARK TWP	07066	4498.2	557.9	0.03			T	0.03

[A] APEDS 02/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
KOP-COAT INC.	480 FRELINGHUYSEN AVE	NEWARK	07114	4505.8	568.1	14.30	1.31		A T	14.30
KOP-COAT INC. (GARWOOD PLANT)	449 SOUTH AVE	WESTFIELD	07090	4499.8	556.3	7.10	3.07		A T	7.10
LAMINAIRE CORP	960 EAST HAZELWOOD AVE	RAHWAY	07065	4494.0	561.2		1.15		A	1.15
LMT STEEL PRODUCTS INC	550 9TH ST	HOBOKEN	07030	4511.0	581.6		0.82		A	0.82
MAAS & WALDSTEIN CO.	2121 MC CARTER HWY	NEWARK	07104	4514.0	571.6	1.91			T	1.91
MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4		5.50		A	5.50
METEX CORP	970 NEW DURHAM RD	EDISON	08818	4487.5	553.3		0.57		A	0.57
MID ATLANTIC CONTAINER CORP.	1200 W. BLANCKE ST	LINDEN	07036	4496.9	564.4	7.78			T	7.78
MOBIL CHEM CORP CHEM PRODUCTS DIV	RTE. 27 & VINEYARD RD	EDISON	08818	4486.7	552.3	4.71	293.59		A T	4.71
NANES FINISHING ASSEMBLY CORP.	305 THIRD AVE WEST	NEWARK	07107	4512.5	568.9		2.43		A	2.43
NATIONAL CAN CORP	287 SOUTH RANDOLPH ROAD	PISCATAWAY	08854	4489.6	545.4		1.49		A	1.49
NEWARK INDUSTRIAL SPRAYING INC.	12 AMSTERDAM STREET	NEWARK	07105	4501.6	570.4	5.25	0.66		A T	5.25
NEWPORT CITY DEVELOPMENT CO	145 12TH STREET	JERSEY CITY	07372	4508.9	581.3		0.13		A	0.13
NJE CORP	CULVER RD	DAYTON	08810	4468.2	539.3		1.50		A	1.50
NOVICK CHEMICALS	181-183 EMMETT ST	NEWARK		4507.6	569.9		0.02		A	0.02
PARAMOUNT METAL FINISHING CO INC	1515 WEST ELIZABETH AVE	LINDEN	07036	4496.4	562.2		3.42		A	3.42
PENICK CORP.	158 MOUNT OLIVET AVE	NEWARK	07114	4504.4	567.2		0.24		A	0.24
PERMACEL	U.S. RTE. #1	NORTH BRUNSWICK	08902	4479.6	546.7	46.08	311.76		A T	46.08
PETER A DROBACH CO INC	US HIGHWAY 22 & BALL AVE	UNION	07083	4504.4	560.0		0.01		A	0.01
PMC, INC. (SPECIALTIES GROUP)	INDUSTRIAL AVE.	FORDS	08863	4484.5	557.2		0.03		A	0.03
POWER DRAULICS-NIELSEN INC	670 E LINCOLN AVE	RAHWAY	07065				2.71		A	2.71
PRO AUTO COLLISION INC	37 PARK STREET	ORANGE	07050				0.20		A	0.20
RADEL LEATHER CO.	849 BROADWAY	NEWARK	07104	4513.5	571.0	34.00			T	34.00
RBH DISPERSIONS INC.	L-5 FACTORY LN	MIDDLESEX	08846	4488.6	542.2	2.51	0.17		A T	2.51

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[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
REDDAWAY MFG. CO. INC.	32 EUCLID AVE.	NEWARK	07105	4508.9	572.2	17.50			T	17.50
REICHHOLD CHEMICALS INC.	726 ROCKEFELLER STREET	ELIZABETH	07202	4497.9	567.7	4.13	9.87		A T	4.13
RELIANCE ELECTRIC CO	165 FIELDCREST AVE	EDISON	08818				0.45		A	0.45
RUSSEL STANLEY EAST INC.	CONVERY BLVD	WOODBRIDGE	07095	4486.7	546.9	28.34	7.51		A T	28.34
SAFETY-KLEEN CORP	1200 SYLVAN STREET	LINDEN	07036	4495.9	563.3		0.03		A	0.03
SERVILLO ASSOCIATES INC	34 EXCHANGE PLACE	JERSEY CITY	07303	4507.5	581.7		0.25		A	0.25
SETON CO. RADEL TANNING DIV.	849 BROADWAY	NEWARK	07104	4513.5	571.0	15.54			T	15.54
SILVER LINE BUILDING PRODUCTS CORP	207 POND AVE	MIDDLESEX	08846	4492.0	544.0		0.53		A	0.53
SPENCER KELLOGG PRODUCTS	400 DOREMUS AVE	NEWARK	07105	4507.5	573.9	0.25	3.23		T	0.25
STACOR CORP.	285 EMMET ST	NEWARK	07114	4507.7	569.6	10.84			T	10.84
STEEL CRAFT FLUORESCENT CO.	191 MURRAY STREET	NEWARK	07114	4508.3	570.2		0.03		A	0.03
STRATUS PETROLEUM CORP	678 DOREMUS AVE	NEWARK	07105	4506.3	574.0		0.92		A	0.92
TENAX FINISHING PRODUCTS CO.	390 ADAMS ST	NEWARK	07114	4507.3	570.6	0.87	1.02		A T	0.87
TRANSFER PRINT FOILS INC.	9 COTTERS LN	EAST BRUNSWICK	08816	4477.2	549.3	3.32	0.01		A T	3.32
TREMLEY POINT INDUSTRIES	4700 TREMLEY POINT RD	LINDEN	07036	4494.9	566.7		0.02		A	0.02
TRUE VALUE AUTO BODY & PAINTING CO	744-748 COMMUNIPAW AVE	JERSEY CITY	07304	4508.2	577.6		0.08		A	0.08
UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	5.37	9.13		A T	5.37
UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3		4.90		A	4.90
WARNER MFG CORP	100 3RD AVE	KEARNY	07032	4512.2	572.4		0.72		A	0.72
WESTINGHOUSE ELECTRIC CORP	1447 CHESTNUT AVE	HILLSIDE TWP	07205				0.10		A	0.10
WHITE CHEMICAL CORP.	660 FRELINGHUYSEN AVE	NEWARK	07114	4507.7	569.7	0.41	0.03		A T	0.41
WHITTAKER CORP NO. BRUNSWICK DIV	1430-1470 JERSEY AVE	NORTH BRUNSWICK	08902	4480.2	543.9	1.93	0.04		A T	1.93
WILLIAM GRANT & SONS INC	130 FIELDCREST AVE	EDISON	08817	4485.6	556.0		0.05		A	0.05

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[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-15: Xylenes (mixed isomers) point source inventory (continued)

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
WOOD TEXTURES INC.	300 MCGAW DR	EDISON	08837	4485.6	556.4		0.92		A	0.92
W.A.S. TERMINALS INC.	126 PASSAIC STREET	NEWARK	07104	4511.9	570.4		1.10		A	1.10
ACME STEEL PARTITION CO	513 PORTER AVE	BROOKLYN	11222	4508.5	588.3	16.11			T	16.11
COLONIAL MIRROR AND GLASS	142 19TH ST	BROOKLYN	11232	4501.1	585.4	24.44			T	24.44
FYN PAINT & LACQUER CO	229 KENT AVE	BROOKLYN	11211	4507.5	587.4	0.75			T	0.75
GLOSS FLO CORP	135 JACKSON ST	BROOKLYN	11211	4507.4	589.4	0.65			T	0.65
HARCO CHEMICAL COATINGS	208 DUPONT ST	BROOKLYN	11222	4509.6	588.5	15.00			T	15.00
INDUSTRIAL FINISHING PRODUCTS	465 LOGAN ST	BROOKLYN	11208	4512.9	587.2	0.58			T	0.58
INDUSTRIAL FINISHING PRODUCTS	214 40TH ST	BROOKLYN	11232	4512.9	587.2	0.25			T	0.25
INDUSTRIAL FINISHING PRODUCTS	320-40 REMSEN AVE	BROOKLYN	11236	4512.9	587.2	0.22			T	0.22
JEFSTEEL BUSINESS EQUIP	1345 HALSEY ST	BROOKLYN	11237	4506.0	592.4	17.84			T	17.84
MARK CABINET CORP	300 LIBERTY AVE	BROOKLYN	11207	4502.8	593.0	15.98			T	15.98
PYRAMID PAINT PRODUCTS	761 E. 42ND ST	BROOKLYN	11210	4498.5	590.0	0.13			T	0.13
										1,113.01

[A] APEDS 02/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-16: m-Xylene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
ARGUS DIVISION	633 COURT STREET	BROOKLYN	11231	4502.7	584.4	0.25			T	0.25
GOODY PRODUCTS INC.	969 NEWARK TURNPIKE	KEARNY	07032	4514.2	572.4	12.61			T	12.61
										12.86

Table III-5-17: o-Xylene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[A] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
SAMUEL BINGHAM COMPANY	100 SOGMYI COURT	SOUTH PLAINFIELD	07080	4490.7	550.5	0.13			T	0.13
INTERNATIONAL PAINT	2270 MORRIS AVENUE	UNION	07083	4505.1	560.5	0.50			T	0.50
HATCO CORP	KING GEORGE POST ROAD	FORDS	08863	4485.6	557.8	0.18			T	0.18
BASF CORP	50 CENTRAL AVENUE	KEARNY	07032	4507.3	574.6	0.59	0.88		A T	0.59
PERK CHEMICAL CO., INC.		ELIZABETH	07207	4499.8	568.5			0.05	E	0.05
SOLVENTS RECOVERY SERVICE		LINDEN	07036	4496.0	563.2			0.37	E	0.37
MARISOL INC.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9			0.49	E	0.49
										2.31

Table III-5-18: p-Xylene point source inventory

FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM NORTHING	UTM EASTING	FACILITY[F] WIDE EMISSIONS (TPY)	APEDS[1] (TPY)	ENGINEERING SCIENCE (TPY)	SOURCE[S]	UATAP EMISSIONS INVENTORY (TPY)
KENCO WIRE & IRON PRODUCTS INC	39 EVERGREEN STREET	HAZLET	07735	4476.3	568.3	0.00	0.62		A T	0.00

[A] APEDS 01/25/90 - permit allowable annual emissions rate (rounded to one-hundredths of a ton).

[F] FACILITY WIDE EMISSIONS means data from TRI (SARA 313), the NYSDEC Source Management System (SMS), or the EPA Region II POTW Inventory.

[S] SOURCE LEGEND: A = APEDS; E = Engineering Science Inventory; P = EPA Region II POTW Inventory; S = SMS; T = TRI.

Table III-5-19: Area and mobile source air toxics emissions summary for Middlesex and Union Counties, New Jersey, and Staten Island, New York. (Estimated Air Emissions in Tons per Year)

	Benzene	Cadmium	Carbon Tetrachloride	Chloroform	Dichloro-methane	Formaldehyde	n-Hexane	Perchloro-ethylene	Toluene	1,1,1-Trichloro-ethane	Trichloro-ethylene	Xylene (all isomers)
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	NE[1]	0.00	170.34	0.00	0.00	85.40
Area Oil Heating	0.00	0.42	0.00	0.00	0.00	0.37	NE	0.00	0.00	0.00	0.00	0.00
Area Wood Heating	0.00	0.00	0.00	0.00	0.00	37.90[2]	NE	0.00	0.00	0.00	0.00	0.00
Auto Refinishing	0.00	0.00	0.00	0.00	0.00	0.00	NE	0.00	43.65	0.00	0.00	54.12
Cold Degreasing	22.08	0.00	0.00	0.00	72.77	0.00	NE	41.25	44.25	260.14	79.14	38.43
Consumer Solvent Use	0.00	0.00	0.00	0.00	0.00	27.11	NE	0.00	0.00	0.00	0.00	0.00
Dry Cleaning	0.00	0.00	0.00	0.00	0.00	0.00	NE	748.28	0.00	0.00	0.00	0.00
Gasoline Distribution	57.67	0.00	0.00	0.00	0.00	0.00	NE	0.00	233.79	0.00	0.00	325.70
Area Sources total	79.75	0.42	0.00	0.00	72.77	65.38	NE	789.52	492.03	260.14	79.14	503.65
Mobile Sources	1281.89	0.00	0.00	0.00	0.00	412.58	317.55[3]	0.00	1,757.48	0.00	0.00	1,961.87

[1] "NE" means not evaluated for these source categories in this study.

[2] Evaluated for Middlesex and Union Counties, NJ, only.

[3] Derived from EPA Region II mobile source inventory. (See Emission Inventory Appendix E.)

Emissions Inventory Appendices A through E provide details of the generation of the inventories for point sources treated as area sources and for area sources as follows:

Appendix A	POTWs
Appendix B	Landfills
Appendix C	Hazardous wastes TSDF
Appendix D	Architectural coating, area (residential) oil heating, auto refinishing, consumer solvent use, cold degreasing, dry cleaning (coin operated and commercial), and gasoline distribution (retail)
Appendix E	Mobile sources

Emissions Inventory Appendices A through E provide details of the generation of the inventories for point sources treated as area sources and for area sources as follows:

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Appendix E	Mobile sources

Emissions Inventory Appendix A

Emissions from New Jersey's
Publicly Owned Treatment Works
Evaluated in the Area Source Emission System

and

Emissions from New Jersey's and New York's
Publicly Owned Treatment Works
Evaluated in the EPA Region II POTW Inventory

Estimation of Air Toxics Emissions from Publicly Owned Treatment Works - Derivation and Application of Emissions Factors

1. EPA Region II POTW Inventory

This became the POTW inventory for the project. Development of this inventory was based upon the work of Baamonde and Martinovich (1987). The requirements for estimating the air toxics emissions were speciated influent data to each POTW, daily flow rates, removal efficiencies by pollutant, and tables from the Report to Congress on the Discharge of Hazardous Wastes to Publicly Owned Treatment Works (U.S. EPA, 1986) which presented the expected rates of volatilization by pollutant. The results are presented in Table III-5-A-1. The POTW Profile emission factors in units of percent of total VOCs emitted were derived by summing the emissions of a particular pollutant from each of the 11 POTWs, and dividing the total by the total VOC emissions from all 11 POTWs. See Table III-5-A-2.

2. New Jersey's Area Source Emission System

Air toxics emissions from POTWs in Middlesex and Union Counties were estimated by generating the total VOC emissions using the Surface Impoundment Modeling System (SIMS). The model requires the facility SIC code and daily flow input. (For the purposes of this study, all POTW's were classified as SIC code 4953.) The model uses Henry's Law to predict the volatilization of the flow from the surface impoundment. Following the determination of total VOC emissions, a generic emission factor for the air toxics of concern was derived in units of pounds of air toxic substance per one million gallons of waste water processed. The emission factor was applied to the estimated average daily flow. See Table III-5-A-4 for the ASES emission factors. The results of the ASES estimates are presented in Table III-5-A-3.

3. Comparison of ASES and EPA Region II-derived Emission Factors

Table III-5-A-4 presents for comparison the New Jersey ASES emission factors, the EPA Region II POTW Profile-derived emission factors, and the range of facility-specific emission factors derived for all the POTWs in EPA Region II inventory, in units of pounds of substance per million gallons of waste water processed.

Table III-5-A-1: Staten Island/New Jersey Urban Air Toxics Assessment Project POTWS (SIC Code 4953) for Middlesex and Union Counties, NJ, and for Brooklyn and Staten Island (Developed by EPA Region II)

FACILITY NAME[1]	UTM-E[2]	UTM-N[2]	FLOW (MGD)[3,4]	VOCs (TPY)	ESTIMATED AIR TOXICS EMISSIONS (in Tons per Year): Benzene	Carbon Tetrachloride	Chloroform	Dichloro-methane	Perchloro-ethylene	Toluene	1,1,1-Tri-chloroethane	Trichlor-ethylene
BOROUGH OF CARTERET DPW	566.66	4491.58	3.10	4.12	0.03	0.01	0.02	0.95	0.20	0.36	0.43	0.11
CITY OF BAYONNE	574.81	4499.74	13.30	18.11	0.14	0.04	0.11	4.18	0.89	1.59	1.89	0.51
CITY OF ELIZABETH	568.31	4503.13	20.00	27.29	0.21	0.06	0.16	6.31	1.34	2.40	2.85	0.76
CITY OF HOBOKEN	583.04	4511.45	7.30	23.59	0.18	0.05	0.14	5.45	1.16	2.08	2.46	0.66
CITY OF LINDEN	563.37	4505.28	9.70	13.10	0.10	0.03	0.08	3.03	0.64	1.15	1.37	0.37
CITY OF NEW BRUNSWICK	543.78	4482.94	15.20	20.72	0.16	0.05	0.12	4.79	1.02	1.82	2.16	0.58
CITY OF ORANGE DPW	563.32	4510.83	6.40	8.61	0.06	0.02	0.05	1.99	0.42	0.76	0.90	0.24
CITY OF PERTH AMBOY	561.08	4483.06	5.05	6.77	0.05	0.02	0.04	1.56	0.33	0.60	0.71	0.19
JOINT MEETING OF ESSEX & UNION	567.86	4498.44	72.00	98.52	0.00	0.00	1.50	38.96	0.00	15.77	0.00	10.67
LINDEN ROSELLE S.A.	567.14	4494.98	12.40	16.88	5.13	0.00	0.06	6.17	0.00	5.37	0.06	0.00
MIDDLESEX COUNTY	550.84	4482.98	125.00	171.12	2.13	1.23	0.63	8.21	23.11	46.02	61.13	5.45
MIDDLESEX COUNTY SA	563.29	4480.95	86.40	118.24	0.89	0.27	0.69	27.32	5.81	10.41	12.35	3.30
OLD BRIDGE TOWNSHIP S.A.	564.87	4478.59	3.73	4.97	0.04	0.01	0.03	1.15	0.24	0.44	0.52	0.14
RAHWAY VALLEY S.A.	566.88	4492.76	36.00	49.21	0.28	0.00	0.05	0.87	8.10	13.66	0.93	2.54
SOMERSET RARITAN VALLEY	536.64	4489.00	14.20	19.35	0.11	0.00	0.27	1.39	0.07	0.37	0.17	0.15
SOUTH BRUNSWICK	532.19	4468.69	1.57	2.04	0.02	0.00	0.01	0.47	0.10	0.18	0.21	0.06
TOWN OF KEARNY	574.85	4507.23	5.30	7.11	0.05	0.02	0.04	1.64	0.35	0.63	0.74	0.20
TOWNSHIP OF LIVINGSTON	555.57	4517.70	3.50	4.66	0.03	0.01	0.03	1.08	0.23	0.41	0.49	0.13
TOWNSHIP OF WOODBRIDGE	563.50	4489.24	3.20	4.26	0.03	0.01	0.02	0.98	0.21	0.37	0.44	0.12
TOWNSHIP OF WOODBRIDGE	558.88	4484.58	1.30	1.67	0.01	0.00	0.01	0.39	0.08	0.15	0.17	0.05
26TH WARD	595.17	4500.13	5.79	56.00	0.00	0.00	0.00	3.42	1.23	0.00	0.42	0.72
CONEY ISLAND	590.42	4490.60	33.93	99.00	0.00	0.00	0.00	26.72	5.92	0.24	0.00	1.05
NEWTOWN CREEK	587.33	4509.04	121.27	321.00	0.00	1.08	2.72	68.88	7.70	7.81	7.26	7.55
OAKWOOD BEACH	574.09	4488.72	1.11	34.00	0.00	0.00	0.22	0.37	0.21	0.22	0.00	0.00
OWLS HEAD	581.61	4498.67	301.83	114.00	0.00	0.00	0.09	77.92	0.44	0.13	35.29	0.13
PORT RICHMOND	573.83	4499.05	7.12	39.00	0.00	0.00	0.39	2.28	3.29	0.00	1.03	0.13
RED HOOK	586.26	4506.40	4.46	41.00	0.31	0.09	0.24	9.47	2.02	3.21	4.28	1.14
Totals					9.95	3.01	7.72	305.94	65.13	116.54	138.27	36.92

[1] For facilities not addressed in Baamonde and Martinovich (1986), the POTW Profile percentages appearing in Table III-5-A-2 were used to speciate total VOCs.

[2] The UTM coordinates of each POTW were derived from latitude and longitude coordinates.

[2] "MGD" means million gallons per day.

[4] Average flow, in MGD, based upon facility-specific data reported in 1987, Baamonde et al., for New York POTWs, and reported in 1990 for New Jersey POTWs.

Table III-5-A-2: POTWs used to develop an average POTW Profile of air toxics emissions

Facility name	Flow rate (MGD)*	VOCs (TPY)	UTM-N	UTM-E	Benzene	Carbon tetra-chloride	Chloro-form	Dichloro-methane	Perchloro-ethylene	Toluene	1,1,1-Tri-chloro-ethane	Tri-chloro-ethylene
JOINT MEETING OF ESSEX & UNION	72.00	98.52	4498.44	567.86	0.00%	0.00%	1.52%	39.54%	0.00%	16.01%	0.00%	10.83%
LINDEN ROSELLE S.A.	12.40	16.88	4494.98	567.14	30.38%	0.00%	0.34%	36.53%	0.00%	31.79%	0.35%	0.00%
MIDDLESEX COUNTY	125.00	171.12	4482.98	550.84	1.24%	0.72%	0.37%	4.80%	13.50%	26.89%	35.72%	3.18%
RAHWAY VALLEY S.A.	36.00	49.21	4492.76	566.88	0.57%	0.00%	0.10%	1.77%	16.46%	27.76%	1.89%	5.16%
SOMERSET RARITAN VALLEY	14.20	19.35	4489.00	536.64	0.57%	0.00%	1.40%	7.18%	0.36%	1.91%	0.88%	0.78%
26TH WARD	5.79	56.00	4500.13	595.17	0.00%	0.00%	0.00%	6.11%	2.20%	0.00%	0.75%	1.29%
CONEY ISLAND	33.93	99.00	4490.60	590.42	0.00%	0.00%	0.00%	26.99%	5.98%	0.24%	0.00%	1.06%
NEWTOWN CREEK	121.27	321.00	4509.04	587.33	0.00%	0.34%	0.85%	21.46%	2.40%	2.43%	2.26%	2.35%
OAKWOOD BEACH	1.11	34.00	4488.72	574.09	0.00%	0.00%	0.65%	1.09%	0.62%	0.65%	0.00%	0.00%
OWLS HEAD	301.83	114.00	4498.67	581.61	0.00%	0.00%	0.08%	68.35%	0.38%	0.12%	30.96%	0.11%
PORT RICHMOND	7.12	39.00	4499.05	573.83	0.00%	0.00%	1.00%	5.85%	8.44%	0.00%	2.64%	0.33%
Value used as average POTW Profile**					0.75%	0.23%	0.58%	23.10%	4.92%	8.80%	10.44%	2.79%
Maximum value					30.38%	0.72%	1.52%	68.35%	16.46%	31.79%	35.72%	10.83%
Minimum Value					0.00%	0.00%	0.00%	1.09%	0.00%	0.00%	0.00%	0.00%
Average of percentages***					2.98%	0.10%	0.57%	19.97%	4.58%	9.80%	6.86%	2.28%

* Million gallons per day

** The POTW Profile percentages were calculated by summing the emissions of a particular pollutant from each of the 11 POTWs and dividing by the total VOC emissions from all 11 POTWs.

*** The Average of the Percentages is the average of the individual percentages of a particular pollutant from each of the 11 POTWs.

Table III-5-A-3: ASES Inventory of Publicly-Owned Treatment Works facilities (SIC Code 4953) in Middlesex and Union Counties, New Jersey

						ESTIMATED AIR TOXICS EMISSIONS (in Tons per Year)						
PERMIT NUMBER	FACILITY NAME	UTM-E	UTM-N	AVG. FLOW (MGD)[2,3]	YEAR OF AVG.	Benzene 179.20[1] (ug/l)	Carbon Tetrachloride 103.75 (ug/l)	Chloroform 53.10 (ug/l)	Dichloro-methane 477.00 (ug/l)	Perchloro-ethylene 1946.16 (ug/l)	Toluene 3876.00 (ug/l)	Trichlor-ethylene 458.66 (ug/l)
NJ0020141	MIDDLESEX COUNTY SEWERAGE AUTH.	551.0	4480.0	82.48	11/86-10/87	22.53	13.04	6.67	59.96	244.63	487.21	57.65
NJ0020397	WOODBRIDGE, TOWNSHIP OF	563.0	4489.8	4.90	12/86-11/87	1.34	0.77	0.40	3.56	14.53	28.94	3.43
NJ0020401	WOODBRIDGE, TOWNSHIP OF	558.9	4484.5	1.19	12/86-11/87	0.32	0.19	0.10	0.87	3.53	7.03	0.83
NJ0020541	SOUTH AMBOY S.T.P.	560.0	4481.0	0.98	11/86-10/87	0.27	0.15	0.08	0.71	2.91	5.79	0.69
NJ0021636	NEW PROVIDENCE WTP, BOROUGH OF	550.0	4507.0	1.00	12/86-11/87	0.27	0.16	0.08	0.73	2.97	5.91	0.70
NJ0022306	OLDBRIDGE BOARD OF EDUCATION	558.6	4475.9	0.01	11/86-10/87	0.00	0.00	0.00	0.00	0.02	0.04	0.00
NJ0022471	OLDBRIDGE TWP S.A.	563.9	4478.9	0.90	12/86-11/87	0.25	0.14	0.07	0.65	2.67	5.32	0.63
NJ0023213	PERTH AMBOY, CITY OF	561.1	4483.4	4.60	12/86-11/87	1.26	0.73	0.37	3.34	13.64	27.17	3.22
NJ0023825	SAYREVILLE, BOROUGH OF	563.2	4479.3	0.23	12/86-11/87	0.06	0.04	0.02	0.17	0.67	1.34	0.16
NJ0023833	SAYREVILLE, BOROUGH OF	560.0	4480.5	0.10	12/86-11/87	0.03	0.02	0.01	0.07	0.30	0.60	0.07
NJ0024104	THE LINPRO COMPANY	533.2	4464.0	0.66	10/86-11/87	0.18	0.10	0.05	0.48	1.96	3.90	0.46
NJ0024571	CARTERET D.P.W., BOROUGH OF	566.1	4492.1	2.82	8/86-10/87	0.77	0.45	0.23	2.05	8.36	16.66	1.97
NJ0024643	RAHWAY VALLEY SEWERAGE AUTH.	567.0	4493.1	27.16	12/86-11/87	7.42	4.29	2.20	19.74	80.56	160.43	18.98
NJ0024741	JOINT MTG-ESSEX and UNION CNT'YS	567.8	4499.4	66.94	11/86-11/87	18.28	10.58	5.42	48.66	198.54	395.42	46.79
NJ0024953	LINDEN ROSELLE S.A.	565.0	4496.0	10.69	1/87-10/87	2.92	1.69	0.87	7.77	31.71	63.15	7.47
NJ0027961	WATER POLLUTION CONTROL	546.6	4503.4	1.79	85 - 87	0.49	0.28	0.14	1.30	5.31	10.57	1.25
NJ0028479	JAMESBURG SCHOOL FOR BOYS	552.0	4465.0	0.13	12/86-11/87	0.04	0.02	0.01	0.09	0.39	0.77	0.09
NJ0028835	MIDDLESEX COUNTY	547.0	4482.1	0.06	1/85-1/86	0.02	0.01	0.00	0.04	0.18	0.36	0.04
NJ0033065	OLD BRIDGE MUA BROWNTOWN	558.8	4472.1	0.34	4/85-4/87	0.09	0.05	0.03	0.25	1.01	2.01	0.24

SAMPLE CALCULATION: Middlesex County Sewerage Authority (benzene)

Emissions (TPY) = Avg. Flow (MGD) x 365 days/year x 1.500 pounds/MGD processed ÷ 2000 pounds/ton
= 82.48 x 365 x 1.500 ÷ 2000
= 22.53 tons per year

[1] The number under the substance name represents the derived emission factor in units of micrograms per liter of waste water processed.

[2] "MGD" means million gallons per day.

[3] Average flow, in MGD, based upon facility-specific data collected between 1985 and 1987, as reported under the column labeled "YEAR OF AVG.".

Table III-5-A-4: Emission Factors used in the ASES inventory and derived from the EPA Region II Inventory of POTWs

	EMISSION FACTORS, lbs/million gallons of wastewater processed		
	ASES	EPA[1]	EPA Range
Benzene	1.500	0.183	0.042 - 2.267
Carbon tetrachloride	0.866	0.027	0.017 - 0.115
Chloroform	0.443	0.109	0.002 - 1.086
Dichloromethane	3.980	2.203	0.132 - 11.647
Perchloroethylene	16.300	0.649	0.008 - 2.532
Toluene	32.400	0.937	0.002 - 4.437
1,1,1-Trichloroethane	NA[2]	0.910	0.026 - 5.264
Trichloroethylene	3.830	0.279	0.000 - 1.406

[1] The average emission factor for each pollutant was derived by averaging the facility-specific derived emission factors; i.e.,

$$\frac{\sum_{i=1}^{i=27} (n_i \text{ tons chemical/yr} \times 2000\#/\text{ton} \times 1 \text{ yr}/365 \text{ days})/\text{million gallons per day}}{\text{number of facilities}}$$

[2] "NA" means not available.

Emissions Inventory Appendix B

Emissions from Landfills

1. Landfill Depth

Specific information on landfill acreage and depth generally fell into one of three categories:

(1) both parameters known;
(2) acreage known, depth estimated; or
(3) size unknown, parameters averaged.

The regression line found in Figure III-5-B-1 was developed from the data for facilities in group 1. For group 2, the landfill depth was calculated from the regression line and the known landfill acres, using the equation for a line and solving for depth (the Y variable) as follows:

$$Y = mX + b \qquad \text{(eq. III-5-B-1)}$$

where: Y = landfill depth (feet)
m = slope of the line, which is $\Delta X/\Delta Y$ (dimensionless)
X = landfill size (acres)
b = Y-intercept

For group 3 facilities (size unknown), the parameters were estimated. The mean of the known acreages (groups 1 and 2) was assigned as the estimated acreage, and the estimated depth was calculated from equation III-5-B-1, above.

From Figure III-5-B-1:

$$m = (130 - 60)/(200 - 70) = 0.5385$$
$$b = 22.5$$

$$Y = 0.5385(X) + 22.5$$

or Depth = 0.5385(Acres) + 22.5

Having established values for acreage and depth, the volume of the landfill was determined:

Volume = Acres x Depth

2. Annual VOC Emissions

Estimating the volatile organic compounds (VOC) emissions (in pounds per year) was the next step in the process. The following equation presents the VOC estimating calculation:

$$\text{VOC (lbs/yr)} = (\text{Depth,ft}) \times (1\ \text{yd/ft}) \times (\text{Surface area,acres}) \times (4840\ \text{yd}^2/\text{ac}) \times (3100\ \text{lb/yr}/10^6\ \text{yd}^3)$$

The emission factor of 3,100 pounds of VOC per year per million cubic yards was obtained from Vogt and Conrad (1987).

3. Air Toxics Specific Estimations

Two air toxics emission factors were obtained from EPA (U.S.EPA, 1985; U.S. EPA, 1987) as follows:

Tetrachloroethylene	9.3 lbs/year/million cubic yards
Toluene	3.1 lbs/year/million cubic yards

The annual emission rate for each substance from each landfill was then calculated. When the annual emission rate was estimated at one one-hundredth (0.01) of a ton, or more, the facility information and emissions data were entered into the inventory.

Sample calculations are provided on the next page for

(1) estimation of landfill depth;

(2) estimation of annual VOC emissions;

(3) estimation of annual tetrachloroethylene emissions; and,

(4) estimation of annual toluene emissions.

Sample Calculations of Air Toxics Emissions from Landfills

Example 1: 1216C Asarco Inc. Sanitary Landfill
Acres = 75.8

a. Landfill Depth
Depth = 0.5385(Acres) + 22.5
= 0.5385(75.8) + 22.5
= 63.3 feet

b. Annual VOC Emissions
VOC = [(Depth+3ft/yd)(Acres)(4840yd^2/acre)(3100lb/yr/10^{6}yd^3)
= (63.3/3) (75.8) (4840) (3100) + 1,000,000
= 23,997 lb/yr VOC
= 12 tons/yr VOC

c. Air Toxics Specific Estimations

i. Tetrachloroethylene
emission factor of 9.30 lb/10^6 yd^3
= [(Depth+3ft/yd) (Acres) (4840yd^2/acre) (9.3 lb/yr/10^{6}yd^3)
= (63.3/3) (75.8) (4840) (9.3) + 1,000,000
= 72 lb/yr = <u>0.04 ton/yr</u>

ii. Toluene
emission factor of 3.10 lb/10^6 yd^3
= [(Depth+3ft/yd) (Acres) (4840yd^2/acre) (3.1 lb/yr/10^{6}yd^3)
= (63.3/3) (75.8) (4840) (3.1) + 1,000,000
= 24 lb/yr = <u>0.01 ton/yr</u>

Example 2: Fresh Kills Landfill, Staten Island, NY
size = 1,400 acres, 300 acres of which is served by
a methane recovery plant*
volume = 84 MMyd^3 (84 x 10^6 yd^3) (estimate for 1988*)

i. Tetrachloroethylene
emission factor of 9.30 lb/yr/10^6 yd^3
= 84 MM yd^3 x (1400 acres - 300 acres)/1400 acres x 9.3 lb/yr/10^6 yd^3
= 84 x 0.7857 x 9.3 lb/yr
= 613.8 lb/yr = <u>0.31 ton/yr</u>

ii. Toluene
emission factor of 3.10 lb/yr/10^6 yd^3
= 84 MM yd^3 x 3.1 lb/yr/10^6 yd^3
= 84 x 3.1 lb/yr
= 260.4 lb/yr = 0.13 ton/yr

* Gleason, 1992.

Table III-5-B-1: LANDFILL FACILITIES - SIC Code 4953 (in Middlesex and Union Counties, New Jersey).

ID #	Facility Name	Area (Ac)	Depth (Ft)	Est. Depth (Ft)	UTM (E)	UTM (N)	Volume[1] (MMyds³)	TETRACHLOROETHYLENE Emission Factor[2]	TETRACHLOROETHYLENE lbs. per year	TETRACHLOROETHYLENE TPY[3]	TOLUENE Emission Factor	TOLUENE lbs. per year	TOLUENE TPY[3]
Complete Data Sets													
1204A	Edgeboro Disposal SLF[4]	233	130	148	553.0	4480.0	48.87	9.30	444.70	0.22	3.10	151.49	0.08
1205A	Edison Twp. SLF	35	60	41	554.0	4482.0	3.39	9.30	30.83	0.02	3.10	10.50	0.01
1205C	I.L.R. SLF	120	100	87	556.5	4482.0	19.36	9.30	176.18	0.09	3.10	60.02	0.03
1205D	Kin-Buc Inc. #1	60	90	55	554.5	4482.5	8.71	9.30	79.28	0.04	3.10	27.01	0.01
1205E	Kin-Buc Inc. #2	20	20	33	554.5	4482.5	0.65	9.30	5.87	0.00	3.10	2.00	0.00
1209A	Global Corp. SLF	51	70	50	561.0	4479.0	5.76	9.30	52.41	0.03	3.10	17.85	0.01
1211A	Middlesex Boro SLF	3	8	24	543.0	4490.5	0.04	9.30	0.35	0.00	3.10	0.12	0.00
1213A	Etsch SLF	5	10	25	552.5	4463.5	0.08	9.30	0.73	0.00	3.10	0.25	0.00
1213D	BFI of South Jersey SLF	86	60	69	552.5	4465.5	8.32	9.30	75.76	0.04	3.10	25.81	0.01
1225E	Woodbridge Sanitary	4.6	10	25	559.0	4490.0	0.07	9.30	0.68	0.00	3.10	0.23	0.00
	Fresh Kills Landfill	1400	-	12	570.0	4498.0	84	9.30	613.8	0.31	3.10	260.4	0.13
Acreage known - depth estimated													
1201A	Middlesex Landfill Corp.	15		31	566.5	4494.0	0.74	9.30	6.77	0.00	3.10	2.30	0.00
1201B	Carteret Boro SLF	30		39	566.5	4494.0	1.88	9.30	17.07	0.01	3.10	5.82	0.00
1202A	Cranbury Township SLF	10.8		28	542.0	4464.0	0.50	9.30	4.51	0.00	3.10	1.54	0.00
1213B	Olbry's SLF	7		26	552.5	4465.5	0.30	9.30	2.72	0.00	3.10	0.93	0.00
1213C	Jamesburg Boro SLF	4.2		25	548.0	4467.0	0.17	9.30	1.54	0.00	3.10	0.52	0.00
1213F	Bradford SLF	6.2		26	not located		0.26	9.30	2.37	0.00	3.10	0.81	0.00
1216A	Celotex Corp. SLF	14		30	560.5	4484.5	0.68	9.30	6.20	0.00	3.10	2.11	0.00
1216B	Perth Amboy City SLF	10		28	560.5	4485.0	0.45	9.30	4.12	0.00	3.10	1.40	0.00
1216C	Asarco Inc. SLF	75.8		63	562.5	4485.5	7.74	9.30	70.48	0.04	3.10	24.01	0.01
1216E	Bird & Son SLF	15		31	561.5	4487.0	0.74	9.30	6.77	0.00	3.10	2.30	0.00
1217D	Colluci Trucking SLF	10		28	545.0	4490.5	0.45	9.30	4.12	0.00	3.10	1.40	0.00
1218A	Plainsboro Twp. SLF	5		25	535.0	4463.5	0.20	9.30	1.86	0.00	3.10	0.63	0.00
1222A	South Plainfield Boro	50		49	550.5	4490.5	3.99	9.30	36.33	0.02	3.10	12.38	0.01
1225B	Elizabeth Disposal Inc.	1.5		23	558.5	4485.0	0.06	9.30	0.52	0.00	3.10	0.18	0.00
2001A	Union County SLF	4		25	549.5	4501.5	0.16	9.30	1.46	0.00	3.10	0.50	0.00
2009A	Linden City SLF	45		47	564.0	4494.5	3.40	9.30	30.93	0.02	3.10	10.54	0.01
2013A	Rahway City SLF	2.5		24	562.5	4494.5	0.10	9.30	0.88	0.00	3.10	0.30	0.00

[1] Landfill volume is in units of "millions of cubic yards" (MMyds³).

[2] Emission factors are in units of "pounds per year per million cubic yards" (lbs/yr/MMyds³).

[3] "TPY" means tons per year.

[4] "SLF" means sanitary landfill.

Table III-5-B-1, continued: LANDFILL FACILITIES - SIC Code 4953 (in Middlesex and Union Counties, New Jersey).

ID #	Facility Name	Est. Area (Ac)	Depth (Ft)	Est. Depth (Ft)	UTM (E)	UTM (N)	Volume[1] (MMyds^3)	TETRACHLOROETHYLENE Emission Factor[2]	TETRACHLOROETHYLENE lbs. per year	TETRACHLOROETHYLENE TPY[3]	TOLUENE Emission Factor	TOLUENE lbs. per year	TOLUENE TPY[3]
Size unknown (area & depth based on averages)													
1205U	Lotano Landfill	34.2		41	553.5	4494.5	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1213E	Knights of Columbus Landfill	34.2		41	548.0	4468.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1216U	National Lead Landfill	34.2		41	562.5	4486.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1218B	Plainsboro Twp. SLF[4] Expansion	34.2		41	535.0	4463.5	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1219A	Du Pont-Washington Rd SLF	34.2		41	557.0	4480.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1219B	Sayreville Boro SLF	34.2		41	554.0	4477.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1219D	NL Industries Inc SLF	34.2		41	559.0	4483.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1220U	South Amboy City Landfill	34.2		41	559.5	4483.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1221B	South Brunswick Twp SLF	34.2		41	538.5	4469.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
1221U	Cities Service Landfill	34.2		41	537.0	4469.5	2.26	9.30	20.60	0.01	3.10	7.02	0.00
2009D	American Cyanamid SLF-Haz	34.2		41	465.5	4496.0	2.26	9.30	20.60	0.01	3.10	7.02	0.00
	TOTAL ANNUAL EMISSIONS OF SUBSTANCE (TPY) =									0.96			0.35

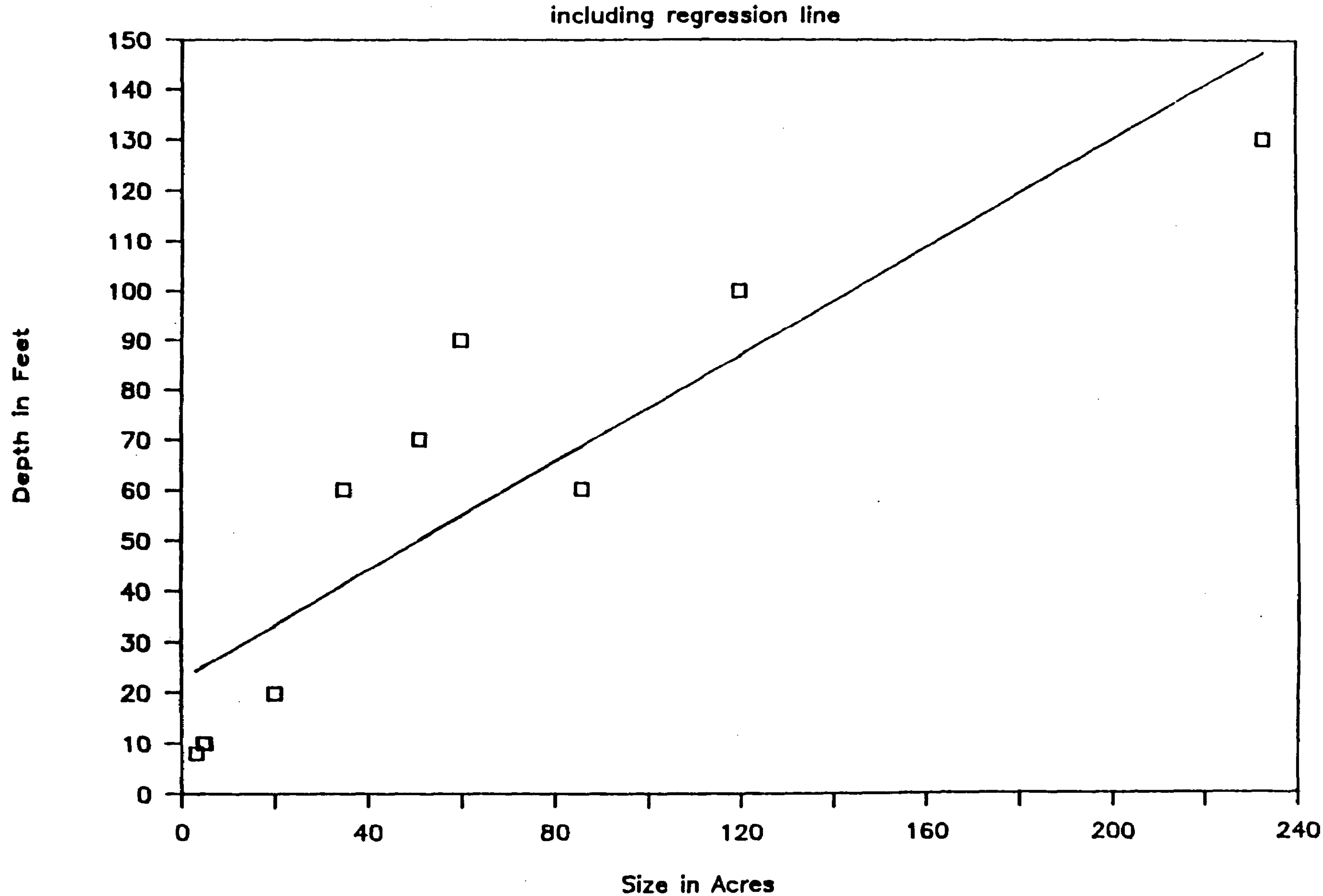
[1] Landfill volume is in units of "millions of cubic yards" (MMyds^3).

[2] Emission factors are in units of "pounds per year per million cubic yards" (lbs/yr/MMyds^3).

[3] "TPY" means tons per year.

[4] "SLF" means sanitary landfill.

Figure III-5-B-1. Landfill Size and Depth



Emissions Inventory Appendix C

Emissions from Hazardous Waste
Treatment, Storage, and Disposal Facilities

Table III-5-C-1: Hazardous waste treatment, storage and disposal facilities[1] - SIC Code 7389 (in Middlesex and Union Counties, New Jersey).

FACILITY NUMBER	FACILITY NAME	CITY	X UTM	Y UTM	1986 Pounds of VOC Emissions	Emissions (tons per year)[2]				
						Benzene	Toluene	Trichloro-ethylene	Tetrachloro-ethylene	Xylenes
1211B	MARISOL INC	MIDDLESEX	540.9	4489.9	5,312,000	0.25	0.74	0.13	0.25	0.49
2004C	PERK CHEMICAL CO., INC	ELIZABETH	568.5	4499.8	4,026,000	0.19	0.56	0.10	0.19	0.37
2009C	SOLVENTS RECOVERY SERVICE OF NJ	LINDEN	563.2	4496.0	549,000	0.03	0.08	0.01	0.03	0.05
						0.47	1.38	0.24	0.47	0.91
EMISSION FACTORS[3] (pound of substance per pound of VOC emissions):						9.30E-05	2.79E-04	4.80E-05	9.30E-05	1.86E-04

[1] Includes only those facilities which were clearly engaged in the processing and treatment of hazardous wastes.

[2] Air toxics emissions based on 1986 volatile organic compound (VOC) emissions data.

[3] Emission factors were derived from EPA documentation (U.S. EPA, 1985; U.S. EPA, 1987).

<u>Emissions Inventory Appendix D</u>

Emissions from Area Sources
using Population Based Emissions Factors

- architectural coating
- area (residential) oil heating
- auto refinishing
- consumer solvent use
- cold degreasing
- dry cleaning (SIC 7215 - coin operated)
  (SIC 7216 - commercial)
- gasoline distribution, retail (SIC 5541)

Estimation of Air Toxics Emissions from Area Sources using Population- Based Emission Factors

Air toxics emissions estimates were developed for area source categories following EPA-prescribed methods. The following categories were evaluated:

- architectural coating
- area (residential) oil heating
- auto refinishing
- cold degreasing
- consumer solvent use
- dry cleaning
- gasoline distribution, retail

The procedure applied simple population based models which estimated usage and emissions of volatile organic compounds (VOCs) on a per capita basis. Speciation factors from previously published data (U.S. EPA, 1980a) were used to generate factors for the relevant pollutants.

To start the process of organizing the data, a grid cell procedure was designed for the study area using square cells of two kilometers (2km) per side. Grid cells were superimposed upon the geographic region based upon boundaries defined as fifths of Universal Transverse Mercator (UTM) 10,000 meter grids. Figure III-5-2 of this report displays the grid cell network.

Assignment of cell population was rigorously determined using tract level information and 1986 census updates (NJDOL, 1987; USDOC, 1986). Population by census tract was allocated to individual cells, based upon U.S. Bureau of the Census maps and the defined grid network. The last step was a simple calculation using cell population and the per capita emission factor to generate the estimated emissions for the individual pollutants.

The population figures were also applied to the development of the mobile source air toxics estimates. Following are the population figures applied to the source categories addressed in this appendix and Appendix E (mobile sources).

	Population Estimates used in generating Area and Mobile Sources Emissions	
County	ASES	EPA Mobile*
Middlesex, NJ	558,560[1,2]	574,520[1,3]
Union, NJ	493,040[2]	499,930[3]
Richmond, NY (Staten Island)	374,000[4]	380,970[3]

* The EPA Region II mobile source inventory covered portions of Essex, Hudson, and Monmouth Counties, and all of Brooklyn, in addition to the counties listed here.

1 Figures for the municipalities included in the study area (approximately 88% of the total county population).

2 NJDOL, 1987.

3 USDOC, 1988.

4 USDOC, 1987.

The population-based emissions factors (in pounds per person per year) that were applied to area source category air toxics emissions estimates follow.

Area (Residential) Oil Heating		
Cadmium	5.86E-04	
Formaldehyde	5.21E-04	
Architectural Coating		
Toluene	2.39E-01	1.39E+00[1]
Xylene	1.20E-01	5.40E-01[1]
Auto Refinishing		
Toluene	6.10E-02	
Xylene	7.60E-02	
Cold Degreasing		
Benzene	3.10E-02	
Dichloromethane	1.02E-01	
Perchloroethylene	5.80E-02	
Toluene	6.20E-02	
1,1,1-Trichloroethane	3.65E-01	
Trichloroethylene	1.11E-01	
Xylene	5.40E-02	
Consumer Solvent Use		
Formaldehyde	3.80E-02	
Dry Cleaning		
Perchloroethylene	1.05E-00	
Gasoline Distribution, retail		
Benzene	8.10E-02	6.54E-02[2]
Toluene	3.28E-01	2.21E-01[2]
Xylene	4.57E-01	3.49E-01[2]

[1] Population-based emission factors developed by NYSDEC for architectural coating.

[2] Population-based emission factors derived from New York State population data and substance-specific emissions, in pounds per day, for retail gas distribution.

Emissions Inventory Appendix E

Estimation of Air Toxics Emissions
from Mobile Sources

Table III-5-E-1: Mobile source emissions estimates by New Jersey, New York, and EPA Region II; and the resulting SI/NJ UATAP mobile source inventory

COUNTY	% OF COUNTY	EMISSIONS (in tons per year - TPY) BENZENE	FORMALDEHYDE	n-HEXANE	TOLUENE	o-XYLENE	p-XYLENE	XYLENES mixed isomers	XYLENES all isomers
NEW JERSEY DEP[1]									
MIDDLESEX	88.1	502.09	161.64	NA	688.40	NA	NA	768.38	768.38
UNION	100.0	443.45	142.72	NA	607.92	NA	NA	678.66	678.66
NEW YORK STATE DEC[2]									
STATEN ISLAND	100.0	532.35	123.00	NA	812.86	NA	NA	1151.21	1151.21
EPA REGION II[3]									
ESSEX	72.9	128.38	71.19	83.72	495.14	150.11	246.64	NA	396.75
HUDSON	77.8	79.47	42.29	49.95	294.33	89.41	146.45	NA	235.86
MIDDLESEX	88.1	195.90	104.22	122.56	724.73	220.03	360.92	NA	580.95
MONMOUTH	30.4	16.64	24.81	29.14	172.37	52.29	85.86	NA	138.15
UNION	100.0	134.32	71.54	83.95	496.04	150.75	247.11	NA	397.86
BROOKLYN	100.0	201.85	107.31	126.29	746.43	226.67	371.94	NA	598.61
STATEN ISLAND	100.0	150.75	80.30	94.54	557.72	169.36	277.77	NA	447.13
TOTALS:		907.31	501.66	590.15	3486.76	1058.62	1736.69		2795.31
SI/NJ UATAP Inventory[4]									
STATEN ISLAND	100.0	336.35	108.22	NA	461.16	NA	NA	514.83	514.83
MIDDLESEX	88.1	502.09	161.64	NA	688.40	NA	NA	768.38	768.38
UNION	100.0	443.45	142.72	NA	607.92	NA	NA	678.66	678.66
TOTALS:		1,281.89	412.58	317.55	1757.48	--	--	1961.87	--

[1] ASES mobile source inventory based upon the countywide VMT, MOBILE3 estimate of total HC, pollutant-specific emission factors in terms of gpm or percent of total hydrocarbons, and apportionment by cell population on a uniform per capita basis (pounds per year per person) throughout Middlesex and Union Counties.

[2] NYSDEC emissions estimates based upon grid-level VMT data, MOBILE3 estimate of total HC, the emission factors used by NJDEP, and apportionment to cells on the basis of VMT per cell.

[3] EPA Region III emissions estimates based upon mobile source emissions data from New Jersey and New York to generate total VOCs; chemical speciation based upon percent compositions from the VOC Profile Report for gasoline vehicle exhaust (U.S. EPA, 1990), and apportionment using 1990 population data.

[4] Calculated using per capita emission factors (pounds/year/person) derived from NJDEP estimates for the New Jersey counties, with the exception of the value for n-hexane, which was generated by EPA Region II.

Table III-5-E-2: Air toxics emissions from motor vehicles-
Derived population-based emissions factors

Pollutant	Emission factor used by NJ and NY[3]	Emission factor used by EPA[4]	Derived per capita Emission Factor[1,2] ASES[5]	SIAIR[5]	EPA Region II[6]
AUTO					
Benzene		1.39%	1.799	2.846	0.365
- Evaporative	1.79%[7]				
- Exhaust	0.131 gpm[8]				
Formaldehyde	0.045 gpm[9]	0.74%	0.579	0.660	0.202
Hexane		0.87%	N/A	N/A	0.237
Toluene		5.14 %	2.466	4.347	1.402
- Evaporative	0.091%[7]				
- Exhaust	7.4%[7]				
Xylenes		4.12%	2.753	6.156	1.124
- Evaporative	0.008%[7]				
- Exhaust	10.6%[7]				

[1] The ASES per capita emission factor was used to generate the SI/NJ UATAP mobile source inventory. It was based on the combined estimated emissions for Middlesex and Union Counties divided by the combined population of the two counties. The SIAIR and EPA Region II per capita emission factors listed here were not used in generating inventories; they were derived from the inventories submitted by NYSDEC and EPA Region II.

[2] Derived population-based emission factor in units of pounds per year per person.

[3] Emission factors in units of percent of total hydrocarbons (output of MOBILE3 model), or grams per mile (gpm).

[4] The average percent composition of the chemical in VOCs in gasoline vehicle exhaust (U.S. EPA, 1990).

[5] The ASES estimate covered all of Union County and 88% of Middlesex County. The SIAIR estimate covered Staten Island. See Appendix D for population etimates used for Middlesex and Union Counties, and for Staten Island.

[6] The EPA Region II estimate covered the combined area covered by the ASES and SIAIR estimates, and portions of Essex, Hudson, and Monmouth Counties, and all of Brooklyn, as well. The 1988 populations used for these additional counties are as follows: 611,850 for 72.9% of Essex; 421,690 for 77.8% of Hudson; 169,610 for 30.4% of Monmouth; and 2,314,300 for 100% of Brooklyn (USDOC, 1988).

[7] Carhart and Walsh, 1987.

[8] U.S. EPA, 1985b.

[9] Carey, 1987.

Table III-5-E-3: EPA Region II mobile source emissions estimates for five New Jersey counties and two boroughs of New York City - VOC emissions in tons per day (TPD)

NEW JERSEY COUNTY	Total VOC in county/ borough, TPD	Percent of county or borough in the study area	Total VOC for study area*, TPD
Essex	36.121	72.9	26.345
Hudson	20.175	77.8	15.690
Middlesex	43.832	88.1	38.629
Monmouth	30.268	30.4	9.190
Union	26.448	100.0	26.448
NEW YORK CITY BOROUGH			
Brooklyn	39.786	100.0	39.786
Staten Island	29.732	100.0	29.732

* NOTE: It was assumed that VOCs are uniform throughout municipalities and that VOC emissions are in direct and constant proportion with population.

Table III-5-E-4: EPA Region II mobile source emissions for five New Jersey counties and two boroughs of New York City - Speciated VOC emissions for the entire county in tons per day[1]

COUNTY	Total VOC, TPD[2]	Speciated VOC for entire county, TPD					
		Benzene (1.39[3])	Formaldehyde (0.74)	n-Hexane (0.87)	Toluene (5.14)	o-Xylene (1.56)	p-Xylene (2.56)
Essex	36.121	0.502	0.267	0.314	1.857	0.563	0.925
Hudson	20.175	0.280	0.149	0.176	1.037	0.315	0.516
Middlesex	43.832	0.609	0.324	0.381	2.253	0.684	1.122
Monmouth	30.268	0.421	0.224	0.263	1.556	0.472	0.775
Union	26.448	0.368	0.196	0.230	1.359	0.413	0.677
Brooklyn	39.786	0.553	0.294	0.346	2.045	0.621	1.019
Staten Island	29.732	0.413	0.220	0.259	1.528	0.464	0.761

[1] NOTE: The emission estimates addressed only light-duty gasoline-fueled vehicles; they do not include the small percentage of gasoline-fueled trucks or the non-gasoline-fueled vehicles. Also not addressed was the variability of emissions with chemical compositions of fuels.

[2] This is the VOC total for the entire county from Table III-5-E-3.

[3] The number in parentheses under the chemical name is the average percent composition of the chemical in gasoline exhaust VOC emissions (U.S. EPA, 1990).

Table III-5-E-5: EPA Region II mobile source emissions for the covered municipalities of Essex County- Chemical emissions in pounds per day and tons per year.

ESSEX COUNTY	% Population[2]		Benzene	Formaldehyde	n-Hexane	Toluene	o-Xylene	p-Xylene
			0.502 TPD[1]	0.267 TPD[1]	0.314 TPD[1]	1.857 TPD[1]	0.563 TPD[1]	0.925 TPD[1]
			Pounds per Day[3]					
East Orange	9.19		92.37	49.13	57.78	341.69	103.59	170.20
Irvington	7.41		74.60	39.68	46.66	275.95	83.66	137.46
Livingston	3.37		4.04	18.10	21.29	125.90	38.17	62.72
Maplewood	2.69		27.21	14.47	17.02	100.65	30.51	50.14
Millburn	2.30		23.29	12.39	14.57	86.16	26.12	42.92
Newark	37.40		375.60	199.77	234.93	1,389.41	421.24	692.08
Orange	3.72		37.55	19.97	23.49	138.90	42.11	69.19
South Orange	1.92		19.48	10.36	12.18	72.05	21.84	35.89
West Orange	4.90		49.30	26.22	30.83	182.36	55.29	90.84
Portion of total Essex population:	72.90%	LBS/DAY:	703.44	390.09	458.75	2,713.07	822.53	1351.44
		TPY:	128.38	71.19	83.72	495.14	150.11	246.64

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.

[2] Population data from USDOC, 1988.

[3] Pounds per day per municipality:
[County tons/day (substance) x 2000 pounds/ton x % Population per Municipality] / 100
e.g.: East Orange (benzene) [0.502 tons/day x 2000 pounds/ton x 9.19%] / 100% = 92.37 LBS/DAY

Table III-5-E-6: EPA Region II mobile source emissions for the covered municipalities of Hudson County - Chemical emissions in pounds per day and tons per year

HUDSON COUNTY	% Population[2]	Benzene	Formaldehyde	n-Hexane	Toluene	o-Xylene	p-Xylene
		0.280 TPD[1]	0.149 TPD[1]	0.176 TPD[1]	1.037 TPD[1]	0.315 TPD[1]	0.516 TPD[1]
		Pounds per Day[3]					
Bayonne	11.24	62.94	33.50	39.56	233.12	70.81	116.00
East Newark	0.32	1.79	0.95	1.13	6.64	2.02	3.30
Harrison	2.20	12.32	6.56	7.74	45.63	13.86	22.70
Hoboken	7.72	43.23	23.01	27.17	160.11	48.64	79.67
Jersey City	40.14	224.78	119.62	141.29	832.50	252.88	414.24
Kearny	6.25	35.00	18.63	22.00	129.63	39.38	64.50
Union	9.89	55.38	29.47	34.81	205.12	62.31	102.06
Portion of total Hudson population:	77.76% LBS/DAY:	435.44	231.74	273.70	1,612.75	489.90	802.47
	TPY:	79.47	42.29	49.95	294.33	89.41	146.45

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.

[2] Population data from USDC, 1988.

[3] Pounds per day per municipality:
[County tons/day (substance) x 2000 pounds/ton x % Population per Municipality] / 100
e.g.: Bayonne (benzene) [0.280 tons/day x 2000 pounds/ton x 11.24%] / 100% = 62.94 LBS/DAY

Table III-5-E-7: EPA Region II mobile source emissions for the covered municipalities of Middlesex County - Chemical emissions in pounds per day and tons per year

MIDDLESEX COUNTY	% Population[2]		Benzene 0.609 TPD[1]	Formaldehyde 0.324 TPD[1]	n-Hexane 0.381 TPD[1]	Toluene 2.253 TPD[1]	o-Xylene 0.684 TPD[1]	p-Xylene 1.122 TPD[1]
			Pounds per Day					
Carteret	2.95		35.93	19.12	22.48	132.93	40.36	66.20
Dunellen	0.95		11.57	6.16	7.24	42.81	13.00	21.32
East Brunswick	6.84		83.31	44.32	52.12	308.21	93.57	153.49
Edison	13.08		159.31	84.76	99.67	589.38	178.93	293.52
Highland Park	1.94		23.63	12.57	14.78	87.42	26.54	43.53
Metuchen	1.97		23.99	12.77	15.01	88.77	26.95	44.21
Middlesex	2.01		24.48	13.02	15.32	90.57	27.50	45.10
Milltown	1.06		12.91	6.87	8.08	47.76	14.50	23.79
New Brunswick	6.04		73.57	39.14	46.02	272.16	82.63	135.54
North Brunswick	4.09		49.82	26.50	31.17	184.30	55.95	91.78
Old Bridge	8.71		106.09	56.44	66.37	392.47	119.15	195.45
Perth Amboy	5.63		68.57	36.48	42.90	253.69	77.02	126.34
Piscataway	6.75		82.22	43.74	51.44	304.16	92.34	151.47
Sayreville	5.49		66.87	35.58	41.83	247.38	75.10	123.20
South Amboy	1.17		14.25	7.58	8.92	52.72	16.01	26.25
S. Plainfield	3.15		38.37	20.41	24.00	141.94	43.09	70.69
South River	2.03		24.73	13.15	15.47	91.47	27.77	45.55
Woodbridge	14.27		173.81	92.47	108.74	643.01	195.21	320.22
Portion of total Middlesex population:	88.13%	LBS/DAY:	1,073.42	571.08	671.55	3,971.14	1,205.62	1,977.64
		TPY:	195.90	104.22	122.56	724.73	220.03	360.92

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.
[2] Population data from USDOC, 1988.

Table III-5-E-8: EPA Region II mobile source emissions for the covered municipalities of Monmouth County - Chemical emissions in pounds per day and tons per year

MONMOUTH COUNTY	% Population[2]	Benzene	Formaldehyde	n-Hexane	Toluene	o-Xylene	p-Xylene
		0.421 TPD[1]	0.224 TPD[1]	0.236 TPD[1]	1.556 TPD[1]	0.472 TPD[1]	0.775 TPD[1]
		Pounds per Day					
Aberdeen	3.38	28.46	15.14	17.78	105.19	31.91	52.39
Atlantic Highlands	0.89	7.49	3.99	4.68	27.70	8.40	13.80
Hazlet	4.10	34.52	18.37	21.57	127.59	38.70	63.55
Highlands	0.92	7.75	4.12	4.84	28.63	8.68	14.26
Holmdel	2.07	17.43	9.27	10.89	64.42	19.54	32.09
Keansburg	1.90	16.00	8.51	9.99	59.13	17.94	29.45
Keyport	1.33	11.20	5.96	7.00	41.39	12.56	20.62
Matawan	1.53	12.88	6.85	8.05	47.61	14.44	23.72
Middletown	12.42	104.58	55.64	65.33	386.51	117.24	192.51
Monmouth Beach	0.66	5.56	2.96	3.47	20.54	6.23	10.23
Union Beach	1.15	9.68	5.15	6.05	35.79	10.86	17.83
Portion of total Monmouth population:	30.35% LBS/DAY:	255.55	135.96	159.65	944.50	286.50	470.45
	TPY:	46.64	24.81	29.14	172.37	52.29	85.86

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.

[2] Population data from USDOC, 1988.

Table III-5-E-9: EPA Region II mobile source emissions for the covered municipalities of Union County - Chemical emissions in pounds per day and tons per year

UNION COUNTY	% Population[2]		Benzene 0.368 TPD[1]	Formaldehyde 0.196 TPD[1]	n-Hexane 0.230 TPD[1]	Toluene 1.359 TPD[1]	o-Xylene 0.413 TPD[1]	p-Xylene 0.677 TPD[1]
			Pounds per Day[3]					
Berkeley Heights	2.53		18.62	9.92	11.64	68.77	20.90	34.26
Clark	3.21		23.63	12.58	14.77	87.25	26.51	43.46
Cranford	4.73		34.81	18.54	21.76	128.56	39.07	64.04
Elizabeth	21.03		154.78	82.44	96.74	571.60	173.71	284.75
Fanwood	1.51		11.11	5.92	6.95	41.04	12.47	20.45
Garwood	0.93		6.84	3.65	4.28	25.28	7.68	12.59
Hillside	4.26		31.35	16.70	19.60	115.79	35.19	57.68
Kenilworth	1.60		11.78	6.27	7.36	43.49	13.22	21.66
Linden	7.57		55.72	29.67	34.82	205.75	62.53	102.50
Mountainside	1.39		10.23	5.45	6.39	37.78	11.48	18.82
New Providence	2.41		17.74	9.45	11.09	65.50	19.91	32.63
Plainfield	9.00		66.24	35.28	41.40	244.62	74.34	121.86
Rahway	5.27		38.79	20.66	24.24	143.24	43.53	71.36
Roselle	4.09		30.10	16.03	18.81	111.17	33.78	55.38
Roselle Park	2.59		19.06	10.15	11.91	70.40	21.39	35.07
Scotch Plains	4.31		31.72	16.90	19.83	117.15	35.60	58.36
Springfield	2.82		20.76	11.05	12.97	76.65	23.29	38.18
Summit	4.13		30.40	16.19	19.00	112.25	34.11	55.92
Union	10.27		75.59	40.26	47.24	279.14	84.83	139.06
Westfield	6.00		44.16	23.52	27.60	163.08	49.56	81.24
Winfield	0.35		2.58	1.37	1.61	9.51	2.89	4.74
Portion of total Union population:	100.00%	LBS/DAY:	736.00	392.00	460.00	2,718.00	826.00	1,354.00
		TPY:	134.32	71.54	83.95	496.04	150.75	247.11

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.
[2] Population data from USDOC, 1988.

Table III-5-E-10: EPA Region II mobile source emissions for Brooklyn - Chemical emissions in pounds per day and tons per year

BROOKLYN		Benzene	Formaldehyde	n-Hexane	Toluene	o-Xylene	p-Xylene
	TPD[1]:	0.553	0.294	0.346	2.045	0.621	1.019
	TPY:	201.85	107.31	126.29	746.43	226.67	371.94

Table III-5-E-11: EPA Region II mobile source emissions for Staten Island - Chemical emissions in pounds per day and tons per year

STATEN ISLAND		Benzene	Formaldehyde	n-Hexane	Toluene	o-Xylene	p-Xylene
	TPD[1]:	0.413	0.220	0.259	1.528	0.464	0.761
	TPY:	150.75	80.30	94.54	557.72	169.36	277.77

[1] Tons per day per substance for the entire county; quantities are from Table III-5-E-4.

Microinventory Maps and Tables

The microinventory maps and listings of the identified minor and major sources within a one-kilometer radius of the project's air monitoring sites are presented in this section. The sites are presented in the order in which the microinventories were conducted.

Figure III-5-8 depicts the Carteret site and the source locations as plotted by the UTM coordinates obtained from New Jersey's Air Pollution Enforcement Data System. This map demonstrates that the states' databases often contained inaccurate geographic (UTM) data, as noted in the field surveys by the microinventory teams - compare with Figure III-5-7 and Table III-5-21.

Note: There were no major or minor sources within the microinventory area of the Piscataway, NJ, air monitoring site.

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Note: There were no major or minor sources within the microinventory area of the Piscataway, NJ, air monitoring site.

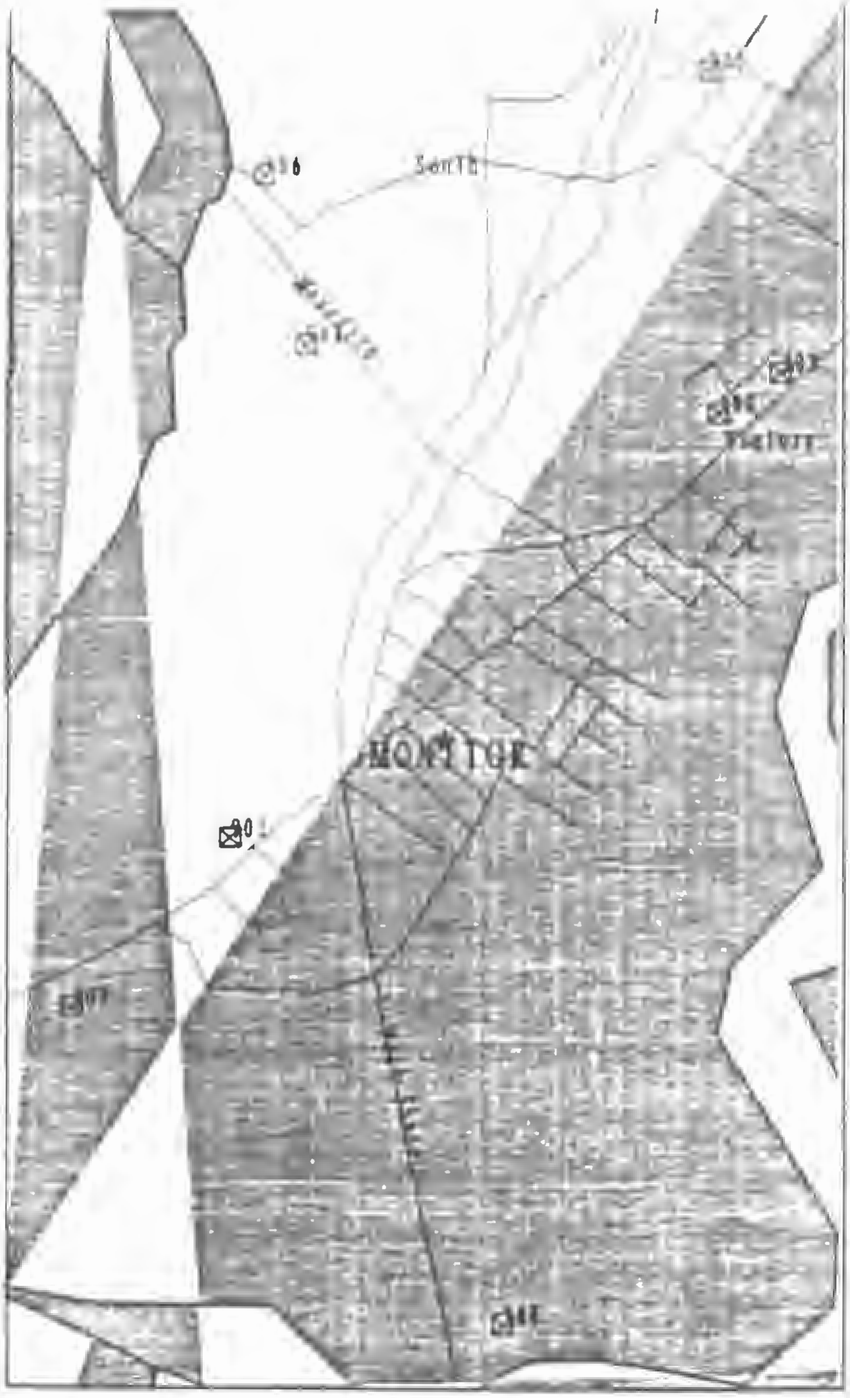

Figure III-5-5. Travis, NY, microinventory site.

Table III-5-20. Major and minor sources identified at Travis microinventory site.

TRAVIS, STATEN ISLAND					EMISSION (T/Y)	
NUMBER	**NAME**	**ADDRESS**	**TYPE**	**SMS/A**	**PM**	**VOC**
901	Con Edison	4401 Victory Bvd.	Power Plant	SMS	0.01	0.00
902	Galatros Cleaners	Baron/Victory	Dry Cleaner	--	N.A.	N.A.
903	Rex-R-Us	Baron/Travis	Auto Refinishing	--	N.A.	N.A.
904	Concrete/Rock Crusher	Meredith Ave.	Rock Crusher	--	N.A.	N.A.
905	Vanbro Corp.	1900 South Ave.	Concrete and Asphalt Plant	SMS	28.81	0.00
906	Spencer Recycle	Spencer Street	Transfer/Recycling	--	N.A.	N.A.
907	Fresh Kills Landfill	Wild Ave./River Front	Landfill	SMS	0.00	3.10
908	Fresh Kills Marine Plant	Wild Ave./River Front	Municipal	SMS	0.18	0.09

Site Summary

This site is exclusively residential with isolated small sources spread throughout the area. The largest and most visible sources are the Con Edison Facility and the landfill, both of which can be seen from miles away.

MAJOR SOURCES:

NONE

MINOR SOURCES:

All eight sourcs are minor. They are broken down as follows:

- one power plant
- one dry cleaner
- one auto refinisher
- one rock crusher
- one asphalt/concrete facility
- one municipal facility
- one landfill
- one transfer/recycling facility

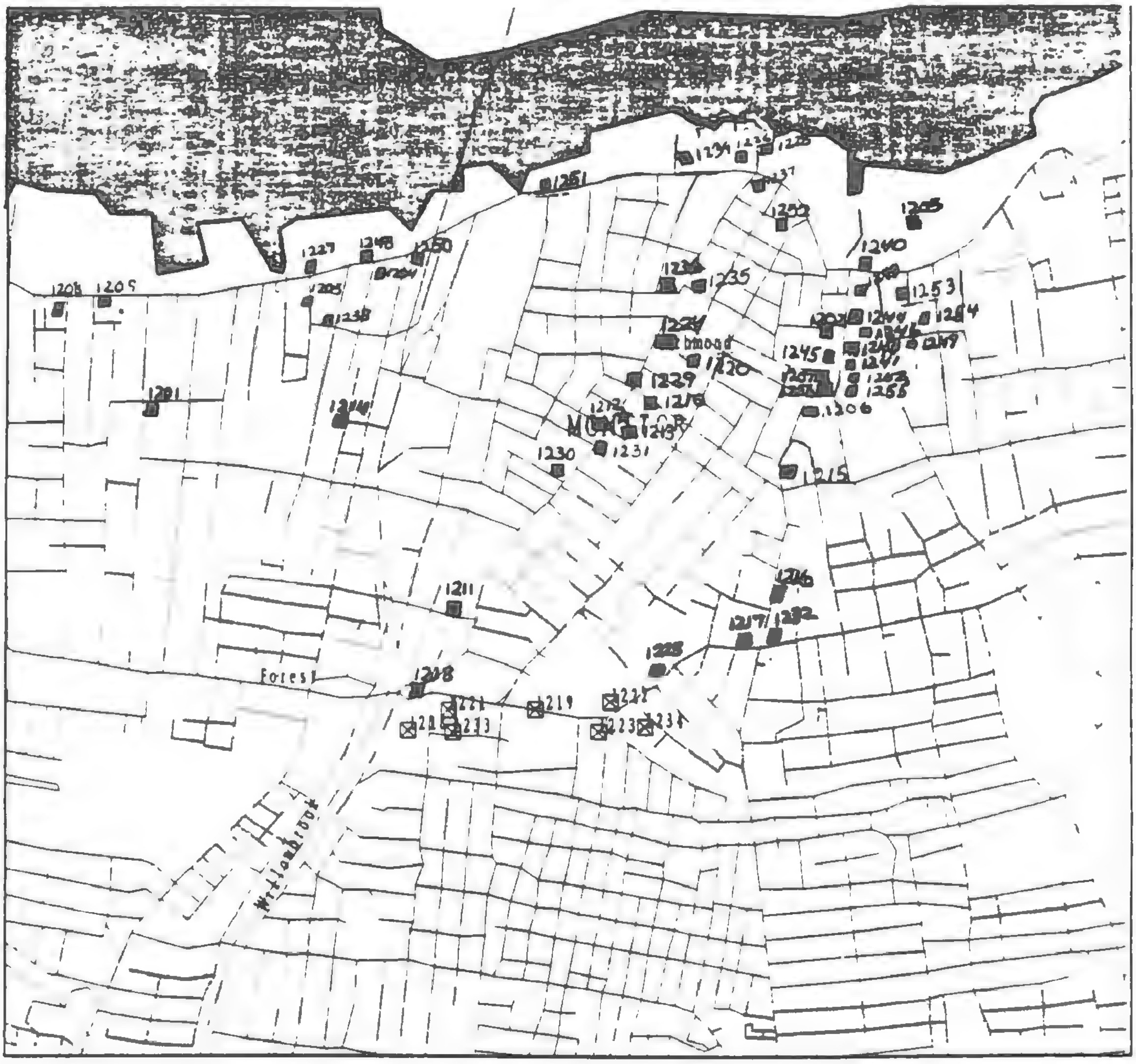

Figure III-5-6. Port Richmond, NY, microinventory site.

Table III-5-21. Major and minor sources identified at Port Richmond microinventory site.

Port Richmond, Staten Island

1201	Cross Siclara	Lake & Walker	Paper Mill/Die Casting	--	N.A.	N.A.
1202	Staten Island Paint & Waterproof	49 Jewett Ave	Paint Manufacture	--	N.A.	N.A.
1203	Fiore Bros.	Granite & LaSalle	Oil/Gas Transfer & Storage	--	N.A.	N.A.
1204	SIPCO Oil Distributors	2541 Richmond Terrace	Oil/Gas Transfer & Storage	--	N.A.	N.A.
1205	Port Richmond POTW	Richmond Terrace/Donegan St	NYCDEP POTW	SMS	0.00	7.12
1206	Castleton Bus Depot	Castleton Rd/Rector	NYC Bus Depot	SMS	0.96	0.16
1207	Tritto's Iron Works	1341 Castleton Road	Metalworks	--	N.A.	N.A.
1208	A. Supino Iron Metals	2585 Richmond Terrace	Metal Recycling (open Burning	--	N.A.	N.A.
1209	P&F Iron Works	2582 Richmond Terrace	Metal Recycling	--	N.A.	N.A.
1210	Score Station	Post/Richmond Ave.	Gas Station	--	N.A.	N.A.
1211	Mobil Station	Port Richmond/Van Riper	Gas Station	SMS	0.00	10.50
1212	Citgo Service Station	Port Richmond/Hatfield	Gas Station	--	N.A.	N.A.
1213	Getty Service Station	Port Richmond/Hatfield	Gas Station	SMS	0.00	1.43
1214	Certified Gas Station	Morning Star Rd/Kalvis	Gas Station	--	N.A.	N.A.
1215	Getty Station	Jewett Av/Post Av	Gas Station	SMS	0.00	4.03
1216	American All-Star Station	Jewett Av/Forest	Gas Station	--	N.A.	N.A.
1217	Mobil Station	Jewett Av/Forest	Gas Station	SMS	0.00	1.40
1218	Sunoco Station	Forest Av/Willowbrook	Gas Station	--	N.A.	N.A.
1219	Hess Station	Forest Av/Decker	Gas Station	SMS	0.00	6.75
1220	Central Cleaning & Tailor	Port Richmond Ave	Dry Cleaner	--	N.A.	N.A.
1221	Budget Dry Cleaning	Forest Av/Willowbrook	Dry Cleaner	--	N.A.	N.A.
1222	Paul Miller Dry Cleaning	Forest Av/Livermore	Dry Cleaner	--	N.A.	N.A.
1223	Jennifer Dry Cleaners	Forest Av/Livermore	Dry Cleaner	--	N.A.	N.A.
1224	Richmond Dry Cleaning	Castleton/Port Richmond	Dry Cleaner	--	N.A.	N.A.
1225	Charton Cleaners	Barrett Ave/Forest	Dry Cleaner	--	N.A.	N.A.
1226	Flag Container Services	Ferry Street	Demolition/Rubbish Removal	--	N.A.	N.A.
1227	Lester Kehoe Machinery	2581 Richmond Terrace	Degreasing	--	N.A.	N.A.
1228	Scann Mix Concrete	Richmond Terrace	Concrete Manufacture	--	N.A.	N.A.
1229	Antique Brass Works	290 Port Richmond Ave	Brass Smelter	SMS	N.A.	0.19
1230	Melone & Sons	17 Hooker Place	Bakery (24 Hour)	--	N.A.	N.A.
1231	Piazza Bakery	Port Richmond	Bakery	--	N.A.	N.A.
1232	Raymond Bakery	Jewett Av/Forest	Bakery	--	N.A.	N.A.
1233	Renato Imperial Pastry Shoppe	Forest Av/Willowbrook	Bakery	--	N.A.	N.A.
1234	TJ Cinnamon's Bakery	Forest Av/Livermore	Bakery	--	N.A.	N.A.
1235	Bakery (no name)	96 Vreeland	Bakery	--	N.A.	N.A.
1236	Home of Oven Bake Shop	137 Port Richmond	Bakery	--	N.A.	N.A.
1237	Artie's Painting Autobody	Richmond Terrace	Auto Refinishing	--	N.A.	N.A.
1238	Tri- Star Auto Body	LaSalle Street	Auto Refinishing	--	N.A.	N.A.
1239	G & G Custom Autobody	Ferry Street	Auto Refinishing	--	N.A.	N.A.
1240	Certified Auto Service	Clove Rd/Richmond Terr	Auto Refinishing	--	N.A.	N.A.
1241	Richmond County Collision	Clove Rd/Castleton	Auto Refinishing	--	N.A.	N.A.
1242	Dependable Autobody & Fender	Castleton Rd/Rector	Auto Refinishing	--	N.A.	N.A.
1243	Two Bros Autobody	99 Rector Street	Auto Refinishing	--	N.A.	N.A.
1244	Mid Island Auto Body	95 Rector Street	Auto Refinishing	--	N.A.	N.A.
1245	Fran Mai Auto Body	91 Jewett Ave	Auto Refinishing	--	N.A.	N.A.
1246	Jimbo Custom Auto Painting	39 Rector Street	Auto Refinishing	--	N.A.	N.A.
1247	PNP Auto Body	39 Rector Street	Auto Refinishing	--	N.A.	N.A.
1248	Maaco Auto Painting	2550 Richmond Terrace	Auto Refinishing	SMS	0.20	1.70
1249	Joe's Ideal Auto Body	25 Rector Street	Auto Refinishing	--	N.A.	N.A.

Table III-5-21. (continued) Port Richmond

1250	DeVille II Auto Collision	2432 Richmond Terrace	Auto Refinishing	--	N.A.	N.A.
1251	Saccone Bros. Autobody	2205 Richmond Terrace	Auto Refinishing	--	N.A.	N.A.
1252	Central Auto Body	21 Herberton Ave	Auto Refinishing	--	N.A.	N.A.
1253	Ted's Rite Way Auto Body	150 Clove Road	Auto Refinishing	--	N.A.	N.A.
1254	Perfect Auto Repair	150 Clove Road	Auto Refinishing	--	N.A.	N.A.
1255	J&M Autobody	1347 Castleton Road	Auto Refinishing	--	N.A.	N.A.
1256	East Coast Auto Body	1335 Castleton Road	Auto Refinishing	--	N.A.	N.A.

<u>Site Summary</u>

This site was a mix of residential and commercial establishments evenly distributed throughout the area. There were several main boulevards that contained commercial shopping areas, and the area near the Kill Van Kull (on the north edge of the site) was mostly industrial. There was a high density of auto refinishers in the north area of the site.

MAJOR SOURCES:
NONE

MINOR SOURCES:

All 56 sources located in the microinventory were minor sources. The breakdown of these sources is as follows:

- 20 auto refinishers
- 10 gas stations
- 7 bakeries
- 6 dry cleaners
- 2 oil/gas transfer & storage facilities
- 2 metal recycling facilities
- the rest are comprised of: a paper mill/die casting facility, a paint manufacturer, a POTW, a bus depot, a demolition & rubbish removal facility, a degreaser, a concrete manufacturer and a brass smelter.

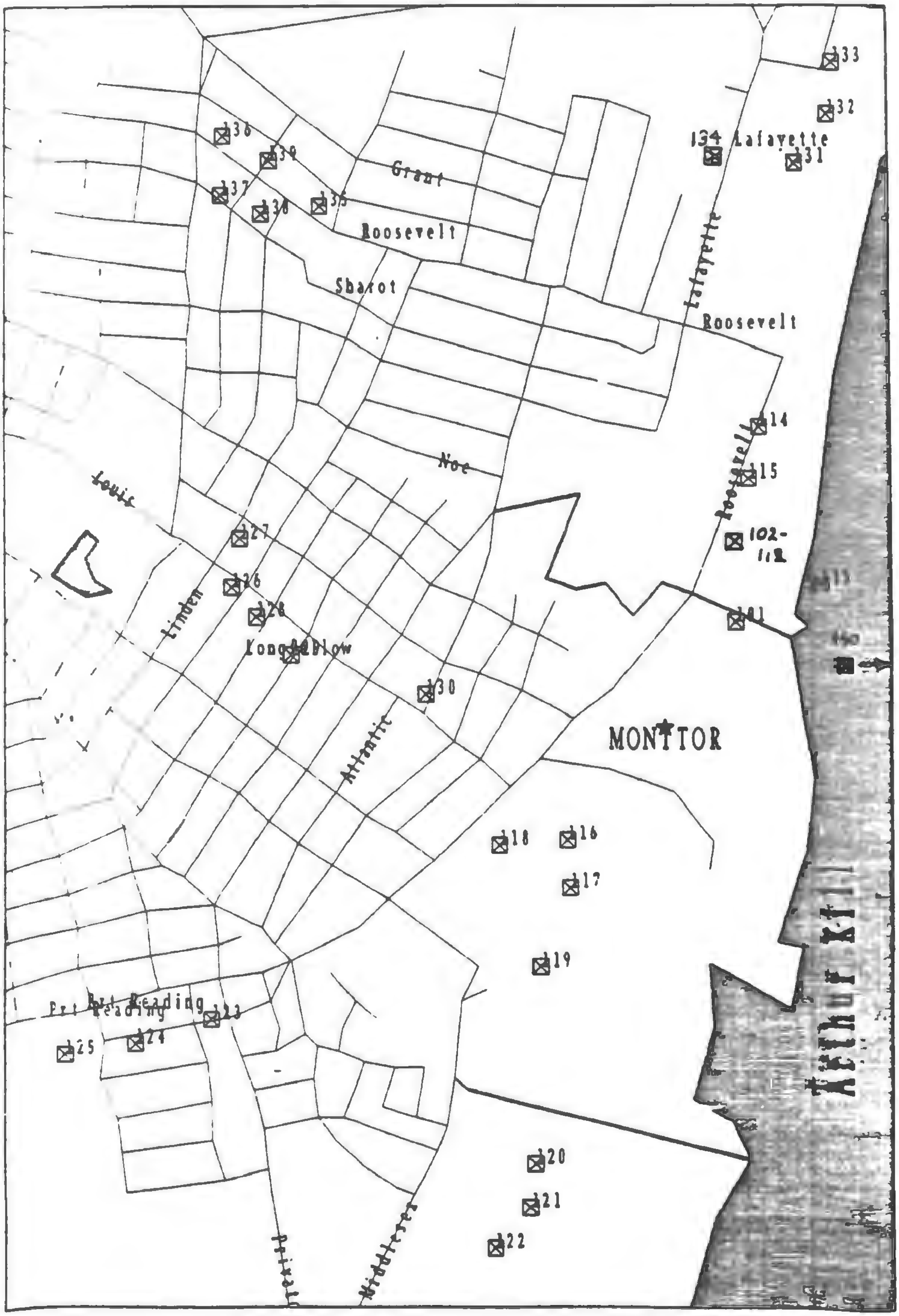

Figure III-5-7. Carteret, NJ, microinventory site.

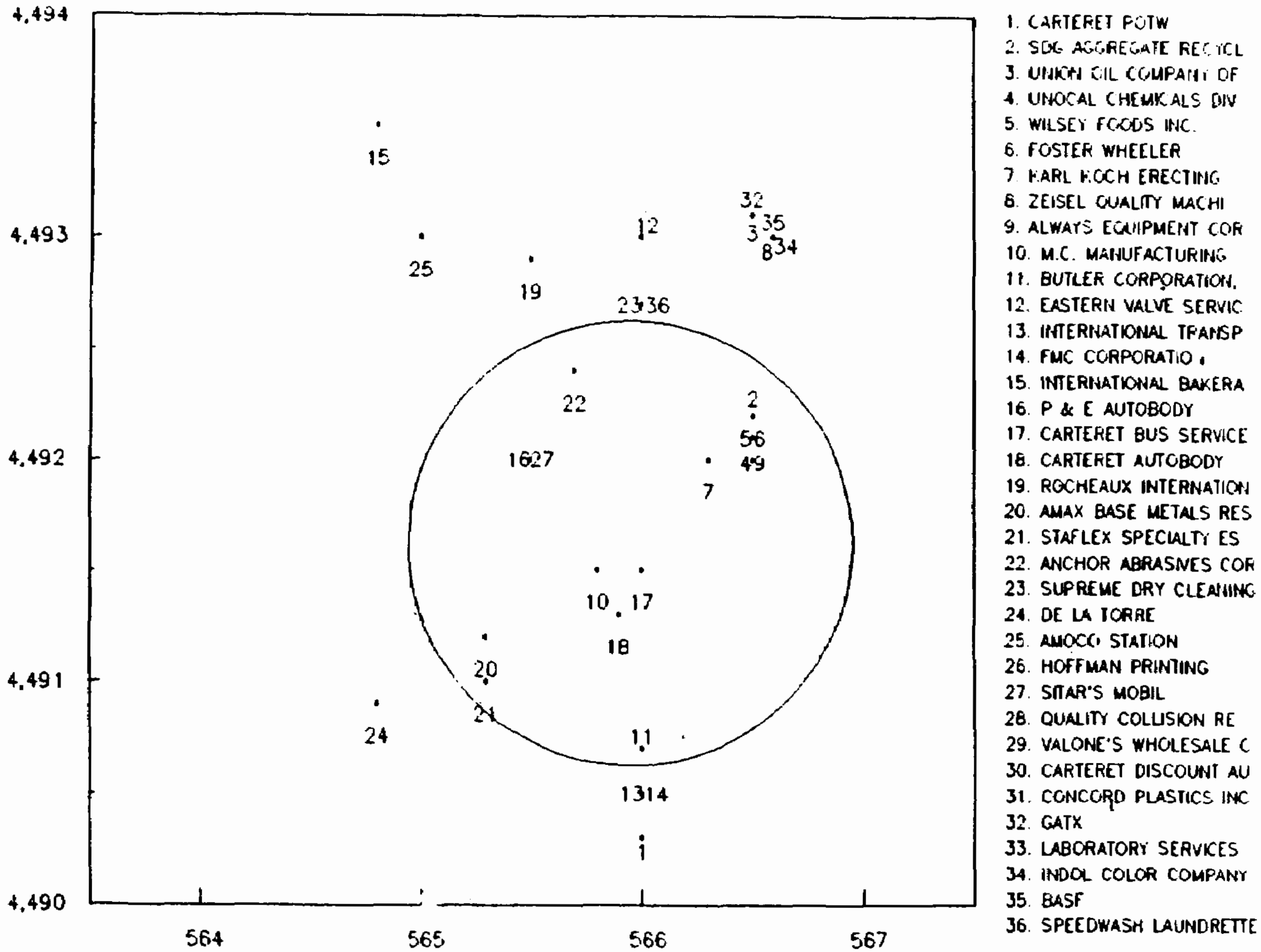

Figure III-5-8: Plot of major and minor sources at the Carteret site by UTM coordinates in the APEDS database.

Table III-5-22. Major and minor sources at Carteret, NJ microinventory site.

Carteret, New Jersey

NUMBER	NAME	ADDRESS	TYPE	SMS/A	PM	VOC
101	CARTERET STP	339 Roosevelt	Sewage Treatment Plant	APEDS	0.00	
102	SDG AGGREGATE RECYCLING CONCRETE/ASPHALT	377 Roosevelt	Concrete and Asphalt Plant			
103	UNION OIL COMPANY OF CALIFORNIA	350 Roosevelt Avenue	Oil/Gas Transfer & Storage	APEDS	0.11	54.37
104	UNOCAL CHEMICALS DIVISION	350 Roosevelt Avenue	Chemical Manufacturer	APEDS	0.00	0.20
105	WILSEY FOODS INC.	351 Roosevelt Avenue	Bakery	APEDS	10.44	1.17
106	FOSTER WHEELER	377 Roosevelt Avenue	Machine manufacturer			
107	KARL KOCH ERECTING	377 Roosevelt Avenue	Builders			
108	ZEISEL QUALITY MACHINE TOOLS	377 Roosevelt Avenue	Tools (Had gas pump)			
109	ALWAYS EQUIPMENT CORP	377 Roosevelt Avenue	Machine manufacturer			
110	M.C. MANUFACTURING	377 Roosevelt Avenue	Machine manufacturer			
111	BUTLER CORPORATION, H.F.	377 Roosevelt Avenue	Machine Manufacturer	APEDS	1.94	0.00
112	EASTERN VALVE SERVICE INC.	377 Roosevelt Avenue	Machine Manufacturer	APEDS	0.00	0.00
113	INTERNATIONAL TRANSPORTATION SERVICES	367 Roosevelt Avenue	Trucking Company			
114	FMC CORPORATION	500 Roosevelt Avenue	Bulk Powders Manufacturer	APEDS	1.20	0.00
115	INTERNATIONAL BAKERAGE,INC.	377 Roosevelt Avenue	Bakery	APEDS	1.34	0.00
116	P & E AUTOBODY	188 Roosevelt Avenue	Auto Refinishing			
117	CARTERET BUS SERVICE INC	1375 Roosevelt Avenue	Gas Station & Bus Depot	APEDS	0.00	10.95
118	CARTERET AUTOBODY	188 Roosevelt Avenue	Auto Refinishing			
119	ROCHEAUX INTERNATIONAL	100 Middlesex Avenue	Miscellaneous Storage	APEDS	0.01	0.00
120	AMAX BASE METALS RESEARCH AND DEV. INC.	400 Middlesex Avenue	Secondary Nonferrous Metals	APEDS	2.01	1.70
121	STAFLEX SPECIALTY ESTERS	400 Middlesex Avenue	Chemical Manufacturer			
122	ANCHOR ABRASIVES CORP.	400 Middlesex Avenue	Sand-blasting	APEDS	0.42	31.54
123	SUPREME DRY CLEANING	Pershing & Roosevelt	Dry Cleaners	APEDS	0.00	?
124	DE LA TORRE	89 Roosevelt Avenue	Dry Cleaners			
125	AMOCO STATION	S E Grant & Port Reading	Gas Station	APEDS	0.00	10.95
126	HOFFMAN PRINTING	29 Washington Avenue	Printing			
127	SITAR'S MOBIL	150 Washington Avenue	Gas Station	APEDS	0.00	10.95
128	QUALITY COLLISION REPAIRS	Linden & Washington	Auto Refinishing			
129	VALONE'S WHOLESALE COOKIE OUTLET	46 Washington Avenue	Bakery			
130	CARTERET DISCOUNT AUTOPARTS, AUTOBODY	35 Cook Avenue	Auto Refinishing			
131	CONCORD PLASTICS INC	31 Lafayette Street	Injection Molders			
132	GATX	78 Lafayette Street	Oil/Gas Transfer & Storage	APEDS	1.40	998.98
133	LABORATORY SERVICES INC.	85 Lafayette Street	Petro-Chemical Testing			
134	INDOL COLOR COMPANY	Leffert Street	Inorganic Pigments	APEDS	0.00	0.08
135	BASF	Roosevelt & Grant	Chemicals Manufacturing			
136	SPEEDWASH LAUNDRETTE & DRY CLEANERS	779 Roosevelt (& Grant)	Dry Cleaners	APEDS	0.00	?
137	GULF STATION	Washington/Roosevelt	Gas Station			
138	AMOCO OIL COMPANY	756 Roosevelt (& Washington)	Gas Station	APEDS	0.00	32.81
139	AMOCO OIL COMPANY	Roosevelt & Grant	Oil/Gas Transfer & Storage	APEDS	0.00	784.12
140	FRESH KILLS LANDFILL	STATEN ISLAND	LANDFILL	SMS	0.00	1.14

Site Summary

The site is predominantly residential, except for the area along the Arthur Kill River which is highly industrialized. Across the Arthur Kill, in Staten Island, is the Fresh Kills Landfill. It is the largest landfill in the world.

Table III-5-22. (continued) Carteret

MAJOR SOURCES:

0103. Union Oil Company of California - 54.37 Tons/Yr of VOC - mostly gasoline and methylene chloride.

0114. FMC Corporation - listed in APEDS as a major source, but does not emit any appreciable amounts of pollutants monitored for in the Study.

0132. GATX Terminals - 999 Tons/Yr of VOC - mostly gasoline, also considerable quantities of methylene chloride, toluene, hexane, xylenes, styrene, methyl ethyl ketone and acetone.

0139. Amoco Oil Company - 784 Tons/Yr of VOC - all gasoline

MINOR SOURCES:

There are 36 minor sources that were located during the microinventory. The breakdown is as follows:

- Three dry Cleaners
- Six Gas Stations (or facilities with gas pumps)
- Six Machine Manufactures or Builders
- Four Auto Refinishers
- Three Small Chemical Manufacturers
- Three Bakeries
- The remaining sources are: a small sewage treatment plant, a metals manufacturer, a concrete & asphalt plant, a trucking company, a sandblasting company, an injection molder, a storage facility, a chemical testing lab, a pigment manufacturer, a printer, a monster landfill.

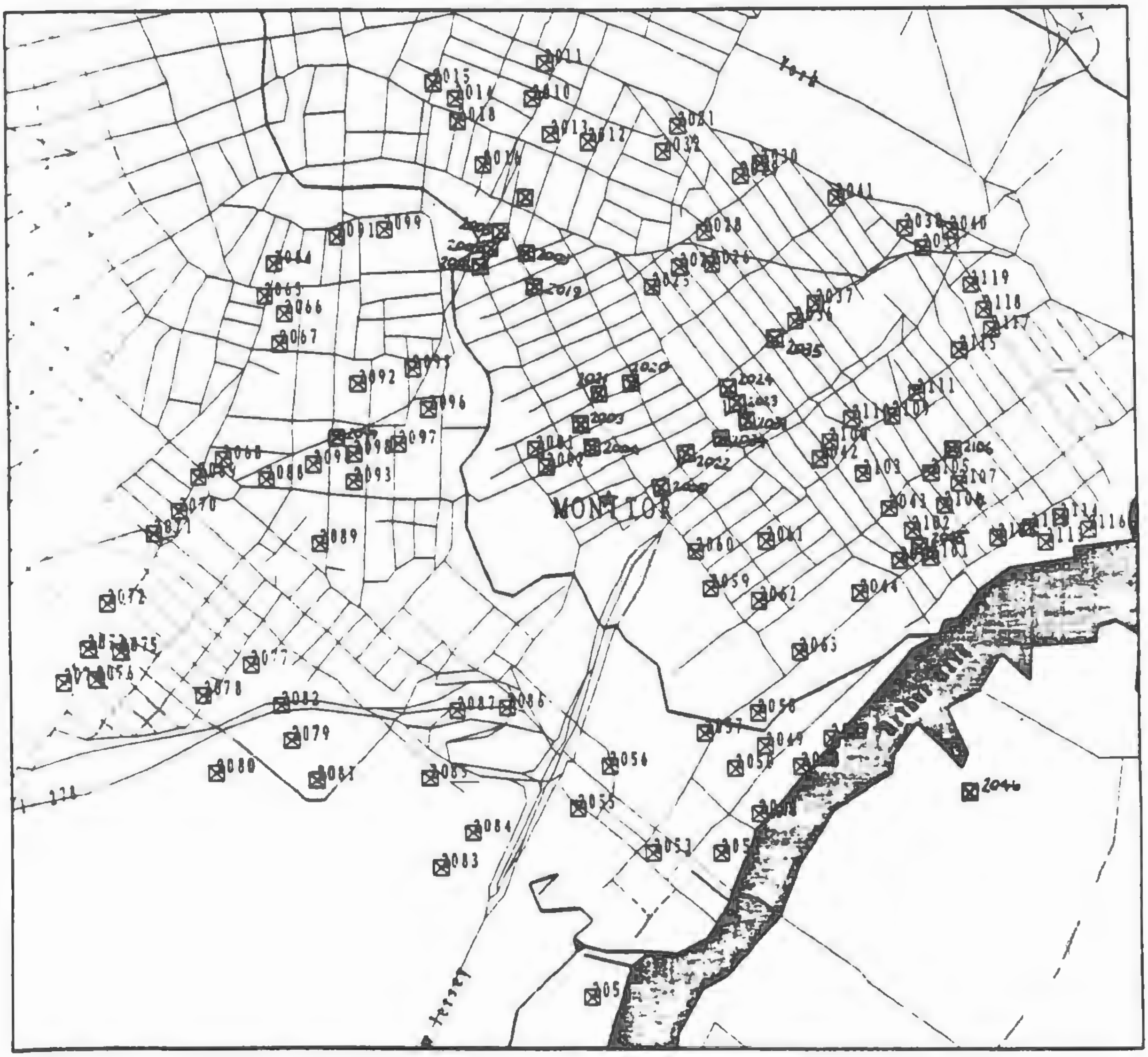

Figure III-5-9. Elizabeth, NJ, microinventory site.

Table III-5-23. Major and minor sources at Elizabeth microinventory site.

Elizabeth, New Jersey

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
2001	PAOLUCCI AUTO CARE (GULF)	SOUTH 5TH ST. AND 5TH AVE.	Gas Station	APEDS	0.00	10.95
2002	JORGE'S AUTOBODY SHOP	SOUTH 5TH ST. AND 5TH AVE.	Auto Refinishing	--	NA	NA
2003	MANACO'S AUTO CENTER (CITGO)	SOUTH 5TH ST. AND 4TH AVE.	Gas Station	APEDS	0.00	10.95
2004	LOUIS' AUTO REPAIR	SOUTH 5TH ST. AND 4TH AVE.	Gas Station	APEDS	0.00	10.95
2005	NJ DOT BAYWAY CENTER	TRENTON AVE. AND 4TH AVE.	Transportation (gas station)	APEDS	0.00	27.38
2006	ENVELOPES & PRINTING CO INC	57 S. SPRING ST	Printing	--	NA	NA
2007	ELIZABETH BOLT/NUT MANUFACTURING CORP.	65 SOUTH SPRING ST.	Metals Manufacturing	--	NA	NA
2008	MONARCH METAL FABRICATORS	SOUTH SPRING AND 3RD AVE.	Metals Manufacturing	--	NA	NA
2009	TOWN OF ELIZABETH RECYC. CENT.	SOUTH SPRING AND 3RD AVE.	Recycling	--	NA	NA
2010	CRINCOLI WOODWORK CO. INC.	160 SPRING ST.	Furniture Manufacturing	APEDS	0.01	1.13
2011	MOBIL STATION	200 SPRING ST.	Gas Station	APEDS	0.00	10.95
2012	ELIZABETH GENERAL MEDICAL CENTER	925 E. JERSEY ST.	Hospital (incinerator)	APEDS	1.01	0.00
2013	ONE-STOP GULF STATION	1002 E. JERSEY ST. & SPRING ST	Gas Station	APEDS	0.00	10.95
2014	GETTY STATION	1101 E. JERSEY ST & MADISON	Gas Station	APEDS	0.00	10.95
2015	SHELL STATION	E. SCOTT & ELIZABETH AVE.	Gas Station	APEDS	0.00	38.35
2016	GETTY STATION	ELIZABETH & W. MRAVLAG	Gas Station	--	NA	NA
2017	ABBA PRODUCTS	1004 ELIZABETH AVE	Bird seed manufacturer	--	NA	NA
2018	JEFFERSON HIGH SCHOOL INCINERATOR	E. JERSEY ST & MORRELL AVE	Incinerator	--	NA	NA
2019	SARACENO'S BAKERY	CENTRE ST & 3RD AVE	Bakery	--	NA	NA
2020	IVORY AUTO BODY SHOP	S. FIFTH ST & 3RD AVE	Auto Refinishing	--	NA	NA
2021	EXXON STATION	S. FIFTH ST & 3RD AVE	Gas Station	APEDS	0.00	38.68
2022	GROVER CLEVELAND JHS BOILER	1ST AVE & RANKIN ST	Boiler	--	NA	NA
2023	EXXON STATION (MARA SERVICE?)	ELIZABETH AVE & 5TH ST	Gas Station	APEDS	0.00	38.32
2024	MARA BAKERY	ELIZABETH AVE & 5TH ST	Bakery	--	NA	NA
2025	EARLY BIRD CLEANERS	FRANKLIN ST & 7TH ST	Dry Cleaners	--	NA	NA
2026	REYNOLD'S CLEANERS	FRANKLIN ST & 7TH ST	Dry Cleaners	APEDS	0.00 ?	
2027	EASTERN SAMPLE SERVICE	659 MARSHALL AVE (& 7TH)	UNKNOWN	--	NA	NA
2028	ALEXIAN BROS HOSPITAL	E. JERSEY ST & 7TH ST	Hospital (incinerator)	APEDS	0.00	0.00
2029	PORT TRUCK REPAIR	7TH ST BET BWAY & S. PARK	Gas Station	--	NA	NA
2030	PORTUGUESE AUTO REPAIR	700 COURT STREET	Auto Refinishing	--	NA	NA
2031	NEW YORK PETERS CORP	805 GRAND ST.	Printing, Paper Products	--	NA	NA
2032	NJ TRANSIT BUS GARAGE	LIVINGSTON ST. & DIVISION ST.	Transportation (gas station)	APEDS	0.45	0.70
2033	O.K. DRY CLEANERS	521 ELIZABETH AVE.	Dry Cleaners	--	NA	NA
2034	NA-VET PRINTING CO.	506 ELIZABETH AVE.	Printing	--	NA	NA
2035	SUPER CAKE BAKERY	5TH & FULTON STS.	Bakery	--	NA	NA
2036	LEMY DRY CLEANERS	5TH & JERSEY STS.	Dry Cleaners	--	NA	NA
2037	SCORE GAS	5TH & LIVINGSTON STS.	Gas Station	--	NA	NA
2038	JERSEY PRIDE FOODS (PAPETTI)	PAPETTI PLAZA	Food Products	APEDS	0.04	0.00
2039	KANSAS J. STANLEY MARINE SUPPLIES	PAPETTI PLAZA	UNKNOWN	--	NA	NA
2040	AIRDYNE INDUSTRIES	455 TRUMBULL AVE.	Propane Filling Station	--	NA	NA
2041	ELIZABETH TRUCK STOP	6TH & BOND STS.	Gas Station	APEDS	0.00	10.95
2042	AMOCO STATION	1ST ST. & ELIZABETH AVE.	Gas Station	APEDS	0.00	32.85
2043	EBONY CLEANERS	SOUTH 2ND ST. & ELIZABETH AVE.	Dry Cleaners	--	NA	NA
2044	THOMAS & BETTS CORP	36 BUTLER ST.	Electrical Products	APEDS	7.24	0.00
2045	J&S CUSTOM CAR CARE	137 ELIZABETH AVE.	Auto Refinishing	--	NA	NA
2046	PROCTOR & GAMBLE CORP.	40 WESTERN AVE (STATEN ISLAND)	Soap & detergent manufacturer	SMS	0.71	1.33
2047	LOIZEAUX BUILDING SUPPLY CO	40 S. FRONT ST	Cement manufacturer (& gas pu	APEDS	0.11	0.00

Table III-5-23. (continued) Elizabeth

2048 CHEVRON USA TANK FARM	S. FRONT ST	Oil/Gas Transfer & Storage	--	NA	NA
2049 CROWN PETROLEUM CORP	450 S. FRONT ST	Oil/Gas Transfer & Storage	APEDS	NA	20.19
2050 CRODA STORAGE INC	534 S. FRONT ST	Oil/Gas Transfer & Storage	APEDS	2.54	9.07
2051 ARCHER DANIELS MIDLAND CORP	554 S. FRONT ST	Oil/Gas Transfer & Storage	APEDS	6.18	0.44
2052 JOSEPH CORY	666 S. FRONT ST	Furniture Manufacturing	APEDS	12.47	0.00
2053 PHELPS DODGE BUTLER COPPER PRODUCTS	BAYWAY & S. FRONT ST	Copper manufacturing	APEDS	0.82	0.00
2054 & # 80 EXXON BAYWAY REFINERY	END OF S. FRONT ST	Oil/Gas Transfer & Storage	APEDS	NA	1440.65
2055 REICHHOLD CHEMICAL CORP	726 ROCKEFELLER AVE	Chemical manufacturer	APEDS	NA	63.57
2056 OLYMPIA TRIALS BUS DEPOT.	BAYWAY AVE. NEAR ROCKEFELLER	Transportation (gas station)	--	NA	NA
2057 JOINT MEETING OF ESSEX AND UNION POTW	500 SOUTH FIRST ST.	POTW	APEDS	0.00	74.95
2058 CYCLE CHEMICAL	217 SOUTH 1ST ST.	Chemical manufacturer	APEDS	0.59	1.49
2059 BILKAYS EXPRESS CO.	BILKAYS BLVD & THIRD AVE.	Trucking	--	NA	NA
2060 ELIZABETHTOWN GAS PRODUCTION PLANT	3RD AVE. & FLORIDA ST.	Bulk Storage	APEDS	0.00	32.85
2061 ELIZABETH BAKERY INC.	52 GENEVA ST.	Bakery	--	NA	NA
2062 LAMETEX CORP	BUTLER & 3RD STS.	UNKNOWN	--	NA	NA
2063 APEX CHEMICAL CO.	200 SOUTH 1ST ST.	Chemical manufacturing	APEDS	0.00	0.00
2064 SNOW LAUNDROMAT & CLEANERS	163 WASHINGTON AVE.	Dry cleaners	--	NA	NA
2065 TRIXEIRA'S BAKERY	161 WASHINGTON AVE.	Bakery	--	NA	NA
2066 COSMOS TAILOR & CLEANERS	304 WASHINGTON AVE.	Dry cleaners	--	NA	NA
2067 MASTER PRINTING	302 WASHINGTON AVE.	Printing	--	NA	NA
2068 AMOCO GAS	BAYWAY CIRCLE & RT. 1	Gas Station	APEDS	0.00	10.95
2069 SHELL GAS	BAYWAY CIRCLE & RT. 1	Gas Station	APEDS	0.00	10.95
2070 VINCENT'S TAILORS & DRY CLEANING	731 WASHINGTON AVE.	Dry Cleaning	--	NA	NA
2071 ABC PRINTING CO.	741 WASHINGTON AVE.	Printing	--	NA	NA
2072 AVIS RENTAL	RT. 1&9 OFF WASHINGTON AVE.	Gas Station	--	NA	NA
2073 EXXON GAS	RT. 1&9 OFF WORTH AVE.	Gas Station	--	NA	NA
2074 EXXON RESEARCH & TECHNOLOGY	RT. 1&9 OFF WORTH AVE.	Research & Development	--	NA	NA
2075 BP GAS STATION	RT. 1&9 OFF PARK AVE.	Gas Station	--	NA	NA
2076 EDGAR RD. TANK WORKS	RT. 1&9 OFF GILCHRIST	Auto Refinishing	--	NA	NA
2077 MAPES & SPROWL CORP.	BEDLE & BACHELLER ST.	Metals Manufacturing	--	NA	NA
2078 PARK CUSTOM MOLDING	940 PARK AVE.	Plastics manufacturing	--	NA	NA
2079 CONVERTERS INK	1301 SO. PARK AVE. (LINDEN)	Ink manufacturer	APEDS	0.97	72.44
2080 SEE # 54	SO. PARK AVE				
2081 ROTUBA EXTRUDERS	1401 SO. PARK AVENUE	Plastics manufacturing	APEDS	1.50	0.00
2082 HERTZ PENSKE	1450 PARK AVENUE	Transportation (gas station)	--	NA	NA
2083 ETO STERILIZATION CORP	2500 BRUNSWICK AVE	Ethylene oxide sterilization	APEDS	0.00	0.04
2084 LAMINATED PAPER PRODUCTS	2500 BRUNSWICK AVE	Paper products	--	NA	NA
2085 SIMMONS INC	2550 BRUNSWICK AVE	Bedding Manufacturers	APEDS	0.10	0.00
2086 AMOCO GAS	PULASKI & BAYONNE AVE	Gas Station	--	NA	NA
2087 EXXON GAS STATION	BAYWAY AVE & MCKINLEY ST	Gas Station	APEDS	0.00	48.49
2088 METRO 1 GAS	RT. 1&9 & BAYWAY CIRCLE	Gas Station	--	NA	NA
2089 SANTILLO ITALIAN BREAD AND PIZZA	641 BROAD ST.	Bakery	--	NA	NA
2090 ELIZABETH CENTRAL HOSPITAL	BROAD & PEARL STS.	Hospital (incinerator)	APEDS	0.00	0.00
2091 G&J MOBIL SERVICE CENTER	211 BROAD ST.	Gas Station	APEDS	0.00	38.26
2092 SOUTH BROAD TAILORS & CLEANERS	458 SO. BROAD ST.	Dry Cleaning	--	NA	NA
2093 TOKYO CLEANERS	560 SOUTH BROAD ST.	Dry Cleaning	--	NA	NA
2094 UNLABLED GAS STATION	RT. 1&9 OFF GRIER ST.	Gas Station	--	NA	NA
2095 J&D EXXON	RT. 1&9 OFF HETFIELD	Gas Station	APEDS	0.00	10.95
2096 MOSCARITULO BROS. GETTY STATION	RT. 1&9 OFF FILMORE ST.	Gas Station	APEDS	0.00	10.95
2097 CIRCLE FUEL OIL	RT. 1&9 OFF FILMORE ST.	Gas Station	--	NA	NA
2098 CITGO GAS	RT. 1&9 OFF GRIER ST.	Gas Station	APEDS	0.00	10.95
2099 BELLOMO FUEL CO	RT. 1&9 OFF ALLEN ST.	Gas Station	APEDS	0.00	10.95

Table III-5-23. (continued) Elizabeth

2100	AMERICAN PRINTING CO.	328 ELIZABETH ST.	Printing	--	NA	NA
2101	ADA LAUNDROMAT & DRY CLEANING	10 SOUTH 1ST ST.	Dry Cleaning	--	NA	NA
2102	H&M PRINTING	5 2ND STREET	Printing	--	NA	NA
2103	FONSECA CLEANERS	11 RD ST.	Dry Cleaners	APEDS	0.00 ?	
2104	STEEL BRITE POLISHING	127 FRANKLIN ST	Metal Polishing	--	NA	NA
2105	FRANCALANCIA BAKERY	85 2ND ST	Bakery	--	NA	NA
2106	FONSECA GETTY	2ND ST & E. JERSEY ST	Gas Station	APEDS	0.00	10.95
2107	EL ALCAZAR BAKERY & PIZZERIA	108 EAST JERSEY ST	Bakery	--	NA	NA
2108	EXACT ANODIZING CORP	LIVINGSTON ST	Electroplating	--	NA	NA
2109	FLAMINGO BAKERY	120 3RD ST	Bakery	--	NA	NA
2110	CONTINENTAL WELDING CO	336 LIVINGSTON ST	Welder	--	NA	NA
2111	UNLABLED GAS STATION	SO PARK AV & 3RD ST	Gas Station	--	NA	NA
2112	JOSPEH'S AUTO BODY	SO PARK AV & 1ST	Auto Refinishing	--	NA	NA
2113	H&H AUTO BODY	SO PARK AV & 1ST	Auto Refinishing	--	NA	NA
2114	BELTS PLASTICS PRODUCTS	160-166 1ST ST	Injection Molding	--	NA	NA
2115	PORT SERVICE GARAGE	311 MAGNOLIA AVE	Gas Station	APEDS	0.00	10.95
2116	GARCIA UNIFORM	PINE & 1ST STS	Clothier	--	NA	NA
2117	AMOCO GAS STATION	3RD & PINE STS	Gas Station	--	NA	NA
2118	BON-ART INTERNATIONAL INC	325 PINE ST	Manufacturing	APEDS	0.03	11.55
2119	CUSTOM BANDAG	PINE & 4TH STS	Tire retreading	APEDS	0.09	1.74

Site Summary

This site contained, by far, the most number of sources found in any site area in all 15 microinventories. It was extremely commercialized with many small sources interspersed with residences. The area along the banks of the Arthur Kill was heavily industrialized, including large sources such as Exxon Bayway.

MAJOR SOURCES:

2054 & 2080. Exxon Layway Refinery - 1440.65 Tons/yr of VOC - mostly gasoline and xylene.

2050. Croda Storage - 9.07 Tons/yr VOC & 2.54 PM - but no emissions of pollutants considered in SI/NJ UATAP.

2049. Crown Petroleum - 20.19 Tons/Yr of gasoline.

2055. Reichold Chemical - 63.57 Tons/Yr of VOC - mostly toluene and xylene, smaller amounts of gasoline, formaldehyde, styrene, methyl and ethyl ketone and acetone.

MINOR SOURCES:

There are 114 minor sources that were located during the microinventory. The breakdown is as follows:

- 37 gas stations/gas distributors
- 12 dry cleaners
- 9 bakeries
- 7 auto refinishers
- 7 printers
- 5 boilers/incinerators
- 4 metals manufacturers
- 3 furniture manufacturers
- 2 chemical manufacturers
- 2 oil/gas transfer & storage facilities
- 2 plastics manufacturers

- the remaining are: a sewage treatment plant, three unknown facilities, a recycling facility, a bird seed manufacturer, a food manufacturer, a propane filling station, an electrical products manufacturer, a soap/detergent manufacturer, a cement producer, a trucking company, a bulk storage terminal, a petroleum research facility, an ink manufacturer, an ethylene oxide sterilizer, a paper

Table III-5-23. (continued) Elizabeth

producer, a metal polisher, an electroplater, a welder, an injection molder, a clothier, a tire retreader, an unknown type of manufacturer, a food distibutor, a toiletry manufacturer, a general woodworking facility, a chemical manufacturer, a cannery, an industrial gas distributor, a bakery, and a school.

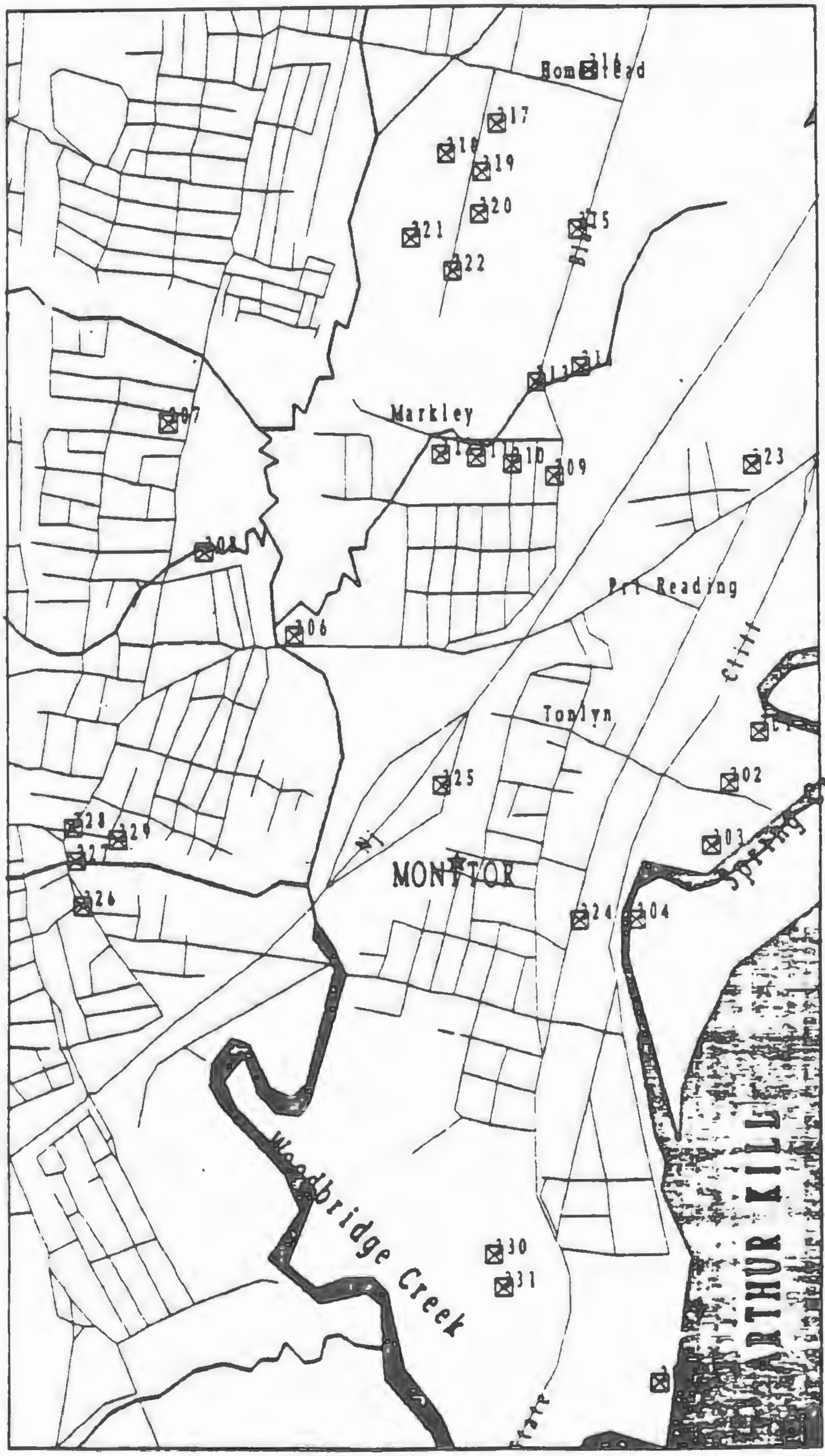

Figure III-5-10. Sewaren, NJ, microinventory site.

Table III-5-24. Major and minor sources at Sewaren microinventory site.

Sewaren, New Jersey

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
301	AMERADA HESS CORP. REFINERY	CLIFF ROAD	Oil/Gas Transfer & Storage	APEDS	N.A.	1285.00
302	PSE&G GAS TURBINE GENERATOR	CLIFF ROAD	Power Plant	--	N.A.	N.A.
303	WOODBRIDGE TOWNSHIP POTW	CLIFF ROAD	Sewage Treatment Plant	APEDS	N.A.	N.A.
304	WOODBRIDGE MARINA	62 CLIFF ROAD	Boat Marine w/ gas pumps	APEDS	N.A.	32.85
305	ROYAL PETROLEUM	CLIFF ROAD (below FERRY ST)	Oil/Gas Transfer & Storage	APEDS	0.00	137.92
306	DANNY'S AUTOMOTIVE CONNECTION	161 PORT READING AVE	Gas Station	APEDS	0.00	32.85
307	GENNA CLEANERS	RAHWAY AVE	Dry Cleaners	APEDS	N.A.	N.A.
308	McCANN'S AUTO BODY	RAHWAY AVE	Auto Refinishing	--	N.A.	N.A.
309	NOVEL LITHOGRAPHERS	20 MARKLEY STREET	Printing	--	N.A.	N.A.
310	ALLIED OLD ENGLISH	100 MARKLEY STREET	UNKNOWN	--	N.A.	N.A.
311	GENERAL BROOM INC	200 MARKLEY STREET	Warehouse	--	N.A.	N.A.
312	US GYPSUM CO. PORT READING PLANT	300 MARKLEY STREET	Gypsum manufacturing	--	N.A.	N.A.
313	ROYAL FOOD DISTRIBUTORS	215 BLAIR ROAD	food distributors	--	N.A.	N.A.
314	COLONIAL PIPELINE	~400 BLAIR ROAD	Oil/Gas Transfer & Storage	APEDS	0.00	94.32
315	ECOLAB	411 BLAIR ROAD	UNKNOWN	--	N.A.	N.A.
316	PILOT LABS INC	267 HOMESTEAD AVE	UNKNOWN	--	N.A.	N.A.
317	PROCTOR & GAMBLE	100 ESSEX AVE	Toiletry manufacturing	APEDS	0.49	3.21
318	SEYMOUR FRANKS	135 ESSEX AVE	General Woodworking	--	N.A.	N.A.
319	VAN WATERS & ROGERS INC	160 ESSEX AVE	Chemical manufacturing	APEDS	0.00	2.04
320	COLUMBIA CAN COMPANY	180 ESSEX AVE	Cannery	--	N.A.	N.A.
321	BOC DISTRIBUTION SERVICES	135 ESSEX AVE	Industrial gas distributor	--	N.A.	N.A.
322	BRENNAN BROTHERS	200 ESSEX AVE	Oil/Gas Transfer & Storage	APEDS	0.00	10.95
323	D'ORSI BAKERY	479 PORT READING AVE	Bakery	--	N.A.	N.A.
324	MATTHEW JAGO SCHOOL	GLEN COVE AVE	School Boiler	APEDS	0.80	0.00
325	NJ TURNPIKE SERVICE AREA	NJ TNPK MILE POST 92.9	Gas Station	APEDS	0.21	10.95
326	DRY CLEAN AMERICA	10 MAIN STREET	Dry Cleaners	APEDS	0.00	0.06
327	TEXACO STATION	475 RAHWAY AVE	Gas Station	--	N.A.	N.A.
328	WOODBRIDGE OLDS	475 RAHWAY AVE	Auto Refinishing	APEDS	0.00	1.56
329	TED'S CLEANERS	460 RAHWAY AVE	Dry Cleaners	APEDS	N.A.	N.A.
330	SHELL OIL COMPANY	111 STATE STREET	Oil/Gas Transfer & Storage	APEDS	0.00	6343.60
331	CP CHEMICAL	111 STATE STREET	Chemical manufacturing	--	N.A.	N.A.

<u>Site Summary</u>

The site is predominantly residential, except for heavily industrialized areas along the banks of the Arthur Kill River. The New Jersey Turnpike cuts across the site, almost in the middle. Outside of the immediate 1km radius, there is a cluster of industry to the north, on or near Essex Ave and Blair Road. On Rahway Ave, to the west, there are a number of stores and gas stations.

MAJOR SOURCES:

1. Amerada Hess Corp. Refinery - 1285 Tons/Yr of VOC - mostly gasoline and hexane
2. Royal Petroleum Corp. - 137.92 Tons/yr of VOC - mostly gasoline and hexane.
3. C.P. Chemical - listed in APEDS as a major source, but no emissions of pollutants considered in SINJUATAP.
4. Colonial Pipeline - 94.32 Tons/yr of VOC - mostly gasoline and hexane
5. Shell Oil Company - 6343.6 Tons/yr of VOC - mostly gasoline, but also includes acetone, methyl ethyl ketone, xylenes, toluene, and methylene chloride.
6. Economics Laboratory (Ecolab) - Listed as a major source; but of the pollutants in SINJUATAP there are only 1.76 Tons/yr of formaldehyde.
7. PSE&G Generating Station - listed as a major source in APEDS, emissions unknown.

Table III-5-24. (continued) Sewaren

MINOR SOURCES:

There are 24 minor sources that were located during the microinventory. The breakdown is as follows:

- five gas station/gas distributors
- two dry cleaners
- two auto refinishers
- the remaining are: a small sewage treatment plant, a print shop, two unknown facilities, a broom warehouse, a gypsum manufacturer, a food distributor, a toiletry manufacturer, a general woodworking facility, a chemical manufacturer, a cannery, a industrial gas distributor, a bakery, and a school.

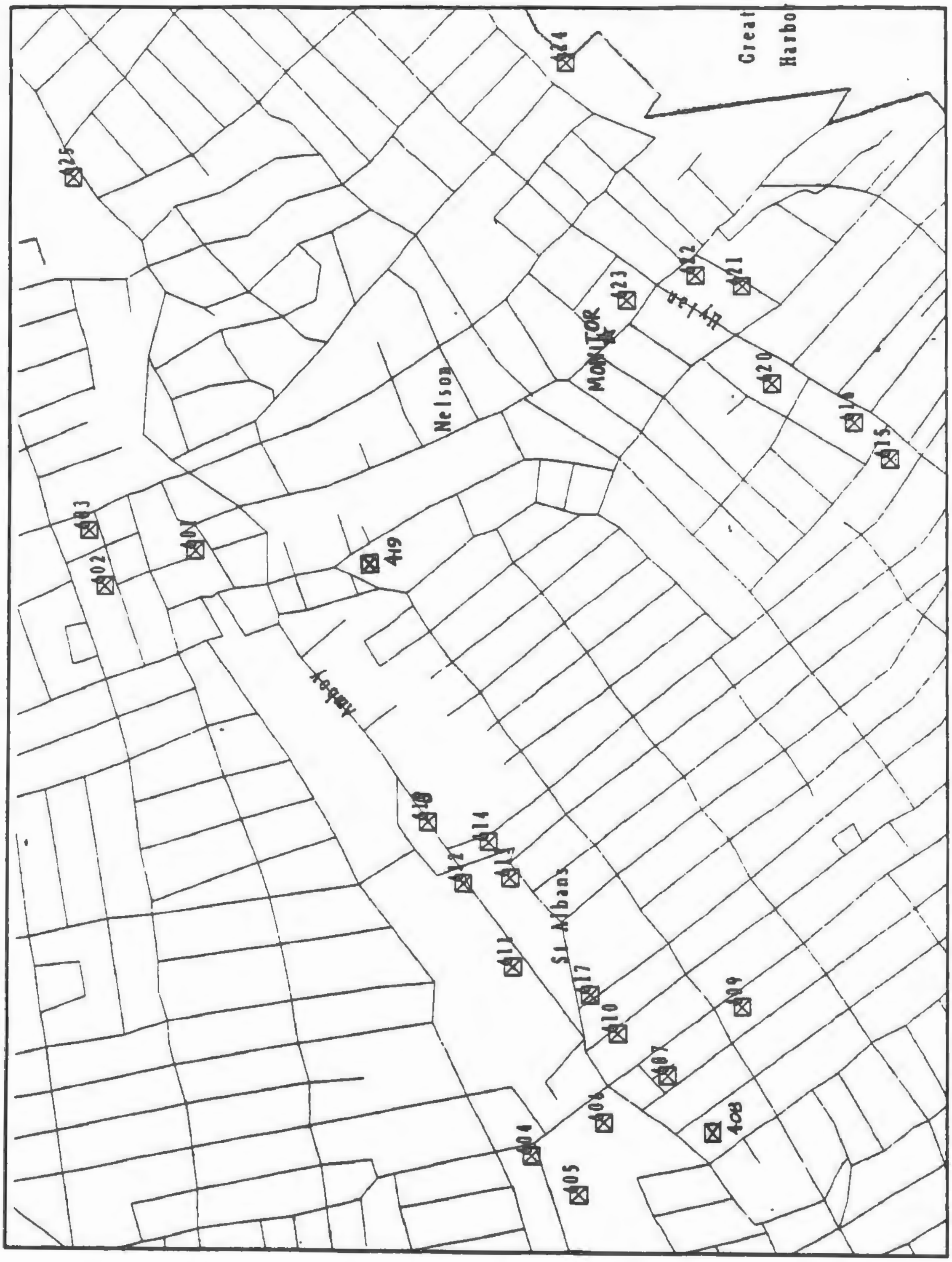

Figure III-5-11. Great Kills, NY, microinventory site.

Table III-5-25. Major and minor sources at Great Kills microinventory site.

Great Kills, Staten Island

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
401	SOUTH SHORE CLEANERS	NELSON AVE & BROWER CT	Dry Cleaners	SMS	N.A.	5.29
402	DANIELLE'S FRENCH CLEANERS	GIFFORDS AVE. & MARGARET AVE	Dry Cleaners	--	N.A.	N.A.
403	RICHMOND DRY CLEANERS	GIFFORDS AVE & MARGARET AVE	Dry Cleaners	--	N.A.	N.A.
404	EMPIRE CLEANERS & LAUNDERERS	RICHMOND AVE & SYLVIA AVE	Dry Cleaners	SMS	N.A.	N.A.
405	J&R PRINTING	RICHMOND & ELTINGVILLE(WEST)	Printing	--	N.A.	N.A.
406	YUKON CLEANERS & TAILORS	RICHMOND & ELTINGVILLE(EAST)	Dry Cleaners	SMS	N.A.	2.70
407	GULF STATION (3 STAR SERVICE)	RICHMOND & AMBOY AVES.	Gas Station	--	N.A.	N.A.
408	CERTIFIED GAS STATION	AMBOY & PRESTON AVES.	Gas Station	--	N.A.	N.A.
409	ANSAL DRY CLEANERS	RICHMOND & OAKDALE AVES.	Dry Cleaners	--	N.A.	N.A.
410	CHARIOT AUTO BODY	RIDGECREST & AMBOY AVES.	Auto Refinishing	--	N.A.	N.A.
411	PAUL MILLER DRY CLEANERS	AMBOY ROAD (ABOVE OLD AMBOY)	Dry Cleaners	--	N.A.	N.A.
412	BARRY'S AUTO BODY	AMBOY & OLD AMBOY ROADS	Auto Refinishing	--	N.A.	N.A.
413	VENEZIA BAKERY	AMBOY & ST ALBANS	Bakery	--	N.A.	N.A.
414	GUIDO'S DRY CLEANING	ST ALBANS NEAR AMBOY	Dry Cleaners	--	N.A.	N.A.
415	CITGO STATION (MENDEL REPAIR)	WALNUT & HYLAN AVES.	Gas Station	--	N.A.	N.A.
416	GATEWAY TAILORS & DRY CLEANERS	WALNUT & HYLAN AVES.	Dry Cleaners	--	N.A.	N.A.
417	COTTAGE GAS	4463 AMBOY ROAD	Gas Station	SMS	N.A.	2.13
418	GETTY STATION	4275 AMBOY ROAD	Gas Station	SMS	N.A.	2.94
419	PUBLIC SCHOOL 8	LINDENWOOD & SCARSDALE AVES.	School Boiler	--	N.A.	N.A.
420	DINO CLASSIC CLEANERS	HYLAN & GLOVER AVES.	Dry Cleaners	--	N.A.	N.A.
421	DONUTVILLE BAKERY & PASTRIES	HYLAN bet. WIMAN & NELSON	Bakery	--	N.A.	N.A.
422	GETTY STATION	4244-4248 HYLAN BLVD	Gas Station	SMS	N.A.	4.08
423	MOBIL STATION	3981 HYLAN BLVD	Gas Station	SMS	N.A.	1.12
424	GREAT KILLS BOAT YARD	183 MANSION AVE	Gas Station	SMS	N.A.	0.40
425	MOBIL STATION	3701 AMBOY ROAD	Gas Station	SMS	N.A.	1.71

<u>Site Summary</u>

The site is very residential. There are no major industrial sources in the area. In fact, the only areas that have any commerce at all are on or near Hylan Blvd or Amboy Road.

MAJOR SOURCES:
NONE

MINOR SOURCES:

- There are 25 minor sources that were located during the microinventory. The breakdown is as follows:
    - nine gas stations
    - ten dry cleaners
    - two bakeries
    - two auto refinishers
    - the remaining sources are: a school and a printer.

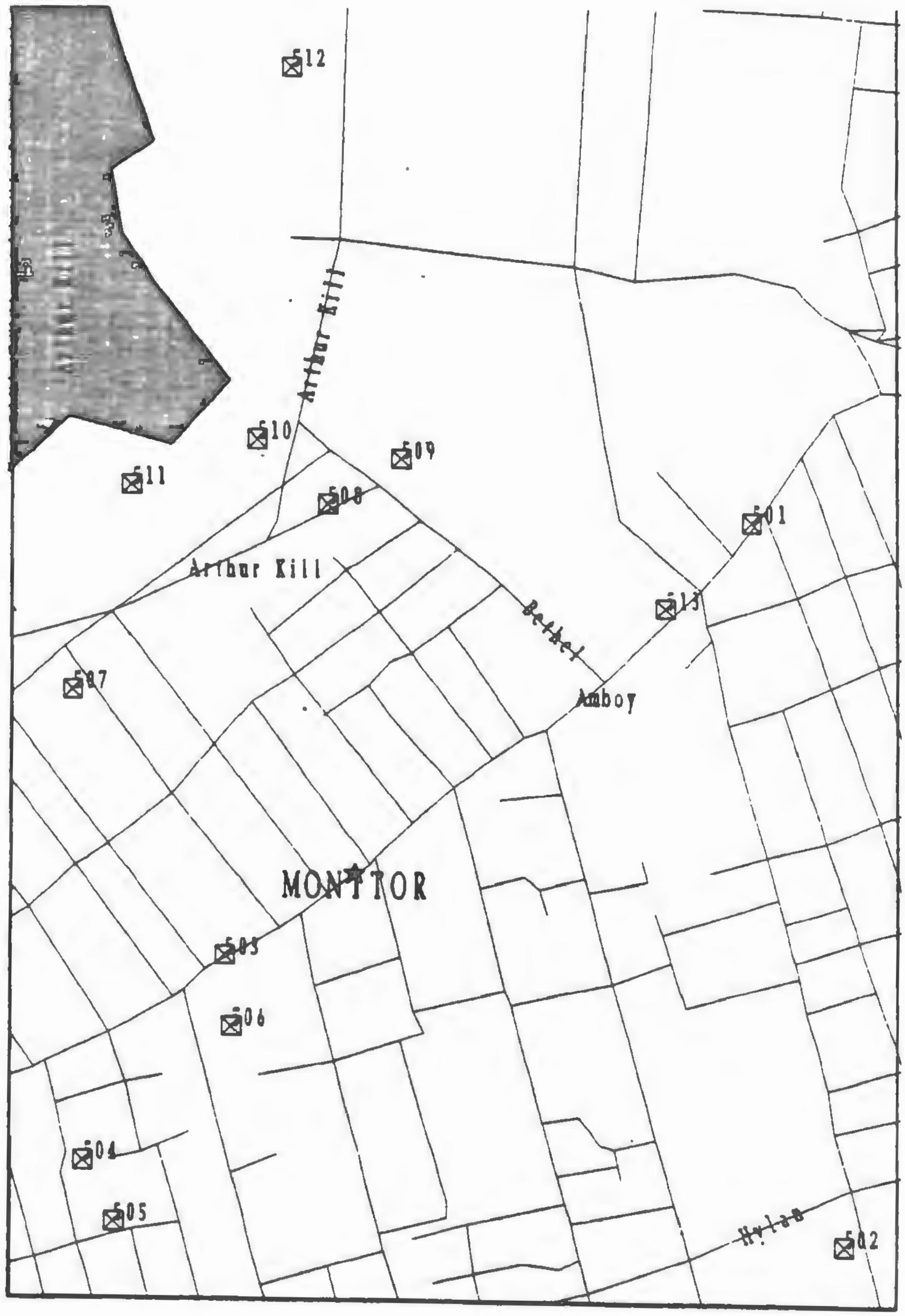

Figure III-5-12. Tottenville, NY, microinventory site.

Table III-5-26 Major and minor sources identified at Tottenville microinventory site.

Tottenville, Staten Island

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
501	CITGO STATION (VALLEY GAS)	7226 AMBOY ROAD (PAST PAGE)	Gas Station	SMS	N.A.	1.80
502	V&M SERVICE GASETERIA	6778 HYLAN & PAGE AVES.	Gas Station	SMS	N.A.	5.47
503	A&M CLEANERS	AMBOY ROAD & WOOD AVE	Dry Cleaners	SMS	N.A.	N.A.
504	PUBLIC SCHOOL 1	SUMMIT & YETMAN AVES.	School Boiler	--	N.A.	N.A.
505	INTERMEDIATE SCHOOL 34	SUMMIT & YETMAN AVES.	School Boiler	--	N.A.	N.A.
506	TOTTENVILLE BAKERY & PASTRY SHOPPE	SLIEGHT AVE & AMBOY ROAD	Bakery	--	N.A.	N.A.
507	J&R COLLISION AUTO BODY	FISHER & ARTHUR KILL ROADS	Auto Refinishing	--	N.A.	N.A.
508	NASSAU AUTO REPAIR	ARTHUR KILL & NASSAU ROADS	Auto Refinishing	--	N.A.	N.A.
509	NASSAU SMELTER	NASSAU ROAD	Copper Smelter	SMS	N.A.	0.07
510	JOHNSON CHEMICAL COMPANY	ELLIS STREET	Pesticide Manufacturer	--	N.A.	N.A.
511	ACE AUTO STYLING	ELLIS STREET	Auto Refinishing	--	N.A.	N.A.
512	ACCO AUTOBODY	SOUTH BRIDGE STREET	Auto Refinishing	--	N.A.	N.A.
513	PREMIERE CLEANERS	PAGE AVE & AMBOY ROAD	Dry Cleaners	--	N.A.	N.A.

Site Summary

This site is almost entirely residential. The area along the Arthur Kill, to the west of the train tracks, is the only area with industry. Other than that, there are scattered facilities on or near either Hylan Blvd or Amboy Road.

MAJOR SOURCES:
NONE

MINOR SOURCES:
There are 13 minor sources that were located during the microinventory. The breakdown is as follows:

- four auto refinishers
- two dry cleaners
- two gas stations
- two schools
- the remaining sources are: a pesticide manufacturer, a copper smelter, and a bakery.

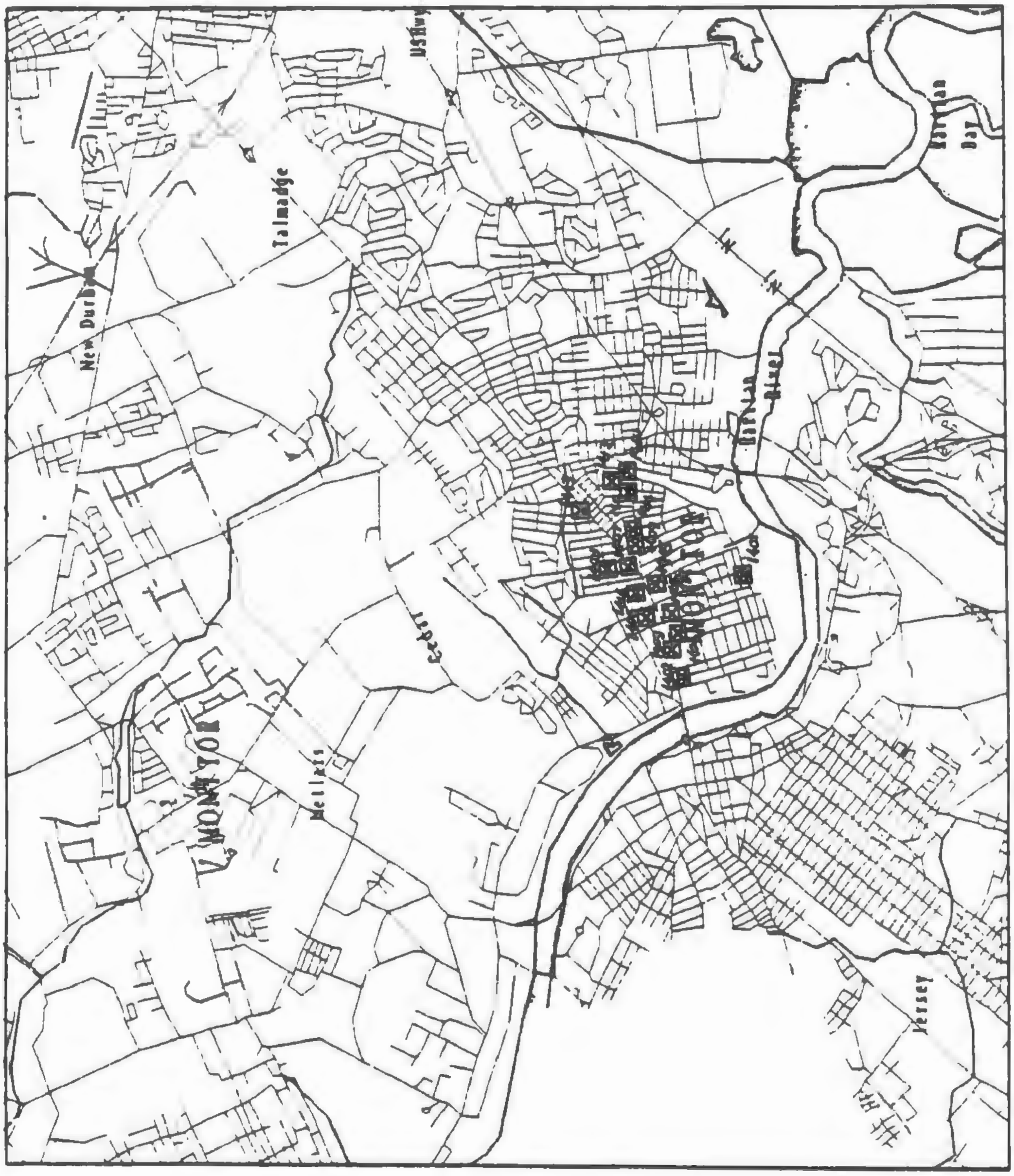

Figure III-5-13. Highland Park, NJ, microinventory site.

Table III-5-27. Major and minor sources identified at Highland Park microinventory site.

Highland Park, New Jersey

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
1401	HIGHLAND PARK PUBLIC WORKS BLDG.	VALENTINE STREET	Gas Station	APEDS	N.A.	21.90
1402	RACEWAY MOBIL	CEDAR & RARITAN AVENUE	Gas Station	--	N.A.	N.A.
1403	GULF SERVICE STATION	RARITAN & 1ST AVE	Gas Station	--	N.A.	N.A.
1404	TEXACO STATION	RARITAN & 1ST AVE	Gas Station	--	N.A.	N.A.
1405	SUNOCO STATION	RARITAN & 2ND AVE	Gas Station	APEDS	N.A.	10.95
1406	1 HOUR MARTINIZING	RARITAN & 2ND AVE	Dry Cleaners	APEDS	N.A.	N.A.
1407	GULF SERVICE STATION	RARITAN & 7TH AVE	Gas Station	--	N.A.	N.A.
1408	RAINBOW CLEANERS	RARITAN & 7TH AVE	Dry Cleaners	--	N.A.	N.A.
1409	MOBIL STATION	RARITAN & WOODBRIDGE AVE	Gas Station	--	N.A.	N.A.
1410	NISSAN AUTO SERVICE	DARTMOUTH & WOODBRIDGE	Auto Refinishing	--	N.A.	N.A.
1411	ACME AUTOBODY (MAJOR A2?)	WOODBRIDGE & COLUMBIA	Auto Refinishing	APEDS	N.A.	0.90
1412	MODERN TREND	WOODBRIDGE & COLUMBIA	Auto Refinishing	APEDS	N.A.	0.16
1413	EL MESCHI AUTO	WOODBRIDGE & COLUMBIA	Auto Refinishing	APEDS	N.A.	0.39
1414	HIGHLAND PARK LAUNDRY	WOODBRIDGE & 9TH AVE	Dry Cleaners	--	N.A.	N.A.
1415	HIGHLAND PARK CLEANERS	RARITAN & 4TH AVE	Dry Cleaners	APEDS	N.A.	N.A.
1416	DEMARCOS DRY CLEANING	4TH AVENUE	Dry Cleaners	--	N.A.	N.A.

Site Summary

This site is predominantly residential, except for business districts along Raritan and Woodbridge Avenues.

MAJOR SOURCES:

1411. ACME AUTOBODY - Listed in APEDS as a major A2 source. Emits only 0.92 Tons/Year of Toluene.

MINOR SOURCES:

There were 15 minor sources that were located during the micoinventory. The breakdown is as follows:

- seven gas stations/gas distributors
- five dry cleaners
- three auto refinishers (that are minor sources)

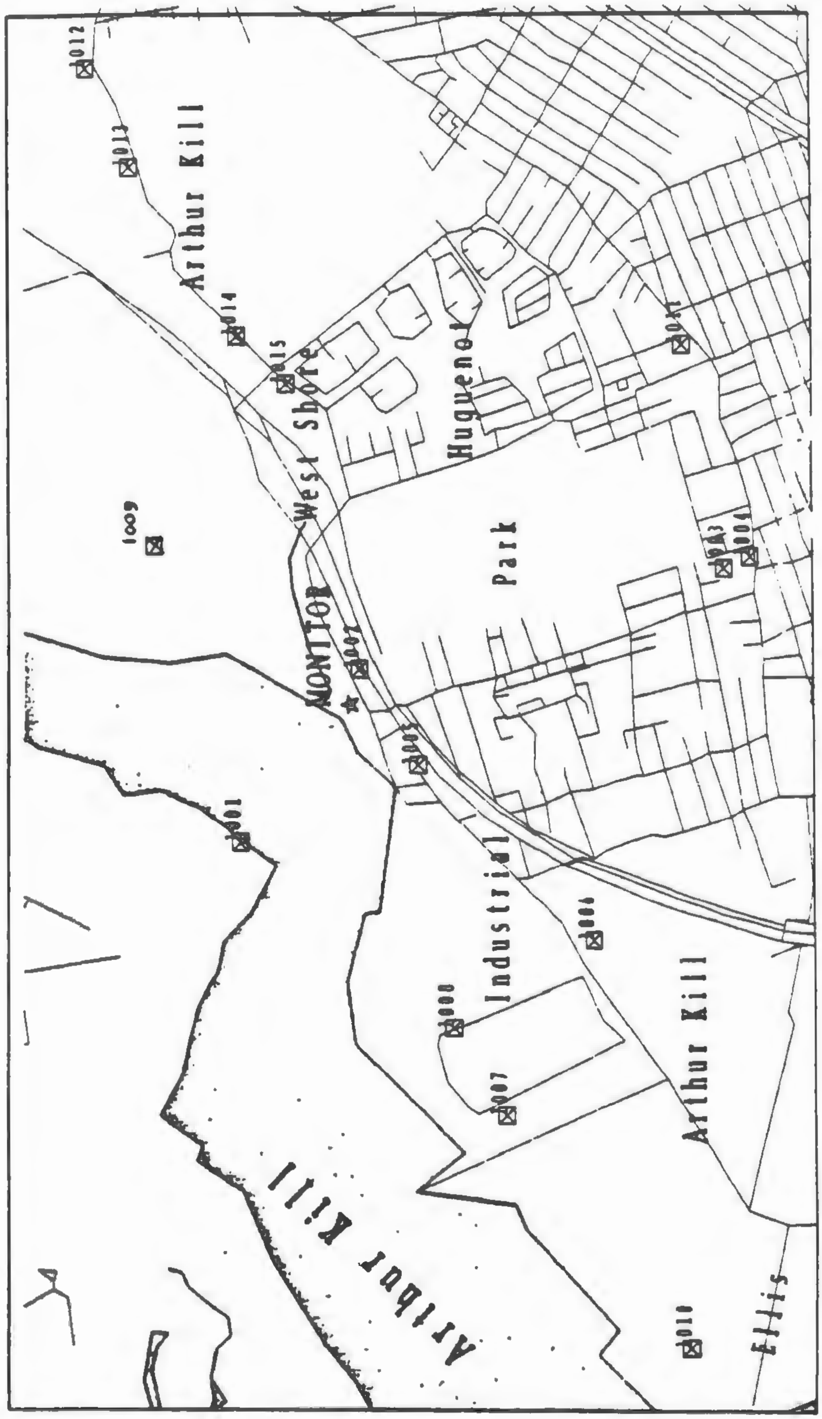

Figure III-5-14. Rossville, NY, microinventory site.

Table III-5-28. Major and minor sources identified at Rossville microinventory site.

Rossville Site, Staten Island

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
1001	US METALS & AREA	NJ SIDE OF ARTHUR KILL	Sandblasting & Smelter	--	N.A.	N.A.
1002	NYNEX BUILDING (AT MONITOR)	ARTHUR KILL ROAD	Gas Station	--	N.A.	N.A.
1003	WOODROW DRY CLEANERS	WOODROW RD & ROSSVILLE AVE	Dry Cleaners	SMS	0.00	1.22
1004	MY WAY BAKERY	WOODROW RD & ROSSVILLE AVE	bakery	--	N.A.	N.A.
1005	RALPH'S AUTO BODY	VETERANS RD WEST & ROSSVILLE	Auto Refinishing	--	N.A.	N.A.
1006	R & S AUTO BODY	ARTHUR KILL ROAD NEAR JAIL	Auto Refinishing	--	N.A.	N.A.
1007	ARTHUR KILL CORRECTIONAL INST.	ARTHUR KILL ROAD	boiler	--	N.A.	N.A.
1008	OPEN BURNING BEHIND JAIL	INDUSTRIAL LOOP ROAD EAST	open burning	--	N.A.	N.A.
1009	GREAT KILLS LANDFILL	ARTHUR KILL RD & EVERYWHERE	landfill	--	N.A.	N.A.
1010	PORT MOBIL TERMINAL	ARTHUR KILL ROAD	tank farm	SMS	0.00	52.76
1011	IS 75	HUEGENOT & WOODROW ROAD	School Boiler	--	N.A.	N.A.
1012	LANDFILL STACKS	WOODROW & ARTHUR KILL	landfill	--	N.A.	N.A.
1013	POSH FRENCH CLEANERS	ARTHUR KILL RD NEAR ARDEN HTS	Dry Cleaners	--	N.A.	N.A.
1014	SHELL STATION	1969 ARTHUR KILL & ARDEN RD	Gas Station	SMS	0.00	9.55
1015	SUNOCO STATION	1781 ARTHUR KILL & ARDEN RD	Gas Station	SMS	0.00	1.91

<u>Site Summary</u>

This site is almost exclusi· ely residential with isolated commercial areas along Arthur Kill Road, woodrow Road and near the jail in Industrial Loop. The landfill is also present in this area. It is the first area where we observed a large number of tall venting stacks coming off the landfill.

MAJOR SOURCES:

1010. Port Mobil Terminal - actually outside the immediate 1km radius but still close enough to consider. It was by far the largest facility in the area. Its emissions are 52.76 tons/year of gasoline.

MINOR SOURCES:

There were 14 minor sources that wer loacted during the microinventory. The breakdown is as follows:

- four gas stations
- two dry cleaners
- two auto refinishers
- the landfill and stacks are listed twice because of its omnipresence in the area.
- two bakeries
- two large boilers
- the remaining are: a sandblasting operation in Carteret, NJ and an incidence of open burning that we shut down on the spot.

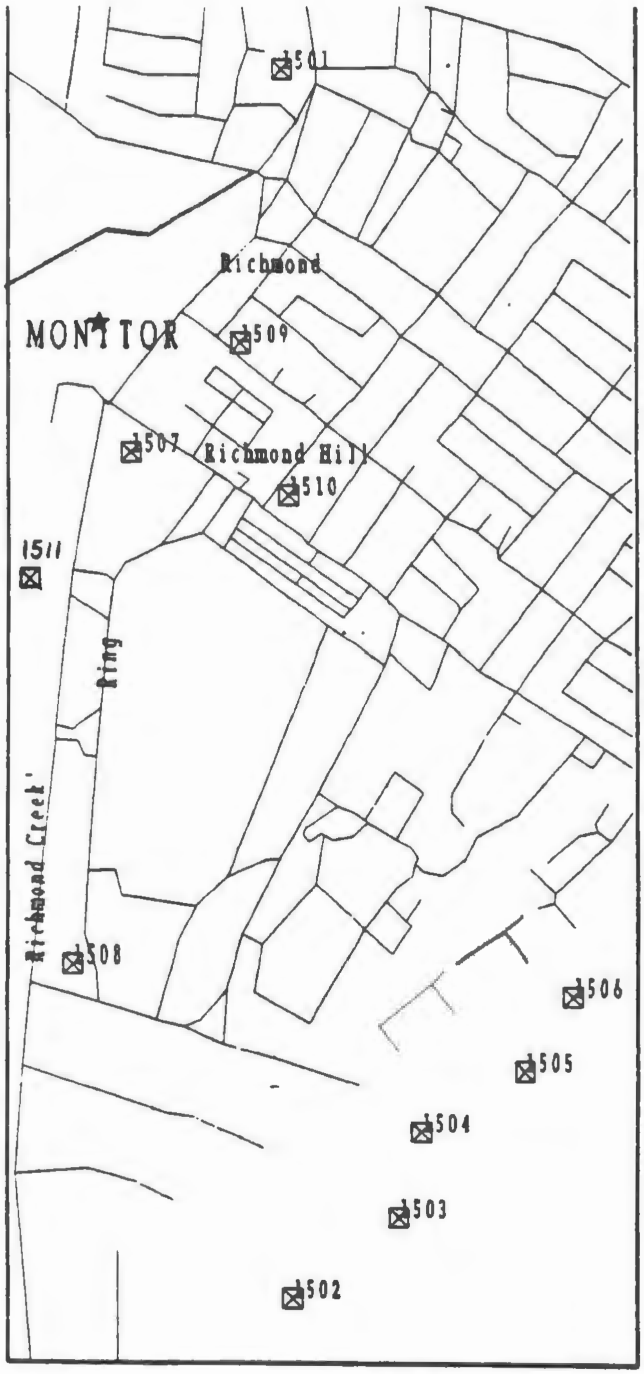

Figure III-5-15. Staten Island Mall microinventory site.

Table III-5-29. Major and minor sources identified at Staten Island Mall microinventory site.

STATEN ISLAND MALL SITE (PUMPHOUSE)

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
1501	SUNOCO STATION (I & II)	RICHMOND & ROCKLAND AVE	Gas Station	--	N.A.	N.A.
1502	NYC YUKON BUS DEPOT	FOREST HILL AVE & YUKON	NYC Bus Depot	--	N.A.	N.A.
1503	CORNICHE CLEANERS	PERAGMENT MALL (MARSH&YUKON)	Dry Cleaners	SMS	0.00	3.24
1504	CAPRICE BAKERY	PERAGMENT MALL (MARSH&YUKON)	bakery	--	N.A.	N.A.
1505	FRENCH CLEANING BY CAROL	PLATINUM & MARSH	Dry Cleaners	SMS	0.00	6.48
1506	LAUNDRY CENTER DRY CLEANING	PAST PLATINUM & FOREST HILL	Dry Cleaners	--	N.A.	N.A.
1507	ANGELO'S GULF STATION	2443 RICHMOND AVE & RICHMOND HI	Gas Station	SMS	0.00	2.04
1508	PAUL MILLER DRY CLEANERS	RICHMOND AVE PAST NOME AVE	Dry Cleaners	--	N.A.	N.A.
1509	MOBIL STATION	2895 RICHMOND AVE & INDEPENDENC	Gas Station	SMS	0.00	2.18
1510	SUNNY HILL CLEANERS	RICHMOND HILL & RICHMOND AVE	Dry Cleaners	SMS	0.00	1.01
1511	LANDFILL WITH STACKS	EVERYWHERE	landfill	--	N.A.	N.A.

Site Summary

This site is almost exclusively residential with an isolated commercial area up and down Richmond Avenue where the mall is. The landfill and stacks were present in the area near the mall.

MAJOR SOURCES:

There were no major sources in the area.

MINOR SOURCES:

There were 11 minor sources that were located during the microinventory. the breakdown is as follows:

- three gas stations
- five dry cleaners
- the remaining are: the landfill & stacks, a bakery and a bus depot.

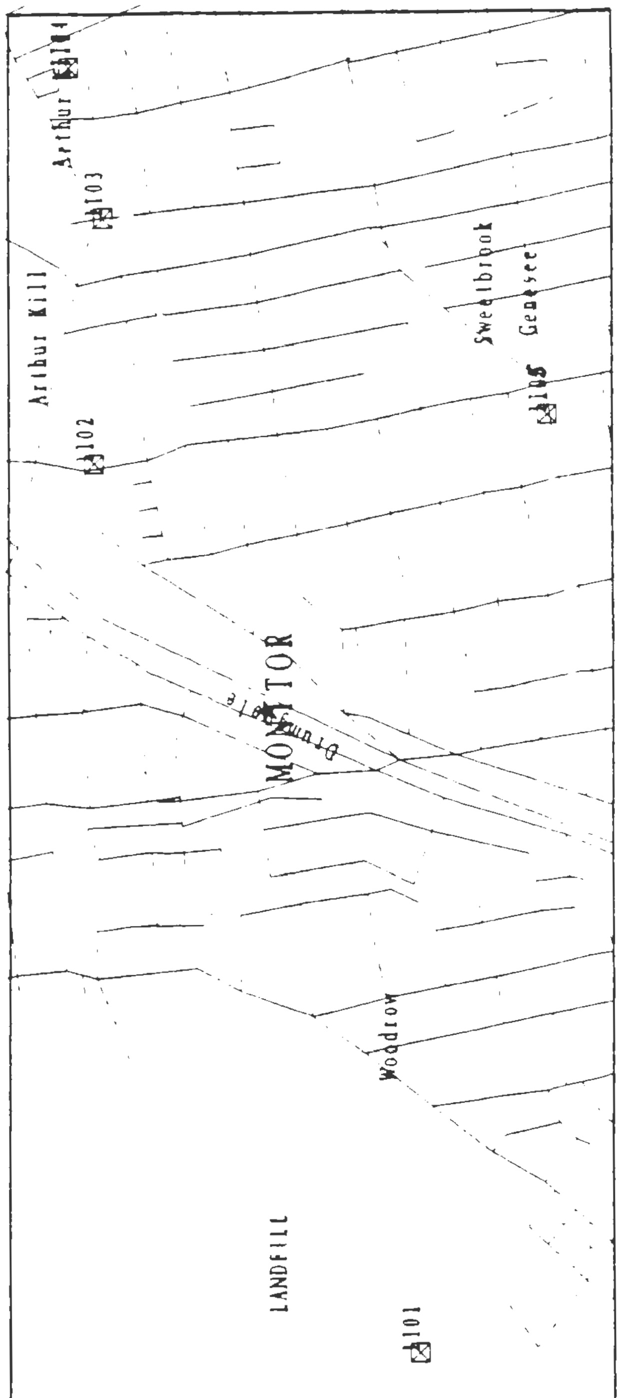

Figure III-5-16. Eltingville (Annadale), NY, microinventory site.

Table III-5-30. Major and minor sources identified at Eltingville microinventory site.

ELTINGVILLE SITE (ANNADALE), STATEN ISLAND

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
1101	LANDFILL WITH STACKS	EVERYWHERE	landfill	--	N.A.	N.A.
1102	PAUL MILLER DRY CLEANERS	RICHMOND AVE & ARTHUR KILL	Dry Cleaners	--	N.A.	N.A.
1103	MERCURY CLEANERS	ARTHUR KILL & CORTELYOU	Dry Cleaners	--	N.A.	N.A.
1104	SUNOCO STATION	630 ARTHUR KILL & ARMSTRONG	Gas Station	SMS	0.00	1.74
1105	PS 42	GENESSEE & RICHMOND	School Boiler	--	N.A.	N.A.

<u>Site Summary</u>

Thsi site is exclusively residential with isolated small sources spread throughout the area. The landfill and stacks were also present in the northeast part of the study area.

MAJOR SOURCES:
NONE

MINOR SOURCES:

There were five minor sources that were located during the microinventory. The breakdown is as follows:

- one gas station
- two dry cleaners
- the remaining are: the landfill & stacks, and a school boiler.

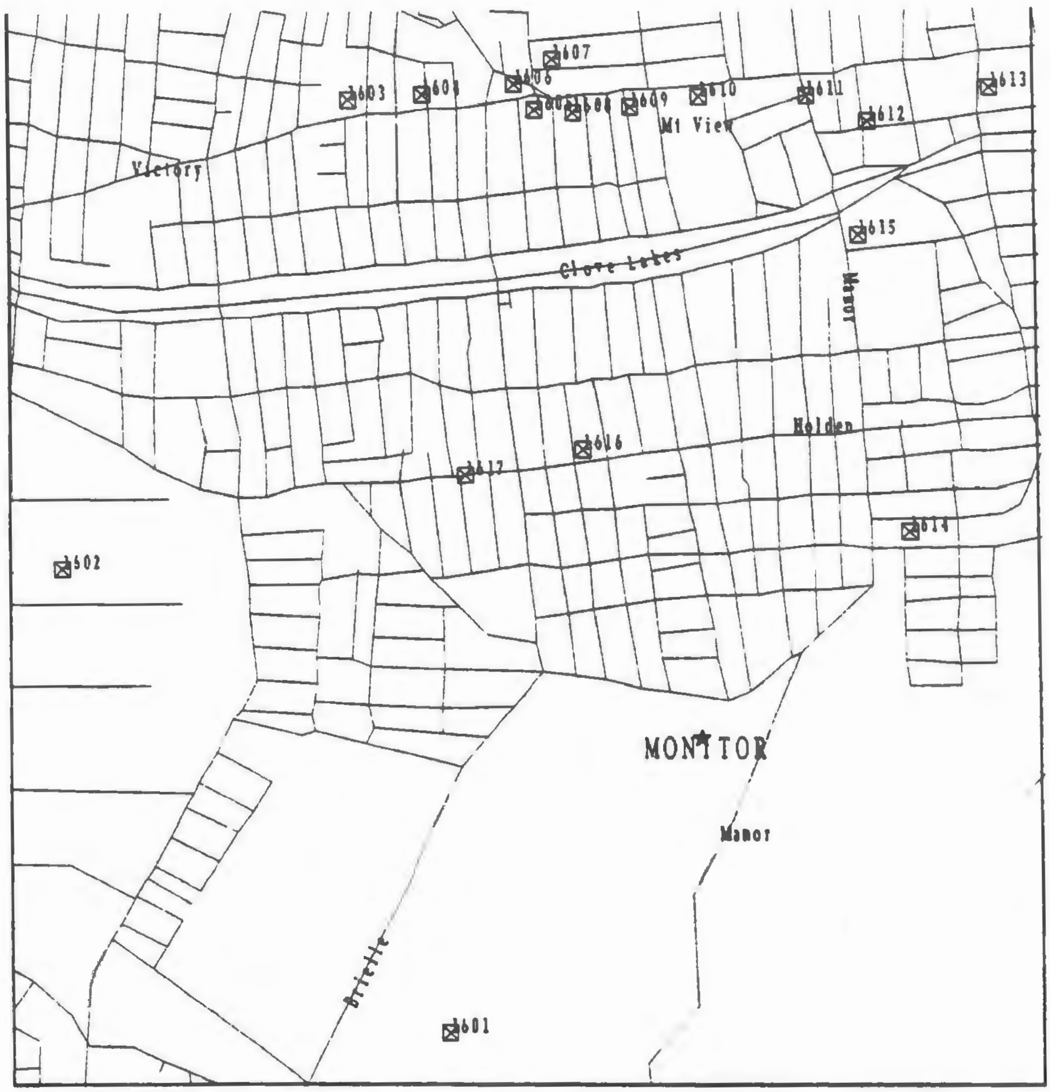

Figure III-5-17. Susan Wagner (Westerleigh), NY, microinventory site.

Table III-5-31. Major and minor sources identified at Susan Wagner microinventory site.

SUSAN WAGNER SITE, STATEN ISLAND

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
1601	SEA VIEW HOSPITAL	BRIELLE AVE	boiler	--	N.A.	N.A.
1602	INST. FOR BASIC RESEARCH	FOREST HILL & WILLOWBROOK	boiler	--	N.A.	N.A.
1603	PETER'S DRY CLEANERS	VICTORY & CARMEL	Dry Cleaner	--	N.A.	N.A.
1604	FAMOUS KOSHER BAKERY	VICTORY & CARMEL	Bakery	--	N.A.	N.A.
1605	AMOCO STATION	2071 VICTORY BLVD	GAS STATION	SMS	0.00	3.36
1606	SUNOCO STATION	2052 VICTORY BLVD	GAS STATION	SMS	0.00	1.32
1607	VICTORY CLEANERS	VICTORY & JEWIT	DRY CLEANERS	--	N.A.	N.A.
1608	CITGO STATION	2071 VICTORY BLVD	GAS STATION	SMS	0.00	14.07
1609	FRIENDLY DRY CLEANERS	VICTORY & CLERMONT	DRY CLEANERS	--	N.A.	N.A.
1610	GETTY STATION	VICTORY & SOUTH GREELEAF AVE.	GAS STATION	--	N.A.	N.A.
1611	BOERUM AUTO SERVICE (MOBIL)	1774 VICTORY BLVD	GAS STATION	--	N.A.	N.A.
1612	PURR-FECT CLEANERS	VICTORY & WINTHROP PLACE	DRY CLEANERS	--	N.A.	N.A.
1613	P.S. 29	SLOSSON AVE. & VICTORY	SCHOOL BOILER	--	N.A.	N.A.
1614	TEXACO STATION	MANOR RD & OCEAN TERRACE	GAS STATION	--	N.A.	N.A.
1615	SWAN CLEANERS	MANOR RD & SCHMIDT LANE	DRY CLEANERS	--	N.A.	N.A.
1616	BRADELY CLEANERS	HOLDEN BLVD & WILLOWBROOK	DRY CLEANERS	--	N.A.	N.A.
1617	P.S.54	WILLOWBROOK & SHERADEN AVE.	SCHOOL BOILER	--	N.A.	N.A.

<u>Site Summary</u>

This site is very residential with two major commercial areas along Hylan Blvd. and Richmond Avenue.

MAJOR SOURCES:

There were no major sources in the area.

MINOR SOURCES:

There were 27 minor sources that were located during the microinventory. The breakdown is as follows:

- 14 gas stations
- 11 dry cleaners
- two school boilers

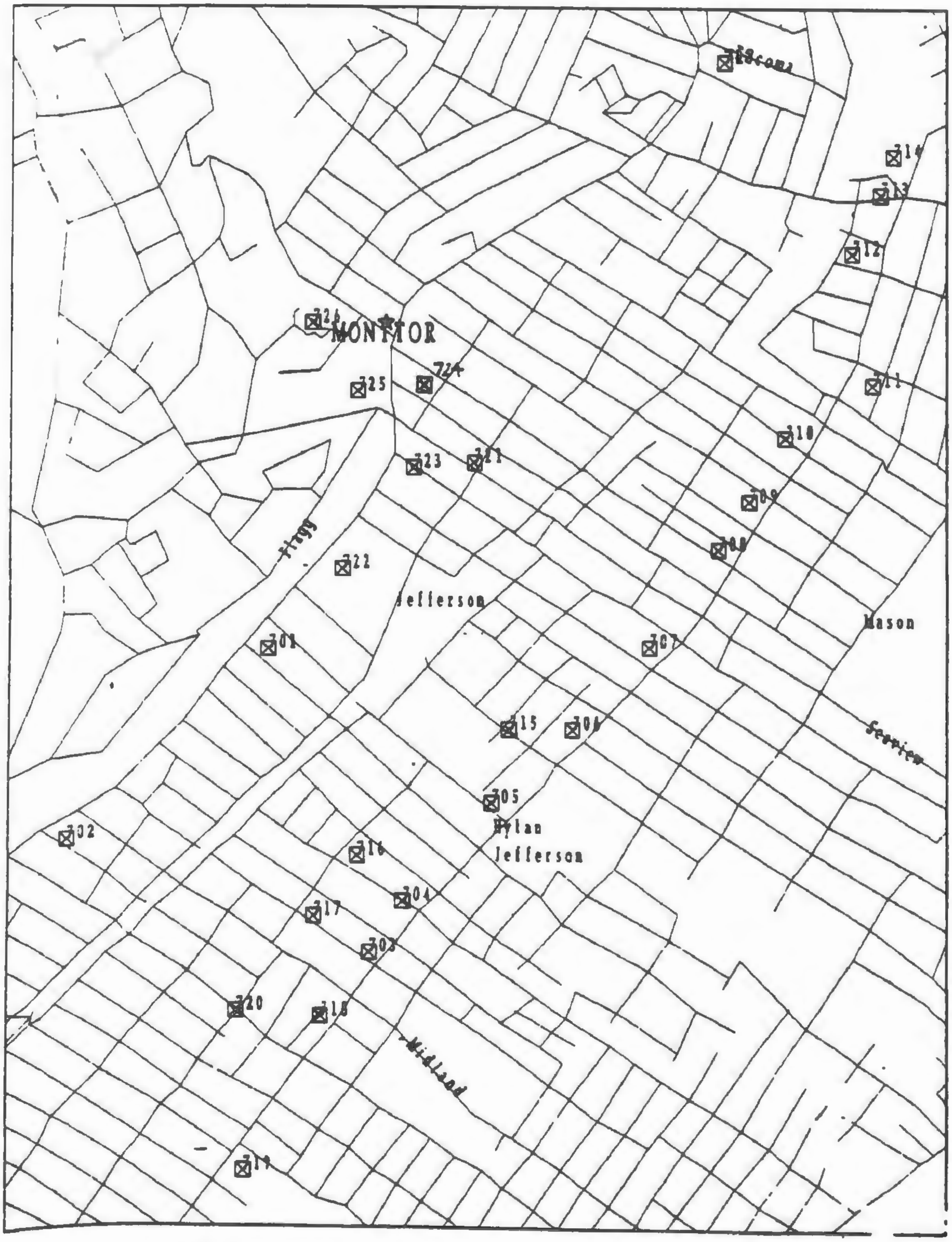

Figure III-5-18. Dongan Hills, NY, microinventory site.

Table III-5-32. Major and minor sources identified at Dongan Hills microinventory site.

DONGAN HILLS SITE, STATEN ISLAND

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
701	GETTY STATION	1201 VICYORY BLVD.	GAS STATION	SMS	0.00	1.39
702	IMPERIAL CLEANERS	RICHMOND & JEFFERSON AVE.	DRY CLEANERS	--	N.A.	N.A.
703	E & M MOBILE STATION	2150 HYLAN BLVD	GAS STATION	SMS	0.00	7.46
704	IS 2	BOUNDARY & MIDLAND	SCHOOL BOILER	--	N.A.	N.A.
705	OCTANE PLUS	HYLAN & JEFFERSON	GAS STATION	--	N.A.	N.A.
706	CITGO STATION	HYLAN & SLATER AVE.	GAS STATION	--	N.A.	N.A.
707	BOULEVARD CLEANERS	HYLAN & NAUGHTON AVE.	DRY CLEANERS	SMS	0.00	3.24
708	REVERE CLEANERS	HYLAN & GARRETSON AVE.	DRY CLEANERS	--	N.A.	N.A.
709	BP STATION	HYLAN & ALTER AVE.	GAS STATION	--	N.A.	N.A.
710	AMOCO STATION	1581 HYLAN BLVD.	GAS STATION	SMS	0.00	3.15
711	MERCURY CLEANERS	1501 HYLAN BLVD.	DRY CLEANERS	SMS	0.00	4.86
712	GETTY STATION	HYLAN & COOPER AV.	GAS STATION	--	N.A.	N.A.
713	GULF STATION	HYLAN & REID AV.	GAS STATION	--	N.A.	N.A.
714	TODT HILL CLEANERS	HYLAN & OLD TOWN RD.	DRY CLEANERS	--	N.A.	N.A.
715	SEAVER CLEANERS & FRENCH TAILORS	HYLAN & SEAVER AVE.	DRY CLEANERS	--	N.A.	N.A.
716	EAGLE GAS	HYLAN & HAMDEN AVE.	GAS STATION	--	N.A.	N.A.
717	GASETERIA	HYLAN & HAMDEN AVE.	GAS STATION	--	N.A.	N.A.
718	SUNOCO STATION	2200 HYLAN BLVD.	GAS STATION	SMS	0.00	3.60
719	R & J SERVICE STATION	HYLAN & LINCOLN AVE.	GAS STATIONS	--	N.A.	N.A.
720	VINCENT'S FRENCH CLEANERS	LINCLON AVE.	DRY CLEANERS	--	N.A.	N.A.
721	PS 11	JEFFERSON & GARRETSON AVE.	SCHOOL BOILER	--	N.A.	N.A.
722	MICHAEL'S CLEANERS	RICHMOND & SEAVIEW AVE.	DRY CLEANERS	--	N.A.	N.A.
723	ONE-STOP CLEANERS	RICHMOND & SEAVIEW AVE.	DRY CLEANERS	--	N.A.	N.A.
724	MOBIL OIL CORP.	1680 RICHMOND AVE.	GAS STATION	SMS	0.00	2.05
725	NORA'S CLEANERS	RICHMOND & BUEL AVE.	DRY CLEANERS	--	N.A.	N.A.
726	REVERE CLEANERS	HYLAN & GARRETSON AVE.	DRY CLEANERS	--	N.A.	N.A.
727	BP STATION	RICHMOND & DELWOOD AVE.	GAS STATION	--	N.A.	N.A.

Site Summary

This site is very residential with two major commercial areas along Hylan Blvd. and Richmond Avenue.

MAJOR SOURCES:

There were no major sources in the area.

MINOR SOURCES:

There were 27 minor sources that were located during the microinventory. The breakdown is as follows:

- 14 gas stations
- 11 dry cleaners
- two school boilers

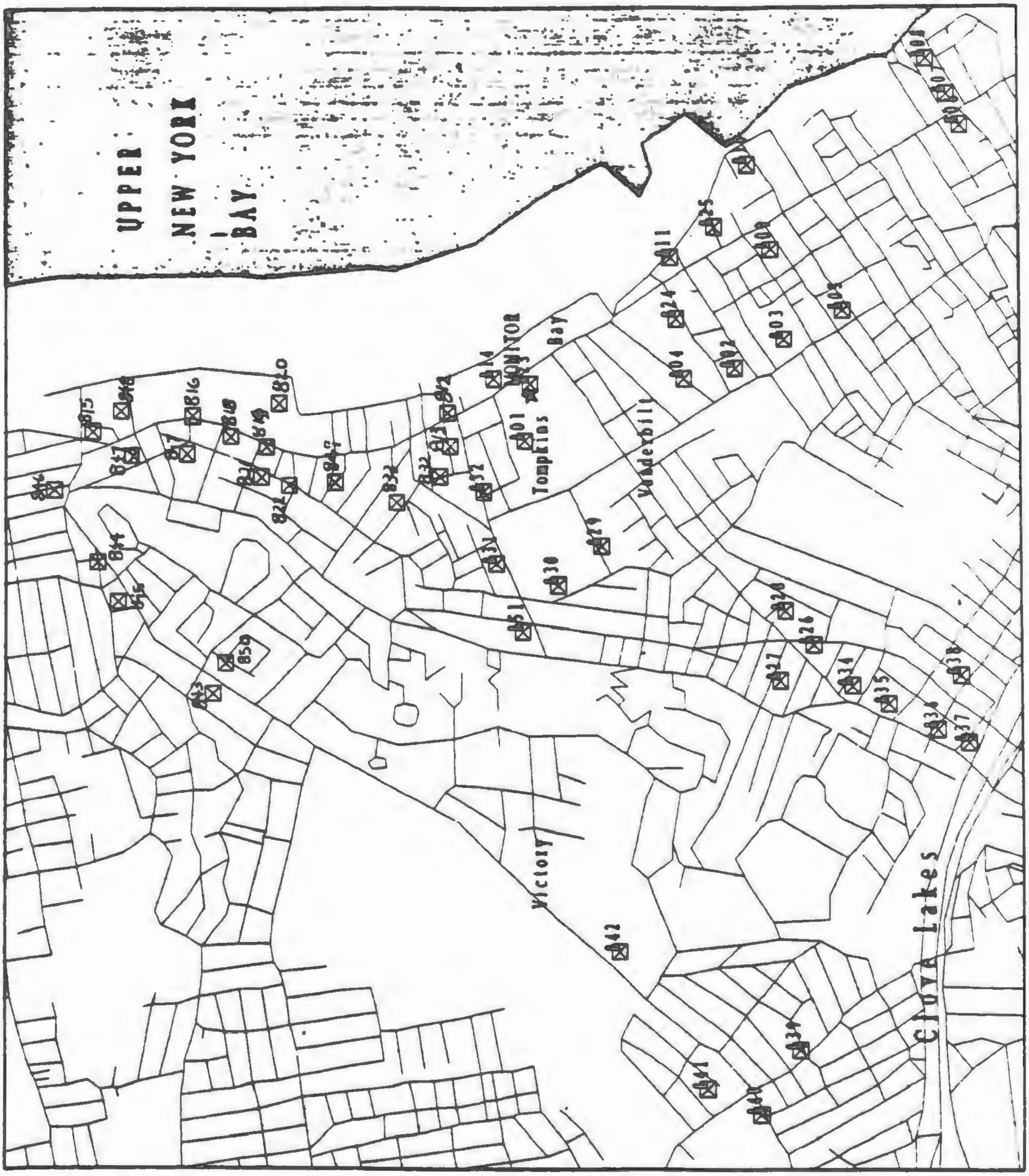

Figure III-5-19. Clifton (Bayley Seton Hospital), NY, microinventory site.

Table III-5-33. Major and minor sources identified at Clifton microinventory site.

CLIFTON SITE, STATEN ISLAND

No.	NAME	ADDRESS	TYPE	INVEN	PM	VOC
801	BAILEY SETON HOSPITAL	TOMPKINS & VANDERBILT AVE.	Hospital Boiler	--	N.A.	N.A.
802	PREFERRED AUTO BODY	LYNHURST & TOMPKINS AVE.	Auto Refinishing	--	N.A.	N.A.
803	SUN CHEMICAL CORP.	441 TOMPKINS AVE.	Pigments	SMS	0.00	0.90
804	DIAMOND PAVEMENT CORP.	118 GREENFIELD AVE.	Cement Plant	--	N.A.	N.A.
805	K & Q DRY CLEANING	CLIFTON & TOMPKINS AVE.	Dry Cleaners	--	N.A.	N.A.
806	GETTY STATION	BAY & FINGERBOARD	Gas Station	--	N.A.	N.A.
807	SHORE ACRES CLEANERS	BAY & CLIFF AVE.	Dry Cleaners	--	N.A.	N.A.
808	APT. BUILDING INCINERATOR	CLIFF AVE.	APT. Incinerator	--	N.A.	N.A.
809	BAY VIEW DRY CLEANERS	BAY & CLIFTON AVE.	Dry Cleaners	--	N.A.	N.A.
810	SWEETCAKES BAKERY	BAY & CLIFTON AVE.	Bakery	--	N.A.	N.A.
811	MERIT STATION	951 BAY STREET	Gas Station	SMS	0.00	10.41
812	JONNY'S AUTOBODY SHOP	36 CANAL ST.	Auto Refinishing	--	N.A.	N.A.
813	A-1 AUTO STYLING	38 CANAL ST	Auto Refinishing	--	N.A.	N.A.
814	BAY STREET BAKERY	BAY & DOCK	Bakery	--	N.A.	N.A.
815	3-STAR GAS STATION	BAY & HANNAN	Gas Station	--	N.A.	N.A.
816	ANGIULI DODGE COSTUM BODY SHOP	BAY STREET	Auto Refinishing	--	N.A.	N.A.
817	MERCURY CLEANERS	BAY & GRANT	Dry Cleaners	--	N.A.	N.A.
818	DEMA'S AUTOBODY	BAY & GRANT	Auto Refinishing	--	N.A.	N.A.
819	DACEY COLLISION	BALTIC STREET	Auto Refinishing	--	N.A.	N.A.
820	T & T TUFF TIMES COLLISION	BAY & WILLIAMS ST.	Auto Refinishing	--	N.A.	N.A.
821	VALET SERVICES CLEANERS	BAY & WILLIAMS ST.	Auto Refinishing	--	N.A.	N.A.
822	GULF STATION	BAY & WAVE ST.	Gas Station	--	N.A.	N.A.
823	MOBIL STATION	830 BAY ST.	Gas Station	SMS	0.00	1.36
824	TECH PRODUCTS INC.	105 WILLOW AVE.	Printer	SMS	0.00	5.34
825	SCORE STATION	BAY & CHESTNUT ST.	Gas Station	--	N.A.	N.A.
826	EAGLE STATION	TARGEE & VANDERBILT	Gas Station	--	N.A.	N.A.
827	MERCURY CLEANERS	TARGEE & VANDERBILT	Dry Cleaners	--	N.A.	N.A.
828	TEXACO STATION (RAMOAR)	TARGEE & VANDERBILT	Gas Station	SMS	0.00	1.12
829	PS 14	HALL ST. & TOMPKINS	School Boiler	--	N.A.	N.A.
830	CLEAN MACHINE CLEANERS	BROAD & TOMPKINS	Dry Cleaners	--	N.A.	N.A.
831	GALATRO'S DRY CLEANERS	BROAD & CEDAR ST.	Dry Cleaners	--	N.A.	N.A.
832	MACKAUER AUTOBODY	BROAD & TOMPKINS	Auto Refinishing	--	N.A.	N.A.
833	RE-NU-IT AUTOBODY	CANAL ST.	Auto Refinishing	--	N.A.	N.A.
834	TIME GAS & SERVICE	VANDERBILT & ELINGTON	Gas Station	--	N.A.	N.A.
835	AUER'S BAKERY	STEUBEN & VANDERBILT	Bakery	--	N.A.	N.A.
836	WAGNER'S COLLISION	PIERCE & VANDERBILT	Auto Refinishing	--	N.A.	N.A.
837	GETTY STATION	NARROWS RD & VANDERBILT	Gas Station	--	N.A.	N.A.
838	CERTIFIED GAS STATION	DEKALB RD & TARGEE	Gas Station	--	N.A.	N.A.
839	MERCURY CLEANERS	CLOVE & GENNESSEE	Dry Cleaners	--	N.A.	N.A.
840	MOBIL STATION (SUNNYSIDE SS)	1262 CLOVE & VICTORY	Gas Station	SMS	0.00	1.45
841	GETTY STATION	1201 VICTORY & CLOVE	Gas Station	SMS	0.00	1.39
842	CITGO STATION (FORMER TEXACO)	VICTORY BLVD PAST HIGHLAND	Gas Station	SMS	0.00	0.42
843	CITGO STATION	VICTORY BLVD & CEBRA AVE	Gas Station	--	N.A.	N.A.
844	GULF STATION	VICTORY BLVD & BROOK ST	Gas Station	--	N.A.	N.A.
845	U-BEND-IT-WE-MEND-IT	VICTORY BLVD & BROOK ST	Auto Refinishing	--	N.A.	N.A.
846	PAUL MILLER DRY CLEANERS	VICTORY BLVD & BROOK ST	Dry Cleaners	--	N.A.	N.A.
847	A&B AUTO BODY	65 & 67 HANNAH ST	Auto Refinishing	--	N.A.	N.A.

Table III-5-33. (continued) Clifton, NY

848 JOHN AND ANDY'S AUTO BODY	VAN DUZER AND SWAN ST.	Auto Refinishing	--	N.A.	N.A.
849 STATEN ISLAND AUTO BODY	148 BEACH ST. & JACKSON	Auto Refinishing	--	N.A.	N.A.
850 CHARLY FRENCH CLEANERS	VICTORY BLVD & CEBRA AVE	Dry Cleaners	--	N.A.	N.A.
851 MARINELLI'S AUTO BODY	VAN DUZER & BROAD	Auto Refinishing	--	N.A.	N.A.

Site Summary

This site is a mix of industrial an residential areas. the area along the waterfront is almost entirely commercial. In fact, it is the area where the naval base homeport is being constructed. There is a facility under construction there that has approximately fifty to seventy stacks on its roof. The ferry terminal is located in this area and there are major shopping areas along Bay Street, Victory Blvd, and Vanderbilt Ave. This site had the second highest number of sources in Staten Island (only Port Richmond had more).

MAJOR SOURCES:

There were no major sources in the area.

MINOR SOURCES:

There were 51 minor sources that were located during the microinventory. The breakdown is as follows:

- 16 gas stations
- 10 dry cleaners
- 16 auto refinishers
- three bakeries
- the remaining are: two boilers (school & hospital), one apartment incinerator, one pigment plant, one cement plant, and a print shop.

Emissions Mappping Maps and Tables

Figure III-5-20

STATEN ISLAND PROJECT MAPPING SYSTEM
BENZENE POINT SOURCES

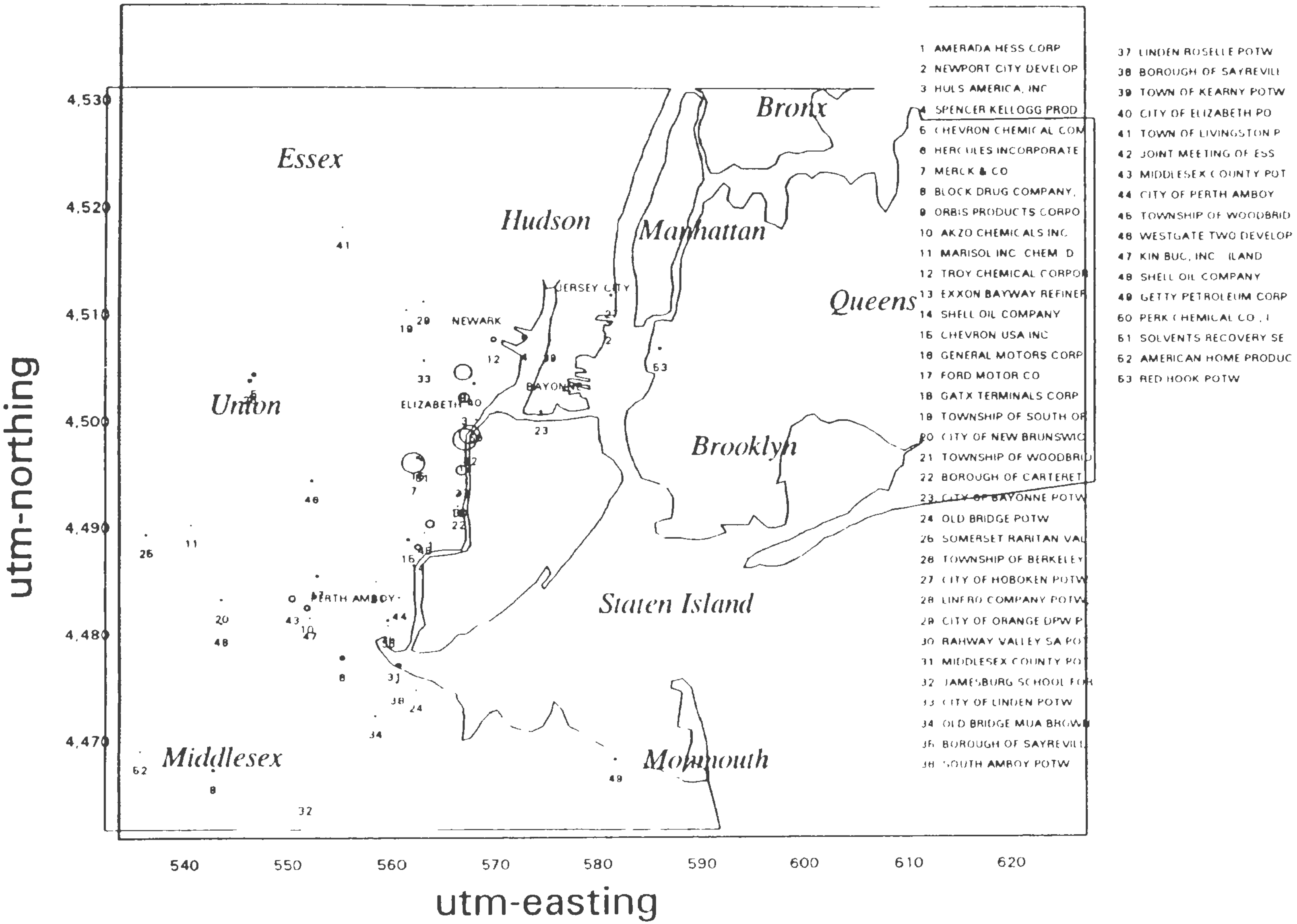

Table III-5-34: Benzene point sources on bubble map Figure III-5-20

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
1	AMERADA HESS CORP	750 CLIFF RD	PORT READING	07064	4490.0	564.0	2.90
2	NEWPORT CITY DEVELOPMENT CO	145 12TH STREET	JERSEY CITY	07372	4508.9	581.3	0.11
3	HULS AMERICA, INC.	830 MAGNOLIA AVENUE	ELIZABETH	07201	4501.8	567.3	5.09
4	SPENCER KELLOGG PRODUCTS	400 DOREMUS AVE	NEWARK	07105	4507.5	573.8	1.10
5	CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0	0.68
6	HERCULES INCORPORATED	MINISINK & CHEESEQUAKE RD	SAYREVILLE	08872	4477.5	555.6	0.88
7	MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4	21.60
8	BLOCK DRUG COMPANY, INC.	257 CORNELISON AVE	JERSEY CITY	07302	4467.0	543.0	0.28
9	ORBIS PRODUCTS CORPORATION	55 VIRGINIA STREET	NEWARK	07114	4504.2	567.1	13.14
10	AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2	1.53
11	MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9	0.03
12	TROY CHEMICAL CORPORATION	ONE AVENUE L	NEWARK	07105	4507.3	570.1	1.31
13	EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	25.00
14	SHELL OIL COMPANY	111 STATE STREET	SEWAREN	07077	4487.8	562.8	1.50
15	CHEVRON USA INC.	1200 STATE STREET	PERTH AMBOY	08861	4488.5	561.9	0.30
16	GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	0.25
17	FORD MOTOR CO	939 US ROUTE #1	EDISON	08818	4485.2	553.2	0.25
18	GATX TERMINALS CORP.	78 LAFAYETTE STREET	CARTERET	07008	4492.7	566.7	0.05
19	TOWNSHIP OF SOUTH ORANGE	WALTON AVE. PUMPING STA.	SOUTH ORANGE	07079	4510.0	561.6	0.02
20	CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	0.16
21	TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.01
22	BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.03
23	CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.14
24	OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.04
25	SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.11
26	TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6	0.49
27	CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	0.18
28	LINPRO COMPANY POTW, THE				4464.0	533.1	0.18
29	CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.06
30	RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.28
31	MIDDLESEX COUNTY POTW	1 CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	0.89
32	JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0	0.04
33	CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.10
34	OLD BRIDGE MUA BROWNTOWN POTW				4472.0	558.8	0.09
35	BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0	0.03
36	SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0	0.27
37	LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	5.13
38	BOROUGH OF SAYREVILLE POTW 1				4479.3	563.1	0.06
39	TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.05
40	CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	0.21

Table III-5-34, continued: Benzene point sources on bubble map Figure III-5-20

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
41	TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.03
42	JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.8	18.28
43	MIDDLESEX COUNTY POTW 2				4483.0	550.8	2.13
44	CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.05
45	TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.03
46	WESTGATE TWO DEVELOPERS INC (LANDFILL)	RAHWAY ROAD	EDISON	08818	4494.0	552.7	0.20
47	KIN-BUC, INC. (LANDFILL)	MEADOW ROAD	EDISON	08817	4481.2	552.5	0.02
48	SHELL OIL COMPANY	1300 ROUTE 27	NORTH BRUNSWICK	08902	4480.7	543.8	0.09
49	GETTY PETROLEUM CORP.	ROUTE 36 & AVENUE D	ATLANTIC HIGHLANDS	07716	4468.0	582.0	0.26
50	PERK CHEMICAL CO., INC.		ELIZABETH	07207	4499.8	568.5	0.03
51	SOLVENTS RECOVERY SERVICE		LINDEN	07036	4496.0	563.1	0.19
52	AMERICAN HOME PRODUCTS CORP.	567 RIDGE ROAD	MONMOUTH JCT.	08852	4468.8	536.1	0.04
53	RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	0.31

Figure III-5-21

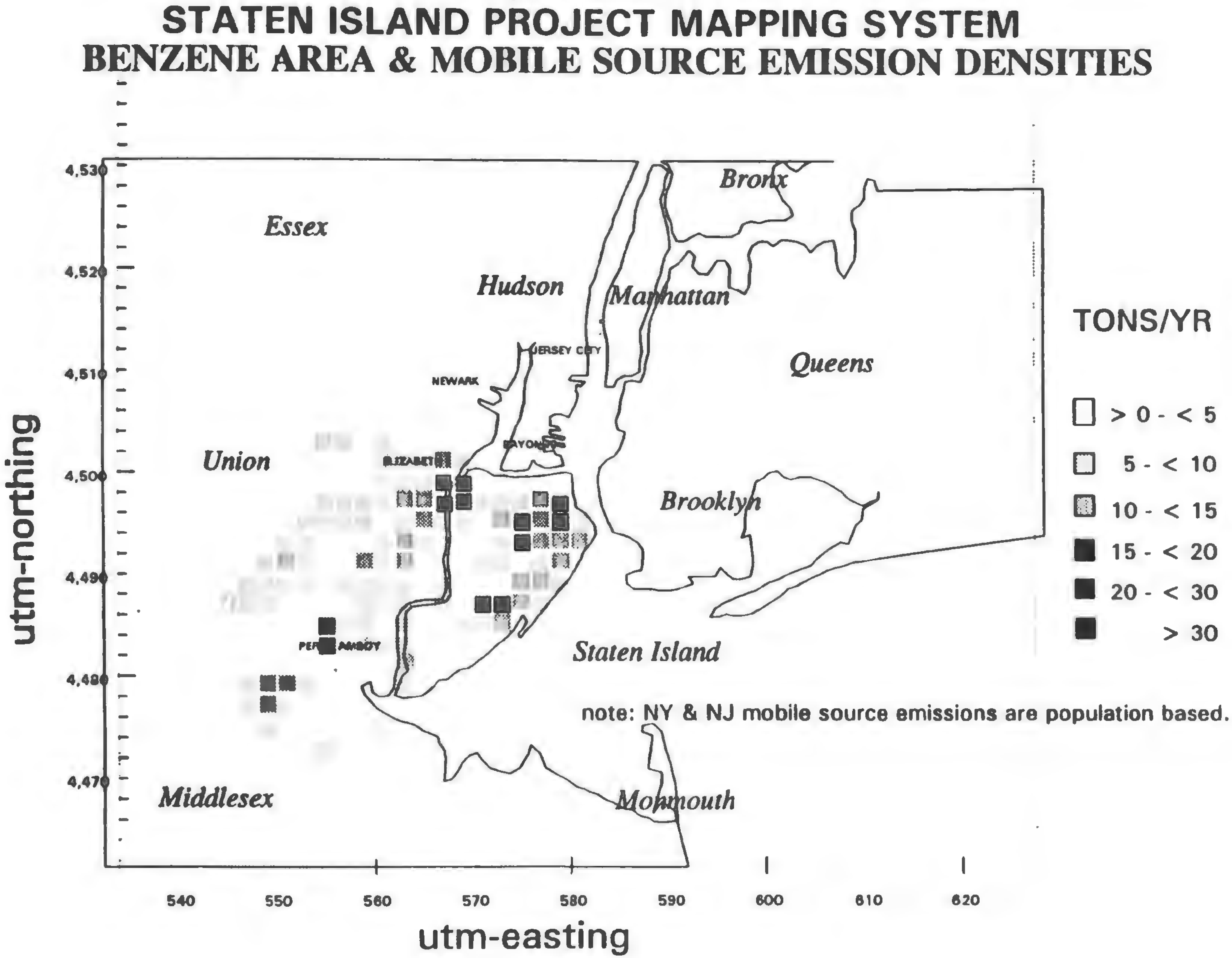

Figure III-5-22

STATEN ISLAND PROJECT MAPPING SYSTEM
BENZENE AREA & MOBILE SOURCE EMISSION DENSITIES

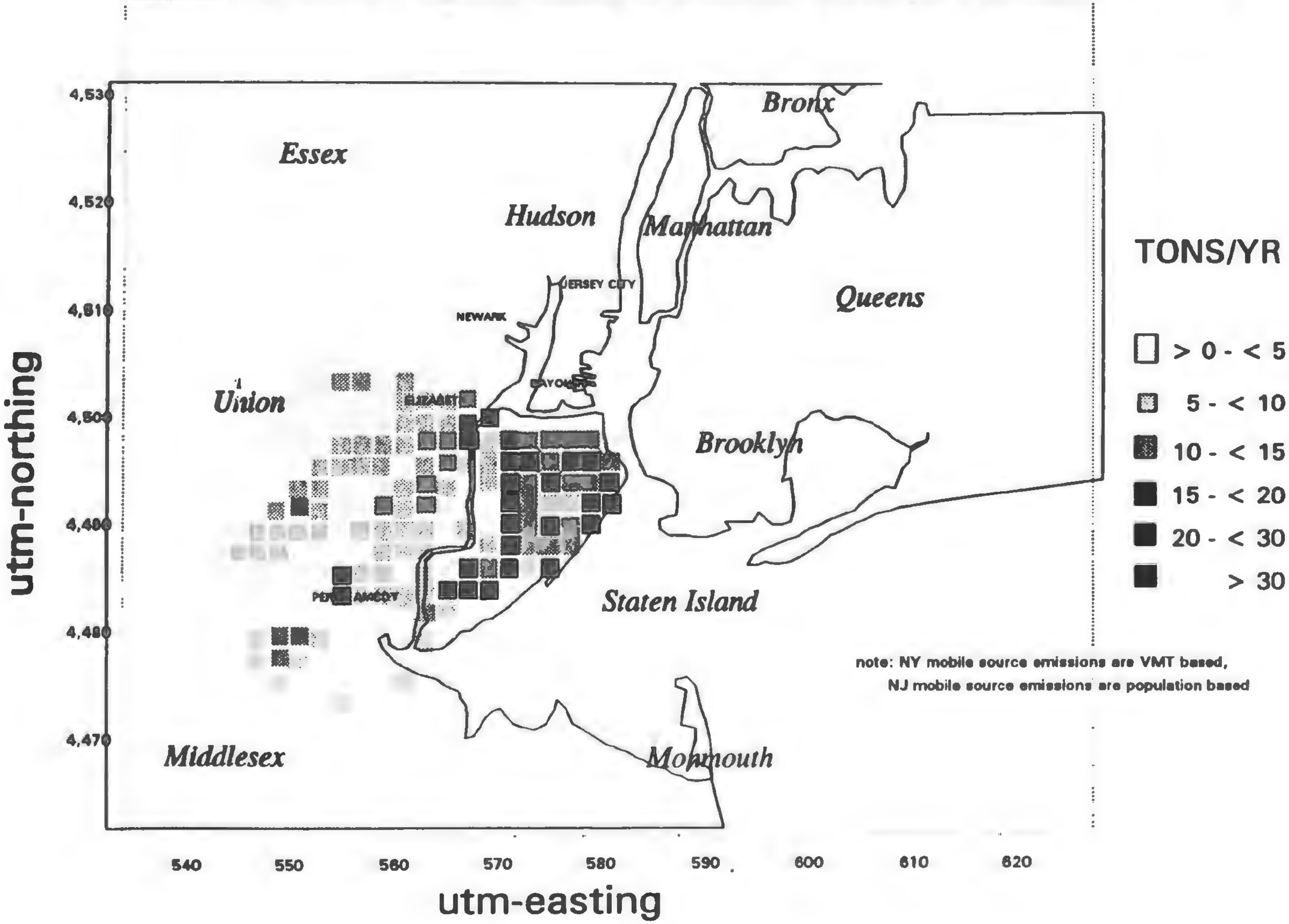

Table III-5-35: Benzene area and mobile source air toxics emissions in Staten Island, tons/year-comparison of New York and New Jersey methods for estimating these emissions which are depicted in emission density maps Figures III-5-21 and 22

utm-n	utm-e	1986 POPULATION	Avg: VMT/Grid 1000 Mi/Year	VOC 29.732 TONS/DAY	EXHAUST[1] 0.131 Gm/Mile	EVAPORATIVE[2] 1.79% VOC	A* SUBT NY MOBILE (LB/DAY)	B EPA GAS STATION LBS/DAY	NY[3] TOTAL TONS/YR	C NJGAS	D NJ COLD DEGREASE	E NJMOBILE METHOD LB/DAY	TOTAL (LB/DAY)	NJ[4] TOTAL TONS/YR	DIFF NY-NJ TONS/YR
		374,000[5]	2,340,886[6]	59,464[7]											
4,483	563	725	13,591	345	10.75	6.18	16.93	0.13	3.13	0.16	0.06	3.57	3.80	0.69	2
4,485	563	1,909	13,788	350	10.91	6.27	17.18	0.34	3.23	0.42	0.16	9.41	9.99	1.82	1
4,487	563	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4,489	563	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4,483	565	1,331	2,172	55	1.72	0.99	2.71	0.24	0.56	0.30	0.11	6.56	6.97	1.27	-1
4,485	565	3,519	30,489	774	24.12	13.86	37.99	0.63	7.10	0.78	0.30	17.34	18.42	3.36	4
4,487	565	1,327	95,041	2,414	75.20	43.22	118.42	0.24	21.67	0.29	0.11	6.54	6.95	1.27	20
4,489	565	797	24,240	616	19.18	11.02	30.20	0.14	5.55	0.18	0.07	3.93	4.17	0.76	5
4,483	567	26	0	0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.13	0.14	0.02	0
4,485	567	1,790	22,247	565	17.60	10.12	27.72	0.32	5.14	0.40	0.15	8.82	9.37	1.71	3
4,487	567	6,711	77,727	1,974	61.50	35.34	96.84	1.20	18.00	1.49	0.57	33.08	35.14	6.41	12
4,489	567	2,044	85,525	2,173	67.67	38.89	106.56	0.37	19.55	0.45	0.17	10.07	10.70	1.95	18
4,491	567	0	18,003	457	14.24	8.19	22.43	0.00	4.09	0.00	0.00	0.00	0.00	0.00	4
4,493	567	0	4,427	112	3.50	2.01	5.52	0.00	1.01	0.00	0.00	0.00	0.00	0.00	1
4,495	567	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4,497	567	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4,499	567	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4,485	569	1,365	7,881	200	6.24	3.58	9.82	0.24	1.86	0.30	0.12	6.73	7.15	1.30	1
4,487	569	6,840	59,602	1,514	47.16	27.10	74.26	1.22	13.88	1.52	0.58	33.71	35.81	6.54	7
4,489	569	15,787	60,089	1,526	47.55	27.32	74.87	2.82	14.42	3.50	1.34	77.81	82.65	15.08	-1
4,491	569	1,468	27,725	704	21.94	12.61	34.54	0.26	6.37	0.33	0.12	7.24	7.69	1.40	5
4,493	569	5,291	65,375	1,661	51.73	29.73	81.45	0.95	15.12	1.17	0.45	26.08	27.70	5.06	10
4,495	569	756	101,490	2,578	80.30	46.15	126.45	0.14	23.11	0.17	0.06	3.73	3.96	0.72	22
4,497	569	70	99,187	2,520	78.48	45.10	123.58	0.01	22.56	0.02	0.01	0.35	0.37	0.07	22
4,499	569	247	46,890	1,191	37.10	21.32	58.42	0.04	10.67	0.05	0.02	1.22	1.29	0.24	10
4,487	571	10,466	35,291	896	27.92	16.05	43.97	1.87	8.53	2.32	0.89	51.58	54.80	10.00	-1
4,489	571	20,514	38,648	982	30.58	17.57	48.15	3.67	9.78	4.55	1.74	101.11	107.40	19.60	-10
4,491	571	4,730	25,048	636	19.82	11.39	31.21	0.85	5.92	1.05	0.40	23.31	24.76	4.52	1
4,493	571	7,399	22,638	575	17.91	10.29	28.21	1.32	5.50	1.64	0.63	36.47	38.74	7.07	-2
4,495	571	9,935	72,497	1,842	57.36	32.96	90.33	1.78	16.96	2.20	0.84	48.97	52.02	9.49	7
4,497	571	12,967	92,156	2,341	72.92	41.90	114.82	2.32	21.58	2.88	1.10	63.91	67.89	12.39	9
4,499	571	6,740	13,455	342	10.65	6.12	16.76	1.20	3.38	1.50	0.57	33.22	35.29	6.44	-3
4,487	573	1,554	8,671	220	6.86	3.94	10.80	0.28	2.05	0.34	0.13	7.66	8.14	1.48	1
4,489	573	13,081	26,803	681	21.21	12.19	33.40	2.34	6.72	2.90	1.11	64.47	68.49	12.50	-6

Table III-5-35, continued: Benzene area and mobile source air toxics emissions in Staten Island, tons/year-comparison of New York and New Jersey methods for estimating these emissions which are depicted in emission density maps Figures III-5-21 and 22

utm-n	utm-e	1986 POPULATION	Avg: VMT/Grid 1000 Mi/Year	VOC 29.732 TONS/DAY	EXHAUST[1] 0.131 Gm/Mile	EVAPORATIVE[2] 1.79% VOC	A SUBT NY MOBILE (LB/DAY)	B EPA GAS STATION LBS/DAY	NY[3] TOTAL TONS/YR	C NJGAS	D NJ COLD DEGREASE	E NJMOBILE METHOD LB/DAY	TOTAL (LB/DAY)	NJ[4] TOTAL TONS/YR	DIFF NY-NJ TONS/YR
		374,000[5]	2,340,886[6]	59,464[7]											
4,491	573	12,585	20,179	513	15.97	9.18	25.14	2.25	5.19	2.79	1.07	62.03	65.89	12.02	-7
4,493	573	4,389	84,091	2,136	66.54	38.24	104.77	0.78	19.33	0.97	0.37	21.63	22.98	4.19	15
4,495	573	18,537	114,829	2,917	90.86	52.21	143.07	3.31	27.00	4.11	1.57	91.36	97.05	17.71	9
4,497	573	19,887	79,848	2,028	63.18	36.31	99.49	3.55	19.11	4.41	1.69	98.02	104.12	19.00	0
4,499	573	8,531	81,389	2,067	64.40	37.01	101.41	1.52	18.92	1.89	0.72	42.05	44.67	8.15	11
4,489	575	5,725	14,988	381	11.86	6.82	18.67	1.02	3.68	1.27	0.49	28.22	29.97	5.47	-2
4,491	575	15,564	68,404	1,738	54.12	31.10	85.23	2.78	16.30	3.45	1.32	76.71	81.49	14.87	1
4,493	575	6,711	7,680	195	6.08	3.49	9.57	1.20	2.07	1.49	0.57	33.08	35.14	6.41	-4
4,495	575	12,893	63,294	1,608	50.08	28.78	78.86	2.30	15.01	2.86	1.10	63.55	67.50	12.32	3
4,497	575	13,217	40,963	1,041	32.41	18.63	51.04	2.36	9.95	2.93	1.12	65.14	69.20	12.63	-3
4,499	575	12,566	41,479	1,054	32.82	18.86	51.68	2.25	10.04	2.79	1.07	61.93	65.79	12.01	-2
4,491	577	6,982	16,732	425	13.24	7.61	20.85	1.25	4.14	1.55	0.59	34.41	36.56	6.67	-3
4,493	577	14,812	83,920	2,132	66.40	38.16	104.56	2.65	19.80	3.29	1.26	73.00	77.55	14.15	6
4,495	577	15,557	73,761	1,874	58.36	33.54	91.90	2.78	17.52	3.45	1.32	76.68	81.45	14.86	3
4,497	577	18,426	90,674	2,303	71.75	41.23	112.98	3.29	21.50	4.09	1.56	90.82	96.47	17.61	4
4,499	577	26,126	62,615	1,591	49.54	28.47	78.02	4.67	15.50	5.80	2.22	128.77	136.79	24.96	-9
4,493	579	4,935	11,246	286	8.90	5.11	14.01	0.88	2.79	1.10	0.42	24.32	25.84	4.72	-2
4,495	579	11,904	156,893	3,985	124.14	71.34	195.48	2.13	36.25	2.64	1.01	58.67	62.32	11.37	25
4,497	579	5,264	31,720	806	25.10	14.42	39.52	0.94	7.47	1.17	0.45	25.95	27.56	5.03	2
4,499	579	0	5,486	139	4.34	2.49	6.84	0.00	1.25	0.00	0.00	0.00	0.00	0.00	1
					1,852 LB/DAY	1,065 LB/DAY	2,917 LB/DAY	67 LB/DAY	550 TPY	83 LB/DAY	32 LB/DAY	1,843 LB/DAY	1,958 LB/DAY	357 TPY	193
														% diff	35.1%

* Column A is the subtotal for exhaust plus evaporative emissions estimates by NYSDEC.
[1] Exhaust emissions in lbs/day using emission factor from U.S. EPA, 1985b.
[2] Evaporative emissions in lbs/day using emission factor from Carhart and Walsh, 1987.
[3] "NY TOTAL" means the sum of columns A (SUBT NY), B (EPA GAS STATION), and D (NJ COLD DEGREASE) in tons per year.
[4] "NJ TOTAL" means the sum of columns C (NJGAS), D (NJ COLD DEGREASE), and E (NJMOBILE) in tons per year.
[5] Countywide population from USDOC, 1986.
[6] Countywide VMT from NYSDEC.
[7] Countywide total VOC in lbs/day from Butensky, 1990.

Figure III-5-23

STATEN ISLAND PROJECT MAPPING SYSTEM
CADMIUM POINT SOURCES

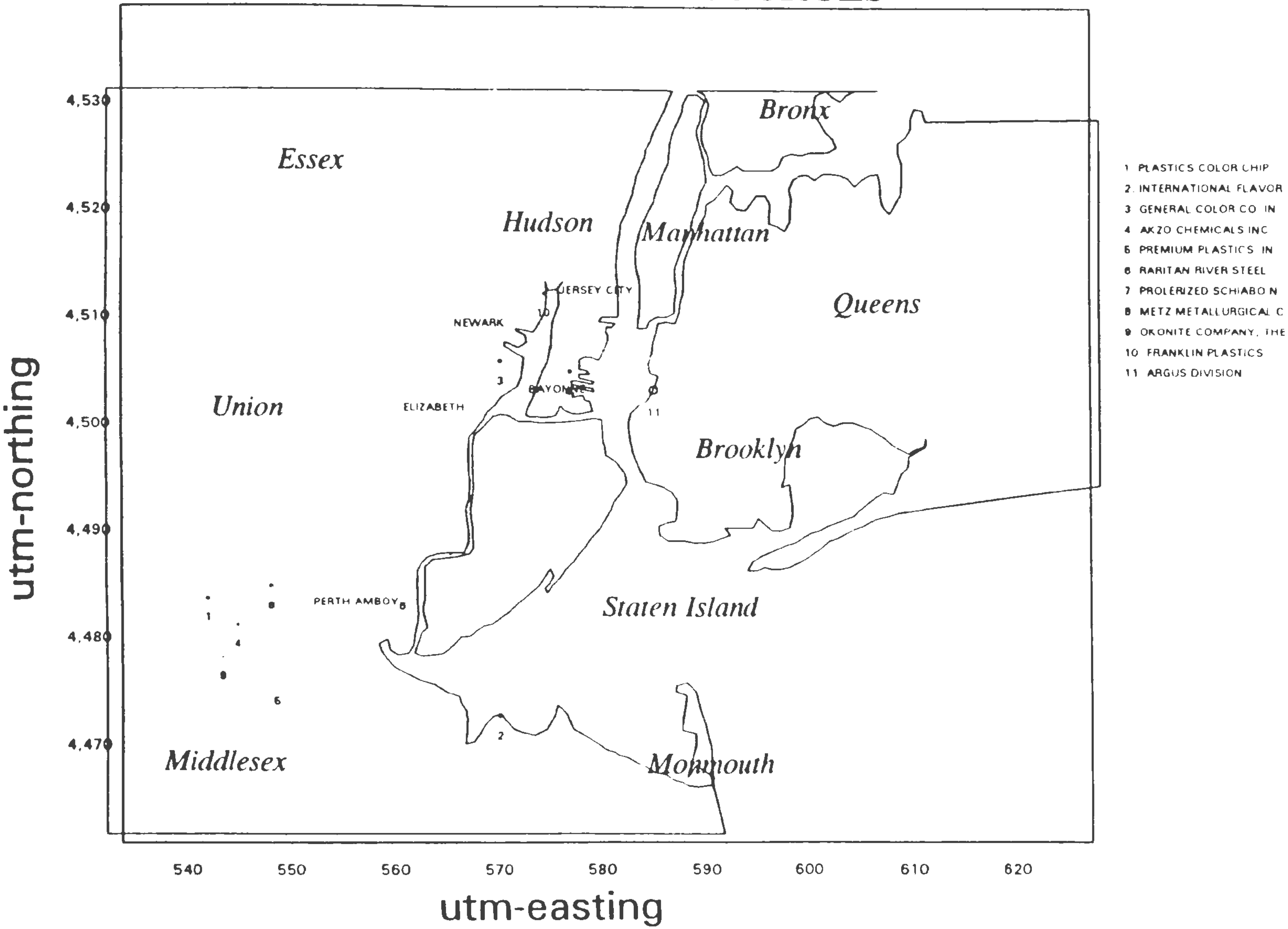

Table III-5-36: Cadmium and cadmium compound point sources on bubble map Figure III-5-23

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
1	PLASTICS COLOR CHIP INC	2 CAMPUS COURT	SOMERSET	08875	4483.4	542.2	0.25
2	INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.0	571.8	0.18
3	GENERAL COLOR CO. INC.	24 AVENUE B	NEWARK	07114	4505.4	570.5	0.50
4	AKZO CHEMICALS INC.	500 JERSEY AVENUE	NEW BRUNSWICK	08903	4480.9	545.1	0.13
5	PREMIUM PLASTICS, INC.	300 RYDERS LANE	EAST BRUNSWICK	08816	4475.5	548.9	0.01
6	RARITAN RIVER STEEL COMPANY	MARKET AND ELM STREETS	PERTH AMBOY	08861	4484.3	561.0	0.01
7	PROLERIZED SCHIABO NEU COMPANY	FOOT OF LINDEN AVENUE	JERSEY CITY	07303	4504.4	577.3	0.50
8	METZ METALLURGICAL CORP.	3900 S. CLINTON AVE.	SOUTH PLAINFIELD	07080	4484.5	548.4	0.38
9	OKONITE COMPANY, THE	US ROUTE 1	NORTH BRUNSWICK	08902	4477.9	543.6	0.02
10	FRANKLIN PLASTICS	113 PASSAIC AVE	KEARNY	07032	4511.8	590.7	0.25
11	ARGUS DIVISION	633 COURT STREET	BROOKLYN	11231	4502.7	584.4	3.33

Figure III-5-24

STATEN ISLAND PROJECT MAPPING SYSTEM
CADMIUM AREA & MOBILE SOURCE EMISSION DENSITIES

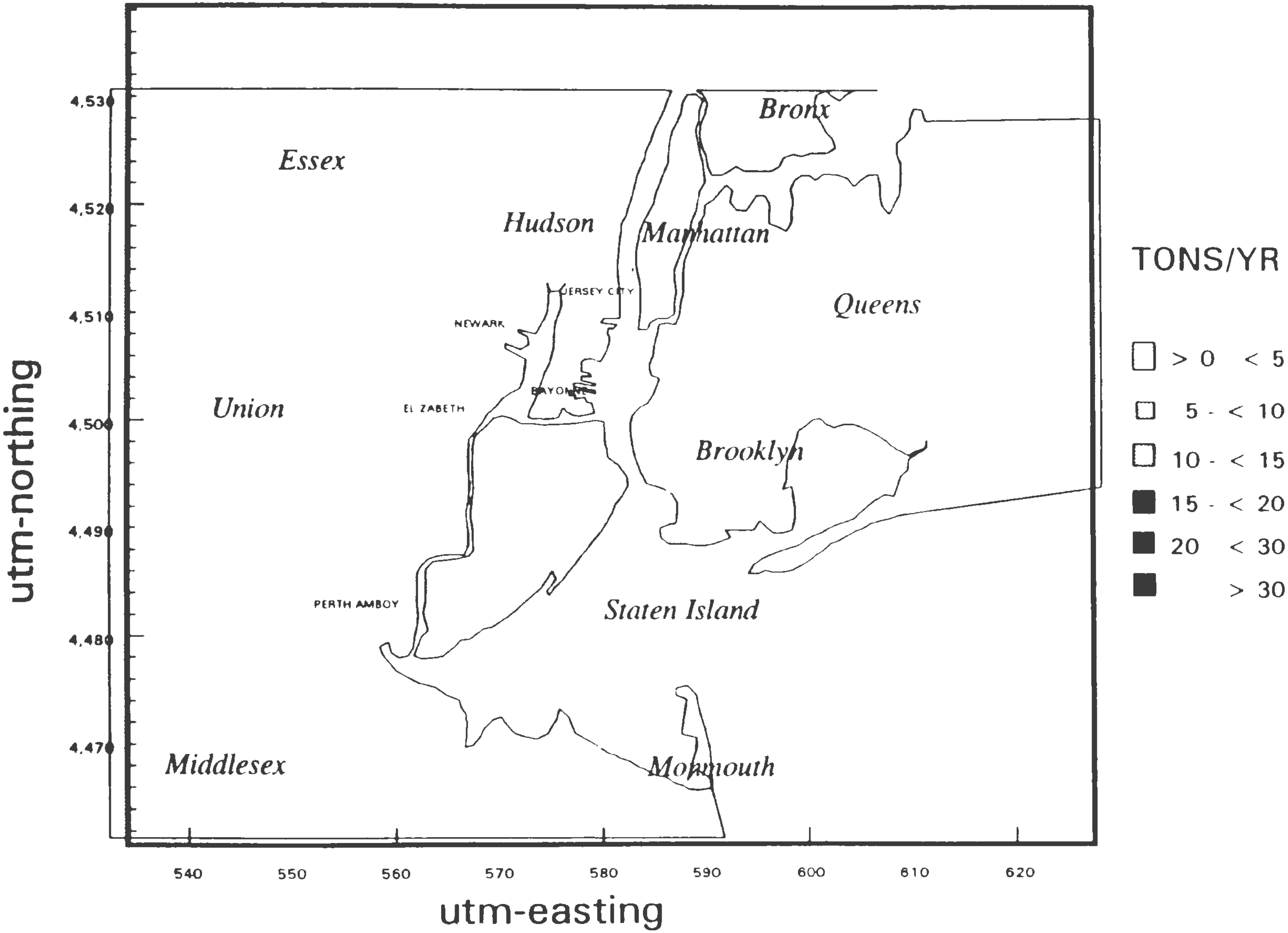

Figure III-5-25

STATEN ISLAND PROJECT MAPPING SYSTEM
METHYLENE CHLORIDE (DICHLOROMETHANE) POINT SOURCES

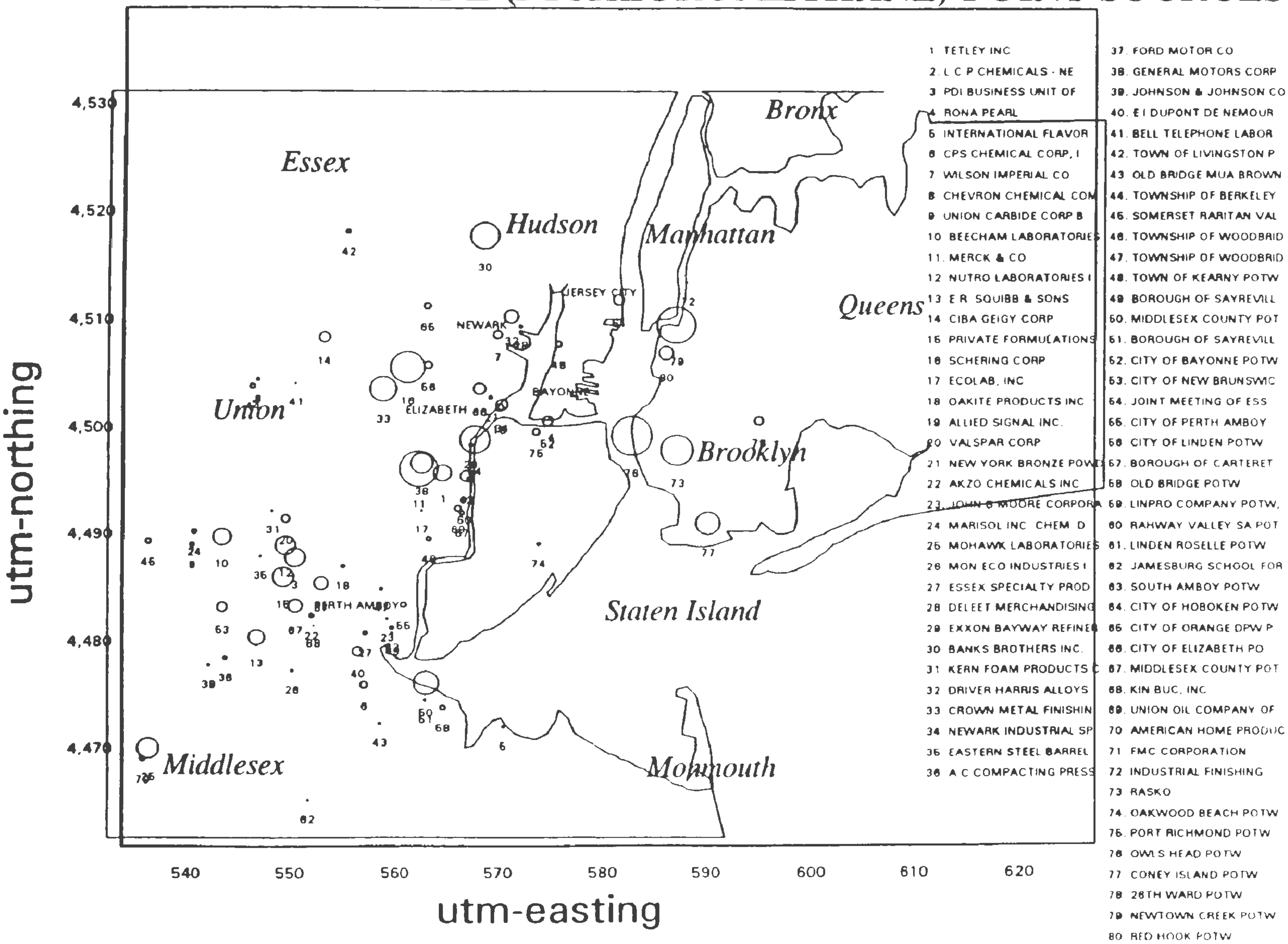

Table III-5-37: Dichloromethane point sources for bubble map Figure III-5-25

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
1	TETLEY INC	601 WEST LINDEN AVE	LINDEN	07036	4495.3	564.7	13.63
2	L C P CHEMICALS - NEW JERSEY INC.	FOOT OF SOUTH WOOD AVE.	LINDEN	07036	4494.7	567.3	1.14
3	PDI BUSINESS UNIT OF ICI AMERICAS	54 KELLOGG COURT	EDISON	08817	4487.5	550.6	17.00
4	RONA PEARL	4 HOOK ROAD	BAYONNE	07002	4500.5	575.2	0.25
5	INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.25
6	CPS CHEMICAL CORP, INC	OLD WATERWORKS RD	OLD BRIDGE	08857	4475.7	557.2	2.35
7	WILSON IMPERIAL CO	115 CHESTNUT STREET	NEWARK	07105	4508.1	570.0	3.60
8	CHEVRON CHEMICAL COMPANY	SUMMIT AVENUE	BERKELEY HEIGHTS	07922	4504.0	547.0	0.44
9	UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	0.90
10	BEECHAM LABORATORIES	101 POSSUMTOWN RD	PISCATAWAY	08854	4489.4	543.6	14.49
11	MERCK & CO	126 EAST LINCOLN AVE	RAHWAY	07065	4495.7	562.4	64.00
12	NUTRO LABORATORIES INC	650 SOUTH PLAINFIELD	SOUTH PLAINFIELD	07080	4488.6	549.7	17.79
13	E.R. SQUIBB & SONS	1 SQUIBB DRIVE	NORTH BRUNSWICK	08902	4480.1	547.0	12.05
14	CIBA-GEIGY CORP	556 MORRIS AVE	SUMMIT	07901	4507.9	553.3	5.66
15	PRIVATE FORMULATIONS, INC.	460 PLAINFIELD AVENUE	EDISON	08840	4485.7	549.5	19.32
16	SCHERING CORP	1011 MORRIS AVE	UNION	07083	4505.1	561.3	51.14
17	ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.7	0.07
18	OAKITE PRODUCTS INC	700 MIDDLESEX AVE	METUCHEN	08840	4486.7	555.1	0.50
19	ALLIED SIGNAL INC.	10 NORTH AVE EAST	ELIZABETH	07201	4501.3	570.2	2.58
20	VALSPAR CORP	3474 RAND AVE	SOUTH PLAINFIELD	07080	4491.1	549.7	3.36
21	NEW YORK BRONZE POWDER CO. INC.	515-519 DOWD AVENUE	ELIZABETH	07201	4502.3	569.3	0.62
22	AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2	1.08
23	JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.4	0.20
24	MARISOL INC. CHEM. DIV.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.9	1.09
25	MOHAWK LABORATORIES OF NJ	STOUTS LANE	MONMOUTH JUNCTION	08852	4469.8	536.5	21.38
26	MON-ECO INDUSTRIES INC	5 JOANNA COURT	EAST BRUNSWICK	08816	4477.0	550.4	0.25
27	ESSEX SPECIALTY PRODUCTS INC.	1 CROSSMAN RD SOUTH	SAYREVILLE	08872	4480.5	557.3	0.80
28	DELEET MERCHANDISING CORP	26 BLANCHARD ST	NEWARK	07105	4508.9	572.2	0.47
29	EXXON BAYWAY REFINERY	1400 PARK AVE	LINDEN	07036	4497.9	567.4	0.35
30	BANKS BROTHERS INC.	24 FEDERAL PLAZA	BLOOMFIELD	07003	4517.3	568.7	36.30
31	KERN FOAM PRODUCTS CORP	1253 NEWMARK AVE	SOUTH PLAINFIELD	07080	4491.8	548.4	0.13
32	DRIVER HARRIS ALLOYS INC	308 MIDDLESEX STREET	HARRISON	07029	4509.8	571.3	9.00
33	CROWN METAL FINISHING CO. INC.	40 BORIGHT AVE	KENILWORTH	07033	4503.1	559.0	30.24
34	NEWARK INDUSTRIAL SPRAYING INC.	12 AMSTERDAM STREET	NEWARK	07105	4501.6	570.4	6.00
35	EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.13
36	A C COMPACTING PRESSES, INC.	1577 LIVINGSTON AVENUE	NORTH BRUNSWICK	08902	4478.2	544.0	0.58
37	FORD MOTOR CO	939 US ROUTE #1	EDISON	08818	4485.2	553.2	8.63
38	GENERAL MOTORS CORP. CPC GROUP	1016 WEST EDGAR RD	LINDEN	07036	4496.2	562.8	21.28
39	JOHNSON & JOHNSON CO INC	US ROUTE 1 & AARON ROAD	NORTH BRUNSWICK	08902	4477.5	542.5	0.24
40	E I DUPONT DE NEMOURS & CO	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7	4.59

Table III-5-37, continued: Dichloromethane point sources for bubble map Figure III-5-25

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
41	BELL TELEPHONE LABORATORIES	600 MOUNTAIN AVENUE	NEW PROVIDENCE	07974	4503.6	550.7	0.01
42	TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	1.08
43	OLD BRIDGE MUA BROWNTOWN POTW				4472.0	558.8	0.25
44	TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6	1.30
45	SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	1.39
46	TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.98
47	TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.39
48	TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	1.64
49	BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0	0.07
50	MIDDLESEX COUNTY POTW 1 (#15669)	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	27.32
51	BOROUGH OF SAYREVILLE POTW 1				4479.3	563.1	0.17
52	CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	4.18
53	CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	4.79
54	JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	38.96
55	CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	1.56
56	CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	3.03
57	BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.95
58	OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	1.15
59	LINPRO COMPANY POTW, THE				4464.0	533.1	0.48
60	RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	0.87
61	LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	6.17
62	JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0	0.09
63	SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0	0.71
64	CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	5.45
65	CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	1.99
66	CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	6.31
67	MIDDLESEX COUNTY POTW 2				4483.0	550.8	8.21
68	KIN-BUC, INC.	MEADOW ROAD	EDISON	08817	4481.2	552.5	0.01
69	UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3	1.82
70	AMERICAN HOME PRODUCTS CORP.	567 RIDGE ROAD	MONMOUTH JCT.	08852	4468.8	536.1	1.26
71	FMC CORPORATION	PLAINSBORO ROAD	PLAINSBORO TWP.	08536	4465.1	531.9	1.14
72	INDUSTRIAL FINISHING PRODUCTS	465 LOGAN STREET	BROOKLYN	11208	4512.9	587.2	0.01
73	RASKO	1704 MCDONALD AVE	BROOKLYN	11230	4497.4	587.4	47.93
74	OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.37
75	PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	2.28
76	OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	77.92
77	CONEY ISLAND POTW	AVE Z/KNAPP ST	BROOKLYN		4490.6	590.4	26.72
78	26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	3.42
79	NEWTOWN CREEK POTW	329-369 GREENPOINT AVE	BROOKLYN		4509.0	587.3	68.88
80	RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	9.47

Figure III-5-26

STATEN ISLAND PROJECT MAPPING SYSTEM
METHYLENE CHLORIDE AREA & MOBILE SOURCE EMISSION DENSITIES

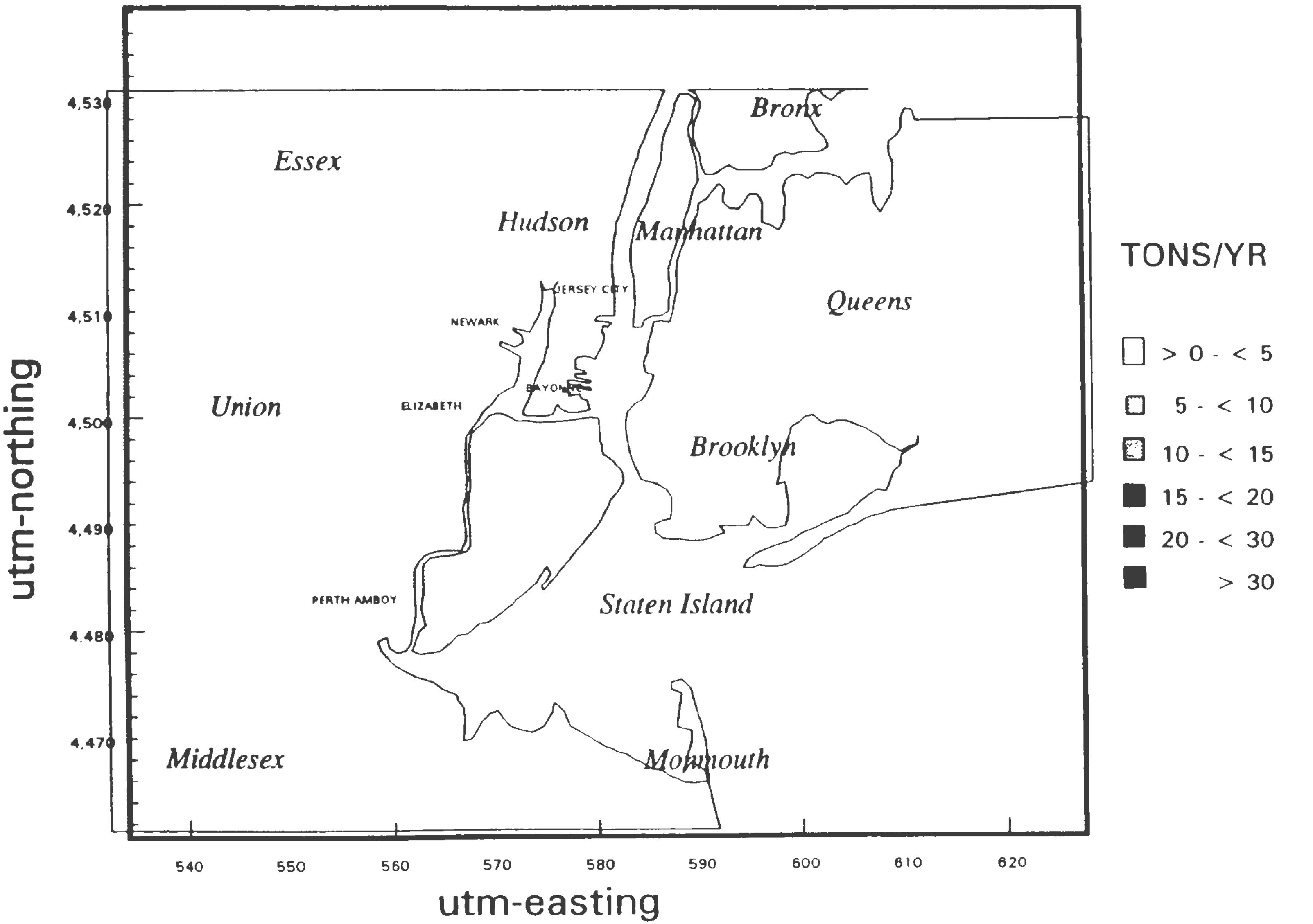

Figure III-5-27

STATEN ISLAND PROJECT MAPPING SYSTEM
FORMALDEHYDE POINT SOURCES

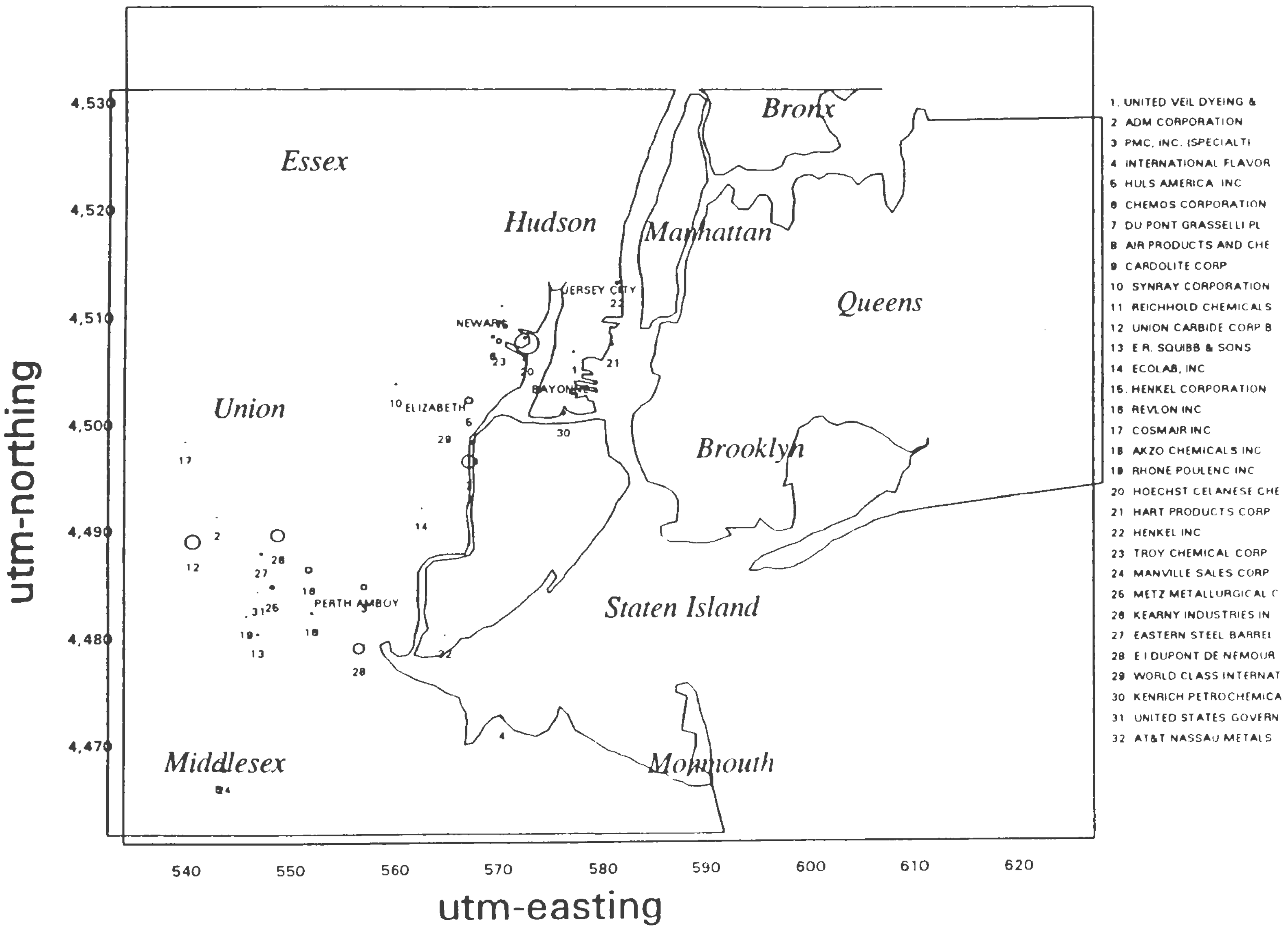

Table III-5-38: Formaldehyde point sources for bubble map Figure III-5-27

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
1	UNITED VEIL DYEING & FINISHING CO	28-50 BOSTWICK AVENUE	JERSEY CITY	07305	4506.3	577.3	0.10
2	ADM CORPORATION	100 LINCOLN BLVD.	MIDDLESEX	08846	4491.0	543.0	0.02
3	PMC, INC. (SPECIALTIES GROUP)	INDUSTRIAL AVE.	FORDS	08863	4484.5	557.2	1.61
4	INTERNATIONAL FLAVORS & FRAGRANCES	800 ROSE LANE	UNION BEACH	07735	4477.1	571.8	0.25
5	HULS AMERICA, INC.	830 MAGNOLIA AVE	ELIZABETH	07201	4501.8	567.3	2.52
6	CHEMOS CORPORATION	225-235 EMMET STREET	NEWARK	07114	4507.7	569.6	0.46
7	DU PONT GRASSELLI PLANT	SOUTH WOOD AVE	LINDEN	07036	4496.1	567.3	8.64
8	AIR PRODUCTS AND CHEMICALS INC.	DAYTON-JAMESBURG ROAD	DAYTON	08810	4467.9	543.2	4.03
9	CARDOLITE CORP.	500 DOREMUS AVE.	NEWARK	07105	4507.6	573.7	0.25
10	SYNRAY CORPORATION	209 N. MICHIGAN AVENUE	KENILWORTH	07033	4503.3	560.2	0.16
11	REICHHOLD CHEMICALS INC.	726 ROCKEFELLAR STREET	ELIZABETH	07202	4497.9	567.7	0.50
12	UNION CARBIDE CORP BOUND BROOK PLT	1 RIVER ROAD	PISCATAWAY	08854	4488.7	540.7	9.67
13	E.R. SQUIBB & SONS	1 SQUIBB DRIVE	NORTH BRUNSWICK	08902	4480.1	547.0	0.13
14	ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.7	0.01
15	HENKEL CORPORATION	FIRST & ESSEX STREETS	HARRISON	07029	4510.5	570.5	0.08
16	REVLON INC.	ROUTE 27 & TALMADGE RD.	EDISON TOWNSHIP	08817	4486.1	551.9	2.12
17	COSMAIR INC.	200-222 TERMINAL AVENUE	CLARK	07066	4299.0	599.0	0.01
18	AKZO CHEMICALS INC.	MEADOW ROAD	EDISON	08817	4482.1	552.2	0.13
19	RHONE-POULENC INC.	297 JERSEY AVENUE	NEW BRUNSWICK	08903	4481.8	545.9	0.02
20	HOECHST CELANESE CHEMICAL GROUP	354 DOREMUS AVENUE	NEWARK	07105	4507.1	573.9	22.93
21	HART PRODUCTS CORP.	173 SUSSEX STREET	JERSEY CITY	07302	4507.0	581.0	0.25
22	HENKEL INC	1301 JEFFERSON AVENUE	HOBOKEN	07030	4512.7	581.5	0.54
23	TROY CHEMICAL CORP.	ONE AVENUE L	NEWARK	07105	4507.3	570.2	1.28
24	MANVILLE SALES CORP.	45 STULTS ROAD	DAYTON	08810	4467.5	543.8	0.42
25	METZ METALLURGICAL CORP.	3900 SOUTH CLINTON AVE	SOUTH PLAINFIELD	07080	4484.5	548.4	0.68
26	KEARNY INDUSTRIES INC.	2624 HAMILTON BLVD.	SOUTH PLAINFIELD	07080	4489.3	548.9	7.38
27	EASTERN STEEL BARREL CORP	4100 NEW BRUNSWICK AVE	PISCATAWAY	08854	4487.6	547.3	0.25
28	E I DUPONT DE r1h3V♦\1D.20■&	CHEESEQUAKE ROAD	SAYREVILLE	08872	4478.8	556.7	5.67
29	WORLD CLASS INTERNATIONAL KITCHENS	1930 EAST ELIZABETH AVE.	LINDEN	07036	4499.9	564.9	0.01
30	KENRICH PETROCHEMICALS INC	140 EAST 22ND STREET	BAYONNE	07002	4500.5	576.3	0.62
31	UNITED STATES GOVERNMENT	CAMP KILMER	EDISON	08818	4484.0	547.0	0.01
32	AT&T NASSAU METALS	286 RICHMOND VALLEY ROAD	STATEN ISLAND	10309	4480.0	565.0	0.03

Figure III-5-28

STATEN ISLAND PROJECT MAPPING SYSTEM
FORMALDEHYDE AREA & MOBILE SOURCE EMISSION DENSITIES

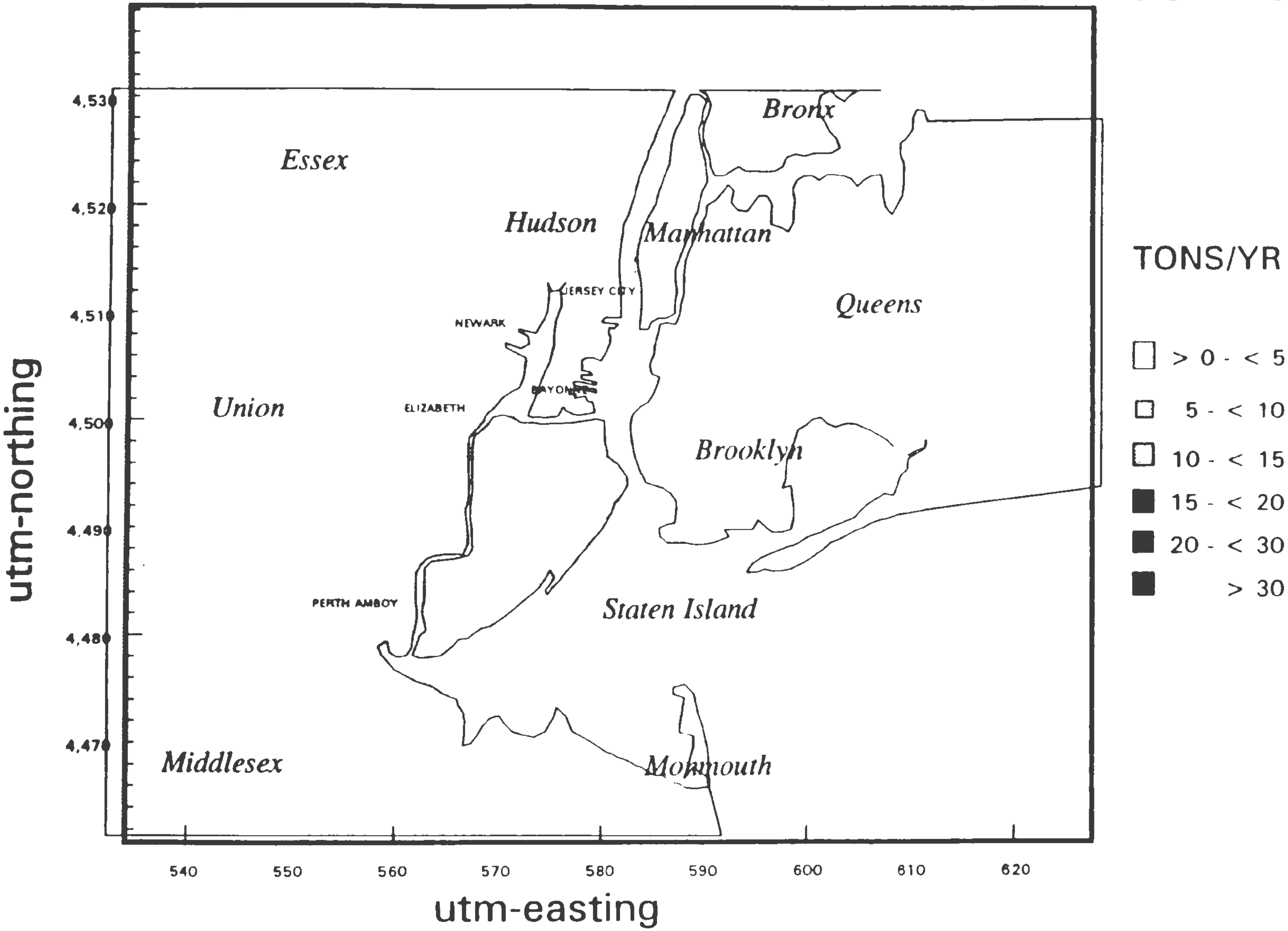

Figure III-5-29

STATEN ISLAND PROJECT MAPPING SYSTEM
PERCHLOROETHYLENE POINT SOURCES

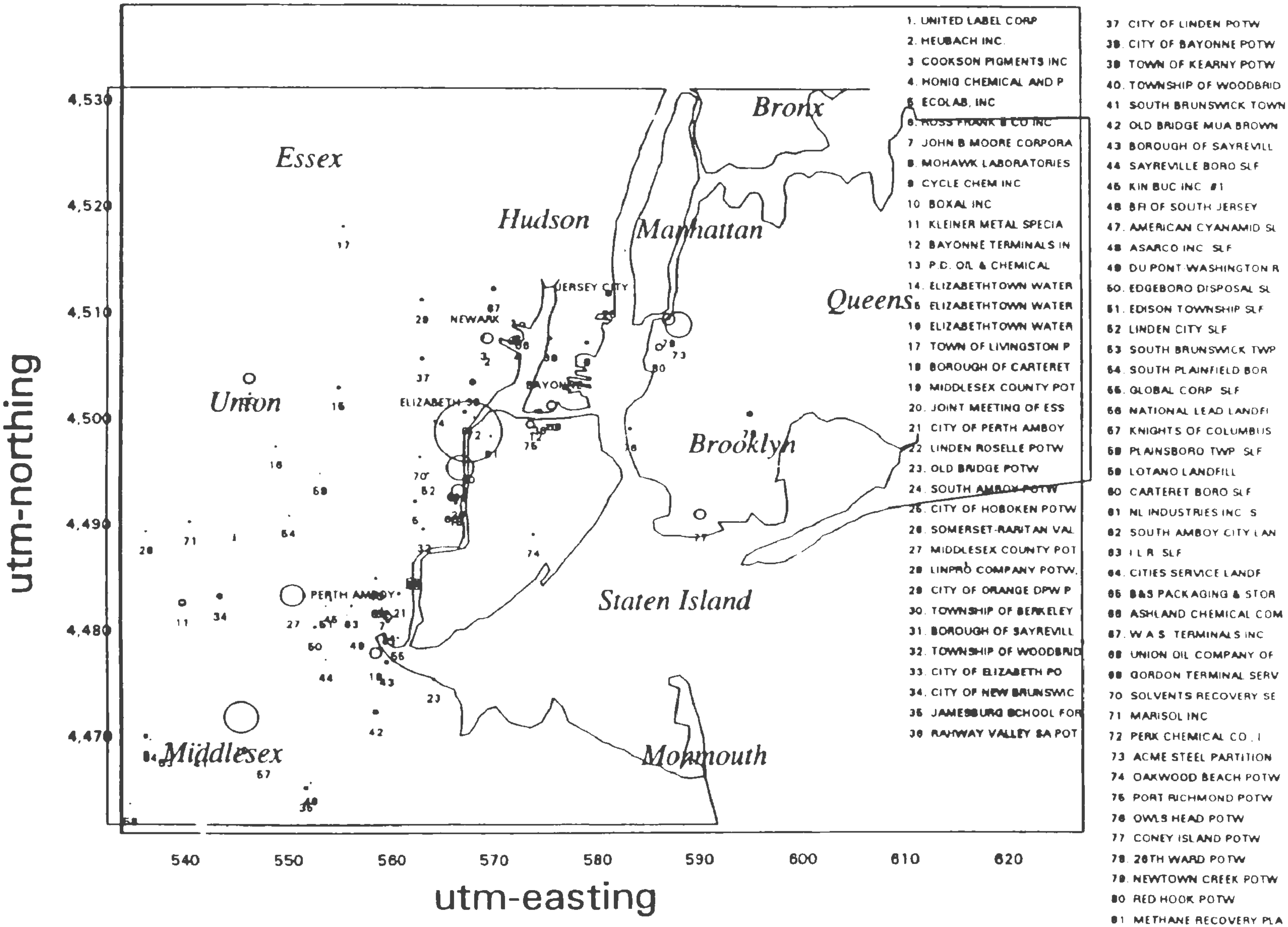

Table III-5-39: Perchloroethylene point sources for bubble map Figure III-5-29

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
1	UNITED LABEL CORP.	65 CHAMBERS STREET	NEWARK	07105	4508.9	572.2	0.10
2	HEUBACH INC.	HEUBACH AVE.	NEWARK	07114	4507.2	569.7	6.15
3	COOKSON PIGMENTS INC.	256 VANDERPOOL STREET	NEWARK	07114	4507.3	569.3	0.13
4	HONIG CHEMICAL AND PROCESSING CORP	414 WILSON AVENUE	NEWARK	07105	4507.3	572.6	0.62
5	ECOLAB, INC.	255 BLAIR ROAD	WOODBRIDGE TWP.	07095	4491.8	562.6	0.40
6	ROSS FRANK B CO INC	6-10 ASH STREET	JERSEY CITY	07304	4506.8	579.3	0.44
7	JOHN B MOORE CORPORATION	ROUTE 9 AT PARKWAY	SAYREVILLE	08872	4481.8	559.3	0.01
8	MOHAWK LABORATORIES OF NJ	STOUTS LANE	MONMOUTH JUNCTION	08852	4469.8	536.5	0.44
9	CYCLE CHEM INC.	217 SOUTH FIRST ST.	ELIZABETH	07206	4299.0	599.0	0.54
10	BOXAL INC.	5 BASSETT COURT	CRANBURY	08512	4471.5	545.8	50.57
11	KLEINER METAL SPECIALTIES INC.	4315 NEW BRUNSWICK AVE.	SOUTH PLAINFIELD	07080	4299.0	599.0	1.75
12	BAYONNE TERMINALS INC.	2ND STREET & HOBART AVE.	BAYONNE	07002	4499.7	574.3	0.16
13	P.D. OIL & CHEMICAL STORAGE, INC.	FOOT OF EAST 22ND STREET	BAYONNE	07002	4500.9	575.8	3.69
14	ELIZABETHTOWN WATER COMPANY	MORRIS AVE. & ROUTE 22	UNION	07083	4501.0	565.0	0.23
15	ELIZABETHTOWN WATER COMPANY	CHARLES STREET	MOUNTAINSIDE	07092	4502.5	555.1	0.40
16	ELIZABETHTOWN WATER COMPANY	NORTH AVENUE	PLAINFIELD	07061	4497.0	549.1	0.10
17	TOWN OF LIVINGSTON POTW		LIVINGSTON	07039	4517.7	555.6	0.23
18	BOROUGH OF CARTERET POTW	399 ROOSEVELT AVE	CARTERET	07008	4491.6	566.7	0.20
19	MIDDLESEX COUNTY POTW 1	CHEVALIER AVE	SAYREVILLE	08872	4481.0	563.3	5.81
20	JOINT MEETING OF ESSEX-UNION POTW	500 SOUTH FIRST STREET	ELIZABETH	07202	4498.4	567.9	198.54
21	CITY OF PERTH AMBOY POTW	260 HIGH STREET	PERTH AMBOY	08861	4483.1	561.1	0.33
22	LINDEN ROSELLE POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4495.0	567.1	31.71
23	OLD BRIDGE POTW	OLD WATER WORKS ROAD	OLD BRIDGE	08857	4478.6	564.9	0.24
24	SOUTH AMBOY POTW		SOUTH AMBOY	08879	4481.0	560.0	2.91
25	CITY OF HOBOKEN POTW	94 WASHINGTON STREET	HOBOKEN	07030	4511.5	583.0	1.16
26	SOMERSET-RARITAN VALLEY POTW	POLHEMUS AVE	BRIDGEWATER	08807	4489.0	536.6	0.07
27	MIDDLESEX COUNTY POTW 2				4483.0	550.8	23.11
28	LINPRO COMPANY POTW, THE				4464.0	533.1	1.96
29	CITY OF ORANGE DPW POTW		ORANGE	07051	4510.8	563.3	0.42
30	TOWNSHIP OF BERKELEY HGHTS WPC POTW		BERKELEY HEIGHTS	07922	4503.4	546.6	5.31
31	BOROUGH OF SAYREVILLE POTW 2				4480.5	560.0	0.30
32	TOWNSHIP OF WOODBRIDGE POTW 1	CLIFF ROAD	SEWAREN	07077	4489.2	563.5	0.21
33	CITY OF ELIZABETH POTW		ELIZABETH	07207	4503.1	568.3	1.34
34	CITY OF NEW BRUNSWICK POTW		NEW BRUNSWICK	08903	4482.9	543.8	1.02
35	JAMESBURG SCHOOL FOR BOYS POTW				4465.0	552.0	0.39
36	RAHWAY VALLEY SA POTW	1050 EAST HAZELWOOD AVE	RAHWAY	07065	4492.8	566.9	8.10
37	CITY OF LINDEN POTW	5005 SOUTH WOOD AVE	LINDEN	07036	4505.3	563.4	0.64
38	CITY OF BAYONNE POTW	630 AVE C	BAYONNE	07002	4499.7	574.8	0.89
39	TOWN OF KEARNY POTW	39 CENTRAL AVE	KEARNY	07032	4507.2	574.9	0.35

Table III-5-39, continued: Perchloroethylene point sources for bubble map Figure III-5-29

	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	UTM-N	UTM-E	FACILITY-WIDE EMISSIONS (tons/yr)
40	TOWNSHIP OF WOODBRIDGE POTW 2	1 MAIN STREET	WOODBRIDGE	07095	4484.6	558.9	0.08
41	SOUTH BRUNSWICK TOWNSHIP	RT 522 & DAYTON-JAMESBURG RD	DAYTON	08810	4469.0	541.8	0.11
42	OLD BRIDGE MUA BROWNTOWN POTW				4472.0	558.8	1.01
43	BOROUGH OF SAYREVILLE POTW 1				4479.3	563.1	0.67
44	SAYREVILLE BORO SLF		SAYREVILLE	08872	4477.0	554.0	0.01
45	KIN-BUC INC. #1		EDISON TOWNSHIP	08817	4482.5	554.5	0.04
46	BFI OF SOUTH JERSEY SLF				4465.5	552.5	0.04
47	AMERICAN CYANAMID SLF-HAZ	4900 TREMLEY POINT	LINDEN	07036	4496.0	465.5	0.01
48	ASARCO INC. SLF				4485.5	562.5	0.04
49	DU PONT-WASHINGTON RD. SLF	WASHINGTON ROAD	SAYREVILLE	08872	4480.0	557.0	0.01
50	EDGEBORO DISPOSAL SLF	EDGEBORO ROAD	EAST BRUNSWICK	08816	4480.0	553.0	0.23
51	EDISON TOWNSHIP SLF		EDISON	08818	4482.0	554.0	0.02
52	LINDEN CITY SLF		LINDEN	07036	4494.5	564.0	0.02
53	SOUTH BRUNSWICK TWP. SLF		SOUTH BRUNSWICK		4469.0	538.5	0.01
54	SOUTH PLAINFIELD BORO		SOUTH PLAINFIELD	07080	4490.5	550.5	0.02
55	GLOBAL CORP. SLF	ERNSTON ROAD	OLD BRIDGE	08857	4479.0	561.0	0.03
56	NATIONAL LEAD LANDFILL		PERTH AMBOY	08861	4486.0	562.5	0.01
57	KNIGHTS OF COLUMBUS LANDFILL		MONROE TOWNSHIP		4468.0	548.0	0.01
58	PLAINSBORO TWP. SLF EXPANSION		PLAINSBORO TOWNSHIP	08536	4463.5	535.0	0.01
59	LOTANO LANDFILL		EDISON TOWNSHIP	08817	4494.5	553.5	0.01
60	CARTERET BORO SLF		CARTERET	07008	4494.0	566.5	0.01
61	NL INDUSTRIES INC. SLF		SAYREVILLE	08872	4483.0	559.0	0.01
62	SOUTH AMBOY CITY LANDFILL		SOUTH AMBOY	08879	4483.0	559.5	0.01
63	I.L.R. SLF		EDISON	08818	4482.0	556.5	0.09
64	CITIES SERVICE LANDFILL		SOUTH BRUNSWICK		4469.5	537.0	0.01
65	B&S PACKAGING & STORAGE CO., INC.	411 WILSON AVENUE	NEWARK	07105	4508.7	572.3	0.06
66	ASHLAND CHEMICAL COMPANY	221 FOUNDRY STREET	NEWARK	07114	4508.5	573.1	1.24
67	W.A.S. TERMINALS INC.	126 PASSAIC STREET	NEWARK	07104	4511.9	570.3	0.90
68	UNION OIL COMPANY OF CALIFORNIA	350 ROOSEVELT AVENUE	CARTERET	07008	4492.0	566.3	0.81
69	GORDON TERMINAL SERVICE CO.	FOOT OF HOOK ROAD	BAYONNE	07002	4500.5	576.1	0.10
70	SOLVENTS RECOVERY SERVICE		LINDEN	07036	4496.0	563.1	0.19
71	MARISOL INC.	125 FACTORY LANE	MIDDLESEX	08846	4489.9	540.8	0.25
72	PERK CHEMICAL CO., INC		ELIZABETH	07207	4499.8	568.5	0.03
73	ACME STEEL PARTITION CO. INC.	513 PORTER AVENUE	BROOKLYN	11222	4508.5	588.3	33.95
74	OAKWOOD BEACH POTW	EMMET AVE/MILL ROAD	STATEN ISLAND		4488.7	574.1	0.21
75	PORT RICHMOND POTW	1801 RICHMOND TERRACE	STATEN ISLAND		4499.1	573.8	3.29
76	OWLS HEAD POTW	BAY RIDGE AVE/THE NARROWS	BROOKLYN		4498.7	581.6	0.44
77	CONEY ISLAND POTW	AVE Z/KNAPP ST	BROOKLYN		4490.6	590.4	5.92
78	26TH WARD POTW	HENDRIX ST/JAMAICA BAY	BROOKLYN		4500.1	595.2	1.23
79	NEWTOWN CREEK POTW	329-369 GREENPOINT AVE	BROOKLYN		4509.0	587.3	7.70
80	RED HOOK POTW	MARSHALL ST/LITTLE ST	BROOKLYN		4506.4	586.3	2.02
81	METHANE RECOVERY PLANT	FRESH KILLS LANDFILL	STATEN ISLAND	10314	4498.0	570.0	0.07

Figure III-5-30

STATEN ISLAND PROJECT MAPPING SYSTEM
PERCHLOROETHYLENE AREA & MOBILE SOURCE EMISSION DENSITIES

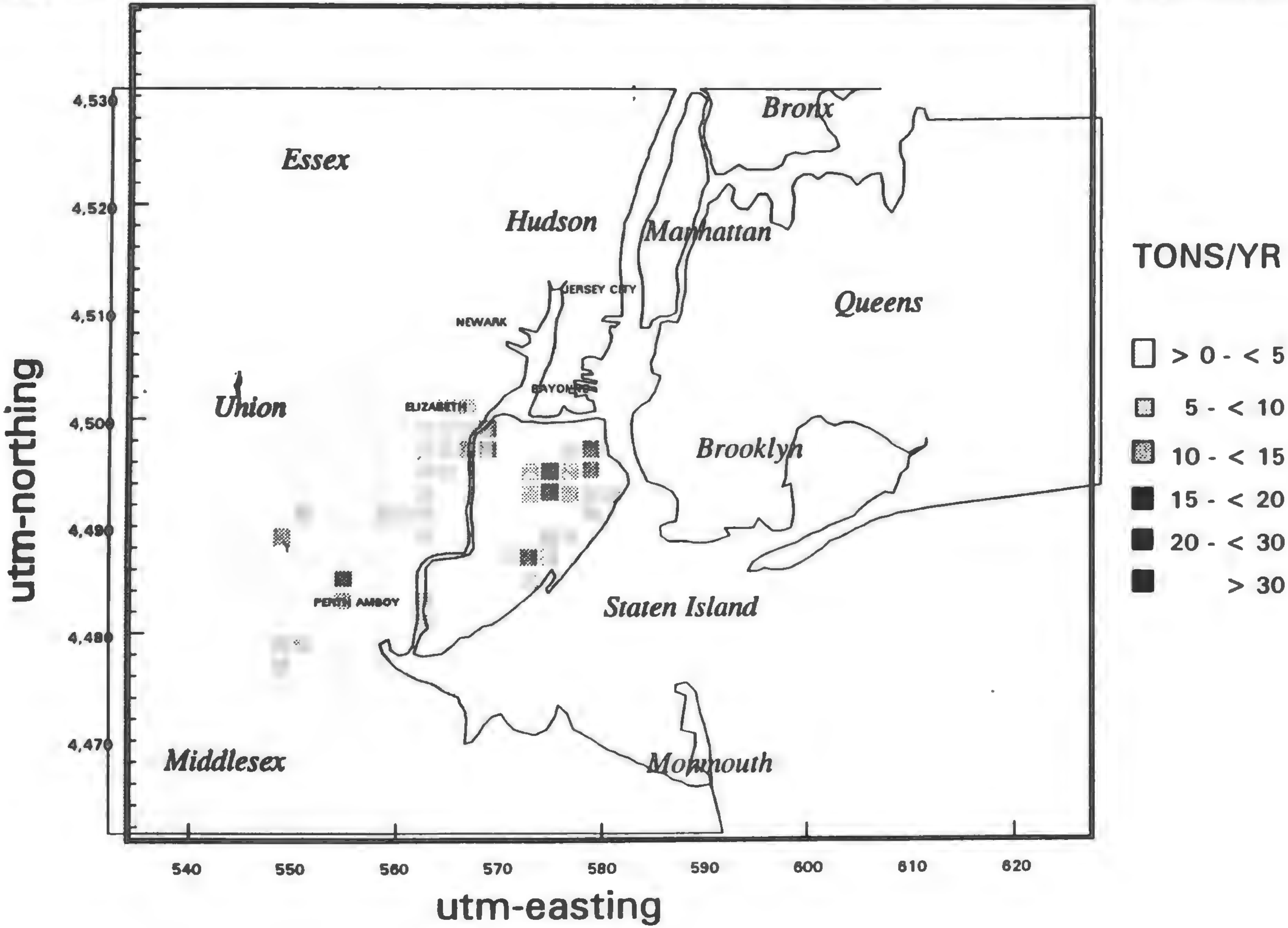

Table III-5-40: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30.

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMALDEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
Staten Island Cells													
1.00	4481.00	565.00	3.13	1	1	0.000	0	0.688	1	0.037	1	0.402	1
2.00	4483.00	565.00	3.23	1	1	0.001	1	0.721	1	0.097	1	1.058	1
3.00	4485.00	565.00	0.00	0	1	0.000	0	0.000	0	0.000	0	0.000	0
4.00	4487.00	565.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
5.00	4481.00	567.00	0.56	1	1	0.000	0	0.133	1	0.068	1	0.737	1
6.00	4483.00	567.00	7.10	2	1	0.001	1	1.580	1	0.179	1	1.950	1
7.00	4485.00	567.00	21.67	5	1	0.001	1	4.740	1	0.068	1	0.735	1
8.00	4487.00	567.00	5.55	2	1	0.000	0	1.218	1	0.041	1	0.442	1
9.00	4481.00	569.00	0.00	0	1	0.000	0	0.001	1	0.001	1	0.014	1
10.00	4483.00	569.00	5.14	2	1	0.001	1	1.138	1	0.091	1	0.992	1
11.00	4485.00	569.00	18.00	4	2	0.003	1	3.985	1	0.342	1	3.718	1
12.00	4487.00	569.00	19.55	4	1	0.001	1	4.282	1	0.104	1	1.132	1
13.00	4489.00	569.00	4.09	1	0	0.000	0	0.893	1	0.000	0	0.000	0
14.00	4491.00	569.00	1.01	1	0	0.000	0	0.220	1	0.000	0	0.000	0
15.00	4493.00	569.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
16.00	4495.00	569.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
17.00	4497.00	569.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
18.00	4483.00	571.00	1.86	1	1	0.000	0	0.417	1	0.070	1	0.756	1
19.00	4485.00	571.00	13.88	3	2	0.003	1	3.088	1	0.349	1	3.789	1
20.00	4487.00	571.00	14.42	3	4	0.005	1	3.285	1	0.805	1	8.746	2
21.00	4489.00	571.00	6.37	2	1	0.001	1	1.404	1	0.075	1	0.813	1
22.00	4491.00	571.00	15.12	4	2	0.002	1	3.345	1	0.270	1	2.931	1
23.00	4493.00	571.00	23.11	5	1	0.001	1	5.049	2	0.039	1	0.419	1
24.00	4495.00	571.00	22.56	5	1	0.001	1	4.921	1	0.004	1	0.039	1
25.00	4497.00	571.00	10.67	3	1	0.001	1	2.331	1	0.013	1	0.137	1
26.00	4485.00	573.00	8.53	2	3	0.003	1	1.952	1	0.534	1	5.798	2
27.00	4487.00	573.00	9.78	2	4	0.006	1	2.312	1	1.046	1	11.365	3
28.00	4489.00	573.00	5.92	2	1	0.002	1	1.334	1	0.241	1	2.620	1
29.00	4491.00	573.00	5.50	2	2	0.002	1	1.265	1	0.377	1	4.099	1
30.00	4493.00	573.00	16.96	4	2	0.004	1	3.788	1	0.507	1	5.504	2
31.00	4495.00	573.00	21.58	5	3	0.005	1	4.821	1	0.661	1	7.184	2
32.00	4497.00	573.00	3.38	1	2	0.002	1	0.797	1	0.344	1	3.734	1
33.00	4485.00	575.00	2.05	1	1	0.001	1	0.460	1	0.079	1	0.861	1
34.00	4487.00	575.00	6.72	2	3	0.004	1	1.581	1	0.667	1	7.247	2

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
35.00	4489.00	575.00	5.19	2	3	0.004	1	1.243	1	0.642	1	6.972	2
36.00	4491.00	575.00	19.33	4	1	0.002	1	4.256	1	0.224	1	2.432	1
37.00	4493.00	575.00	27.00	5	4	0.007	1	6.053	2	0.945	1	10.269	3
38.00	4495.00	575.00	19.11	4	4	0.007	1	4.344	1	1.014	1	11.017	3
39.00	4497.00	575.00	18.92	4	2	0.003	1	4.202	1	0.435	1	4.726	1
40.00	4487.00	577.00	3.68	1	2	0.002	1	0.854	1	0.292	1	3.172	1
41.00	4489.00	577.00	16.30	4	3	0.005	1	3.693	1	0.794	1	8.622	2
42.00	4491.00	577.00	2.07	1	2	0.002	1	0.510	1	0.342	1	3.718	1
43.00	4493.00	577.00	15.01	4	3	0.004	1	3.388	1	0.658	1	7.143	2
44.00	4495.00	577.00	9.95	2	3	0.004	1	2.287	1	0.674	1	7.322	2
45.00	4497.00	577.00	10.04	3	3	0.004	1	2.300	1	0.641	1	6.962	2
46.00	4489.00	579.00	4.14	1	2	0.002	1	0.964	1	0.356	1	3.868	1
47.00	4491.00	579.00	19.80	4	3	0.005	1	4.448	1	0.755	1	8.206	2
48.00	4493.00	579.00	17.52	4	3	0.005	1	3.958	1	0.793	1	8.619	2
49.00	4495.00	579.00	21.50	5	4	0.006	1	4.853	1	0.940	1	10.208	3
50.00	4497.00	579.00	15.50	4	5	0.008	1	3.609	1	1.332	1	14.474	3
51.00	4491.00	581.00	2.79	1	1	0.002	1	0.653	1	0.252	1	2.734	1
52.00	4493.00	581.00	36.25	6	3	0.005	1	8.012	2	0.607	1	6.595	2
53.00	4495.00	581.00	7.47	2	2	0.002	1	1.675	1	0.268	1	2.916	1
54.00	4497.00	581.00	1.25	1	0	0.000	0	0.272	1	0.000	0	0.000	0
New Jersey Cells													
55.00	4451.00	545.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
56.00	4451.00	547.00	0.02	1	1	0.000	0	0.010	1	0.000	0	0.010	1
57.00	4451.00	549.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
58.00	4453.00	545.00	0.02	1	1	0.000	0	0.000	0	0.000	0	0.010	1
59.00	4453.00	547.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
60.00	4453.00	549.00	0.19	1	1	0.000	0	0.080	1	0.010	1	0.110	1
61.00	4453.00	551.00	0.06	1	1	0.000	0	0.030	1	0.000	0	0.030	1
62.00	4455.00	541.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
63.00	4455.00	543.00	0.06	1	1	0.000	0	0.030	1	0.000	0	0.030	1
64.00	4455.00	545.00	0.19	1	1	0.000	0	0.080	1	0.010	1	0.120	1
65.00	4455.00	547.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
66.00	4455.00	549.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
67.00	4455.00	551.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
68.00	4455.00	553.00	0.11	1	1	0.000	0	0.060	1	0.010	1	0.060	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
69.00	4457.00	537.00	0.06	1	1	0.000	0	0.030	1	0.000	0	0.040	1
70.00	4457.00	539.00	0.33	1	1	0.000	0	0.150	1	0.020	1	0.190	1
71.00	4457.00	541.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
72.00	4457.00	543.00	0.24	1	1	0.000	0	0.100	1	0.010	1	0.150	1
73.00	4457.00	545.00	0.34	1	1	0.000	0	0.150	1	0.020	1	0.200	1
74.00	4457.00	547.00	0.76	1	1	0.000	0	0.320	1	0.040	1	0.440	1
75.00	4457.00	549.00	0.49	1	1	0.000	0	0.010	1	0.030	1	0.280	1
76.00	4457.00	551.00	0.19	1	1	0.000	0	0.080	1	0.010	1	0.110	1
77.00	4457.00	553.00	0.22	1	1	0.000	0	0.100	1	0.010	1	0.130	1
78.00	4457.00	555.00	0.03	1	1	0.000	0	0.020	1	0.000	0	0.020	1
79.00	4459.00	535.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
80.00	4459.00	537.00	1.04	1	1	0.000	0	0.410	1	0.060	1	0.600	1
81.00	4459.00	539.00	0.62	1	1	0.000	0	0.260	1	0.030	1	0.360	1
82.00	4459.00	541.00	0.26	1	1	0.000	0	0.120	1	0.010	1	0.150	1
83.00	4459.00	543.00	0.25	1	1	0.000	0	0.110	1	0.010	1	0.150	1
84.00	4459.00	545.00	0.28	1	1	0.000	0	0.130	1	0.020	1	0.170	1
85.00	4459.00	547.00	1.38	1	1	0.000	0	0.550	1	0.070	1	0.800	1
86.00	4459.00	549.00	1.22	1	1	0.000	0	0.480	1	0.070	1	0.710	1
87.00	4459.00	551.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
88.00	4459.00	553.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
89.00	4459.00	555.00	0.19	1	1	0.000	0	0.080	1	0.010	1	0.120	1
90.00	4459.00	557.00	0.03	1	1	0.000	0	0.020	1	0.000	0	0.020	1
91.00	4461.00	533.00	0.16	1	1	0.000	0	0.070	1	0.010	1	0.090	1
92.00	4461.00	535.00	1.28	1	1	0.000	0	0.520	1	0.070	1	0.750	1
93.00	4461.00	537.00	1.32	1	1	0.000	0	0.530	1	0.070	1	0.760	1
94.00	4461.00	539.00	1.31	1	1	0.000	0	0.530	1	0.070	1	0.760	1
95.00	4461.00	541.00	0.48	1	1	0.000	0	0.210	1	0.030	1	0.270	1
96.00	4461.00	543.00	0.18	1	1	0.000	0	0.070	1	0.010	1	0.110	1
97.00	4461.00	545.00	0.52	1	1	0.000	0	0.220	1	0.030	1	0.310	1
98.00	4461.00	547.00	1.46	1	1	0.000	0	0.570	1	0.080	1	0.840	1
99.00	4461.00	549.00	1.36	1	1	0.000	0	0.540	1	0.070	1	0.790	1
100.00	4461.00	551.00	1.09	1	1	0.000	0	0.440	1	0.060	1	0.620	1
101.00	4461.00	553.00	0.35	1	1	0.000	0	0.160	1	0.020	1	0.200	1
102.00	4461.00	555.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.180	1
103.00	4461.00	557.00	0.37	1	1	0.000	0	0.160	1	0.020	1	0.210	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

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	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
104.00	4463.00	533.00	0.24	1	1	0.000	0	0.110	1	0.010	1	0.150	1
105.00	4463.00	535.00	1.26	1	1	0.000	0	0.510	1	0.070	1	0.730	1
106.00	4463.00	537.00	1.03	1	1	0.000	0	0.410	1	0.060	1	0.600	1
107.00	4463.00	539.00	1.09	1	1	0.000	0	0.440	1	0.060	1	0.620	1
108.00	4463.00	541.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
109.00	4463.00	543.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
110.00	4463.00	545.00	3.22	1	1	0.000	0	1.200	1	0.170	1	1.870	1
111.00	4463.00	547.00	1.83	1	1	0.000	0	0.710	1	0.100	1	1.060	1
112.00	4463.00	549.00	0.74	1	1	0.000	0	0.310	1	0.040	1	0.430	1
113.00	4463.00	551.00	1.17	1	1	0.000	0	0.460	1	0.060	1	0.680	1
114.00	4463.00	553.00	0.76	1	1	0.000	0	0.320	1	0.040	1	0.440	1
115.00	4463.00	555.00	0.30	1	1	0.000	0	0.130	1	0.020	1	0.180	1
116.00	4463.00	557.00	0.45	1	1	0.000	0	0.190	1	0.020	1	0.250	1
117.00	4463.00	559.00	0.37	1	1	0.000	0	0.160	1	0.020	1	0.210	1
118.00	4463.00	561.00	0.03	1	1	0.000	0	0.020	1	0.000	0	0.020	1
119.00	4465.00	533.00	0.02	1	1	0.000	0	0.000	0	0.000	0	0.010	1
120.00	4465.00	535.00	0.27	1	1	0.000	0	0.120	1	0.010	1	0.160	1
121.00	4465.00	537.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
122.00	4465.00	539.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
123.00	4465.00	541.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
124.00	4465.00	543.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
125.00	4465.00	545.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
126.00	4465.00	547.00	0.42	1	1	0.000	0	0.180	1	0.020	1	0.240	1
127.00	4465.00	549.00	1.45	1	1	0.000	0	0.570	1	0.080	1	0.840	1
128.00	4465.00	551.00	1.44	1	1	0.000	0	0.570	1	0.080	1	0.830	1
129.00	4465.00	553.00	1.26	1	1	0.000	0	0.500	1	0.070	1	0.730	1
130.00	4465.00	555.00	0.82	1	1	0.000	0	0.340	1	0.040	1	0.480	1
131.00	4465.00	557.00	0.45	1	1	0.000	0	0.190	1	0.020	1	0.250	1
132.00	4465.00	559.00	0.54	1	1	0.000	0	0.230	1	0.030	1	0.320	1
133.00	4465.00	561.00	1.02	1	1	0.000	0	0.410	1	0.050	1	0.590	1
134.00	4465.00	563.00	0.08	1	1	0.000	0	0.040	1	0.000	0	0.050	1
135.00	4467.00	535.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
136.00	4467.00	537.00	1.65	1	1	0.000	0	0.640	1	0.090	1	0.950	1
137.00	4467.00	539.00	1.02	1	1	0.000	0	0.410	1	0.050	1	0.590	1
138.00	4467.00	541.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).
[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
139.00	4467.00	543.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
140.00	4467.00	545.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
141.00	4467.00	547.00	0.32	1	1	0.000	0	0.150	1	0.020	1	0.190	1
142.00	4467.00	549.00	0.85	1	1	0.000	0	0.350	1	0.050	1	0.500	1
143.00	4467.00	551.00	2.24	1	1	0.000	0	0.850	1	0.120	1	1.300	1
144.00	4467.00	553.00	4.33	1	1	0.000	0	1.580	1	0.230	1	2.510	1
145.00	4467.00	555.00	3.04	1	1	0.000	0	1.140	1	0.160	1	1.760	1
146.00	4467.00	557.00	2.28	1	1	0.000	0	0.880	1	0.120	1	1.320	1
147.00	4467.00	559.00	4.30	1	1	0.000	0	1.570	1	0.230	1	2.500	1
148.00	4467.00	561.00	2.30	1	1	0.000	0	0.890	1	0.120	1	1.330	1
149.00	4467.00	563.00	0.82	1	1	0.000	0	0.340	1	0.040	1	0.470	1
150.00	4467.00	565.00	0.06	1	1	0.000	0	0.030	1	0.000	0	0.040	1
151.00	4469.00	537.00	0.91	1	1	0.000	0	0.380	1	0.050	1	0.530	1
152.00	4469.00	539.00	2.18	1	1	0.000	0	0.830	1	0.120	1	1.260	1
153.00	4469.00	541.00	1.04	1	1	0.000	0	0.410	1	0.060	1	0.600	1
154.00	4469.00	543.00	0.71	1	1	0.000	0	0.290	1	0.040	1	0.410	1
155.00	4469.00	545.00	0.02	1	1	0.000	0	0.000	0	0.000	0	0.010	1
156.00	4469.00	547.00	0.44	1	1	0.000	0	0.180	1	0.020	1	0.250	1
157.00	4469.00	549.00	1.47	1	1	0.000	0	0.580	1	0.080	1	0.850	1
158.00	4469.00	551.00	2.20	1	1	0.000	0	0.840	1	0.120	1	1.280	1
159.00	4469.00	553.00	4.95	1	1	0.000	0	1.790	1	0.260	1	2.870	1
160.00	4469.00	555.00	4.86	1	1	0.000	0	1.760	1	0.260	1	2.820	1
161.00	4469.00	557.00	2.67	1	1	0.000	0	1.010	1	0.140	1	1.550	1
162.00	4469.00	559.00	4.06	1	1	0.000	0	1.490	1	0.220	1	2.350	1
163.00	4469.00	561.00	1.33	1	1	0.000	0	0.530	1	0.070	1	0.770	1
164.00	4469.00	563.00	1.27	1	1	0.000	0	0.510	1	0.070	1	0.740	1
165.00	4469.00	565.00	0.82	1	1	0.000	0	0.340	1	0.040	1	0.480	1
166.00	4471.00	537.00	0.18	1	1	0.000	0	0.070	1	0.010	1	0.110	1
167.00	4471.00	539.00	1.46	1	1	0.000	0	0.570	1	0.080	1	0.840	1
168.00	4471.00	541.00	2.45	1	1	0.000	0	0.930	1	0.130	1	1.420	1
169.00	4471.00	543.00	0.73	1	1	0.000	0	0.300	1	0.040	1	0.420	1
170.00	4471.00	545.00	1.42	1	1	0.000	0	0.560	1	0.080	1	0.820	1
171.00	4471.00	547.00	0.91	1	1	0.000	0	0.380	1	0.050	1	0.530	1
172.00	4471.00	549.00	1.21	1	1	0.000	0	0.480	1	0.060	1	0.700	1
173.00	4471.00	551.00	3.54	1	1	0.000	0	1.310	1	0.190	1	2.060	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
174.00	4471.00	553.00	4.32	1	1	0.000	0	1.580	1	0.230	1	2.510	1
175.00	4471.00	555.00	4.67	1	1	0.000	0	1.690	1	0.250	1	2.700	1
176.00	4471.00	557.00	1.83	1	1	0.000	0	0.710	1	0.100	1	1.060	1
177.00	4471.00	559.00	0.60	1	1	0.000	0	0.250	1	0.030	1	0.350	1
178.00	4471.00	561.00	0.63	1	1	0.000	0	0.260	1	0.030	1	0.370	1
179.00	4471.00	563.00	1.39	1	1	0.000	0	0.550	1	0.070	1	0.800	1
180.00	4471.00	565.00	1.09	1	1	0.000	0	0.440	1	0.060	1	0.630	1
181.00	4473.00	541.00	0.34	1	1	0.000	0	0.150	1	0.020	1	0.200	1
182.00	4473.00	543.00	1.48	1	1	0.000	0	0.590	1	0.080	1	0.870	1
183.00	4473.00	545.00	1.97	1	1	0.000	0	0.760	1	0.110	1	1.140	1
184.00	4473.00	547.00	2.37	1	1	0.000	0	0.910	1	0.130	1	1.370	1
185.00	4473.00	549.00	2.50	1	1	0.000	0	0.950	1	0.130	1	1.450	1
186.00	4473.00	551.00	4.05	1	1	0.000	0	1.490	1	0.220	1	2.340	1
187.00	4473.00	553.00	4.60	1	1	0.000	0	1.670	1	0.250	1	2.670	1
188.00	4473.00	555.00	6.80	2	2	0.000	0	2.410	1	0.360	1	3.950	1
189.00	4473.00	557.00	1.97	1	1	0.000	0	0.760	1	0.110	1	1.150	1
190.00	4473.00	559.00	1.45	1	1	0.000	0	0.570	1	0.080	1	0.840	1
191.00	4473.00	561.00	2.35	1	1	0.000	0	0.900	1	0.130	1	1.360	1
192.00	4473.00	563.00	2.10	1	1	0.000	0	0.810	1	0.110	1	1.220	1
193.00	4473.00	565.00	3.08	1	1	0.000	0	1.150	1	0.160	1	1.780	1
194.00	4473.00	567.00	1.10	1	1	0.000	0	0.440	1	0.060	1	0.630	1
195.00	4475.00	543.00	0.40	1	1	0.000	0	0.170	1	0.020	1	0.230	1
196.00	4475.00	545.00	4.37	1	1	0.000	0	1.590	1	0.230	1	2.530	1
197.00	4475.00	547.00	4.61	1	1	0.000	0	1.680	1	0.250	1	2.670	1
198.00	4475.00	549.00	5.53	2	2	0.000	0	1.990	1	0.300	1	3.210	1
199.00	4475.00	551.00	3.12	1	1	0.000	0	1.170	1	0.170	1	1.810	1
200.00	4475.00	553.00	3.69	1	1	0.000	0	1.360	1	0.200	1	2.130	1
201.00	4475.00	555.00	2.66	1	1	0.000	0	1.010	1	0.140	1	1.550	1
202.00	4475.00	557.00	2.12	1	1	0.000	0	0.810	1	0.110	1	1.230	1
203.00	4475.00	559.00	3.75	1	1	0.000	0	1.380	1	0.200	1	2.170	1
204.00	4475.00	561.00	5.29	2	2	0.000	0	1.910	1	0.280	1	3.070	1
205.00	4475.00	563.00	4.17	1	1	0.000	0	1.520	1	0.220	1	2.420	1
206.00	4475.00	565.00	2.29	1	1	0.000	0	0.880	1	0.120	1	1.330	1
207.00	4475.00	567.00	0.58	1	1	0.000	0	0.250	1	0.030	1	0.340	1
208.00	4477.00	545.00	0.98	1	1	0.000	0	0.400	1	0.050	1	0.560	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
209.00	4477.00	547.00	5.85	2	2	0.000	0	2.090	1	0.310	1	3.400	1
210.00	4477.00	549.00	11.84	3	3	0.000	0	4.020	1	0.630	1	6.870	2
211.00	4477.00	551.00	5.21	2	2	0.000	0	1.880	1	0.280	1	3.020	1
212.00	4477.00	553.00	3.60	1	1	0.000	0	1.330	1	0.190	1	2.090	1
213.00	4477.00	555.00	1.59	1	1	0.000	0	0.620	1	0.080	1	0.920	1
214.00	4477.00	557.00	1.90	1	1	0.000	0	0.730	1	0.100	1	1.100	1
215.00	4477.00	559.00	2.08	1	1	0.000	0	0.800	1	0.110	1	1.200	1
216.00	4477.00	561.00	2.78	1	1	0.000	0	1.050	1	0.150	1	1.610	1
217.00	4477.00	563.00	0.58	1	1	0.000	0	0.250	1	0.030	1	0.340	1
218.00	4479.00	547.00	5.23	2	2	0.000	0	1.890	1	0.280	1	3.040	1
219.00	4479.00	549.00	12.89	3	3	0.000	0	4.330	1	0.690	1	7.470	2
220.00	4479.00	551.00	12.20	3	3	0.000	0	4.120	1	0.650	1	7.070	2
221.00	4479.00	553.00	7.44	2	2	0.000	0	2.610	1	0.400	1	4.310	1
222.00	4479.00	555.00	1.57	1	1	0.000	0	0.610	1	0.080	1	0.910	1
223.00	4479.00	557.00	1.16	1	1	0.000	0	0.460	1	0.060	1	0.670	1
224.00	4479.00	559.00	1.41	1	1	0.000	0	0.560	1	0.080	1	0.810	1
225.00	4479.00	561.00	2.09	1	1	0.000	0	0.800	1	0.110	1	1.210	1
226.00	4479.00	563.00	6.82	2	2	0.000	0	2.420	1	0.360	1	3.960	1
227.00	4479.00	565.00	2.26	1	1	0.000	0	0.850	1	0.120	1	1.310	1
228.00	4481.00	545.00	0.52	1	1	0.000	0	0.220	1	0.030	1	0.310	1
229.00	4481.00	547.00	3.07	1	1	0.000	0	1.150	1	0.160	1	1.780	1
230.00	4481.00	549.00	4.05	1	1	0.000	0	1.490	1	0.220	1	2.350	1
231.00	4481.00	551.00	3.97	1	1	0.000	0	1.460	1	0.210	1	2.300	1
232.00	4481.00	553.00	3.55	1	1	0.000	0	1.310	1	0.190	1	2.060	1
233.00	4481.00	555.00	1.86	1	1	0.000	0	0.720	1	0.100	1	1.080	1
234.00	4481.00	557.00	1.16	1	1	0.000	0	0.460	1	0.060	1	0.670	1
235.00	4481.00	559.00	0.42	1	1	0.000	0	0.180	1	0.020	1	0.240	1
236.00	4481.00	561.00	3.12	1	1	0.000	0	1.170	1	0.170	1	1.810	1
237.00	4481.00	563.00	13.56	3	3	0.000	0	4.540	1	0.720	1	7.860	2
238.00	4481.00	565.00	3.98	1	1	0.000	0	1.470	1	0.210	1	2.310	1
239.00	4483.00	543.00	0.24	1	1	0.000	0	0.110	1	0.010	1	0.150	1
240.00	4483.00	545.00	1.81	1	1	0.000	0	0.710	1	0.100	1	1.040	1
241.00	4483.00	547.00	2.35	1	1	0.000	0	0.900	1	0.130	1	1.360	1
242.00	4483.00	549.00	2.37	1	1	0.000	0	0.910	1	0.130	1	1.370	1
243.00	4483.00	551.00	1.89	1	1	0.000	0	0.730	1	0.100	1	1.100	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).
[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
244.00	4483.00	553.00	2.17	1	1	0.000	0	0.850	1	0.120	1	1.260	1
245.00	4483.00	555.00	16.75	4	4	0.010	1	5.520	2	0.890	1	9.720	2
246.00	4483.00	557.00	5.76	2	2	0.000	0	2.060	1	0.310	1	3.350	1
247.00	4483.00	559.00	8.34	2	2	0.000	0	2.910	1	0.450	1	4.830	1
248.00	4483.00	561.00	6.98	2	2	0.000	0	2.460	1	0.370	1	4.040	1
249.00	4483.00	563.00	8.83	2	2	0.000	0	3.070	1	0.470	1	5.130	2
250.00	4483.00	565.00	2.01	1	1	0.000	0	0.780	1	0.110	1	1.160	1
251.00	4485.00	543.00	2.11	1	1	0.000	0	0.810	1	0.110	1	1.220	1
252.00	4485.00	545.00	2.22	1	1	0.000	0	0.840	1	0.120	1	1.290	1
253.00	4485.00	547.00	1.85	1	1	0.000	0	0.720	1	0.100	1	1.080	1
254.00	4485.00	549.00	1.75	1	1	0.000	0	0.680	1	0.090	1	1.010	1
255.00	4485.00	551.00	1.33	1	1	0.000	0	0.530	1	0.070	1	0.770	1
256.00	4485.00	553.00	2.26	1	1	0.000	0	0.850	1	0.120	1	1.310	1
257.00	4485.00	555.00	21.61	5	5	0.010	1	6.990	2	1.150	1	12.530	3
258.00	4485.00	557.00	6.33	2	2	0.000	0	2.260	1	0.340	1	3.670	1
259.00	4485.00	559.00	8.44	2	2	0.000	0	2.940	1	0.450	1	4.900	1
260.00	4485.00	561.00	4.42	1	1	0.000	0	1.620	1	0.240	1	2.560	1
261.00	4485.00	563.00	5.74	2	2	0.000	0	2.050	1	0.310	1	3.330	1
262.00	4485.00	565.00	1.52	1	1	0.000	0	0.600	1	0.080	1	0.890	1
263.00	4485.00	567.00	0.67	1	1	0.000	0	0.270	1	0.040	1	0.390	1
264.00	4487.00	543.00	4.48	1	1	0.000	0	1.640	1	0.240	1	2.600	1
265.00	4487.00	545.00	5.22	2	2	0.000	0	1.880	1	0.280	1	3.030	1
266.00	4487.00	547.00	5.80	2	2	0.000	0	2.080	1	0.310	1	3.370	1
267.00	4487.00	549.00	6.74	2	2	0.000	0	2.380	1	0.360	1	3.900	1
268.00	4487.00	551.00	1.47	1	1	0.000	0	0.580	1	0.080	1	0.850	1
269.00	4487.00	553.00	2.57	1	1	0.000	0	0.970	1	0.140	1	1.490	1
270.00	4487.00	555.00	3.06	1	1	0.000	0	1.150	1	0.160	1	1.770	1
271.00	4487.00	557.00	3.87	1	1	0.000	0	1.430	1	0.210	1	2.250	1
272.00	4487.00	559.00	8.08	2	2	0.000	0	2.820	1	0.430	1	4.690	1
273.00	4487.00	561.00	8.34	2	2	0.000	0	2.910	1	0.450	1	4.830	1
274.00	4487.00	563.00	8.36	2	2	0.000	0	2.910	1	0.450	1	4.840	1
275.00	4487.00	565.00	2.33	1	1	0.000	0	0.900	1	0.120	1	1.350	1
276.00	4487.00	567.00	6.85	2	2	0.000	0	2.430	1	0.370	1	3.970	1
277.00	4487.00	569.00	1.45	1	1	0.000	0	0.570	1	0.080	1	0.840	1
278.00	4489.00	543.00	0.88	1	1	0.000	0	0.360	1	0.050	1	0.520	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMALDEHYDE	FORMVAL	DICHLOROMETHANE	DCMVAL	PERCHLOROETHYLENE	PERCVAL
279.00	4489.00	545.00	2.33	1	1	0.000	0	0.890	1	0.120	1	1.350	1
280.00	4489.00	547.00	8.20	2	2	0.000	0	2.860	1	0.440	1	4.760	1
281.00	4489.00	549.00	9.42	2	2	0.000	0	3.250	1	0.500	1	5.460	2
282.00	4489.00	551.00	6.37	2	2	0.000	0	2.270	1	0.340	1	3.690	1
283.00	4489.00	553.00	5.09	2	2	0.000	0	1.830	1	0.270	1	2.950	1
284.00	4489.00	555.00	2.22	1	1	0.000	0	0.840	1	0.120	1	1.290	1
285.00	4489.00	557.00	7.63	2	2	0.000	0	2.670	1	0.410	1	4.430	1
286.00	4489.00	559.00	7.16	2	2	0.000	0	2.520	1	0.380	1	4.150	1
287.00	4489.00	561.00	6.88	2	2	0.000	0	2.430	1	0.370	1	3.990	1
288.00	4489.00	563.00	8.64	2	2	0.000	0	3.000	1	0.460	1	5.000	2
289.00	4489.00	565.00	3.24	1	1	0.000	0	1.200	1	0.170	1	1.880	1
290.00	4489.00	567.00	7.14	2	2	0.000	0	2.510	1	0.380	1	4.140	1
291.00	4489.00	569.00	1.49	1	1	0.000	0	0.590	1	0.080	1	0.870	1
292.00	4491.00	559.00	10.06	3	3	0.000	0	3.450	1	0.540	1	5.840	2
293.00	4491.00	549.00	7.58	2	2	0.000	0	2.660	1	0.400	1	4.400	1
294.00	4491.00	551.00	12.34	3	3	0.000	0	4.170	1	0.660	1	7.150	2
295.00	4491.00	553.00	8.33	2	2	0.000	0	2.900	1	0.440	1	4.830	1
296.00	4491.00	555.00	2.28	1	1	0.000	0	0.880	1	0.120	1	1.320	1
297.00	4491.00	557.00	2.72	1	1	0.000	0	1.030	1	0.150	1	1.580	1
298.00	4491.00	561.00	8.98	2	2	0.000	0	3.110	1	0.480	1	5.200	2
299.00	4491.00	563.00	10.00	3	3	0.000	0	3.430	1	0.530	1	5.800	2
300.00	4491.00	565.00	3.17	1	1	0.000	0	1.180	1	0.170	1	1.850	1
301.00	4491.00	567.00	1.31	1	1	0.000	0	0.520	1	0.070	1	0.760	1
302.00	4491.00	569.00	0.58	1	1	0.000	0	0.250	1	0.030	1	0.340	1
303.00	4493.00	551.00	5.75	2	2	0.000	0	2.050	1	0.310	1	3.330	1
304.00	4493.00	553.00	8.24	2	2	0.000	0	2.870	1	0.440	1	4.780	1
305.00	4493.00	555.00	2.39	1	1	0.000	0	0.910	1	0.130	1	1.380	1
306.00	4493.00	557.00	3.61	1	1	0.000	0	1.330	1	0.190	1	2.090	1
307.00	4493.00	559.00	4.74	1	1	0.000	0	1.720	1	0.250	1	2.740	1
308.00	4493.00	561.00	6.21	2	2	0.000	0	2.200	1	0.330	1	3.610	1
309.00	4493.00	563.00	10.36	3	3	0.000	0	3.550	1	0.550	1	6.000	2
310.00	4493.00	565.00	5.96	2	2	0.000	0	2.130	1	0.320	1	3.460	1
311.00	4493.00	567.00	1.78	1	1	0.000	0	0.700	1	0.090	1	1.020	1
312.00	4493.00	569.00	0.31	1	1	0.000	0	0.130	1	0.020	1	0.180	1
313.00	4495.00	551.00	1.37	1	1	0.000	0	0.540	1	0.070	1	0.790	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
314.00	4495.00	553.00	7.59	2	2	0.000	0	2.660	1	0.410	1	4.400	1
315.00	4495.00	555.00	5.96	2	2	0.000	0	2.130	1	0.320	1	3.450	1
316.00	4495.00	557.00	7.75	2	2	0.000	0	2.710	1	0.410	1	4.500	1
317.00	4495.00	559.00	8.33	2	2	0.000	0	2.900	1	0.440	1	4.830	1
318.00	4495.00	561.00	3.73	1	1	0.000	0	1.370	1	0.200	1	2.160	1
319.00	4495.00	563.00	8.76	2	2	0.000	0	3.040	1	0.470	1	5.090	2
320.00	4495.00	565.00	14.31	3	3	0.000	0	4.760	1	0.760	1	8.290	2
321.00	4495.00	567.00	6.29	2	2	0.000	0	2.220	1	0.340	1	3.640	1
322.00	4495.00	569.00	6.59	2	2	0.000	0	2.340	1	0.350	1	3.820	1
323.00	4495.00	571.00	4.21	1	1	0.000	0	1.540	1	0.220	1	2.440	1
324.00	4497.00	547.00	0.12	1	1	0.000	0	0.060	1	0.010	1	0.070	1
325.00	4497.00	549.00	1.88	1	1	0.000	0	0.730	1	0.100	1	1.090	1
326.00	4497.00	551.00	1.45	1	1	0.000	0	0.570	1	0.080	1	0.840	1
327.00	4497.00	553.00	4.95	1	1	0.000	0	1.790	1	0.260	1	2.870	1
328.00	4497.00	555.00	6.83	2	2	0.000	0	2.420	1	0.360	1	3.960	1
329.00	4497.00	557.00	5.69	2	2	0.000	0	2.030	1	0.300	1	3.300	1
330.00	4497.00	559.00	7.00	2	2	0.000	0	2.470	1	0.370	1	4.060	1
331.00	4497.00	561.00	7.39	2	2	0.000	0	2.600	1	0.390	1	4.280	1
332.00	4497.00	563.00	11.18	3	3	0.000	0	3.800	1	0.600	1	6.490	2
333.00	4497.00	565.00	14.38	3	3	0.000	0	4.800	1	0.770	1	8.340	2
334.00	4497.00	567.00	23.86	5	5	0.010	1	7.710	2	1.270	1	13.830	3
335.00	4497.00	569.00	19.54	4	4	0.010	1	6.370	2	1.040	1	11.320	3
336.00	4497.00	571.00	7.82	2	2	0.000	0	2.740	1	0.420	1	4.540	1
337.00	4497.00	573.00	0.01	1	1	0.000	0	0.000	0	0.000	0	0.000	0
338.00	4499.00	547.00	0.15	1	1	0.000	0	0.070	1	0.010	1	0.080	1
339.00	4499.00	549.00	2.61	1	1	0.000	0	0.990	1	0.140	1	1.510	1
340.00	4499.00	551.00	3.26	1	1	0.000	0	1.210	1	0.170	1	1.890	1
341.00	4499.00	553.00	3.87	1	1	0.000	0	1.440	1	0.210	1	2.250	1
342.00	4499.00	555.00	2.49	1	1	0.000	0	0.940	1	0.130	1	1.450	1
343.00	4499.00	557.00	2.87	1	1	0.000	0	1.080	1	0.150	1	1.670	1
344.00	4499.00	559.00	4.71	1	1	0.000	0	1.700	1	0.250	1	2.720	1
345.00	4499.00	561.00	5.53	2	2	0.000	0	1.990	1	0.300	1	3.210	1
346.00	4499.00	563.00	8.64	2	2	0.000	0	3.000	1	0.460	1	5.010	2
347.00	4499.00	565.00	9.88	2	2	0.000	0	3.390	1	0.530	1	5.730	2
348.00	4499.00	567.00	15.08	4	4	0.000	0	5.010	2	0.800	1	8.750	2

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

Table III-5-40, continued: Mapping values (shading) for the area and mobile source emissions density maps Figures III-5-21, 22, 24, 26, 28, and 30

Mapping values, ranges in tons/year: 0 = 0, 1 = >0 to ≤5, 2 = >5 to ≤10, 3 = >10 to ≤15, 4 = >15 to ≤20, 5 = >20 to ≤30, 6 = >30

	UTM-N	UTM-E	BENZENE	BENVAL[1]	NJ METHOD BENVAL[2]	CADMIUM	CADVAL	FORMAL-DEHYDE	FORMVAL	DICHLORO-METHANE	DCMVAL	PERCHLORO-ETHYLENE	PERCVAL
349.00	4499.00	569.00	21.85	5	5	0.010	1	7.060	2	1.170	1	12.660	3
350.00	4499.00	571.00	0.64	1	1	0.000	0	0.260	1	0.030	1	0.370	1
351.00	4499.00	573.00	0.01	1	1	0.000	0	0.000	0	0.000	0	0.010	1
352.00	4501.00	549.00	0.24	1	1	0.000	0	0.100	1	0.010	1	0.140	1
353.00	4501.00	551.00	3.99	1	1	0.000	0	1.470	1	0.210	1	2.320	1
354.00	4501.00	553.00	4.60	1	1	0.000	0	1.670	1	0.250	1	2.670	1
355.00	4501.00	555.00	3.50	1	1	0.000	0	1.300	1	0.190	1	2.030	1
356.00	4501.00	557.00	3.71	1	1	0.000	0	1.360	1	0.200	1	2.140	1
357.00	4501.00	559.00	3.51	1	1	0.000	0	1.300	1	0.190	1	2.040	1
358.00	4501.00	561.00	5.81	2	2	0.000	0	2.080	1	0.310	1	3.370	1
359.00	4501.00	563.00	7.68	2	2	0.000	0	2.690	1	0.410	1	4.450	1
360.00	4501.00	565.00	9.09	2	2	0.000	0	3.140	1	0.480	1	5.270	2
361.00	4501.00	567.00	10.09	3	3	0.000	0	3.460	1	0.540	1	5.860	2
362.00	4501.00	569.00	5.93	2	2	0.000	0	2.120	1	0.320	1	3.440	1
363.00	4501.00	571.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
364.00	4501.00	573.00	0.00	0	0	0.000	0	0.000	0	0.000	0	0.000	0
365.00	4503.00	551.00	0.37	1	1	0.000	0	0.160	1	0.020	1	0.210	1
366.00	4503.00	553.00	4.05	1	1	0.000	0	1.490	1	0.220	1	2.340	1
367.00	4503.00	555.00	5.26	2	2	0.000	0	1.890	1	0.280	1	3.050	1
368.00	4503.00	557.00	5.35	2	2	0.000	0	1.930	1	0.290	1	3.090	1
369.00	4503.00	559.00	3.64	1	1	0.000	0	1.340	1	0.190	1	2.110	1
370.00	4503.00	561.00	5.17	2	2	0.000	0	1.870	1	0.280	1	3.000	1
371.00	4503.00	563.00	4.28	1	1	0.000	0	1.570	1	0.230	1	2.480	1
372.00	4503.00	565.00	3.41	1	1	0.000	0	1.270	1	0.180	1	1.970	1
373.00	4503.00	567.00	1.91	1	1	0.000	0	0.740	1	0.100	1	1.110	1
374.00	4505.00	553.00	0.23	1	1	0.000	0	0.100	1	0.010	1	0.140	1
375.00	4505.00	555.00	2.80	1	1	0.000	0	1.060	1	0.150	1	1.620	1
376.00	4505.00	557.00	1.23	1	1	0.000	0	0.480	1	0.070	1	0.720	1

[1] "BENVAL" (also CADVAL, FORMVAL, DCMVAL and PERCVAL) means the mapping value applied to each grid cell, which corresponds to the emissions density range (in tons per year).

[2] "NJ METHOD BENVAL" is the population-based value for comparison with the NY VMT-based value generated for the Staten Island grid cells only.

SOURCE IDENTIFICATION APPENDICES

SOURCE IDENTIFICATION APPENDIX A -

INITIAL POLLUTANT ROSE ANALYSIS

6A.1 Initial Pollutant Rose Analysis

The initial pollutant rose analyses were limited to four project sites and 12 volatile organic compounds (VOCs). This selection of sites and pollutants is consistent with the data analysis performed by the Data Management Subcommittee and the Exposure/Health Assessment Subcommittee. The locations of the four sampling sites and the Newark Airport meteorological site are depicted in Map III-6-1.

The full two years of data were used when available. In general, most of the sites had a complete two-year data set for the VOCs.

6A.2 Initial Pollutant Rose Analysis - Results

6A.2.1 Benzene (Figures III-6A-1 through 4)

TRAVIS - Highest concentrations occurred during north winds. Concentrations were lowest when winds were from an easterly quadrant, especially southeast.

PUMP STATION - Highest concentrations occurred during southeasterly and southerly winds, with lowest on northwest and northeasterly winds. This site showed a trend toward higher concentrations with southerly quadrant winds, lower on winds from the north quadrant.

BAYLEY SETON - Highest concentrations were recorded during periods of north, northeast and southwesterly winds. Levels were lower when winds blew from the east and southeast.

CARTERET - Highest concentrations occurred with winds from the northwest and southwest, lowest on northeasterly winds.

SYNOPSIS - Generally, concentrations were highest on winds from a northerly quadrant, and lowest when winds were east or southeast. However, the Pump Station showed the opposite: highest concentrations when winds were from the southeast; lowest, on northerly winds.

6A.2.2 Toluene (Figures III-6A-5 through 8)

TRAVIS - Concentrations were highest on winds from north and south, lowest with east and southeasterly winds.

PUMP STATION - Highest concentrations were associated with southerly winds; lower, with northwesterly winds; and lowest, with winds from the northeast.

BAYLEY SETON - Highest concentrations occurred on northerly winds; lowest, with winds from southeast and east.

CARTERET - Highest concentrations were linked with southwesterly winds; lowest, with easterly and northeasterly.

SYNOPSIS - Area-wide concentrations were highest when winds blew from the north quadrant, and generally lowest when winds had an easterly component. At the Pump Station, however, concentrations were highest on southerly winds, and lower with winds from the north. Wind direction versus concentration patterns for benzene and toluene were similar, suggesting similar source areas for both of these pollutants. Vehicular exhaust and refineries are among the potential sources. More comprehensive analyses which make use of the emission inventories are presented in the Pollutant Rose - Enhanced Analysis section.

6A.2.3 m-, p-Xylene (Figures III-6A-9 through 12)

TRAVIS - Highest concentrations occurred when winds were from the north; lowest, on winds from the easterly quadrant.

PUMP STATION - Highest levels were recorded with winds from the south and southeast; lowest, from the northwest.

BAYLEY SETON - Concentrations were lowest when winds were from the east; relationships between wind direction and high concentrations were not apparent.

CARTERET - Concentrations were highest with winds from the southwest, and lowest on northeast and easterly winds.

SYNOPSIS - The predominant pattern of higher concentrations with winds from the northerly sector continues with m-, p-xylene, with lowest levels on east and southeasterly winds. Once more, though, this is not the case for the Pump Station.

6A.2.4 o-Xylene (Figures III-6A-13 through 16)

TRAVIS - Northerly winds were associated with concentrations twice as high as the next highest direction. Lowest values occurred on southeasterly winds.

PUMP STATION - Highest concentrations were observed on winds from the south and southeast. Lowest levels occurred when the wind blew from the northwest.

BAYLEY SETON - Peak concentrations were associated with winds from the north and southwest; lower concentrations, from the west; and lowest, with winds from the easterly quadrant.

CARTERET - Highest concentrations were linked with winds from the north counterclockwise through southwest. Lowest concentrations occurred on northeast winds.

SYNOPSIS - In general, concentrations of o-xylene were lowest when the wind was from the easterly quadrant. At the Pump Station, however, highest concentrations were associated with south to southeasterly winds. Lowest levels (except for the Pump Station) were observed with winds having an easterly component.

6A.2.5 Hexane (Figures III-6A-17 through 18)

BAYLEY SETON - Highest concentrations were reported for periods of north, northeast, and southwest through northwest winds, with a drop in concentration on westerly winds. Lowest concentrations were coupled with southeasterly winds.

CARTERET - Highest concentrations occurred on winds from the north through southwest, with a drop in concentration from the west, however. Lowest levels were observed on northeast winds.

SYNOPSIS - For both sites, lowest concentrations were associated with winds from an easterly quadrant; highest concentrations, from a westerly quadrant. This could indicate the presence of a local source. Hexane was sampled at only two of the four project sites chosen for analysis.

6A.2.6 Ethylbenzene (Figures III-6A-19 through 21)

TRAVIS - Higher concentrations were observed on north and south winds, generally; and lowest, on southeasterly winds.

BAYLEY SETON - Similar to the Travis profile, peak concentrations at this site occurred with winds from the north; lowest, from the southeast.

SYNOPSIS - Highest concentrations were linked with north winds; lowest concentrations were connected with southeast winds. Data from the Pump Station site were insufficient to identify concentration versus wind direction trends.

6A.2.7 Carbon tetrachloride (Figures III-6A-22 through 25)

TRAVIS - Concentrations were somewhat higher on southwesterly wind directions, and lowest when the wind blew from the northeast, southeast, and northwest.

PUMP STATION - Concentrations were highest with south and southwesterly winds, lowest with north and northwesterly winds.

BAYLEY SETON - While high concentrations occurred with several wind directions, lowest concentrations were associated with east and southeasterly breezes.

CARTERET - Highest concentrations were coupled with southwesterly winds; levels were lowest when the wind blew from the northeast.

SYNOPSIS - Patterns in wind direction versus concentration are not as obvious for carbon tetrachloride as they were for many of the aromatic compounds. Lowest concentrations do appear to be linked with winds from an easterly quadrant, however. Other monitoring sites have exhibited well-defined concentration peaks; these sites are identified and examined in the Pollutant Rose - Enhanced Analysis section.

6A.2.8 Chloroform (Figures III-6A-26 through 29)

TRAVIS - Highest concentrations were associated with southwesterly winds; winds from the northeast and southeast were linked to the lowest concentrations.

PUMP STATION - Concentrations were highest when winds were from the south; the lowest concentrations occurred when winds were westerly.

BAYLEY SETON - Highest concentrations were spread from the north to southwest, while lowest values were connected with easterly quadrant winds.

CARTERET - There is a slight connection between high concentrations and southeasterly winds; no pattern was readily discernible for the lowest concentrations.

SYNOPSIS - There does not seem to be any well-defined area-wide wind direction versus concentration pattern. Local sources may affect the ambient air concentrations of chloroform much more than does the prevailing wind direction.

6A.2.9 Trichloroethylene (Figures III-6A-30 through 33)

TRAVIS - Highest concentrations were associated with north and northeast winds; values were lowest when winds blew from the southeast.

PUMP STATION - Highest concentrations were linked with southeasterly winds; and lowest values, with easterly winds. The southwest and northeast directions yielded relatively high concentrations.

BAYLEY SETON - Concentrations associated with all directions were low (<0.10 ppb); but highest on winds from the north and northwest, and lowest on southeast winds.

CARTERET - Extremely low concentrations (between 0.02 and 0.07 ppb) were associated with all directions.

SYNOPSIS - In general, this contaminant was present at very low concentrations throughout the project area. Generally, highest levels were from the north and northwest, with lowest readings from the easterly quadrant. The Pump Station continued to show the opposite profile.

6A.2.10 Tetrachloroethylene (Figures III-6A-34 through 37)

TRAVIS - Highest concentrations occurred on north, east, and south winds, with lower values associated with westerly winds.

PUMP STATION - Concentrations appeared to be much higher here than at the other sites. Highest levels were observed on northeasterly winds; lowest concentrations (an order of magnitude lower) were linked with winds from the northwest.

BAYLEY SETON - Twin peaks of high concentrations were noted with winds from the north and south; concentrations for the other directions are similar to one another.

CARTERET - Highest concentrations are connected with east and southeast winds; concentrations for the other directions were similar to one another, ranging between .07 and .15 ppb.

SYNOPSIS - No well-defined patterns or relationships between the four sites are easily discernable. It appears that local sources of this contaminant (e.g., dry-cleaners) are at the root of the observed higher concentrations. Concentrations at the

Pump Station are on the order of five times the levels at other sites.

6A.2.11 Dichloromethane (Figures III-6A-38 through 40)

TRAVIS - Strong peaks were associated with north and south winds; levels were lowest on southeast winds.

PUMP STATION - North and south wind directions yielded the highest concentrations, while the east and southeast directions yielded the lowest. While this pattern is consistent with that observed for this compound at other sites, it is at odds with profiles at this site for other VOCs--i.e., highest concentrations linked with east and southeast winds.

SYNOPSIS - North and south winds produced the highest concentrations at both sites; southeast winds were connected with the lowest values. This is consistent with data for other VOCs at Travis; however it is not consistent with respect to the Pump Station. Data from Carteret and Bayley Seton were not used in this analysis; they were rejected for Quality Assurance reasons. The Pollutant Rose - Enhanced Analysis section presents an emission inventory analysis of a different monitoring site (Port Richmond) which exhibited a major concentration peak.

6A.3 Summary Tables for Initial Pollutant Rose Results

Table III-6A-1: Summary of initial pollutant rose results

SITE - HIGH DIRECTION

	Carteret	Travis	Pump Sta.	Bay. Set.
Benzene	NW/SW	N	SE/S	N/NE/SW
Toluene	SW	N/S	S	N
m,p xylene	SW	N	S/SE	-
o xylene	N TO SW	N	S/SE	N/SW
Hexane	N TO SW	NA	NA	-
Ethylbenzene	NA	N/S	-	N
Carbon Tetrachloride	SW	SW	S/SW	-
Chloroform	SE	SW	S	N TO SW
Trichloroethylene	-	N	SE	N/NW
Tetrachloroethylene	E/SE	N/E/S	NE	N/S
Dichloromethane	NA	N/S	N/S	N/NW/E

SITE - LOW DIRECTION

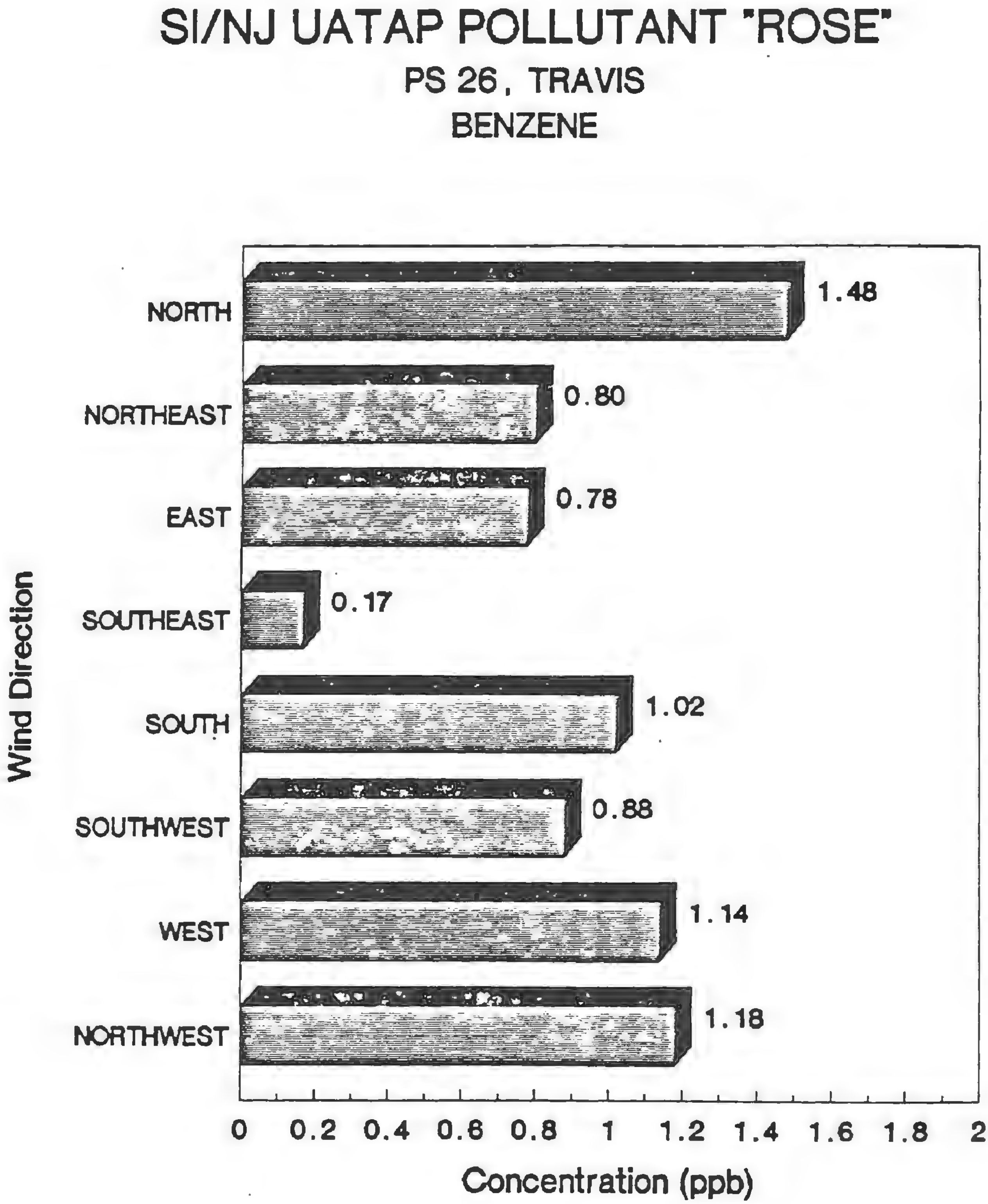
	Carteret	Travis	Pump Sta.	Bay. Set.
Benzene	NE	SE	NW/NE	E/SE
Toluene	E/NE	E/SE	NE	SE/E
m,p-xylene	NE/E	E	NW	E
o xylene	NE	SE	NW	E
Hexane	NE	NA	NA	SE
Ethylbenzene	NA	SE	-	SE
Carbon Tetrachloride	NE	NE/SE/NW	N/NW	E/SE
Chloroform	-	NE/SE	W	E
Trichloroethylene	-	NE	E	SE
Tetrachloroethylene	-	W	NW	-
Dichloromethane	NA	SE	E/SE	NA

Key to Symbols:

N = NORTH S = SOUTH
NE = NORTHEAST SW = SOUTHWEST
E = EAST W = WEST
SE = SOUTHEAST NW = NORTHWEST

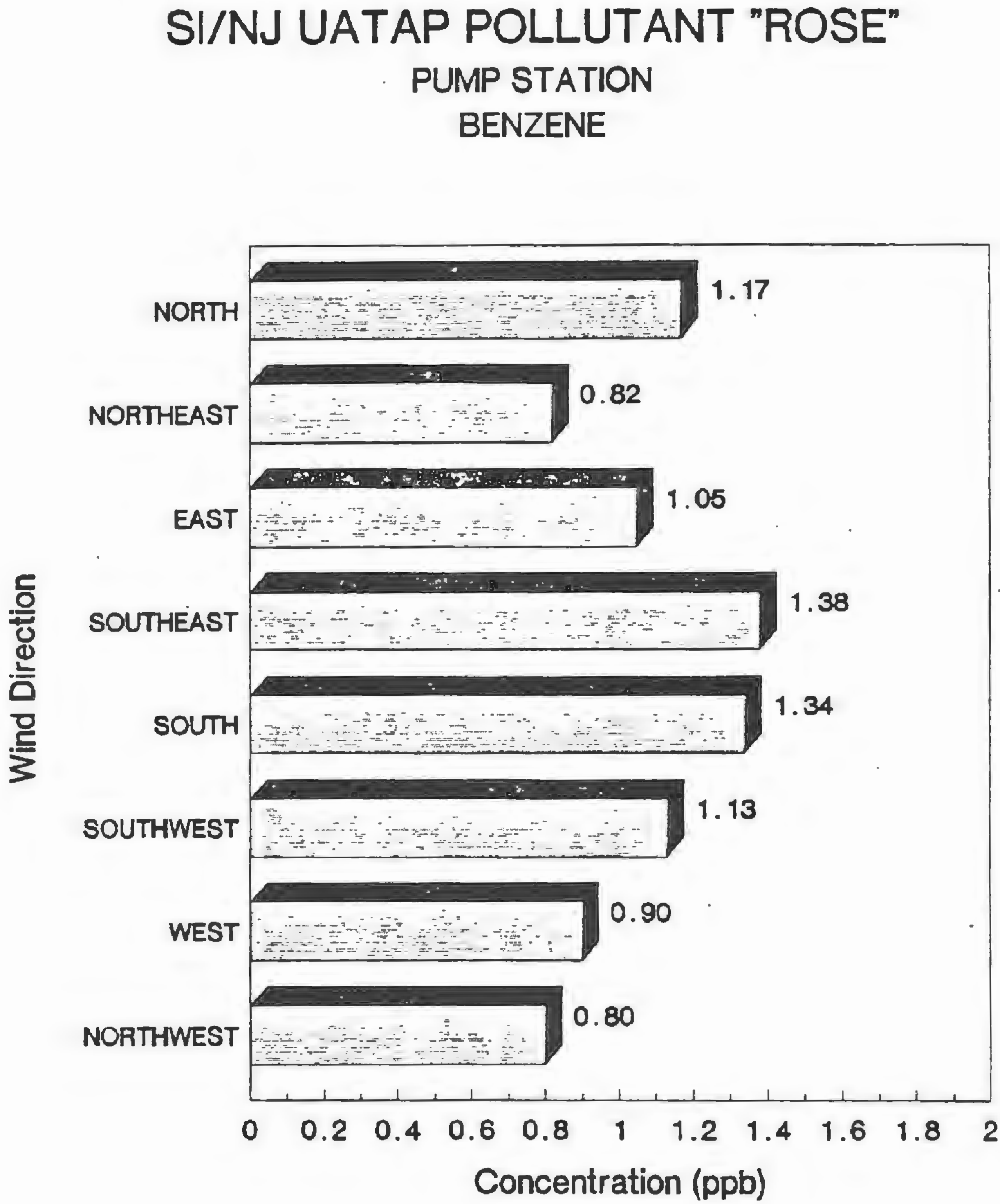
NA = DATA NOT AVAILABLE
\- = NO APPARENT TREND

FIGURE III - 6A-1



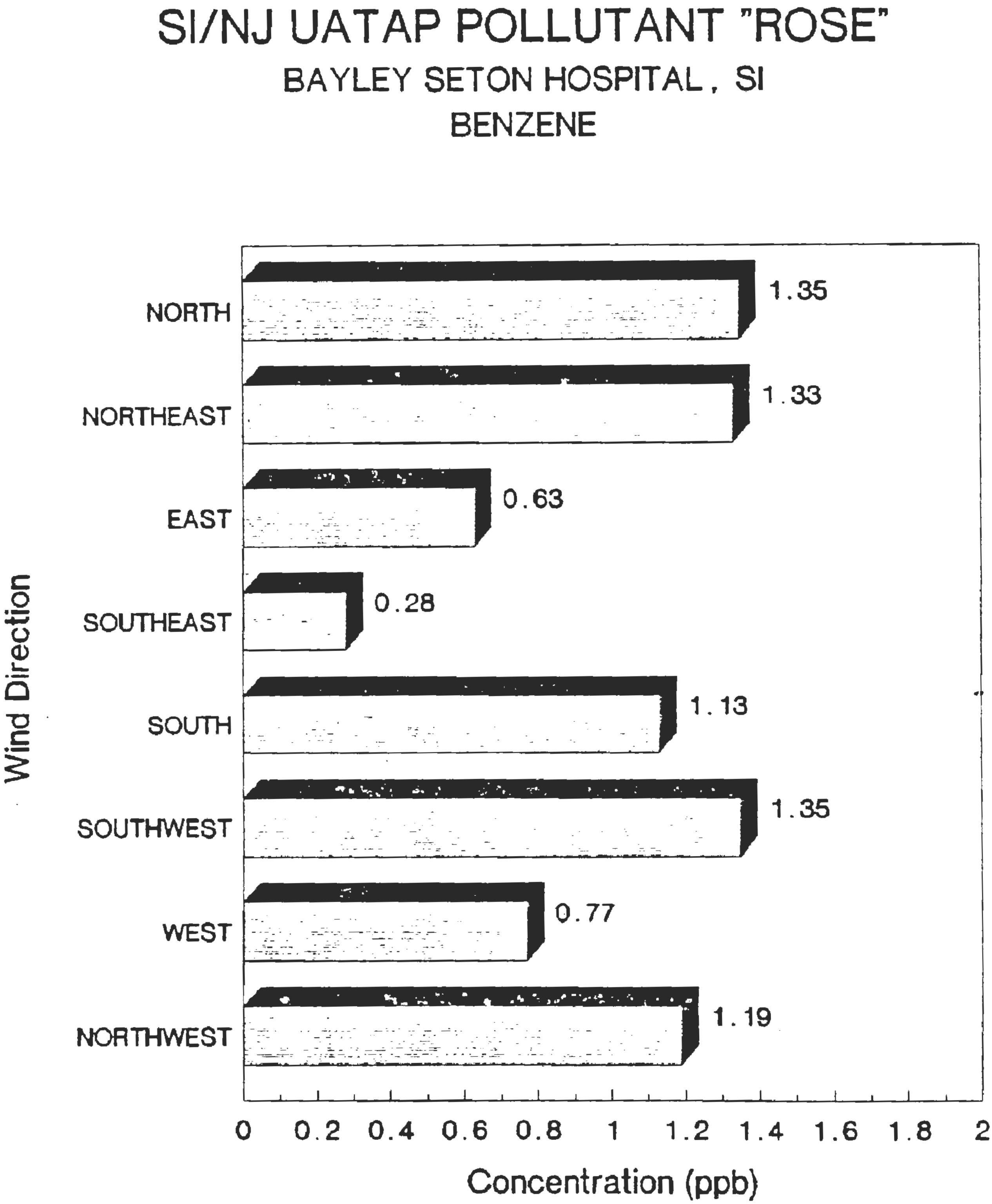
Data: October/87 thru September/89

FIGURE III - 6A-2



Data: October/88 thru September/89

FIGURE III - 6A-3



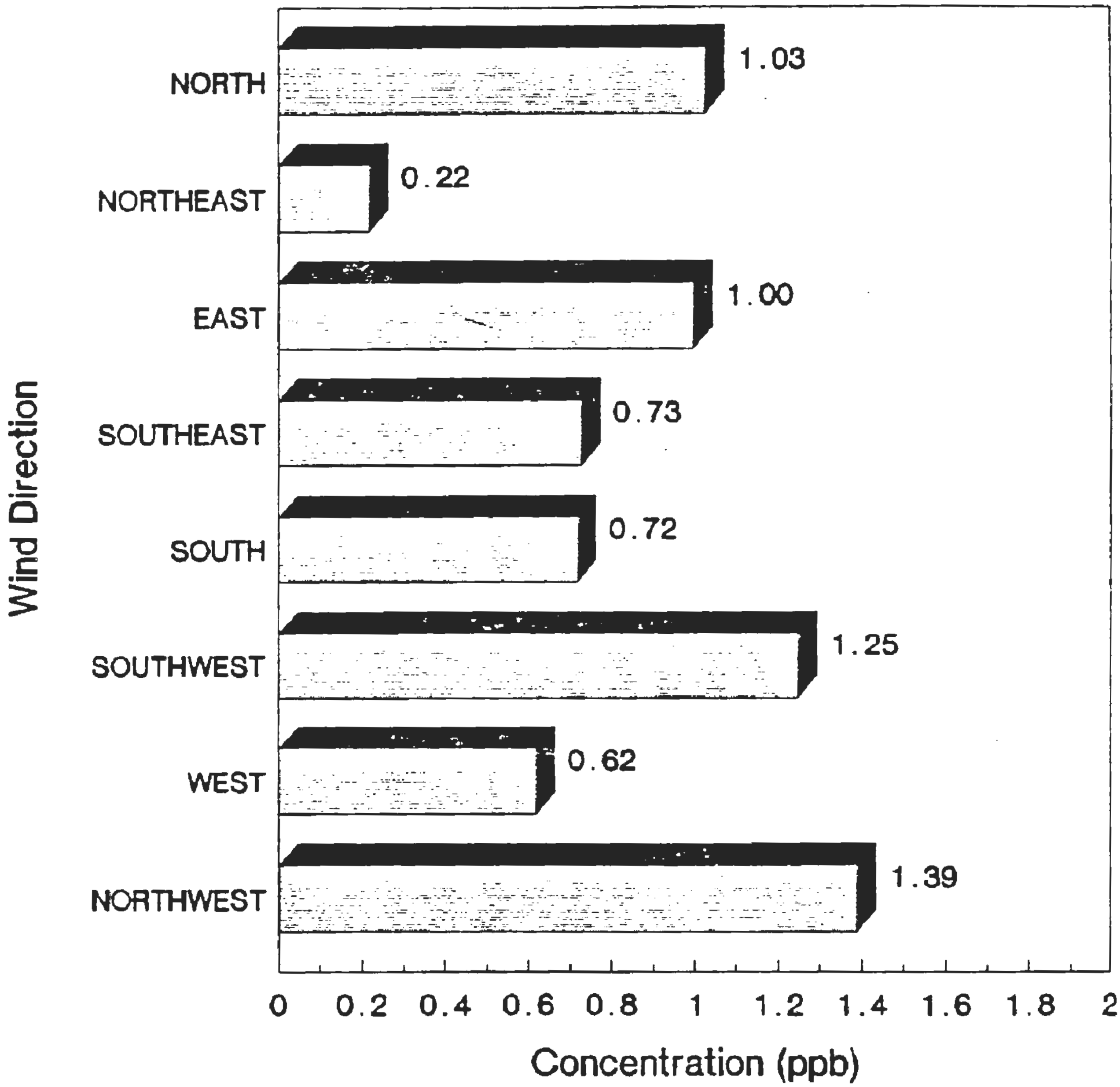
Data: October/87 thru September/89

FIGURE III - 6A-4

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY

BENZENE



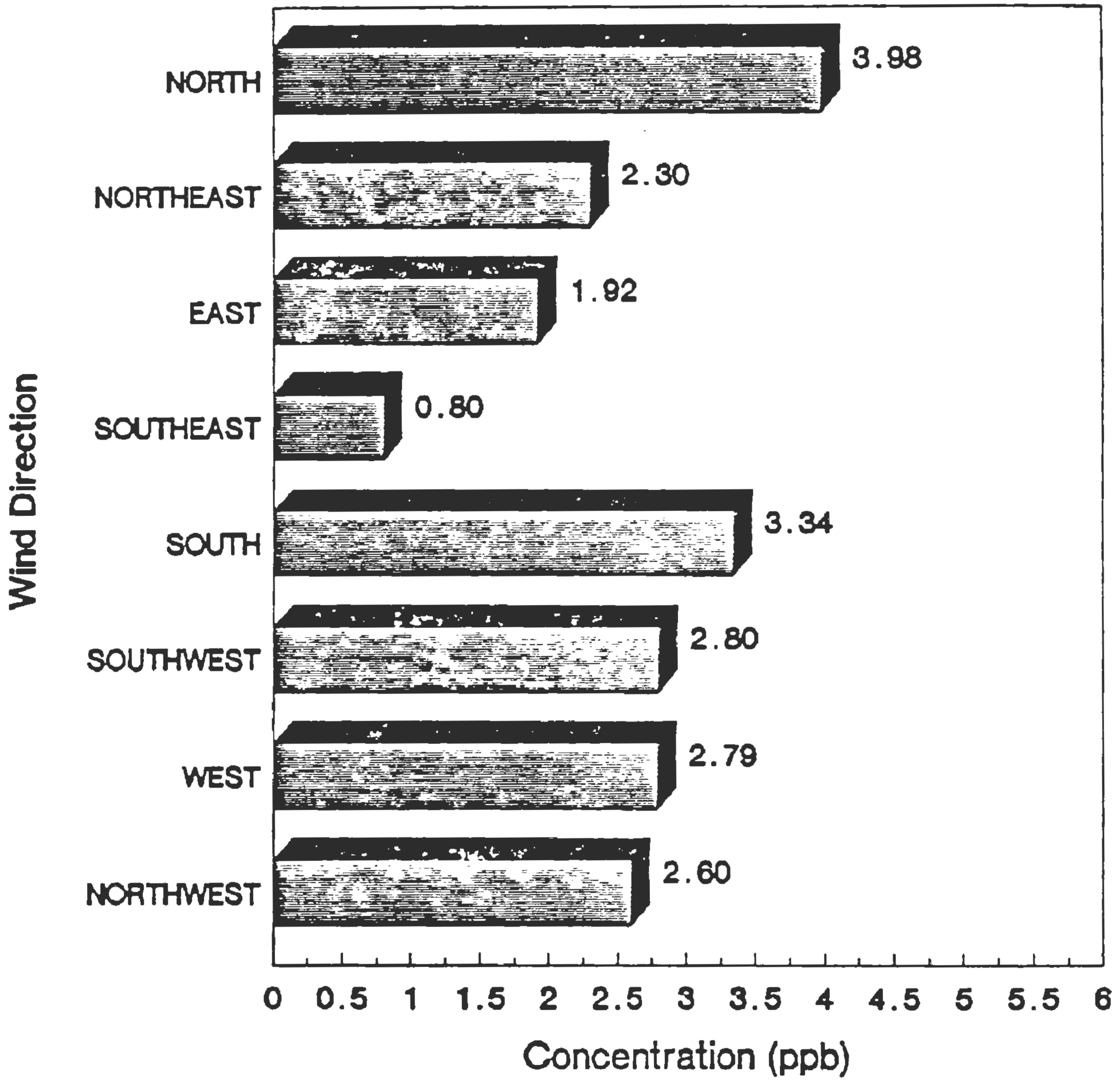
Data: October/87 thru September/89

FIGURE III - 6A-5

SI/NJ UATAP POLLUTANT "ROSE"

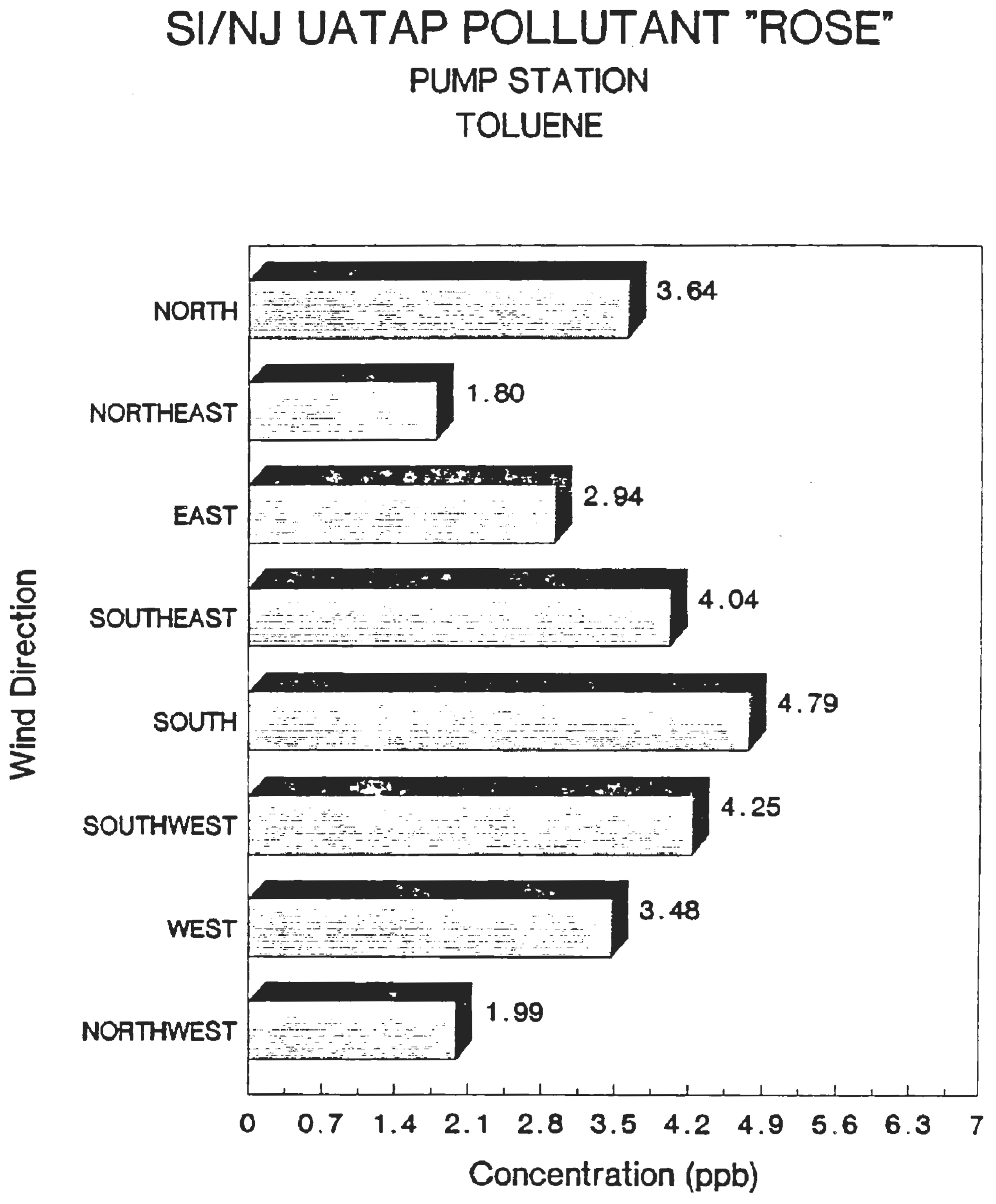
PS 26, TRAVIS

TOLUENE



Data: October/87 thru September/89

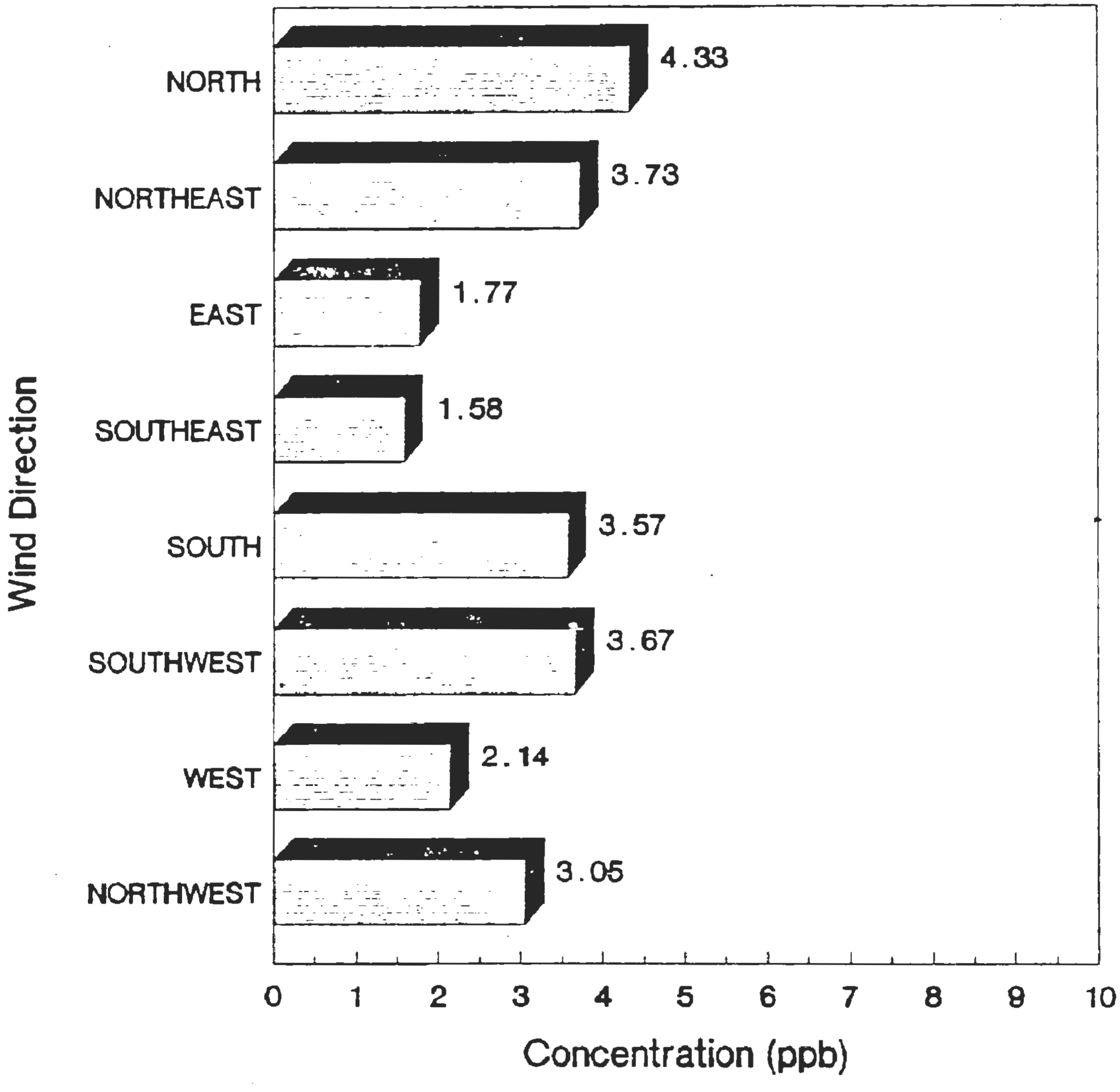
FIGURE III - 6A-6



Data: October/88 thru September/89

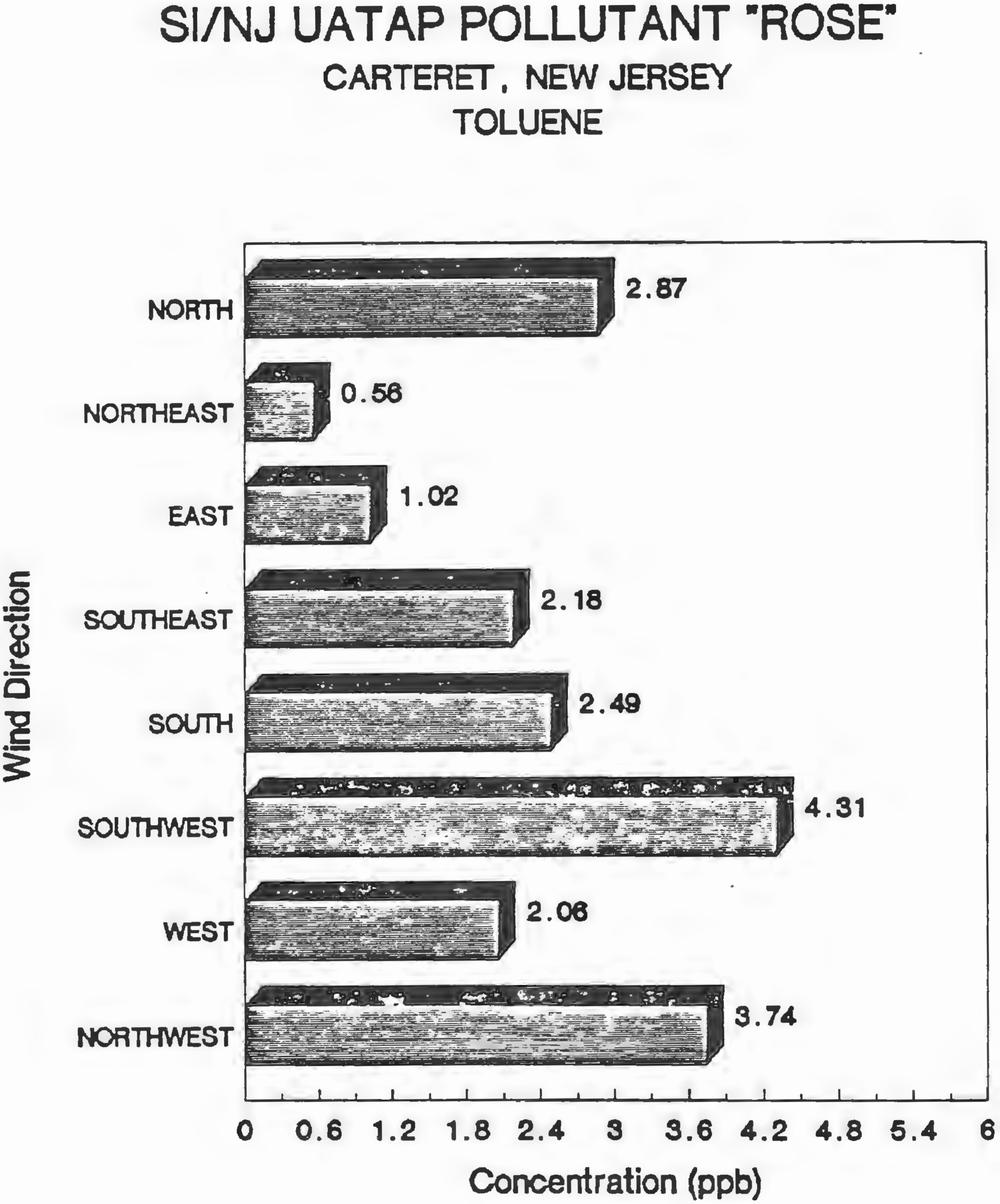
FIGURE III - 6A-7

SI/NJ UATAP POLLUTANT "ROSE"
BAYLEY SETON HOSPITAL, SI
TOLUENE



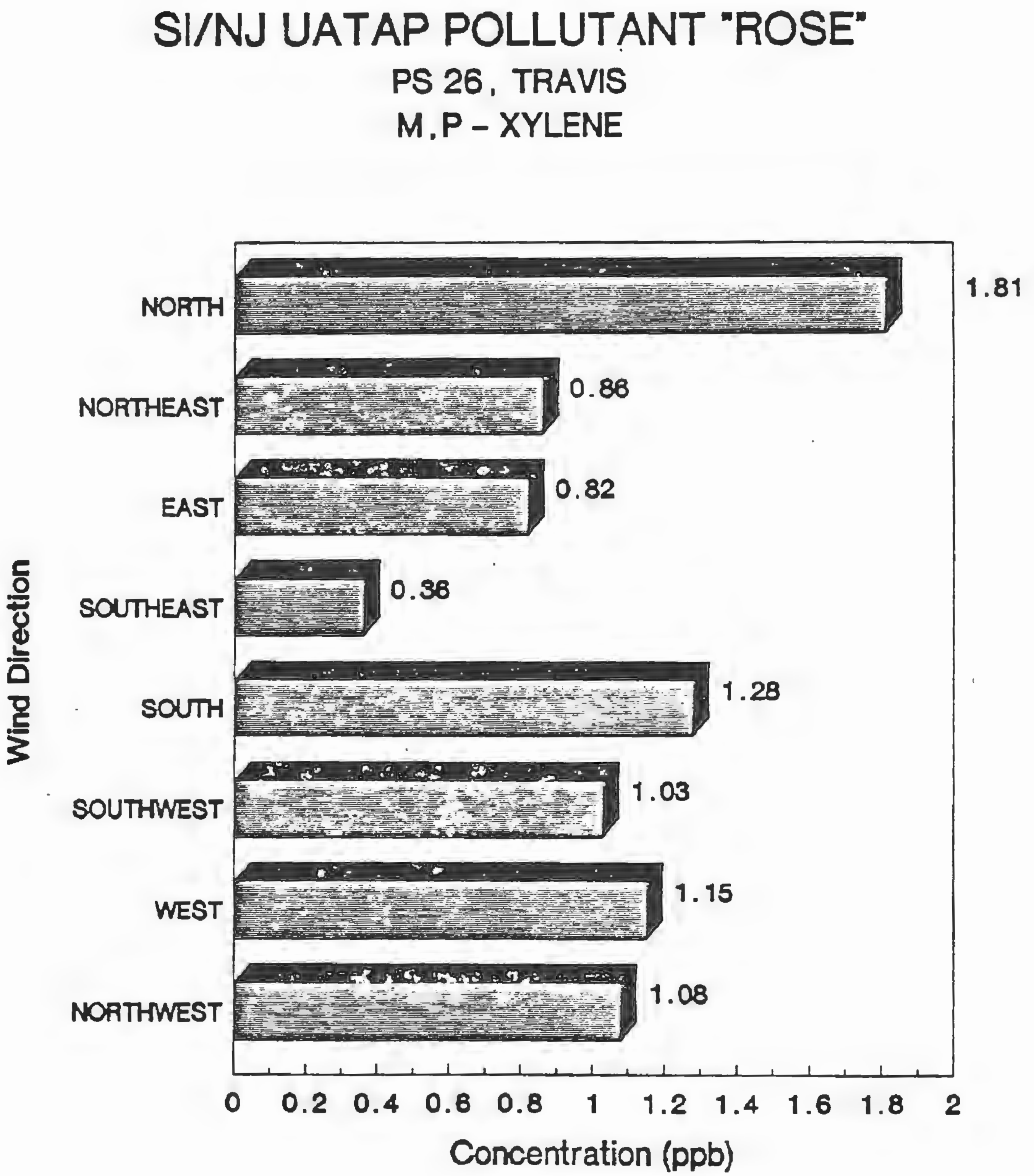
Data: October/87 thru September/89

FIGURE III - 6A-8



Data: October/87 thru September/89

FIGURE III - 6A-9

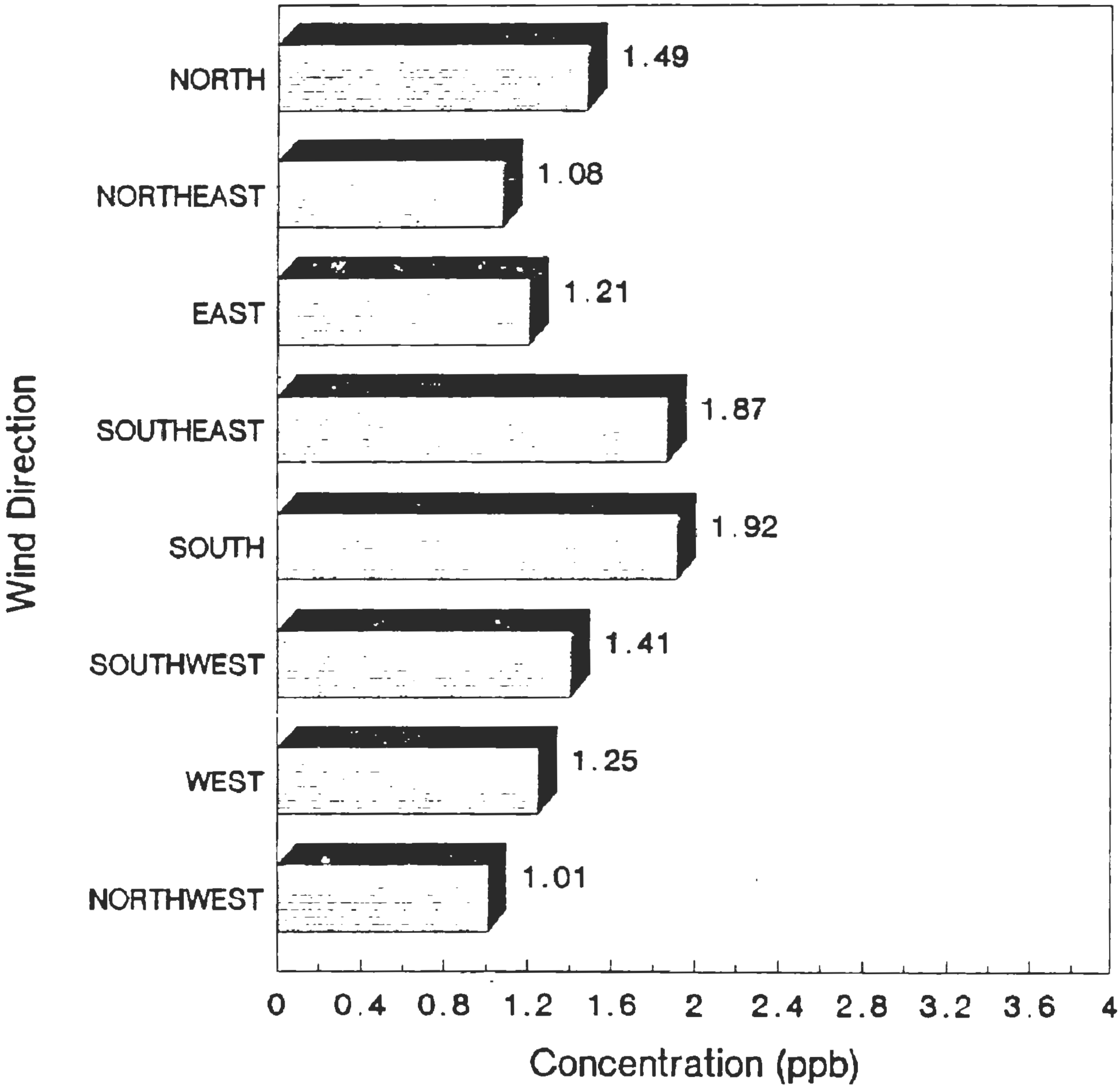


Data: October/87 thru September/89

FIGURE III - 6A-10

SI/NJ UATAP POLLUTANT "ROSE"

PUMP STATION
M/P XYLENE



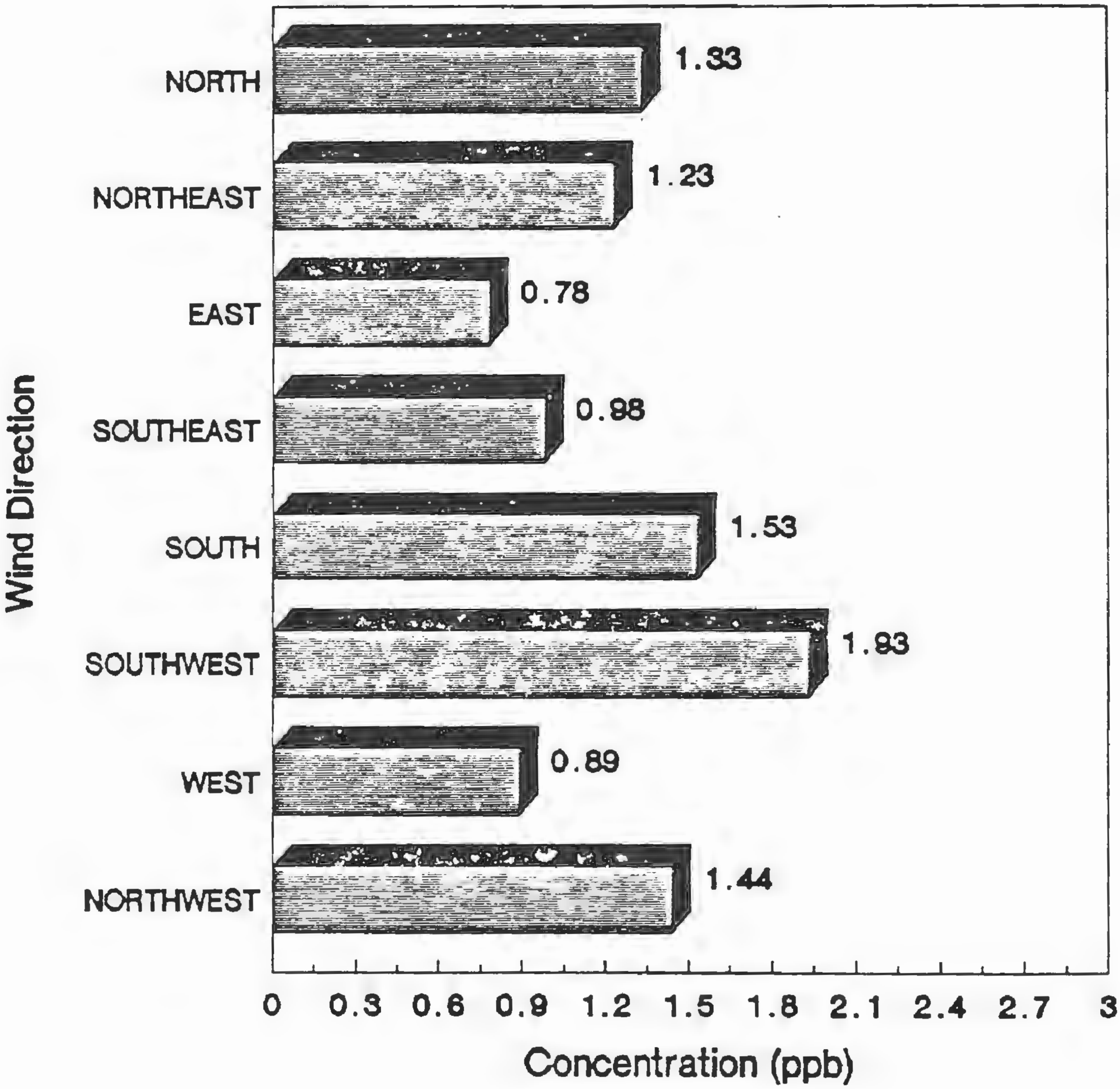
Data: October/88 thru September/89

FIGURE III - 6A-11

SI/NJ UATAP POLLUTANT "ROSE"

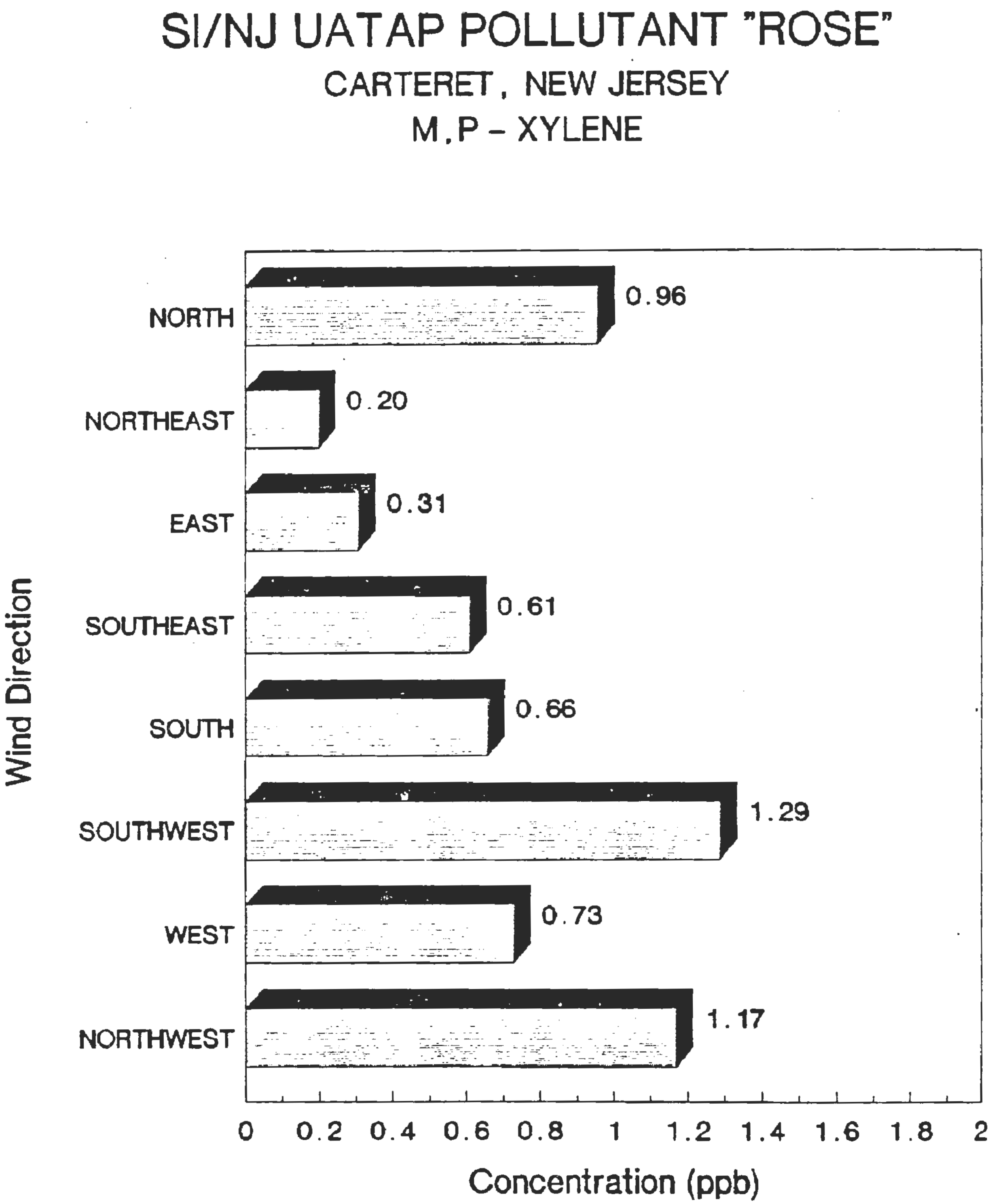
BAYLEY SETON HOSPITAL, SI

M/P XYLENE



Data: February/88 thru September/89

FIGURE III - 6A-12

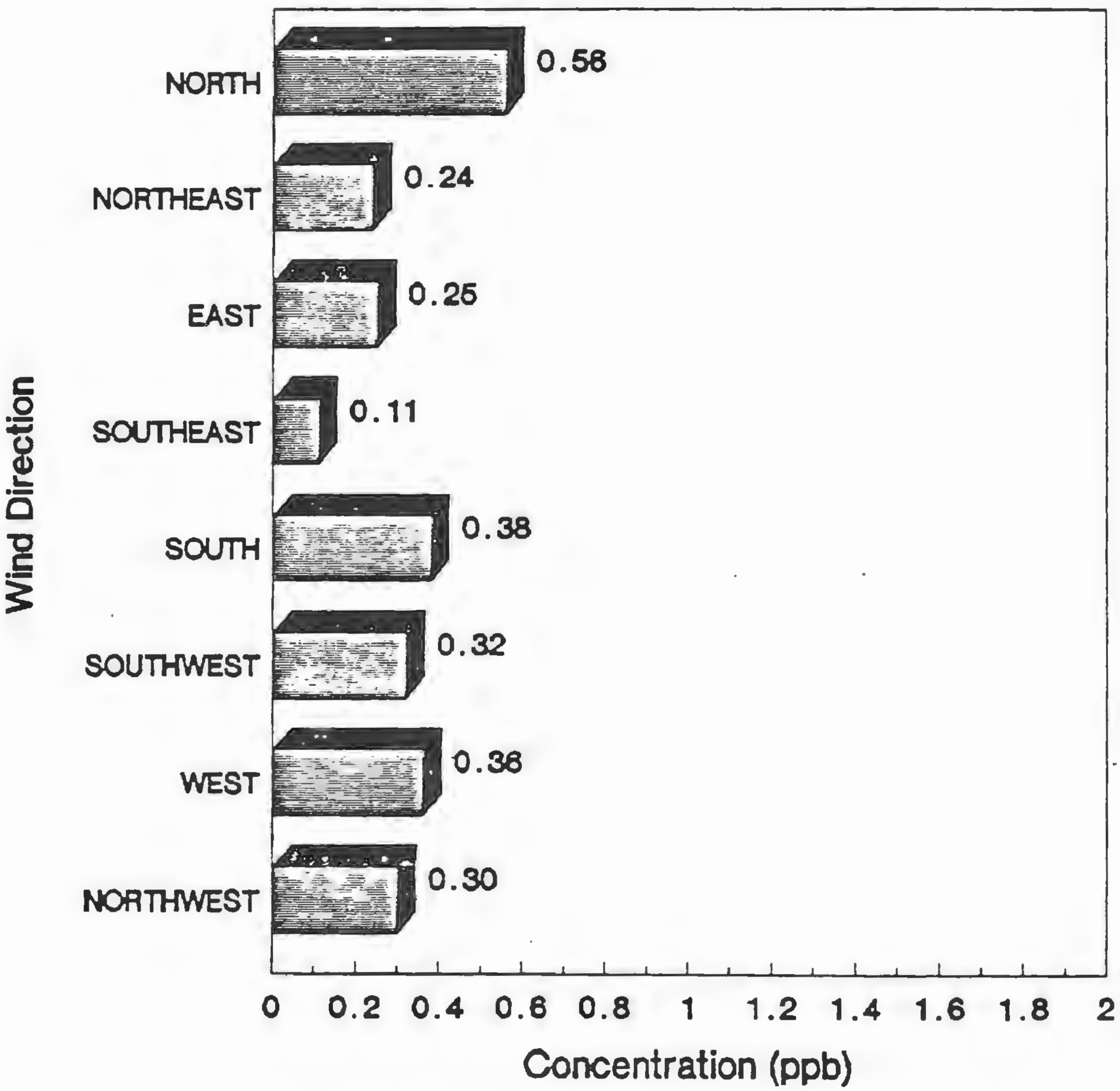


Data: October/87 thru September/89

FIGURE III - 6A-13

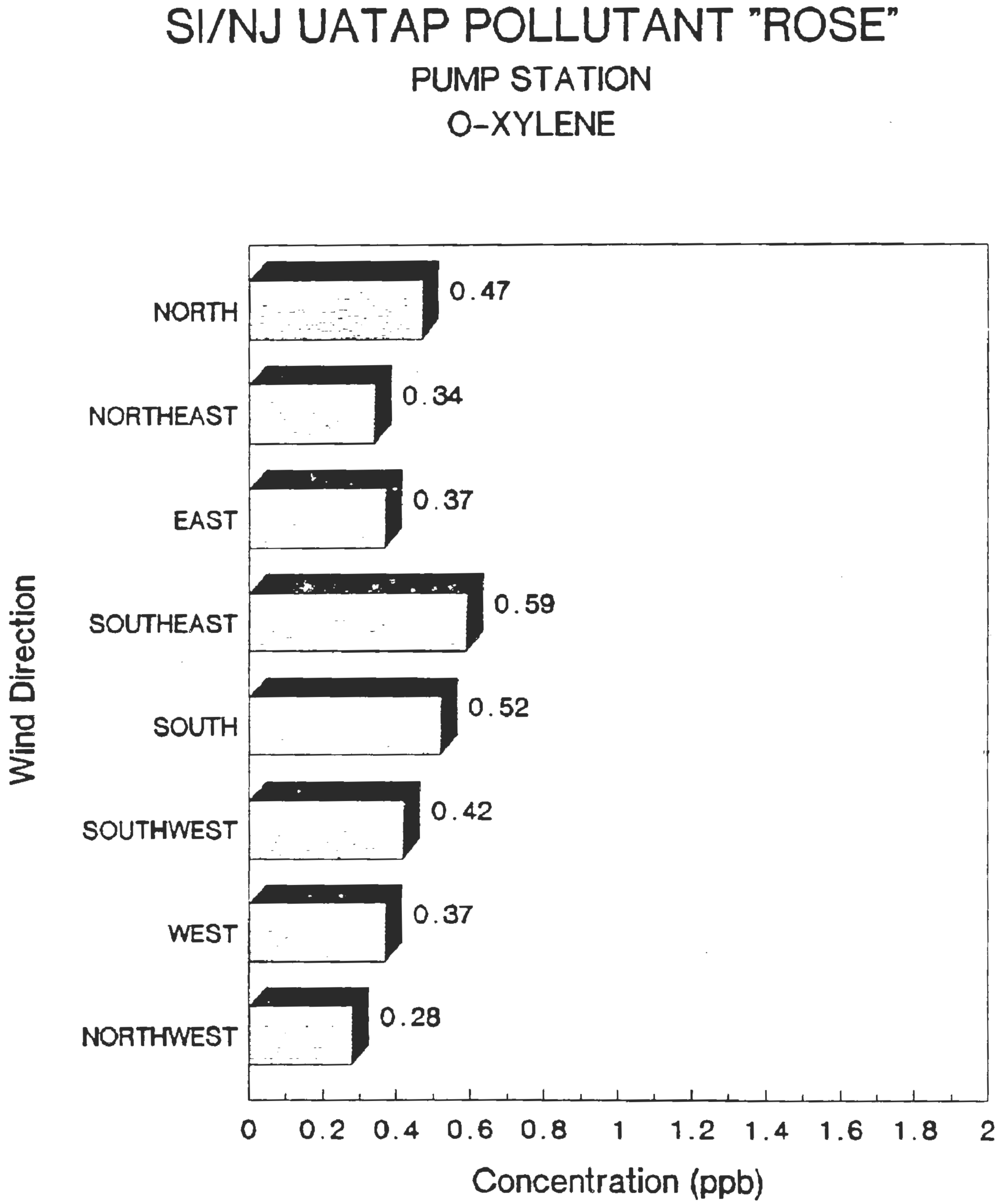
SI/NJ UATAP POLLUTANT "ROSE"

P.S. 26, TRAVIS
O-XYLENE



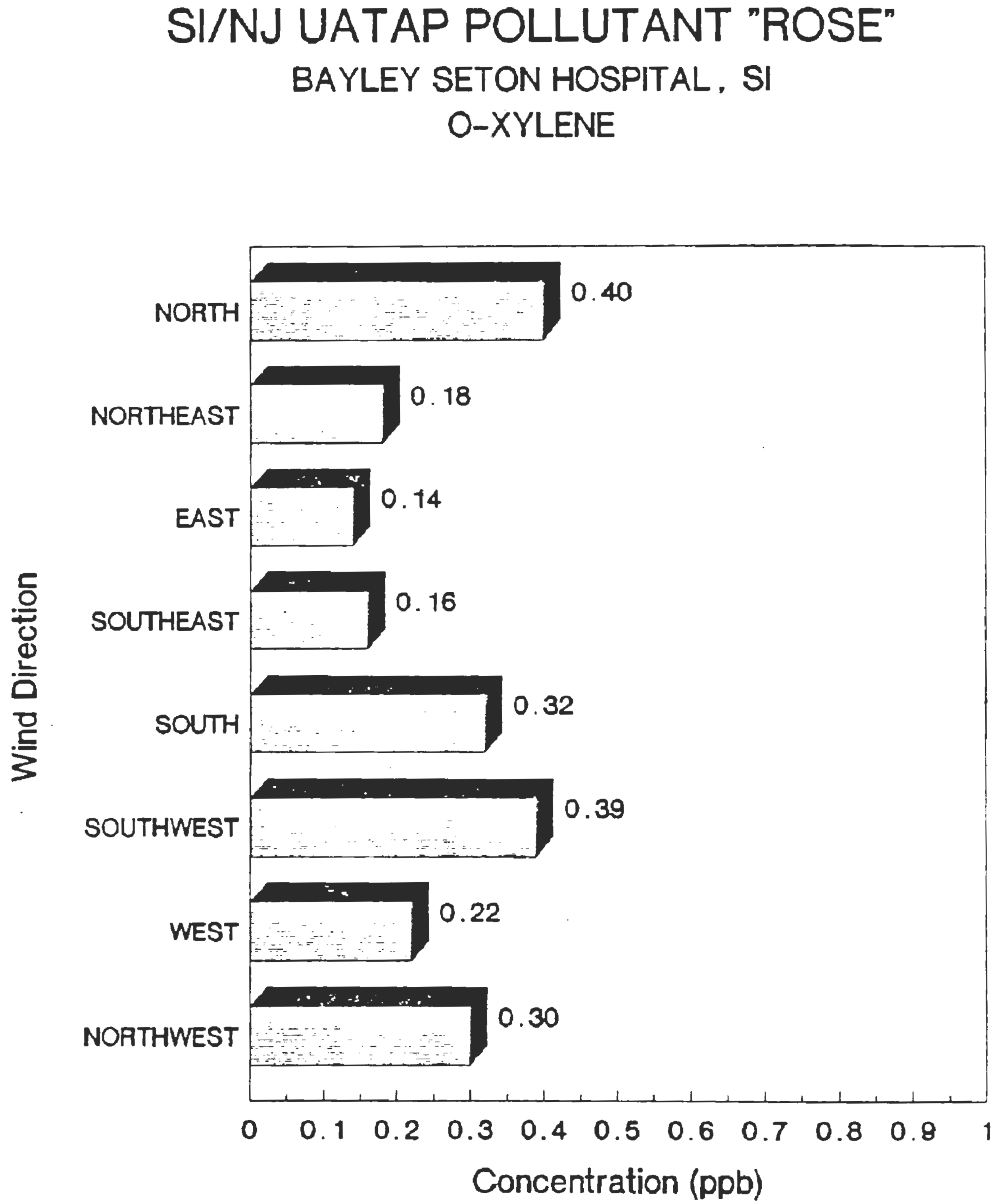
Data: October/87 thru September/89

FIGURE III - 6A-14



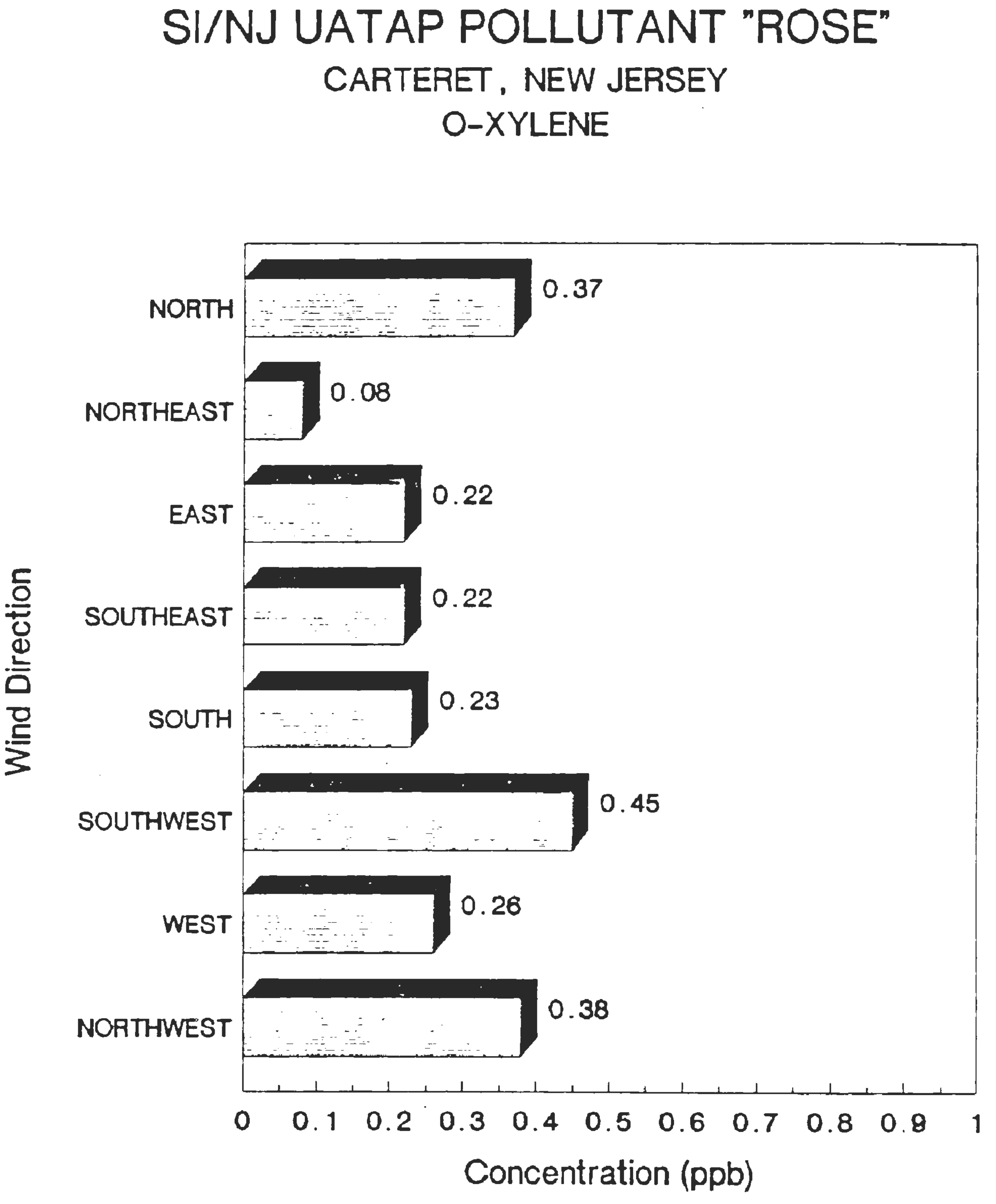
Data: October/88 thru September/89

FIGURE III - 6A-15



Data: October/87 thru September/89

FIGURE III - 6A-16



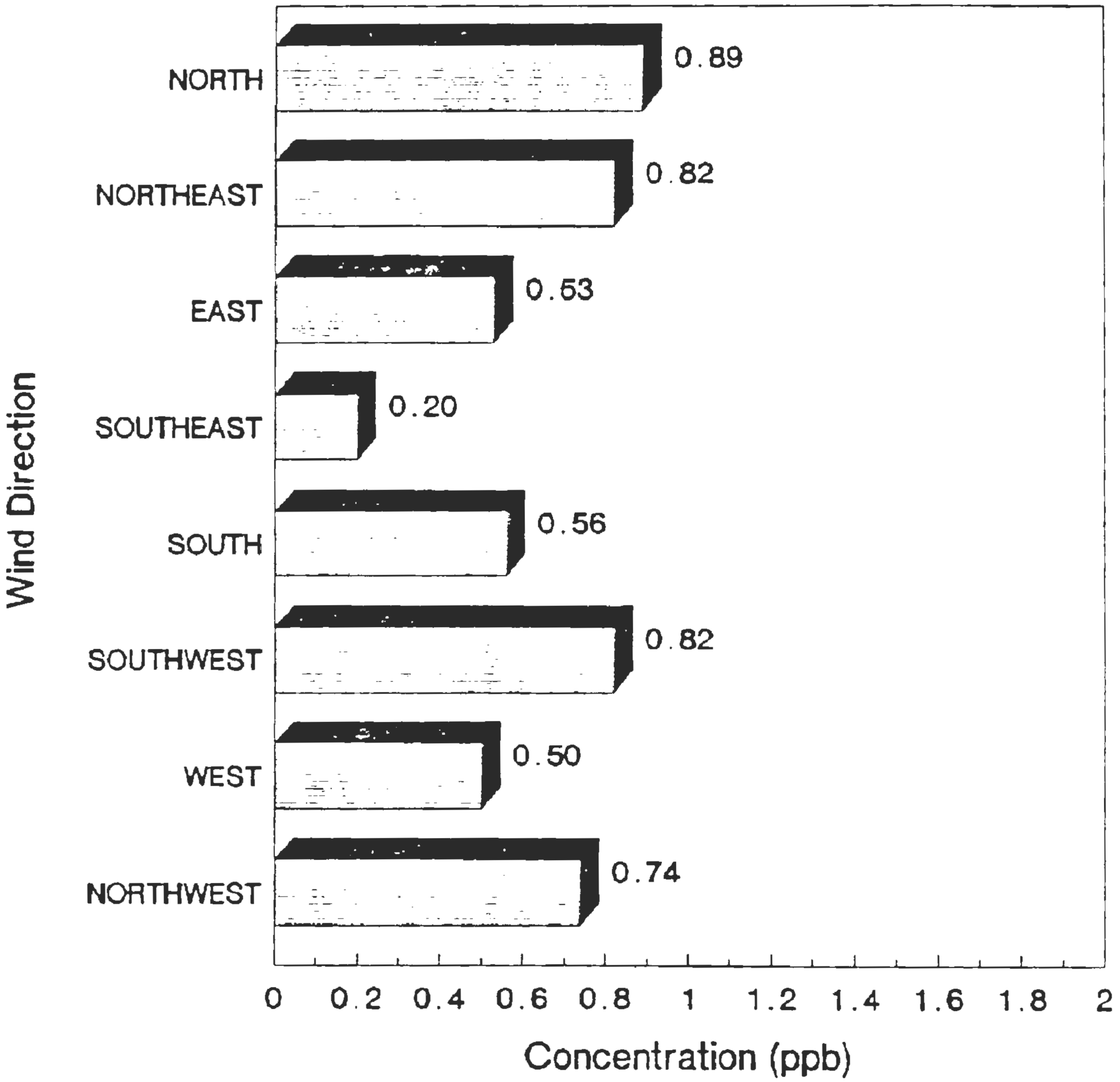
Data: October/87 thru September/89

FIGURE III - 6A-17

SI/NJ UATAP POLLUTANT "ROSE"

BAYLEY SETON HOSPITAL, SI

HEXANE



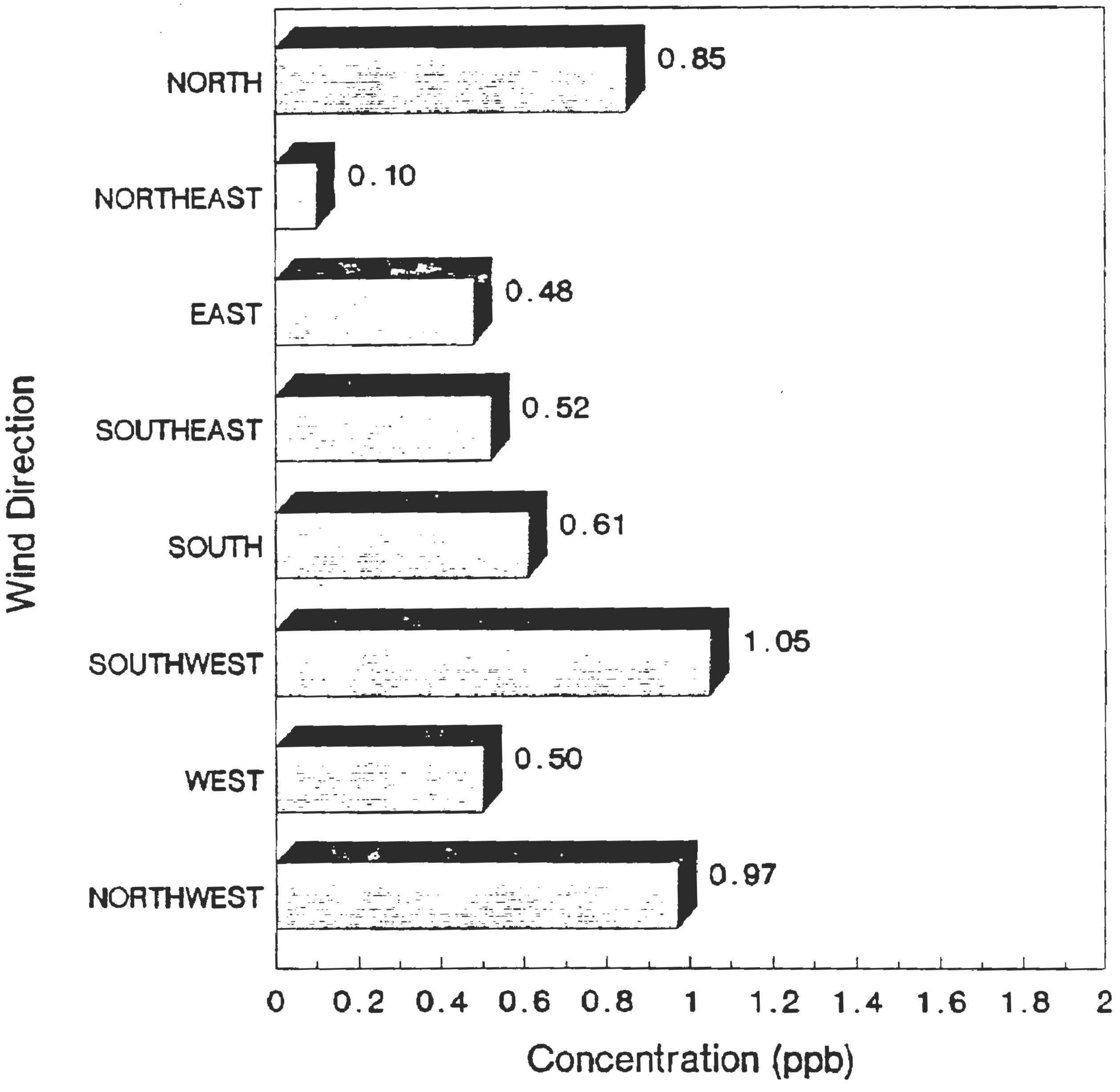
Data: October/87 thru September/89

FIGURE III - 6A-18

SI/NJ UATAP POLLUTANT "ROSE"

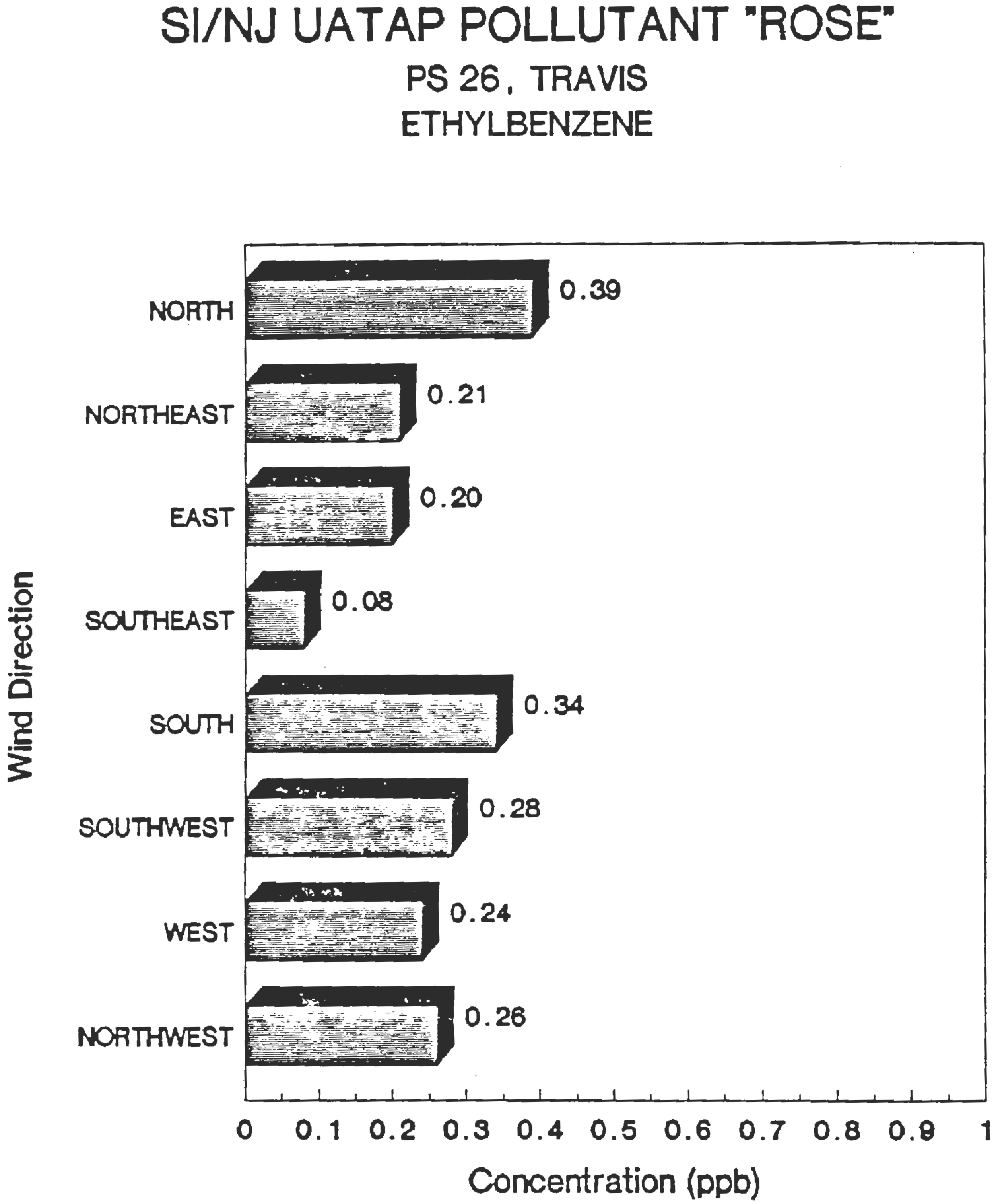
CARTERET, NJ

HEXANE



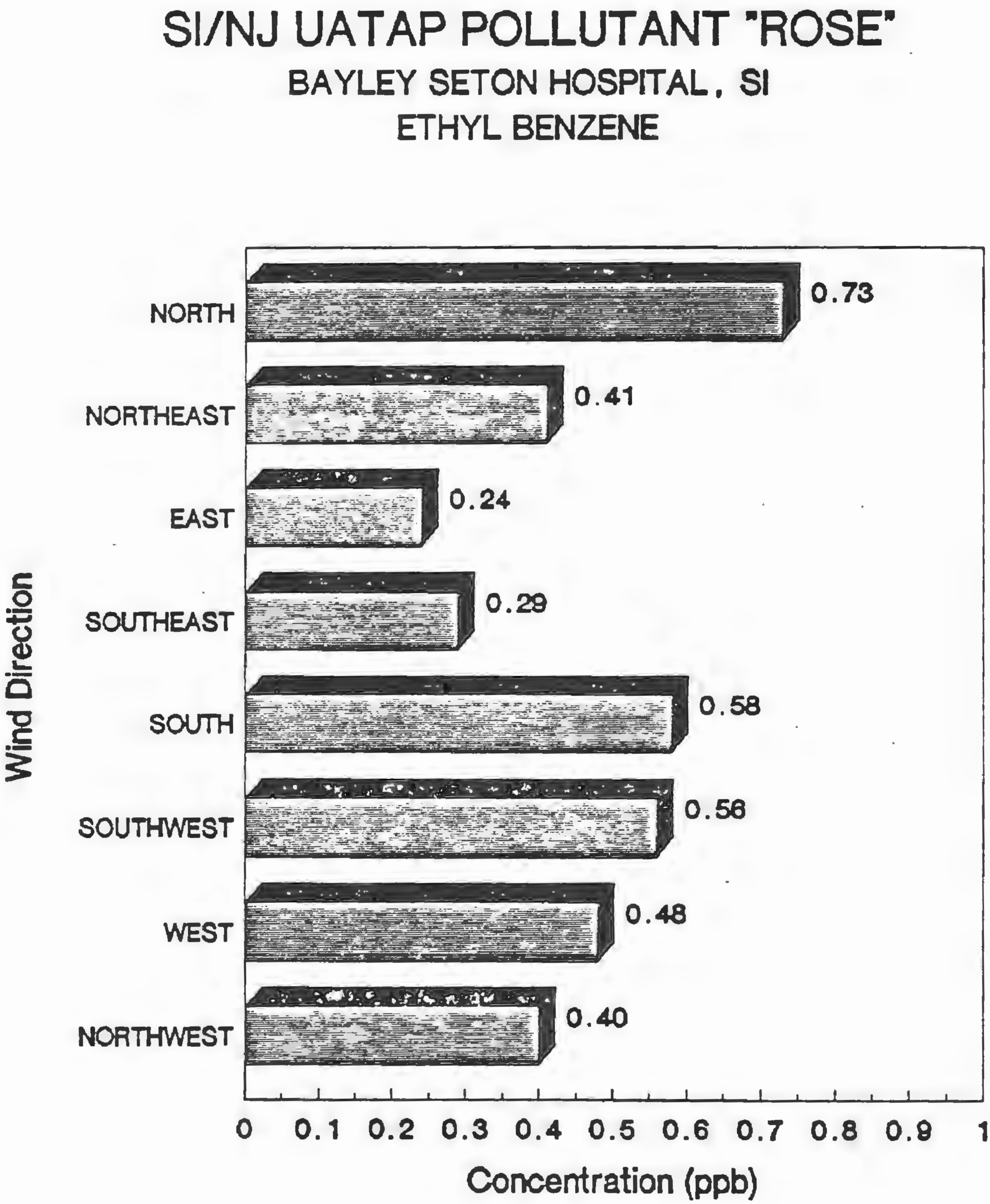
October/1987 thru September/1989

FIGURE III - 6A-19

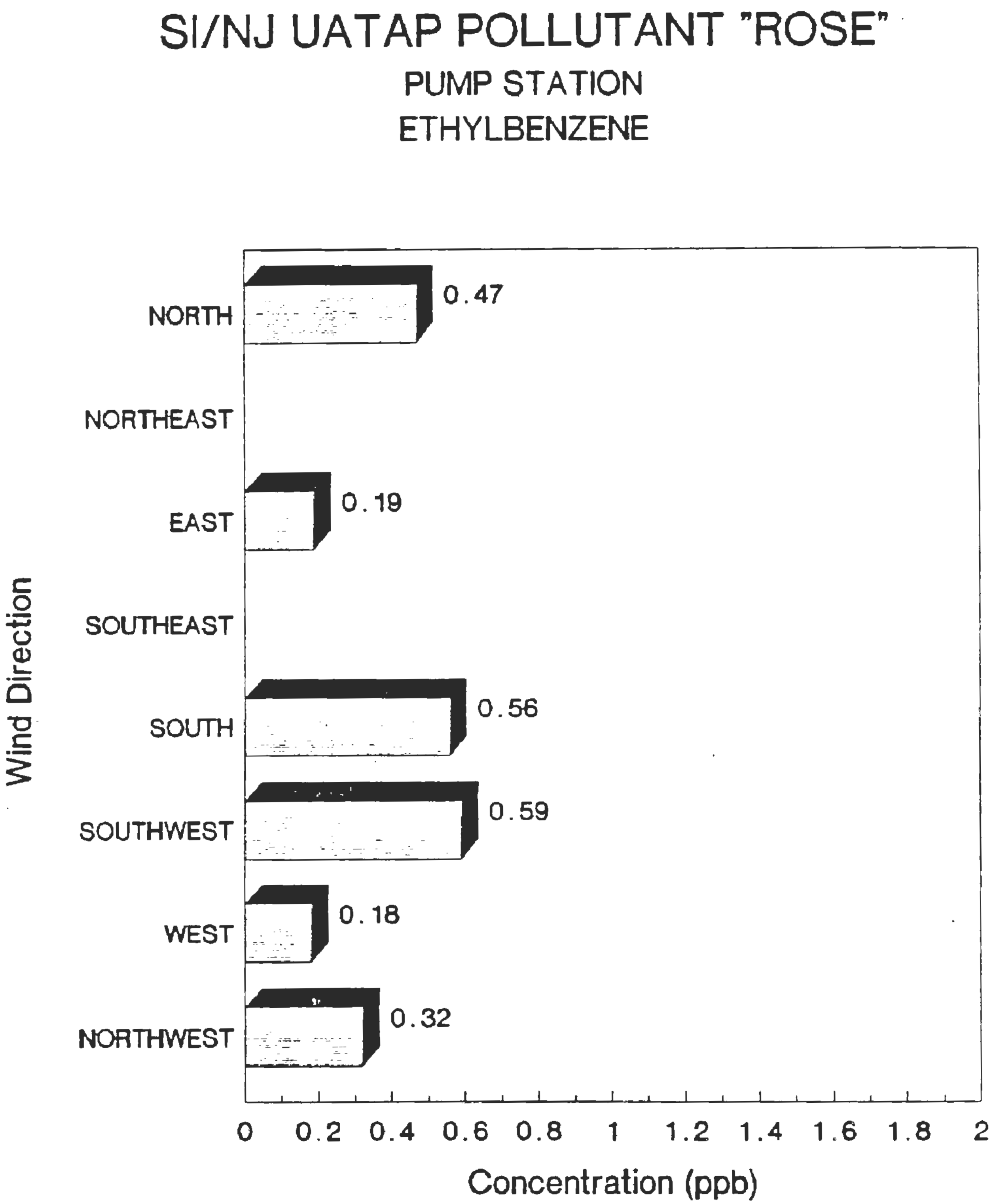


Data: October/87 thru September/89

FIGURE III - 6A-20

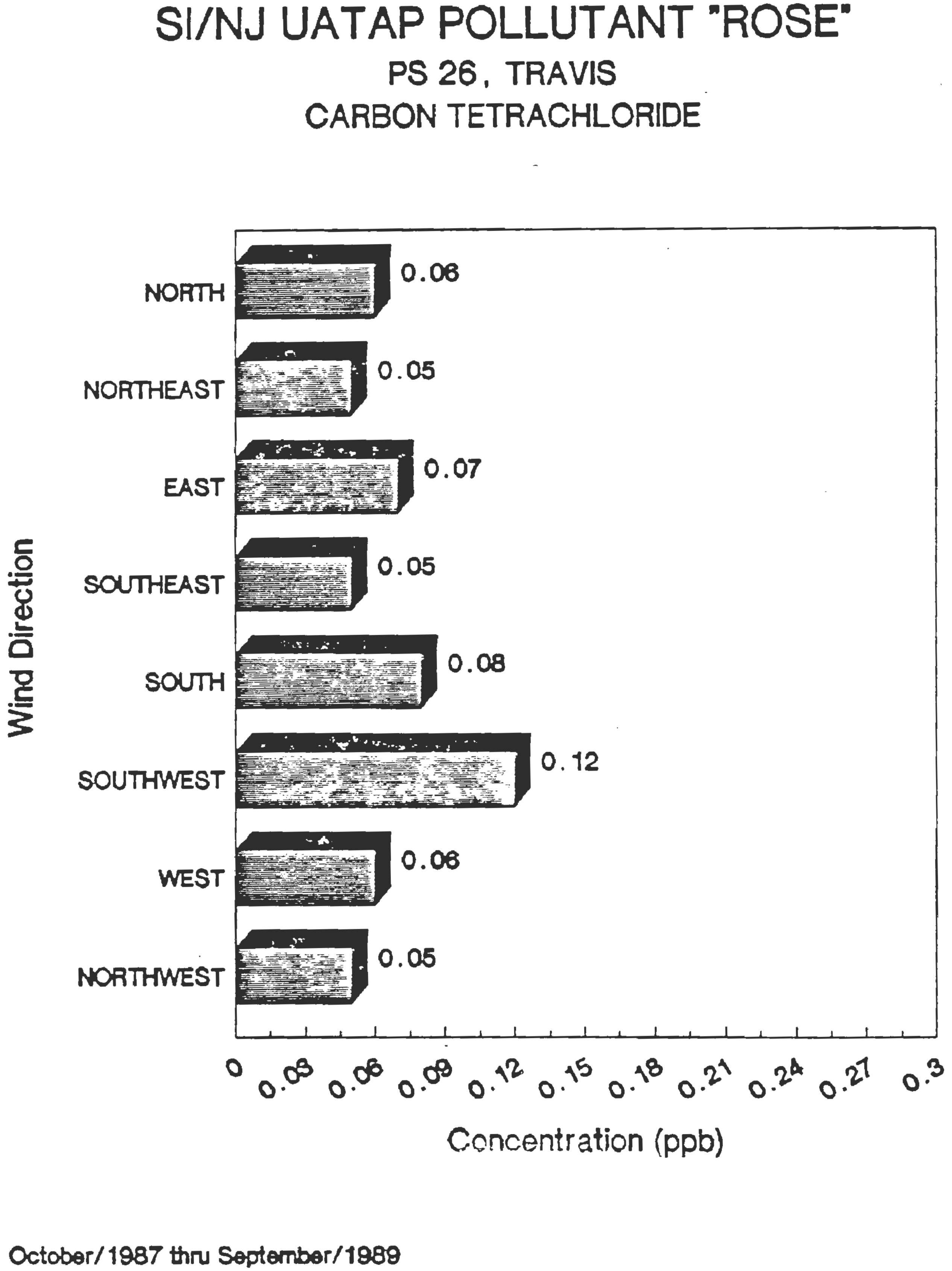


Data: January/88 thru September/89



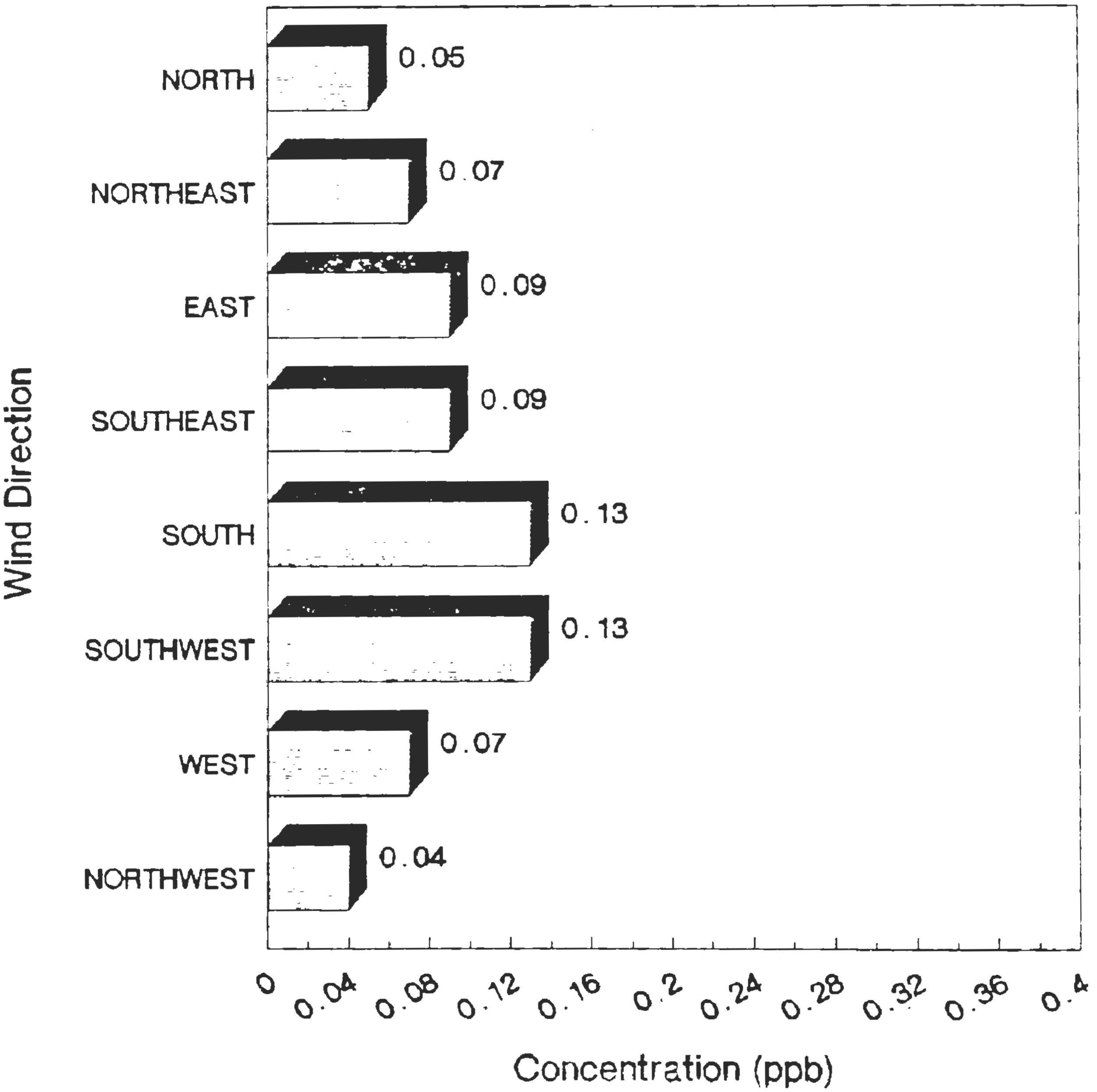
Data: October/88 thru March/89

FIGURE III - 6A-22

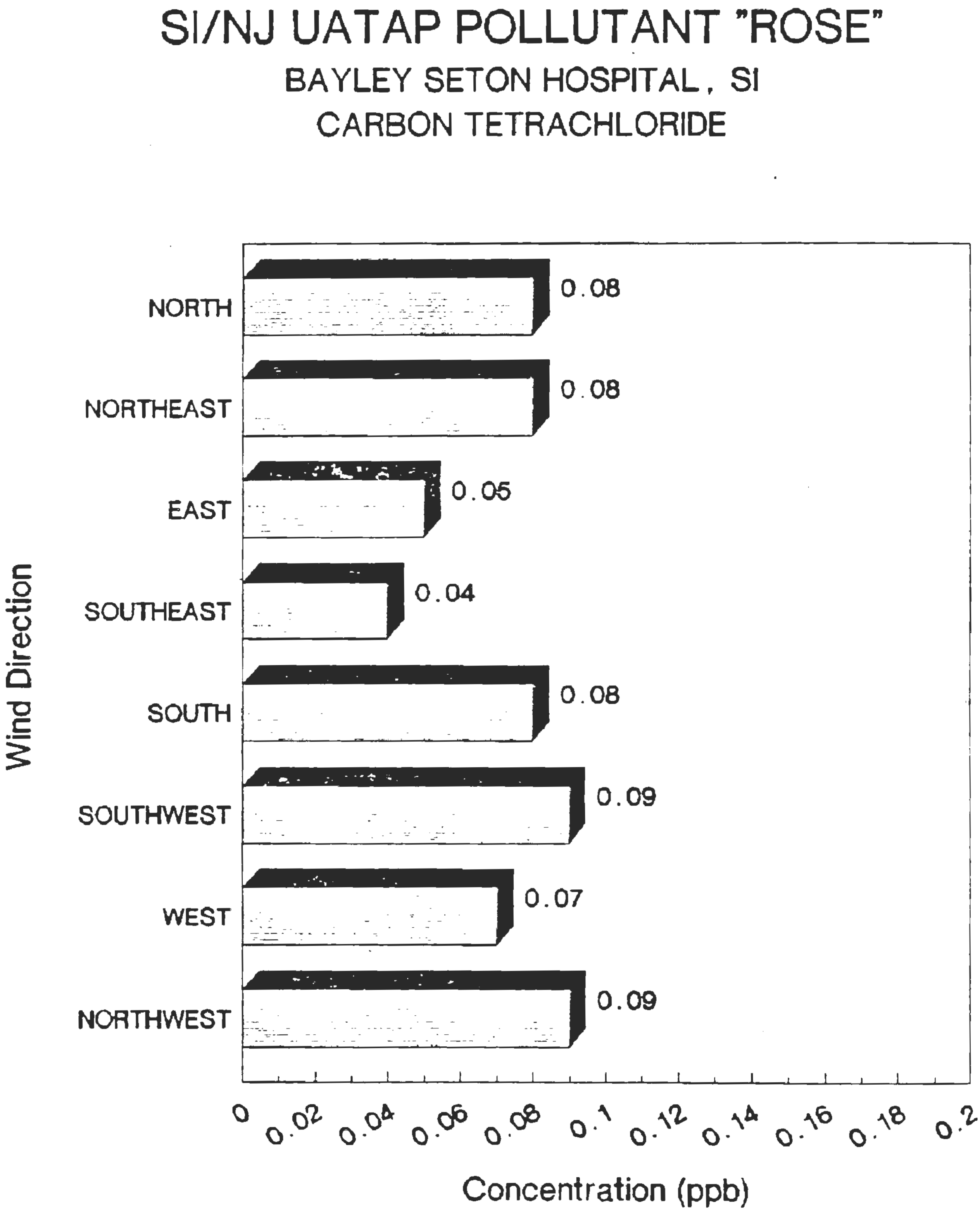


SI/NJ UATAP POLLUTANT "ROSE"

PUMP STATION
CARBON TETRACHLORIDE



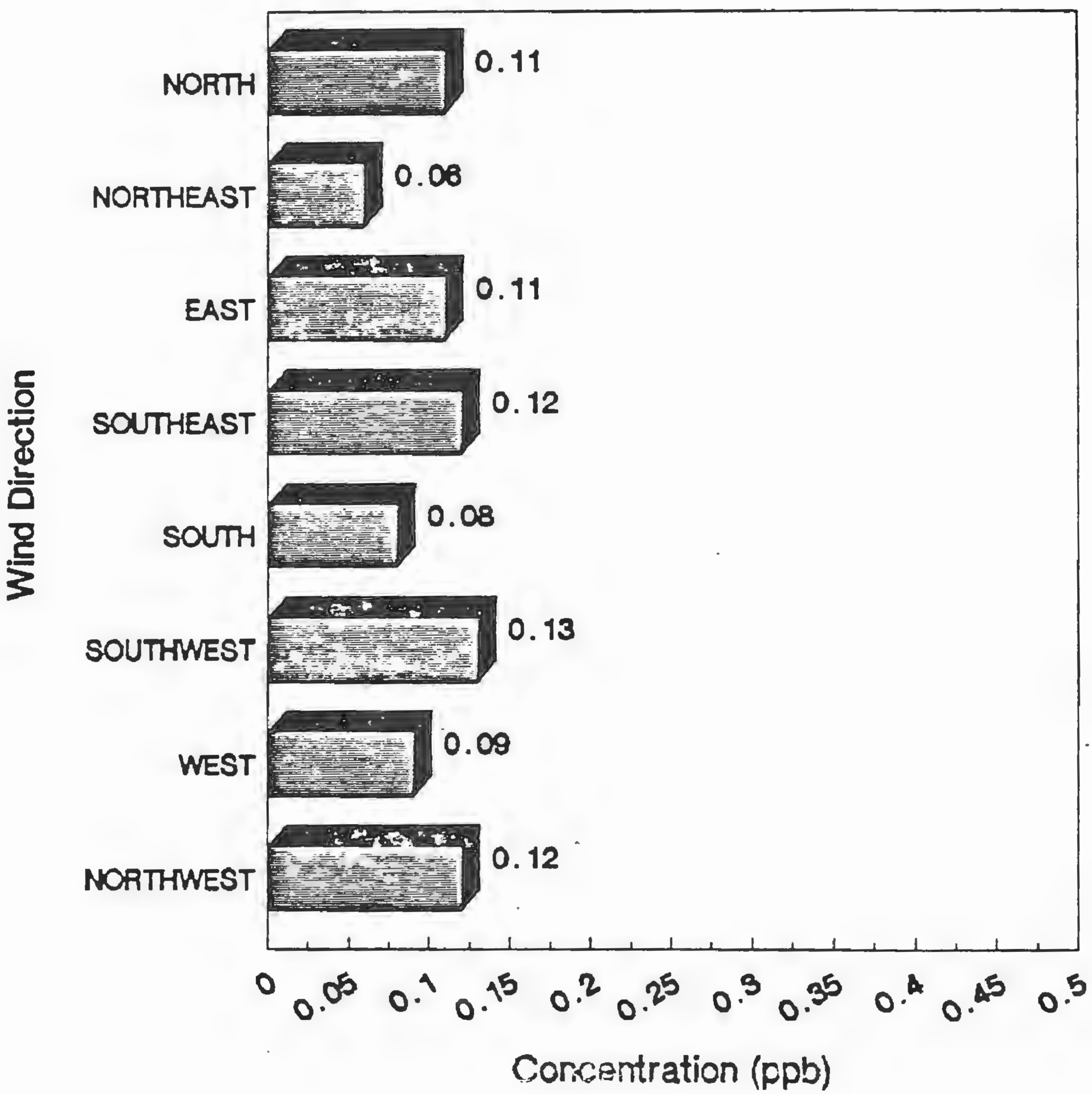
Data: October/88 thru September/89



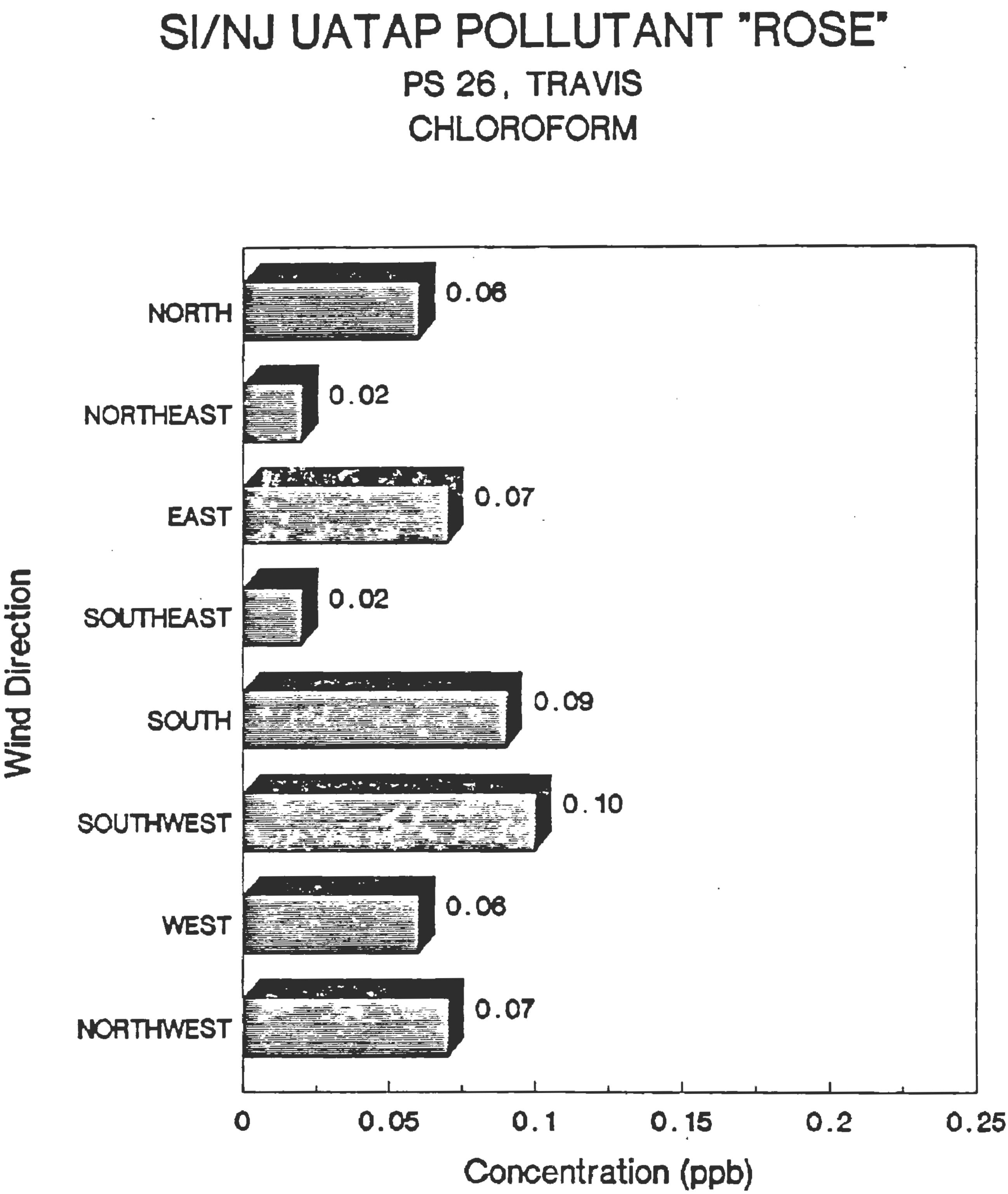
Data: October/87 thru September/89

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY
CARBON TETRACHLORIDE



Data: October/87 thru September/89

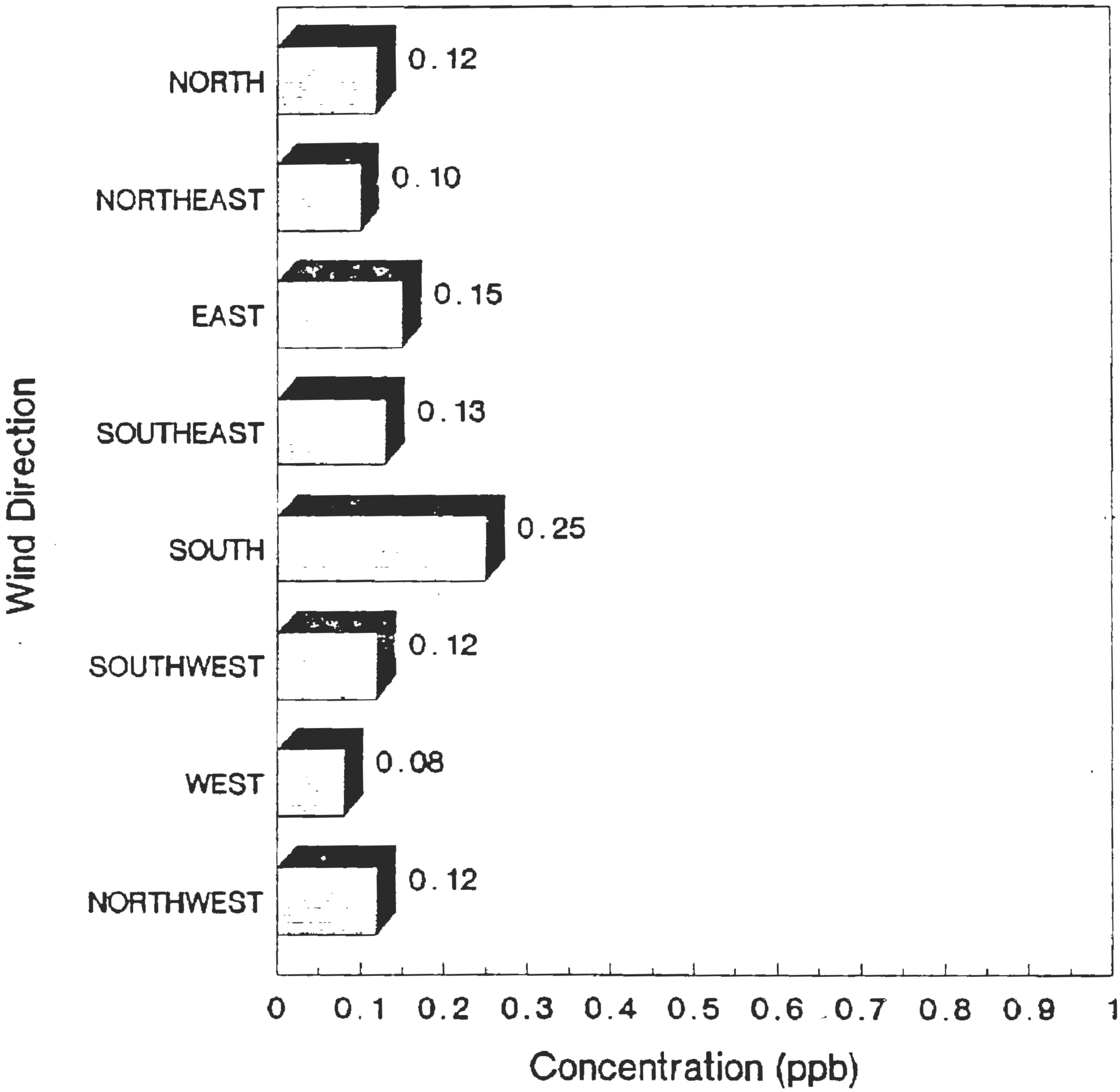


Data: October/87 thru September/89

FIGURE III - 6A-27

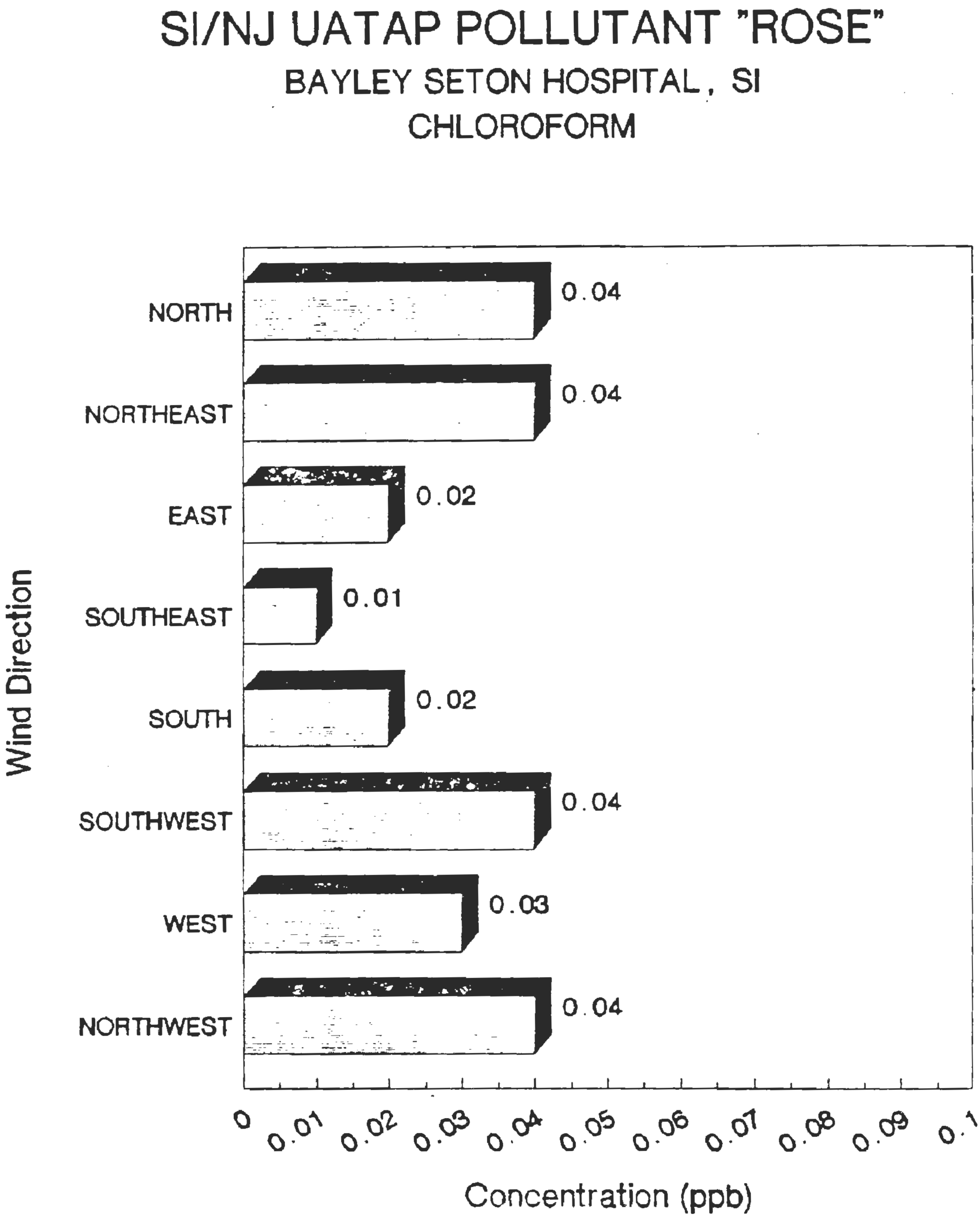
SI/NJ UATAP POLLUTANT "ROSE"

PUMP STATION
CHLOROFORM



Data: October/88 thru September/89

FIGURE III - 6A-28

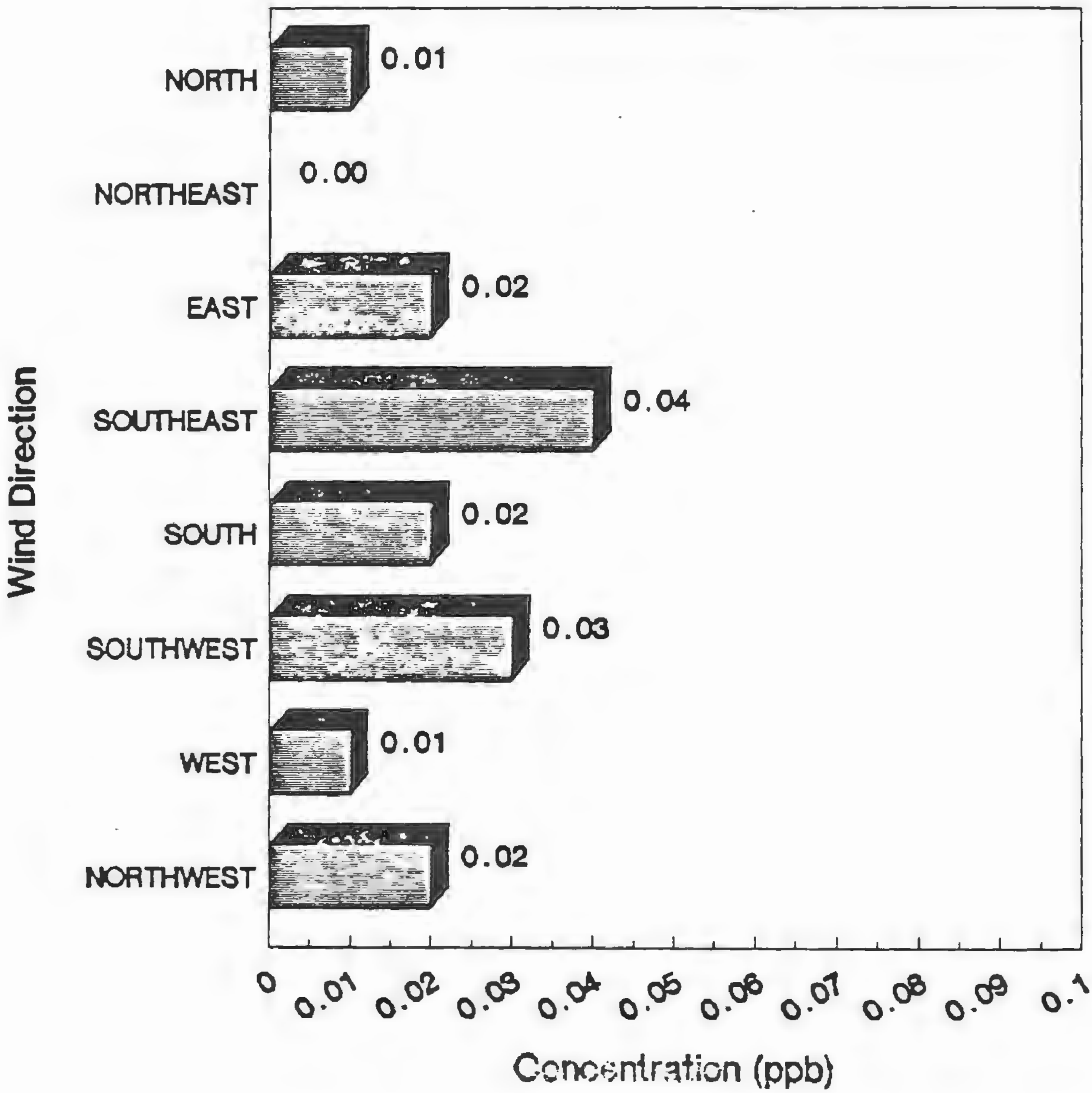


Data: October/87 thru September/89

FIGURE III - 6A-29

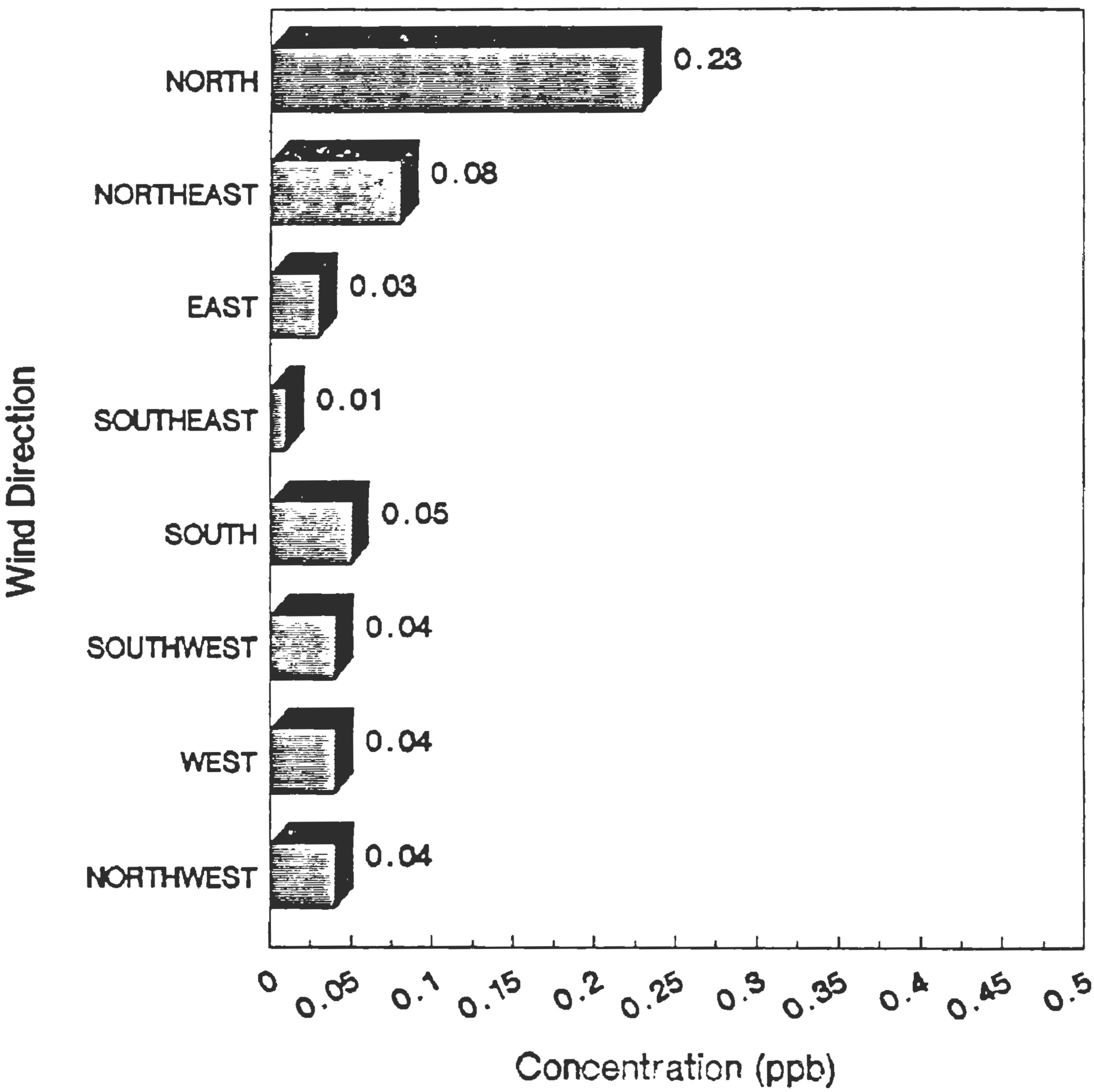
SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY
CHLOROFORM



Data: October/87 thru September/89

SI/NJ UATAP POLLUTANT "ROSE"
PS26, TRAVIS
TRICHLOROETHYLENE



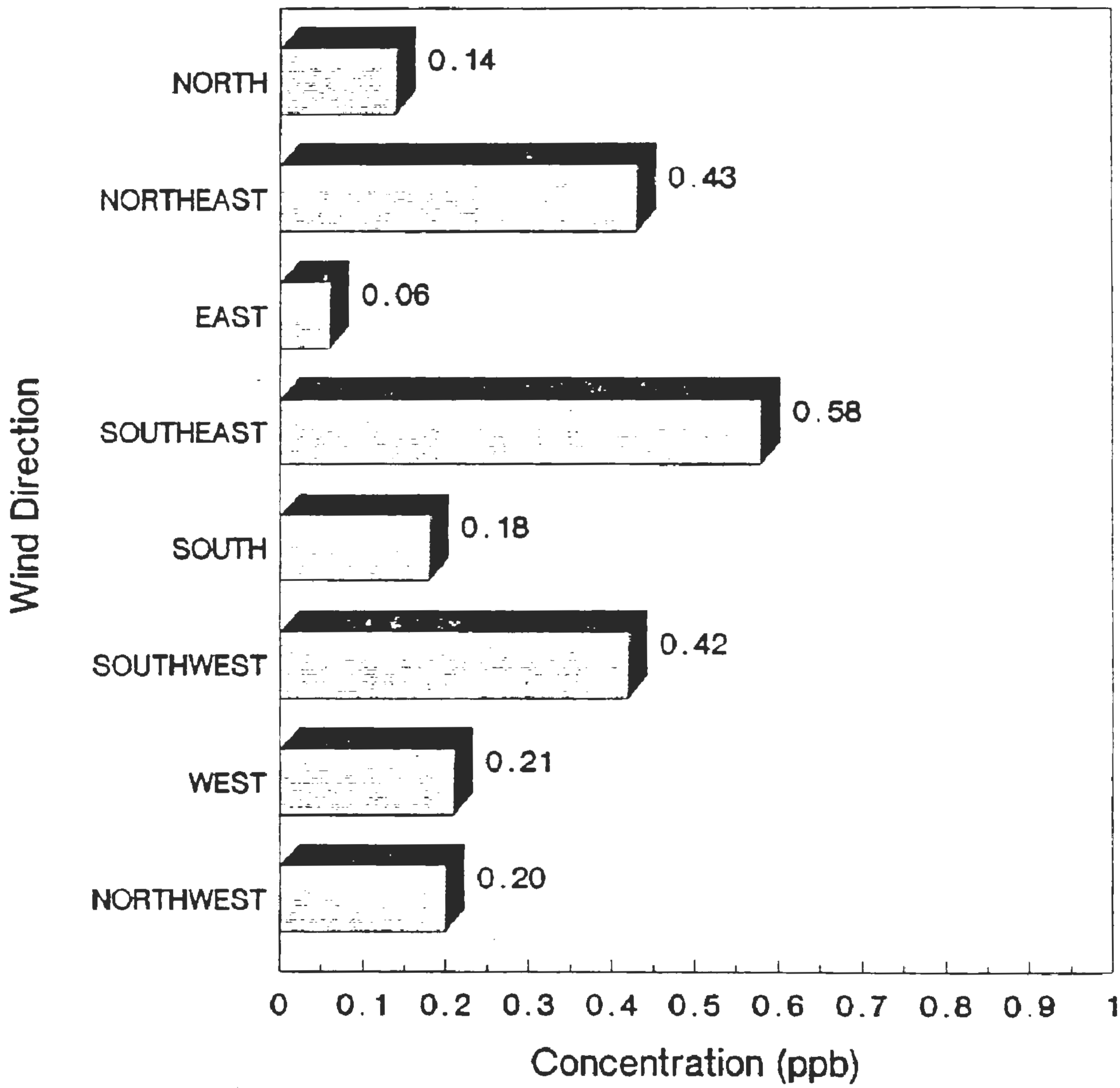
October/1987 thru September/1989

FIGURE III -- 6A-31

SI/NJ UATAP POLLUTANT "ROSE"

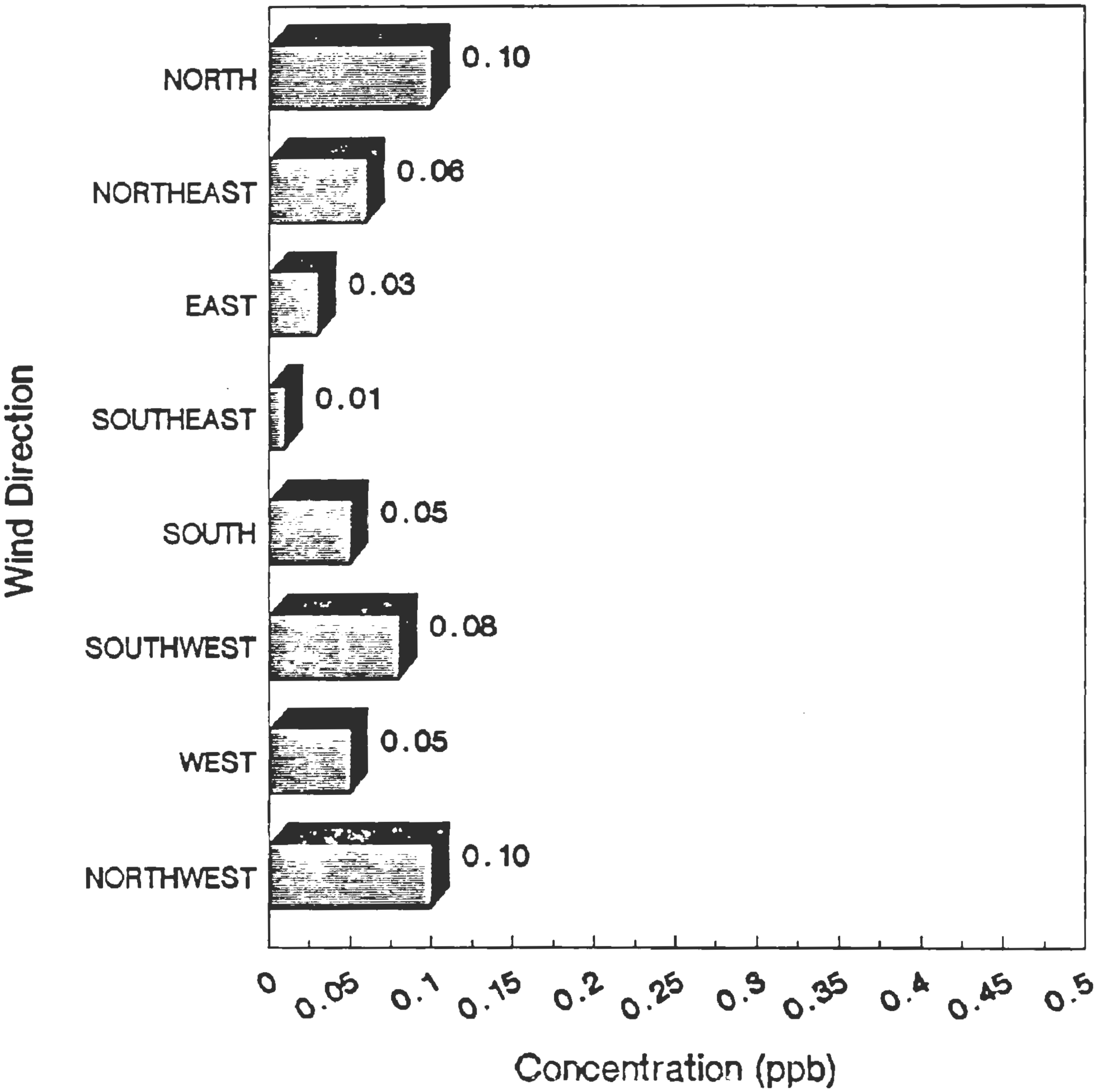
PUMP STATION

TRICHLOROETHYLENE



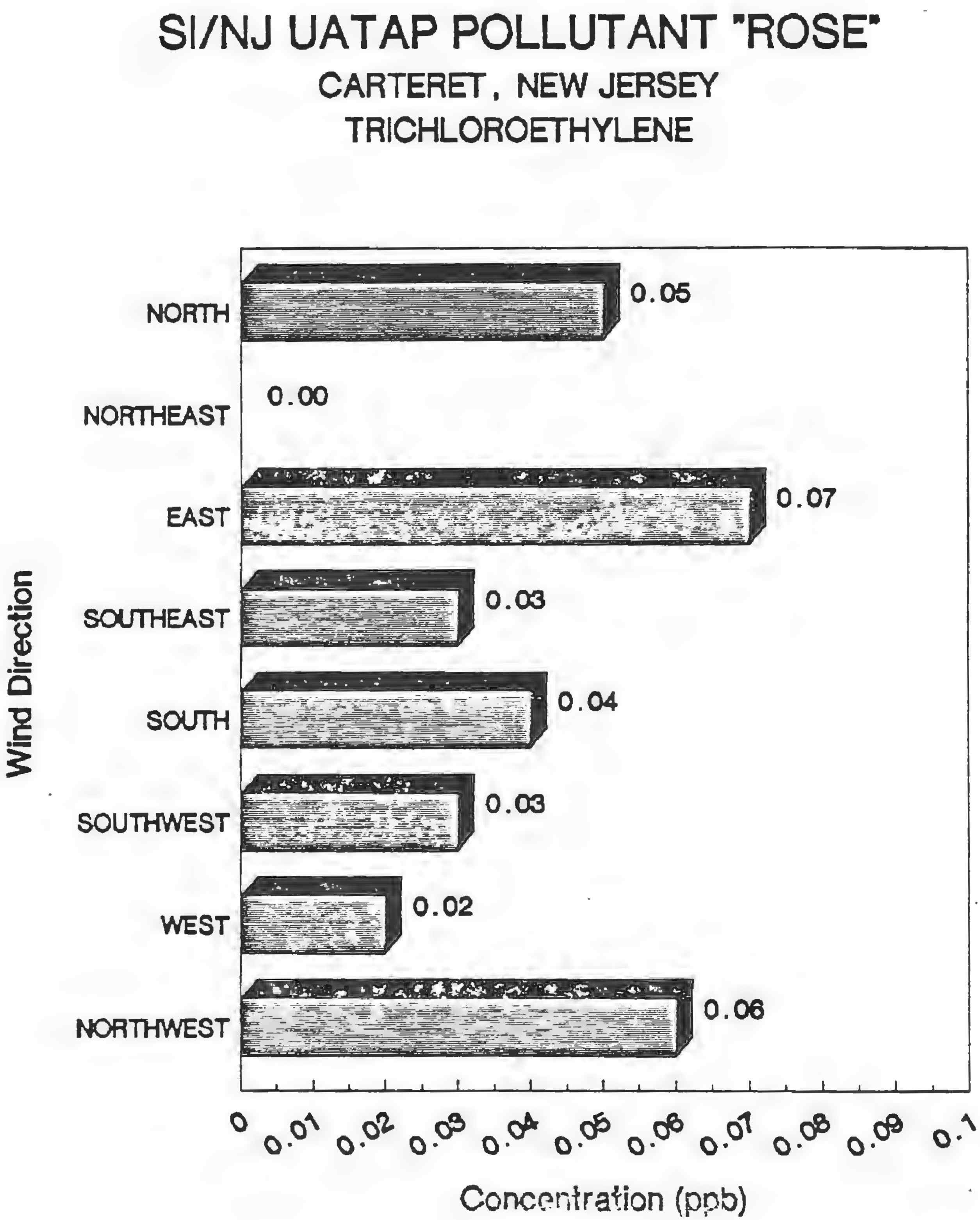
Data: October/88 thru June/89

SI/NJ UATAP POLLUTANT "ROSE"
BAYLEY SETON HOSPITAL, SI
TRICHLOROETHYLENE



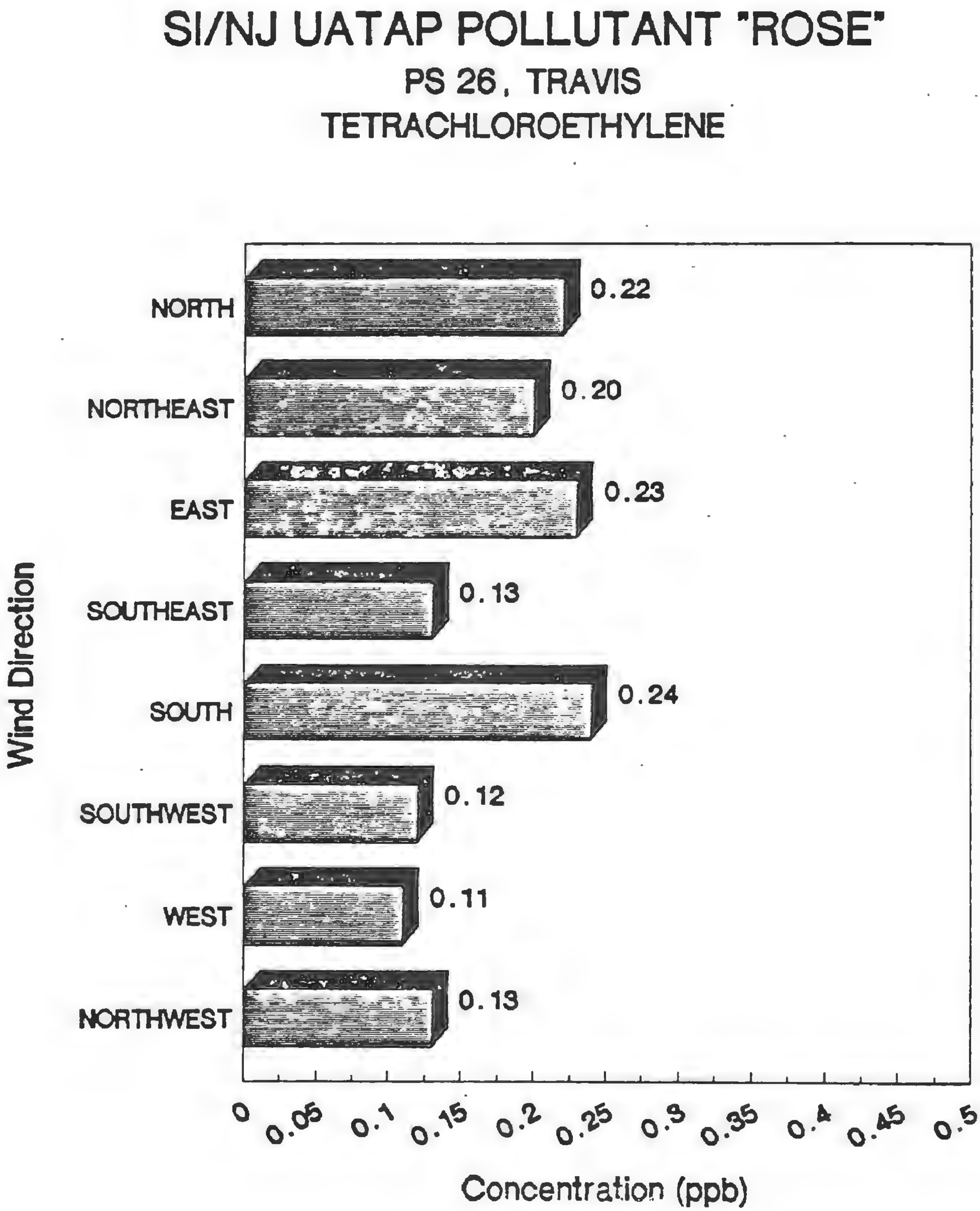
Data: October/87 thru September/89

FIGURE III - 6A-33



Data: October/87 thru September/89

FIGURE III - 6A-34



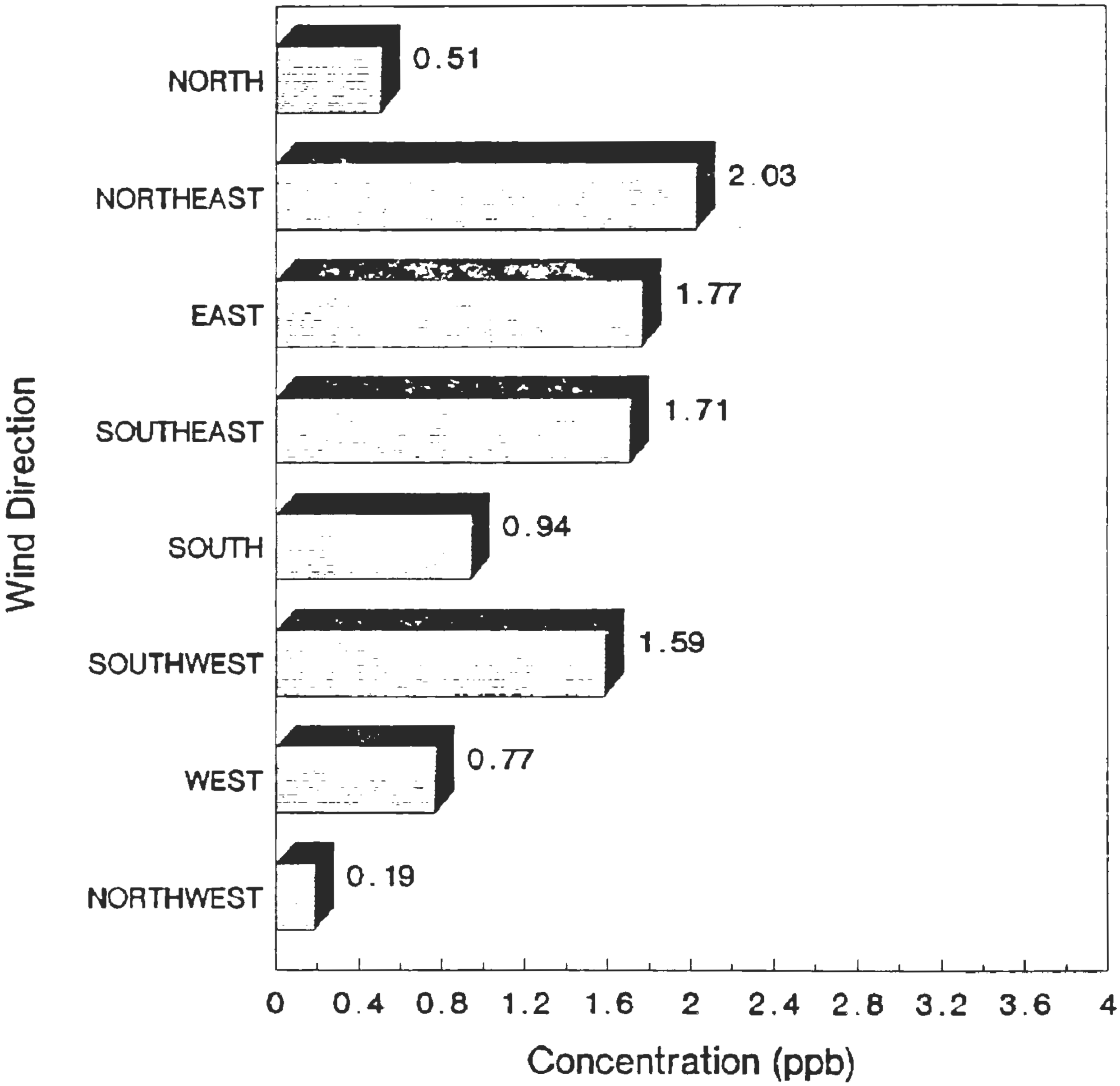
Data: October/87 thru September/89

FIGURE III - 6A-35

SI/NJ UATAP POLLUTANT "ROSE"

PUMP STATION

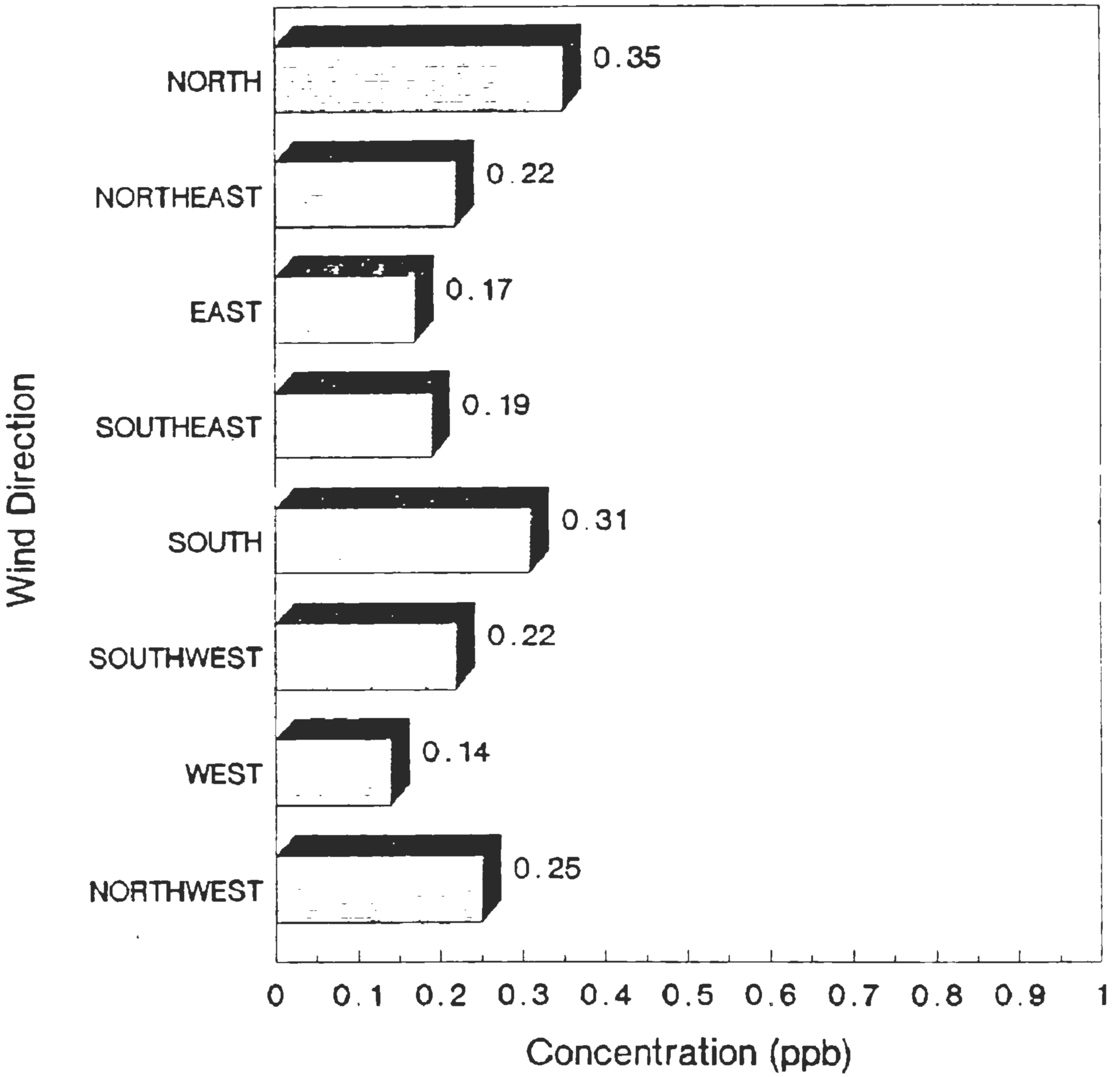
TETRACHLOROETHYLENE



Data: October/88 thru September/89

SI/NJ UATAP POLLUTANT "ROSE"

BAYLEY SETON HOSPITAL, SI
TETRACHLOROETHYLENE

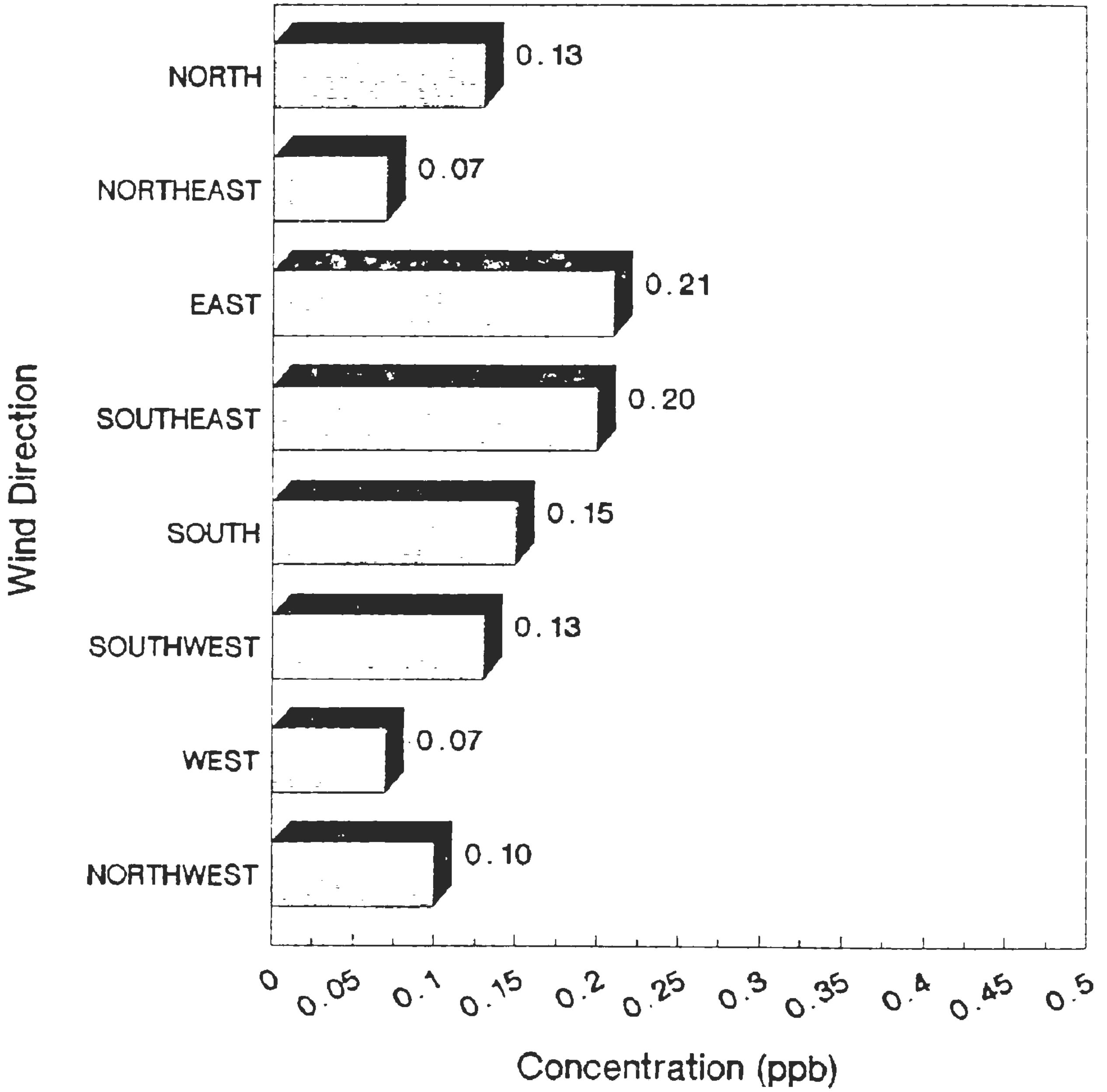


Data: October/87 thru September/89

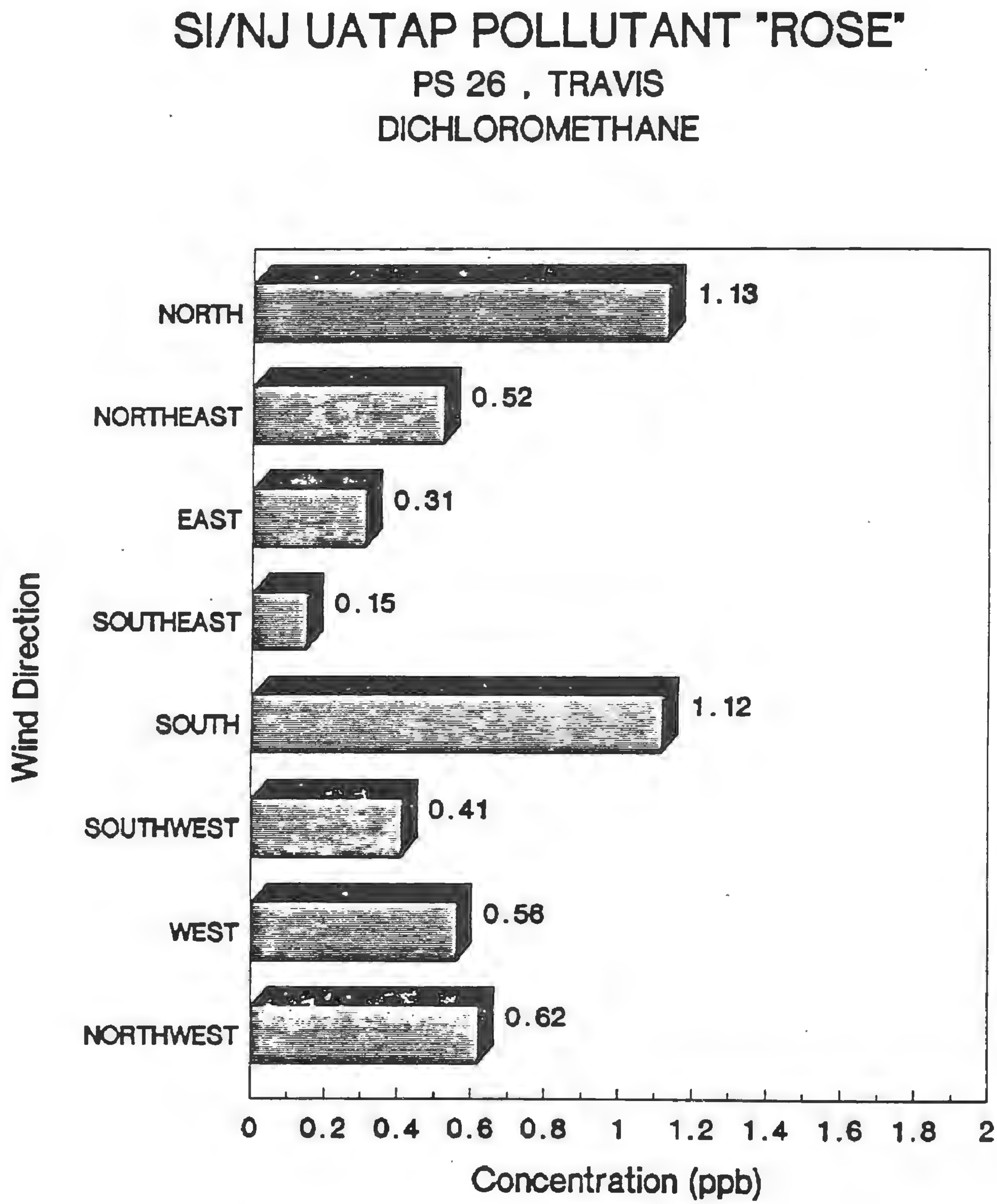
FIGURE III - 6A-37

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY
TETRACHLOROETHYLENE

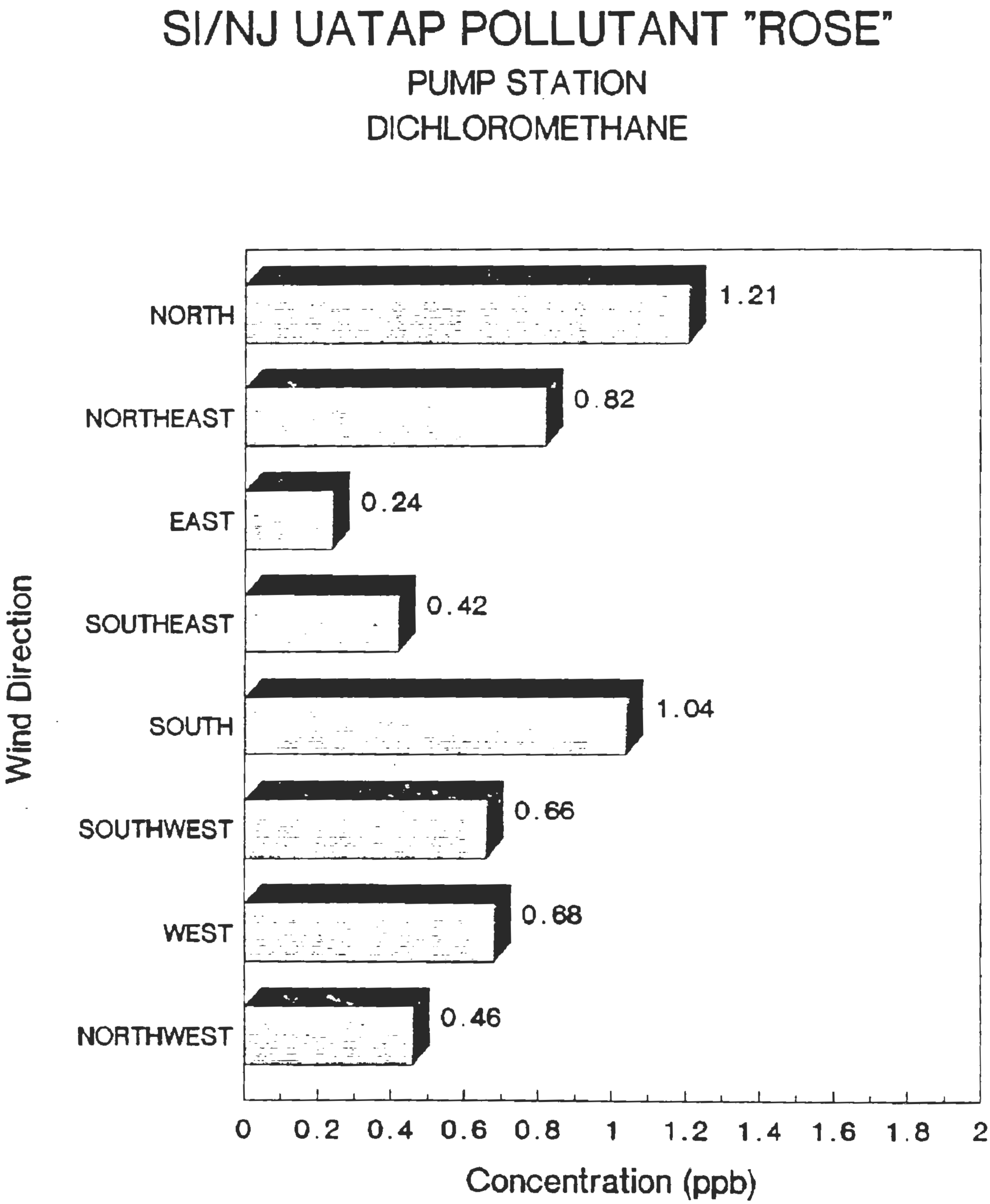


Data: October/87 thru September/89



Data: October/87 thru September/89

FIGURE III - 6A-39

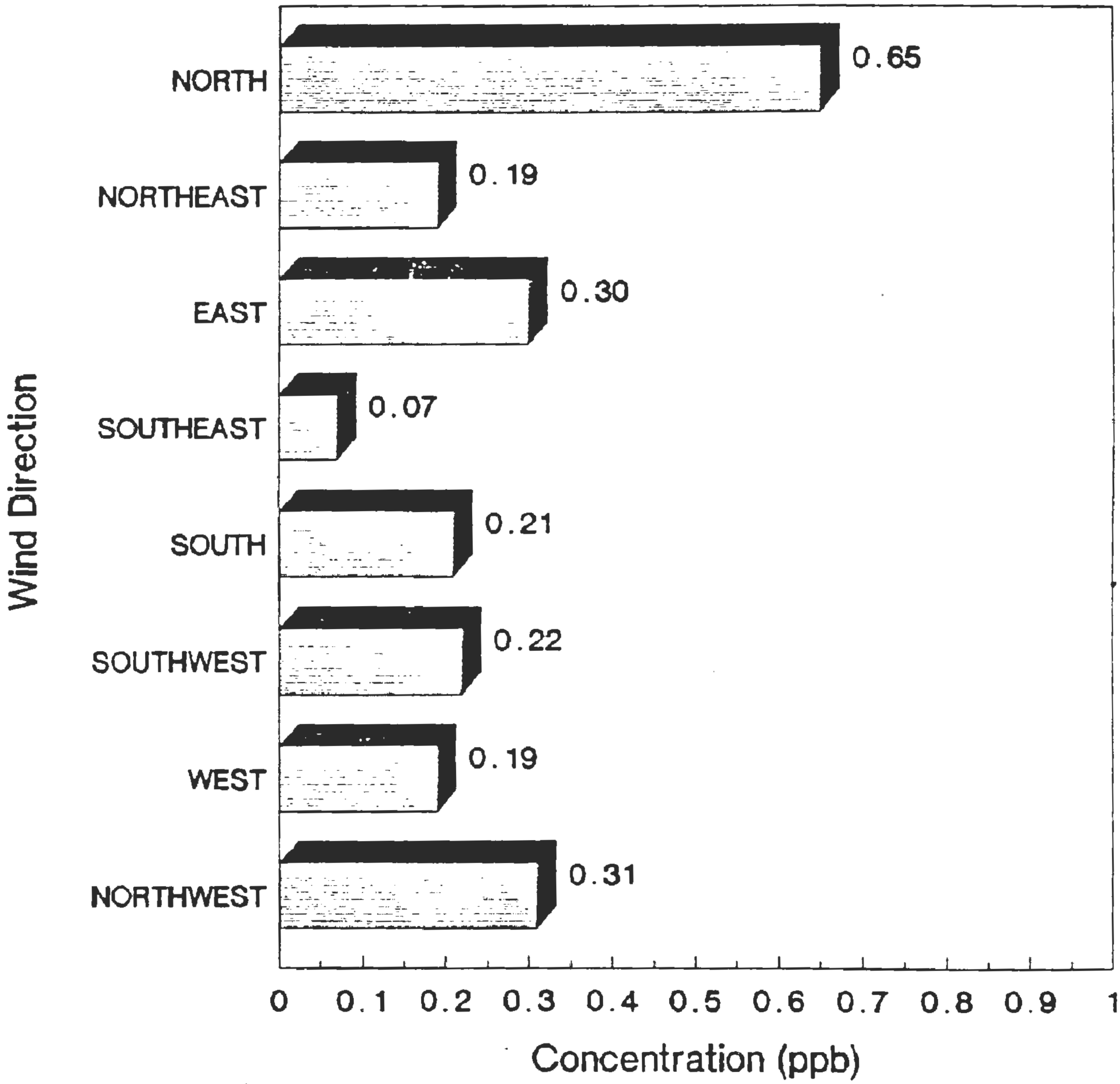


Data: October/88 thru September/89

FIGURE III - 6A-40

SI/NJ UATAP POLLUTANT "ROSE"

BAYLEY SETON HOSPITAL, SI
DICHLOROMETHANE



Data: October/87 thru September/89

SOURCE IDENTIFICATION APPENDIX B -

SOURCE IDENTIFICATION POLLUTANT ROSE ANALYSES NOT DISCUSSED IN SECTION 6.3, AND POLLUTANT ROSE BAR CHARTS FOR POLLUTANT ROSES A THROUGH I

6B.1 Pollutant Rose B - Benzene, Year 2 (Map III-6B-1)

The relationship between east/southeast winds and low concentrations (lack of sources) is once again observed in the data set for year 2. There are some differences from year 1 to year 2, however:

the southeast wind peak at Elizabeth from the previous year is absent;

the north wind peak at Eltingville is gone, and replaced by a slight south wind peak (1.81 ppb); and

the Carteret peak on east winds is missing, and is replaced by a northeast peak (2.06 ppb) that was not observed in year 1.

Explanations for these differences are not readily apparent, especially since yearly emission inventories that highlight emission changes were not available for the project. However, the differences could be inherent in the limited nature of the analysis; these roses incorporate only one year of data in which some wind directions are represented fewer than 5 times, and others, not at all.

6B.2 Pollutant Rose D - Toluene, Year 2 (Map III-6B-2)

Again, low concentration was associated with east and southeast winds. The association of high concentration with southwest winds at Carteret observed in year 1 is gone, and the relationship between high concentration and north winds at Eltingville has vanished. Instead, at Eltingville, there is a pronounced peak associated with south winds (average concentration 5.06 ppb). High concentrations vs. southwest winds at Elizabeth were observed.

6B.2.1 Eltingville, south sector

The south wind peak (5.06) at Eltingville was investigated using the micro and point source inventories.

There are no sources to the south of the Eltingville monitor in either the micro or point source inventories.

The only source identified is the Oakwood Beach POTW (east of the monitor, toluene emissions of 0.22 tpy).

As for year 1 toluene, mobile sources are the most likely cause of the toluene concentration at the monitor. Richmond Parkway, oriented north-south, runs close to the monitoring site.

6B.2.2 Elizabeth, southwest sector

The southwest wind peak (4.77 ppb) at Elizabeth was investigated using the micro and point source inventories.

The micro inventory lists several gas stations to the southwest of the monitor: Exxon, Amoco Gas, and Hertz Penske gas station.

The point source inventory for toluene lists the following in the southwest sector:

Source	Emissions tpy	Distance km
General Motors Corp.	107.1	5.9
Safety Clean Corp.	65.91	5.7
Merck and Company	46.50	6.5
Middlesex County POTW	46.02	23.7
Essex/Union County POTW	15.77	1.7
Rahway Valley POTW	13.66	7.2
Middlesex County,SA POTW	10.41	19.4
EI Dupont & Co.	9.61	23.7
Midatlantic Container Corp.	5.79	4.2

An examination of this emissions versus distance table reveals the connection between toluene concentration and industrial/chemical sources nearby. Mobile sources make a contribution, but the mobile/area source mapping inventory does not quantify emissions for toluene. The emissions of the Essex/Union County POTW, combined with its short distance from the monitor (<2 km) suggests that it, too, contributes to high concentrations at the monitor during periods of southwest winds.

6B.3 Pollutant Rose E - 1,1,1-trichloroethane (Map III-6B-3)

The concentration of 1,1,1-trichloroethane at Port Richmond, New York, on northeast winds is nearly twice the concentration of the next highest direction (1.14 ppb versus 0.65 ppb with north and east winds). For each of the other sites, the variation of concentration with wind direction is less pronounced.

There is a large cluster of sources to the northeast of the Port Richmond monitor. Most notable are the Port Richmond POTW and Antique Brass Works. The latter source is probably insignificant, but it is located only one block northeast of the monitor. The cluster also includes several auto refinishing facilities, but the inventory does not address emissions data for this chemical from these sources.
The point source inventory for 1,1,1-trichloroethane lists the following in the northeast sector:

Source	Emissions tpy	Distance km
P.D. Oil/Chemical Storage	67.14	3.0
Owls Head POTW	35.29	6.6
Rasko	16.22	12.4
Gordon Terminal Svce. Co.	14.45	2.7
Edison Price, Inc.	10.53	19.1
Newtown Creek POTW	7.26	16.5
Simplex Ceiling Corp.	7.00	12.7
Bayonne POTW	1.89	2.5
Port Richmond POTW	1.03	1.2

High concentrations are associated with POTWs and industrial point and area sources. The use of 1,1,1-trichloroethane as a degreaser and industrial solvent could explain these source listings.

6B.4 Pollutant Rose G - Chloroform (Map III-6B-4)

The pollutant rose for Travis, New York, reveals the relationship between higher concentrations of chloroform and south to southwesterly winds (0.11 with south winds, 0.14 with southwest winds).

In the microinventory, three sources are located within 1 km to the south and southwest of the Travis monitor. These are the Con Edison powerplant, Fresh Kills Landfill, and the Fresh Kills Marine Plant.

The point source inventory for chloroform lists the following sources in the combined south/southwest sectors:

Source	Emissions tpy	Distance km
Akzo Chemicals, Inc.	2.75	18.7
Middlesex County,SA POTW	0.69	12.0
Middlesex County POTW	0.63	19.4
Somerset-Raritan Valley POTW	0.27	31.5
New Brunswick, POTW	0.12	25.9
Perth Amboy POTW	0.04	11.3
Old Bridge POTW	0.03	13.8
Woodbridge POTW #1	0.02	5.3
Carteret POTW	0.02	1.4
Woodbridge POTW #2	0.01	11.7

These inventories are indicative of three differing sources of chloroform: chemical plants, POTWs, and the Fresh Kills Landfill. The proximity of the landfill to the Travis monitor and the likelihood that chloroform is emitted from the landfill implicate it as the primary contributor to impact.

6B.5 Pollutant Rose H - Carbon Tetrachloride (Map III-6B-5)

The Carteret rose shows a uniformity of concentration versus wind direction with a range of only 0.12 to 0.15 ppb. The higher concentration is associated with southwesterly winds. The Elizabeth depiction is similar, the low concentration versus east and southeasterly winds is apparent, the highest concentration values of 0.16 and 0.15 ppb matches up with south and southwest winds, respectively. There is more variability in the Sewaren rose. Concentrations of carbon tetrachloride are 35% and 29% higher than the next high direction when winds are south (0.23 ppb) and southwest (0.22 ppb), respectively. Finally, at Tottenville, well defined concentration peaks are linked with southwest and south wind directions (0.27 ppb and 0.21 ppb, respectively).

6B.5.1 Sewaren, south/southwest sectors

The south and southwest peaks at Sewaren were investigated using the micro and point source inventories.

Three sources are listed in the microinventory in terms of total VOCs. These are Shell Oil Co., Royal Petroleum, and CP Chemical. Little, if any, carbon tetrachloride is emitted from any of these sources.

The point source inventory for carbon tetrachloride lists the following in the south/southwest sector:

Source	Emissions tpy	Distance km
Hercules, Inc.	447.74	13.6
Middlesex County POTW	1.23	13.7
Middlesex County,SA POTW	0.27	8.7
Perth Amboy POTW	0.02	6.6
Woodbridge POTW #1	0.01	1.3

The major source here is Hercules, Inc., with emissions of carbon tetrachloride registering two orders of magnitude higher than the next ranked source. POTWs constitute all remaining sources in this portion of the point source inventory, but their extremely low emissions suggests a minimal, if not negligible, contribution to the high concentrations registered at the Sewaren monitor.

6B.5.2 Tottenville, south/southwest sector

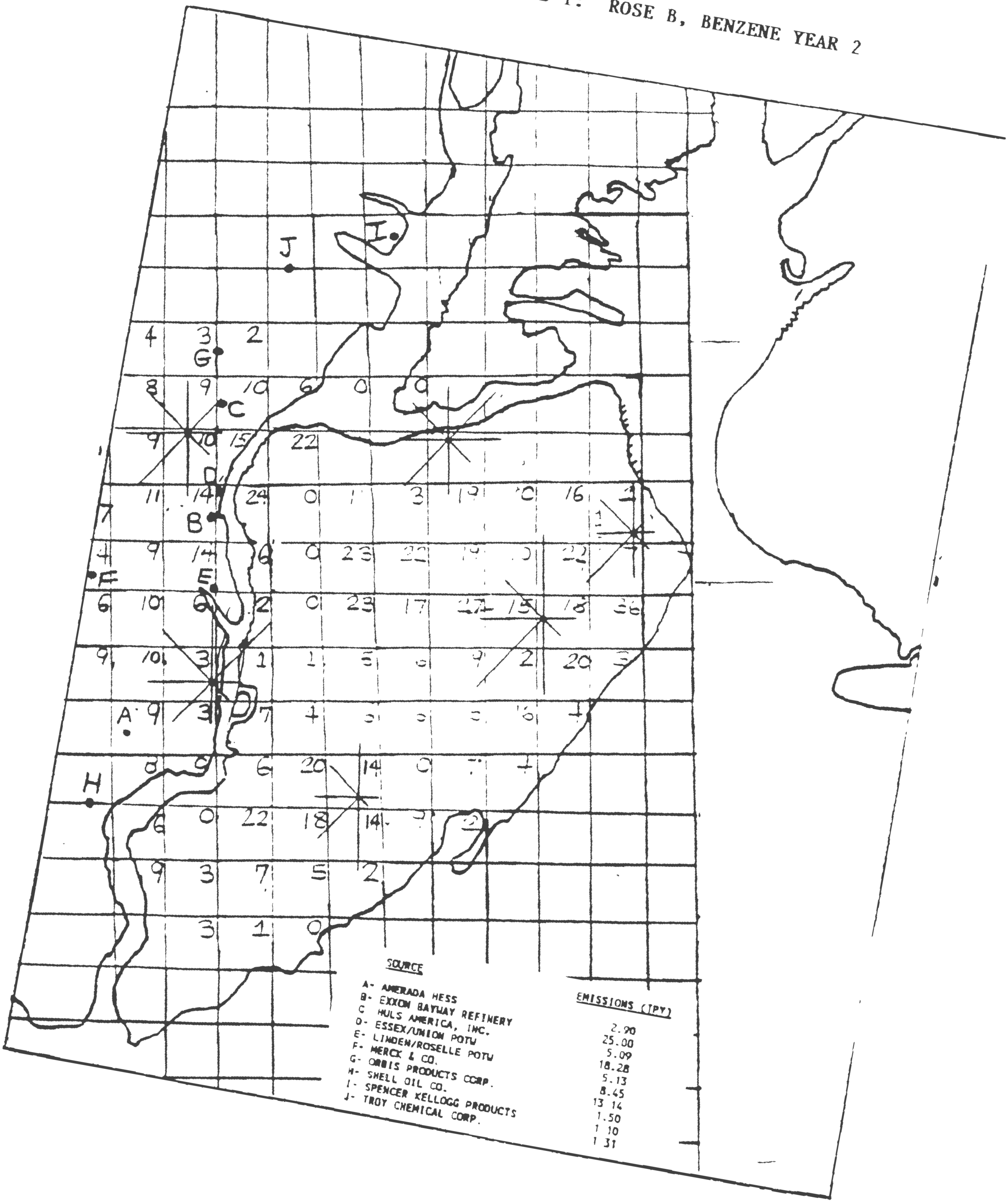
The south and southwest peaks at Tottenville was investigated using the micro and point source inventories.

In the microinventory, four sources were identified, each with very low or zero emissions of carbon tetrachloride. These sources are A&M Cleaners (located two blocks from monitor), Tottenville Bakery & Pastry Shop, and two school boilers. The point source inventory for carbon tetrachloride lists the following in the south/southwest sector:

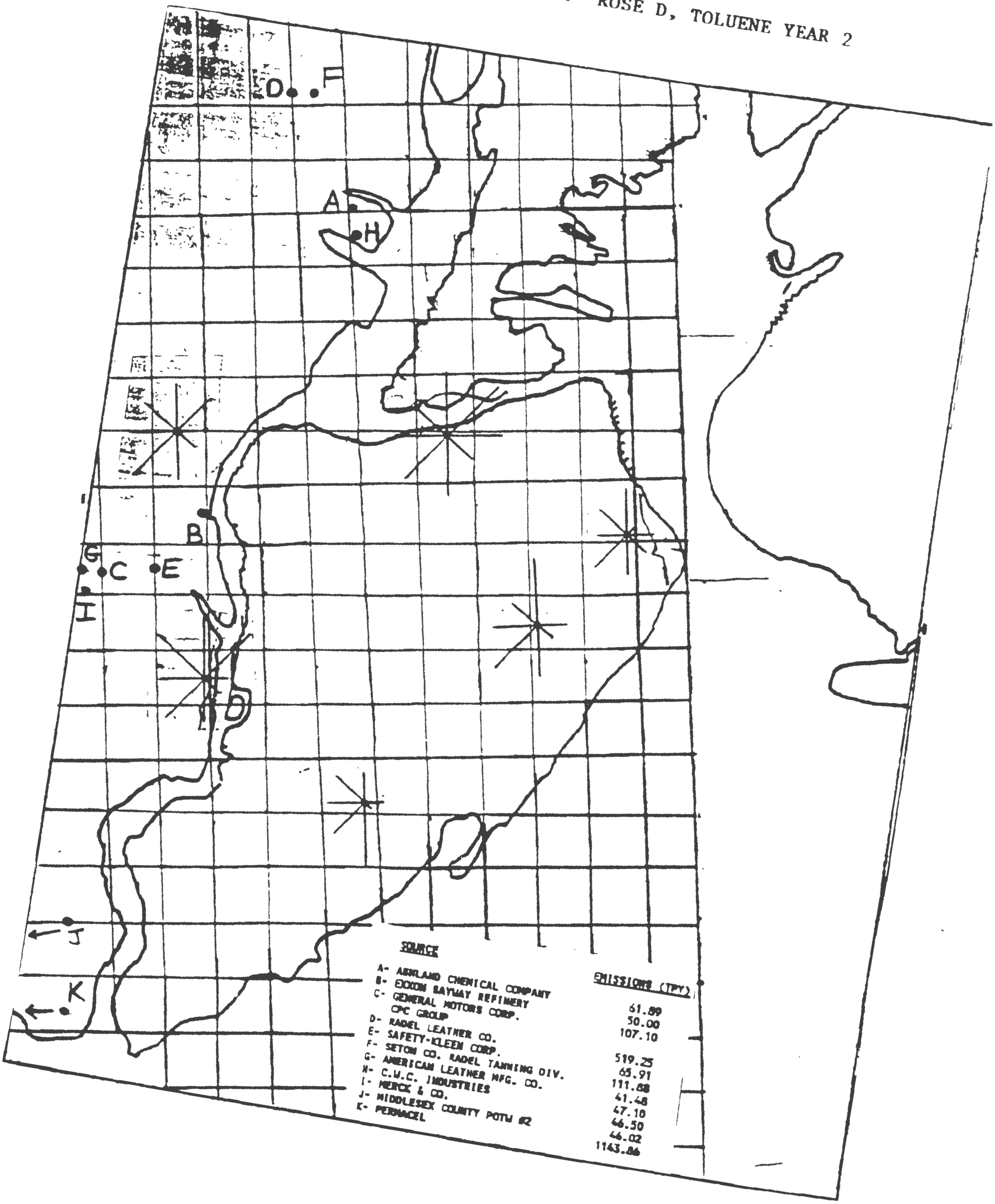
Source	Emissions tpy	Distance km
Hercules, Inc.	447.74	11.0
Middlesex County POTW	1.23	13.7
Middlesex County,SA POTW	0.27	3.9
Perth Amboy POTW	0.02	3.7

As for Sewaren, high concentrations observed at Tottenville when winds were from the south and southwest were associated with its location downwind from Hercules, Inc.

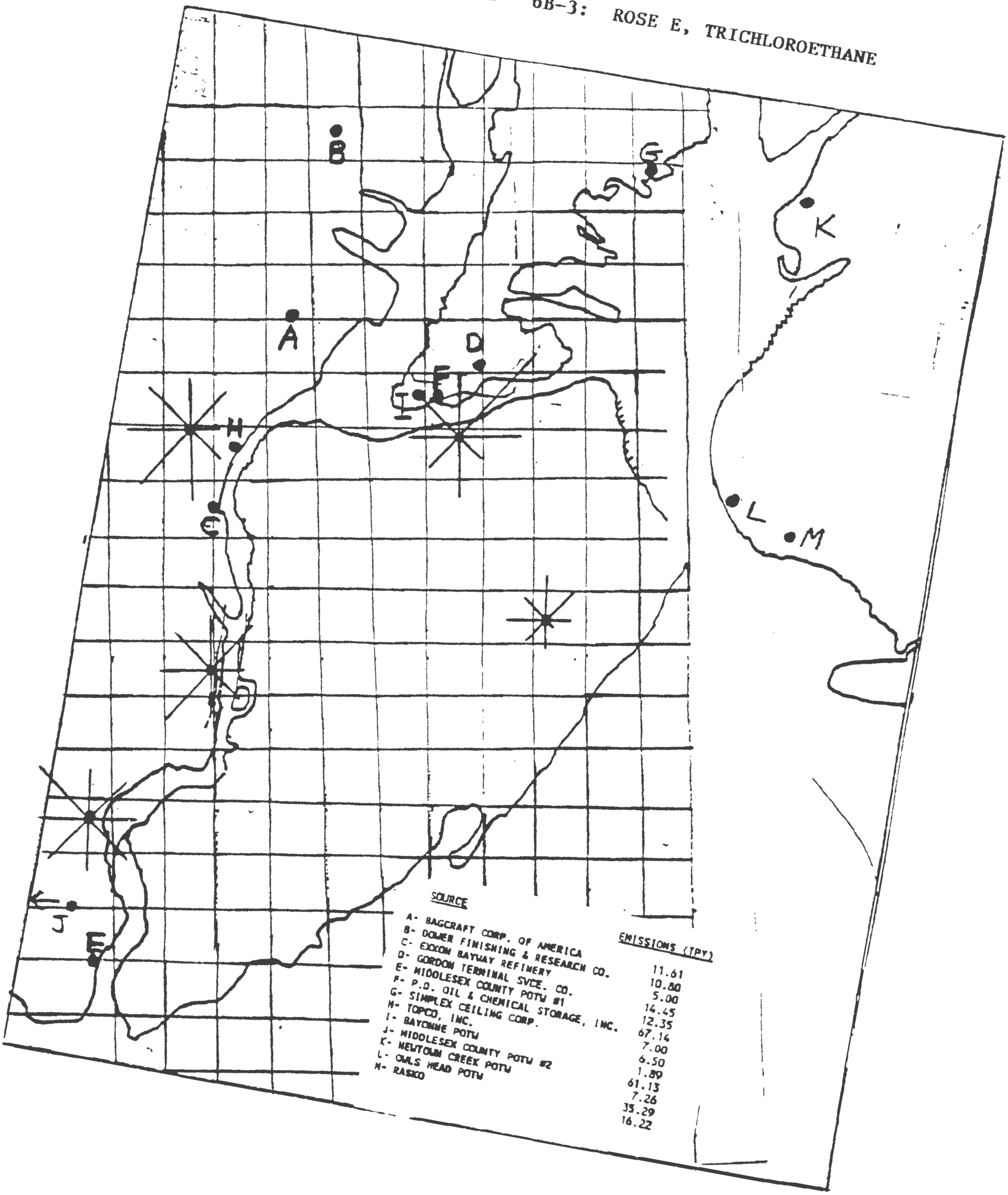
MAP III - 6B-1: ROSE B, BENZENE YEAR 2



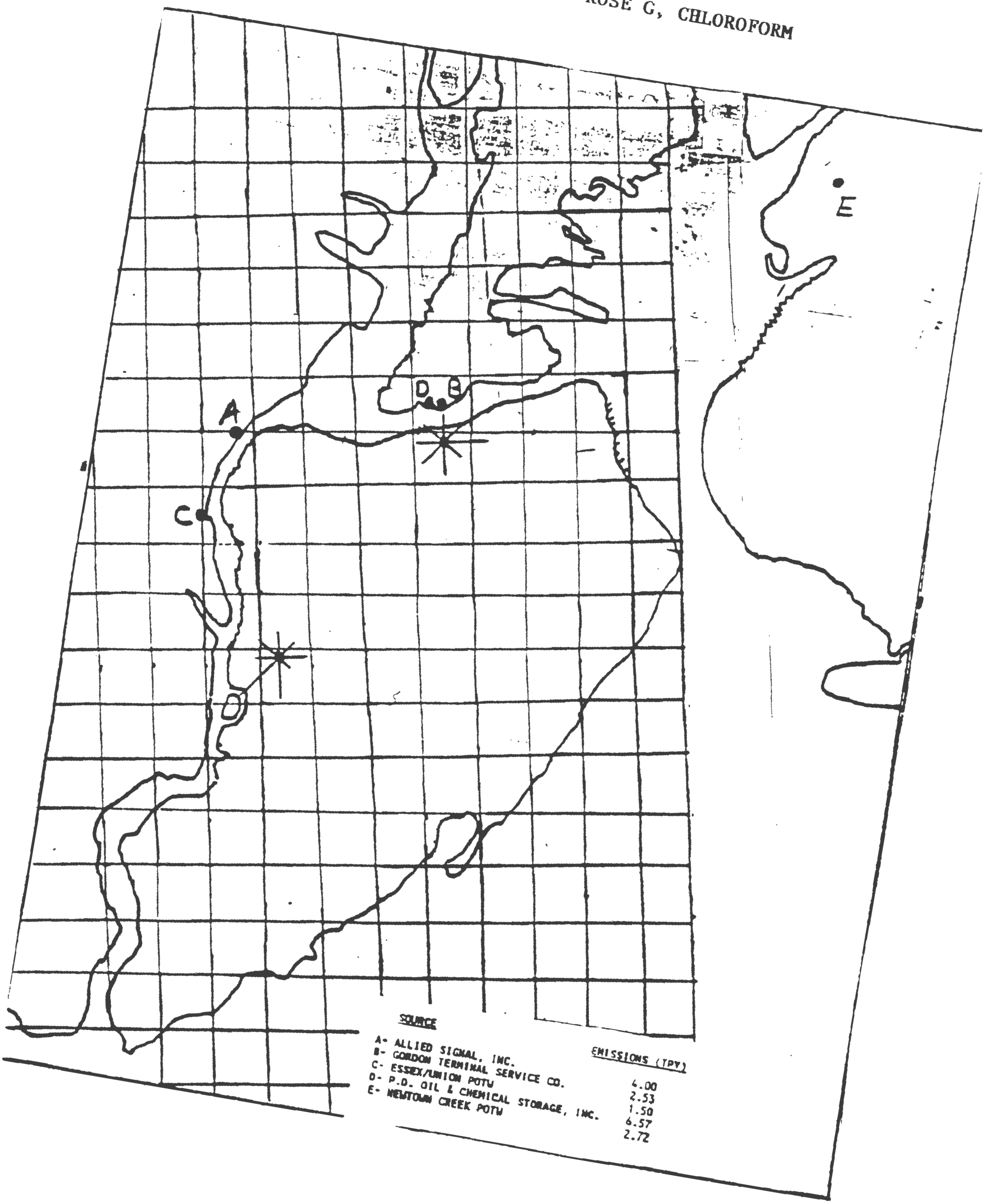
MAP III - 6B-2: ROSE D, TOLUENE YEAR 2



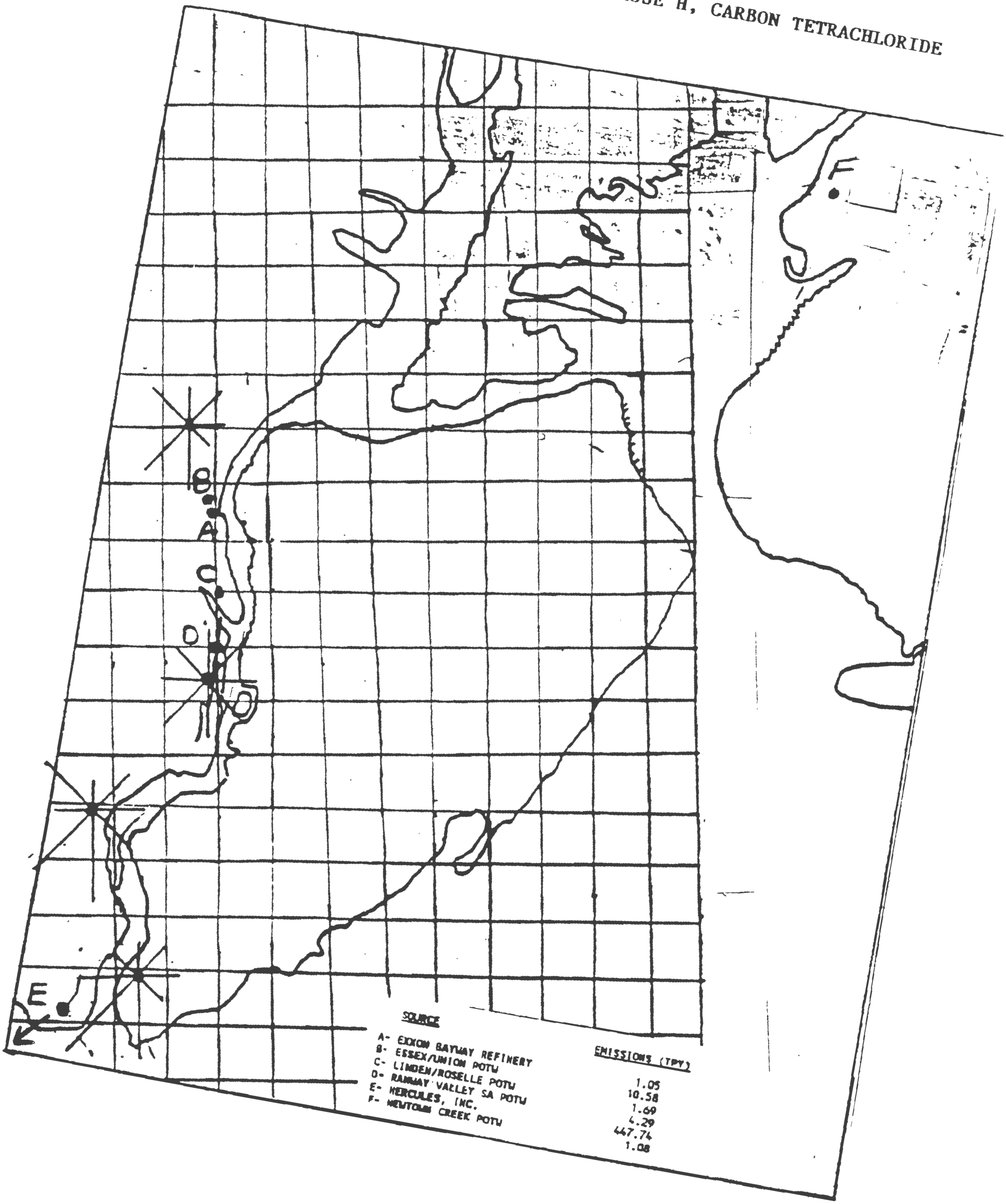
MAP III - 6B-3: ROSE E, TRICHLOROETHANE



MAP III - 6B-4: ROSE G, CHLOROFORM



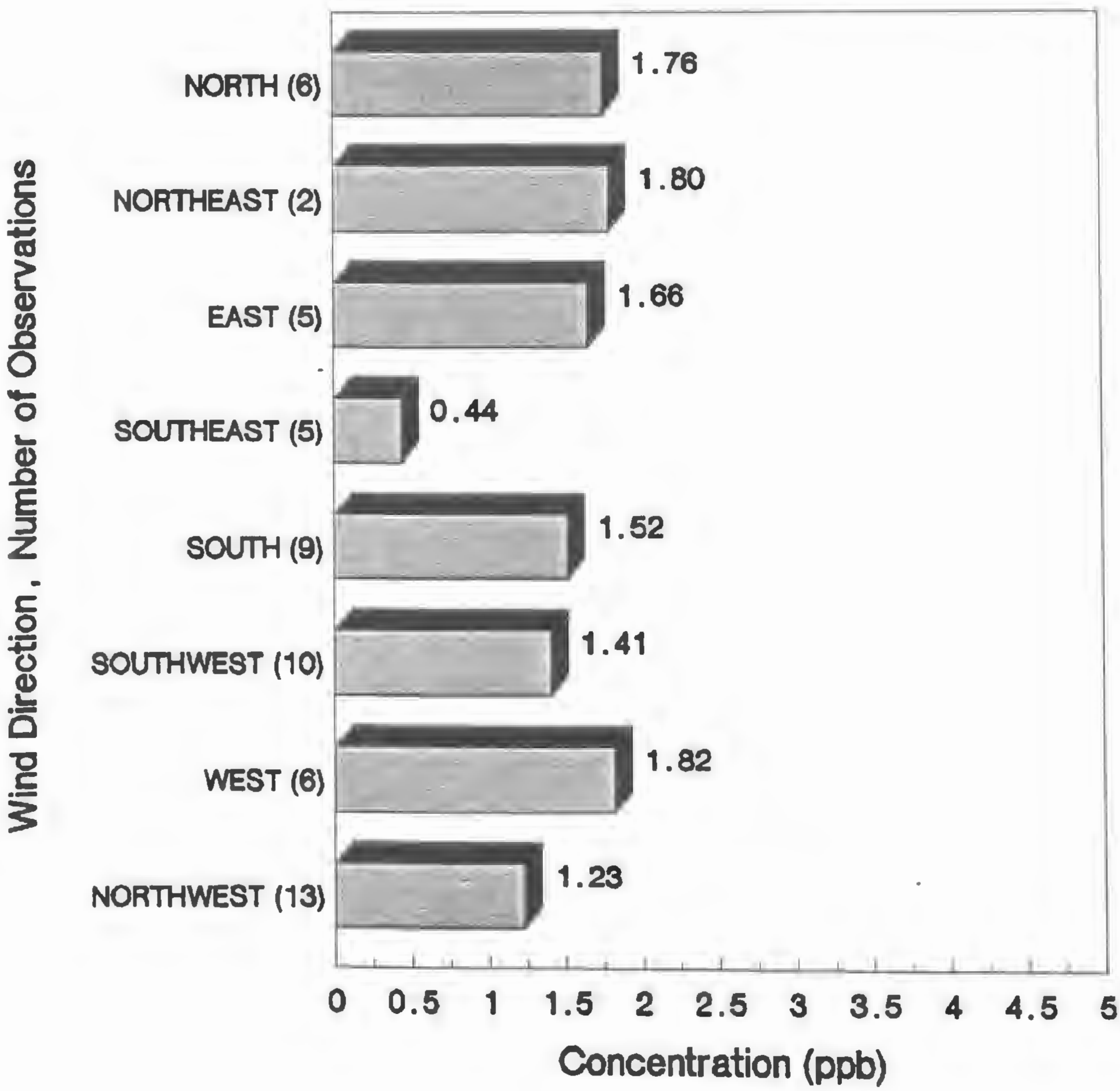
MAP III - 6B-5: ROSE H, CARBON TETRACHLORIDE



SI/NJ UATAP POLLUTANT "ROSE"

DONGAN HILLS, NY

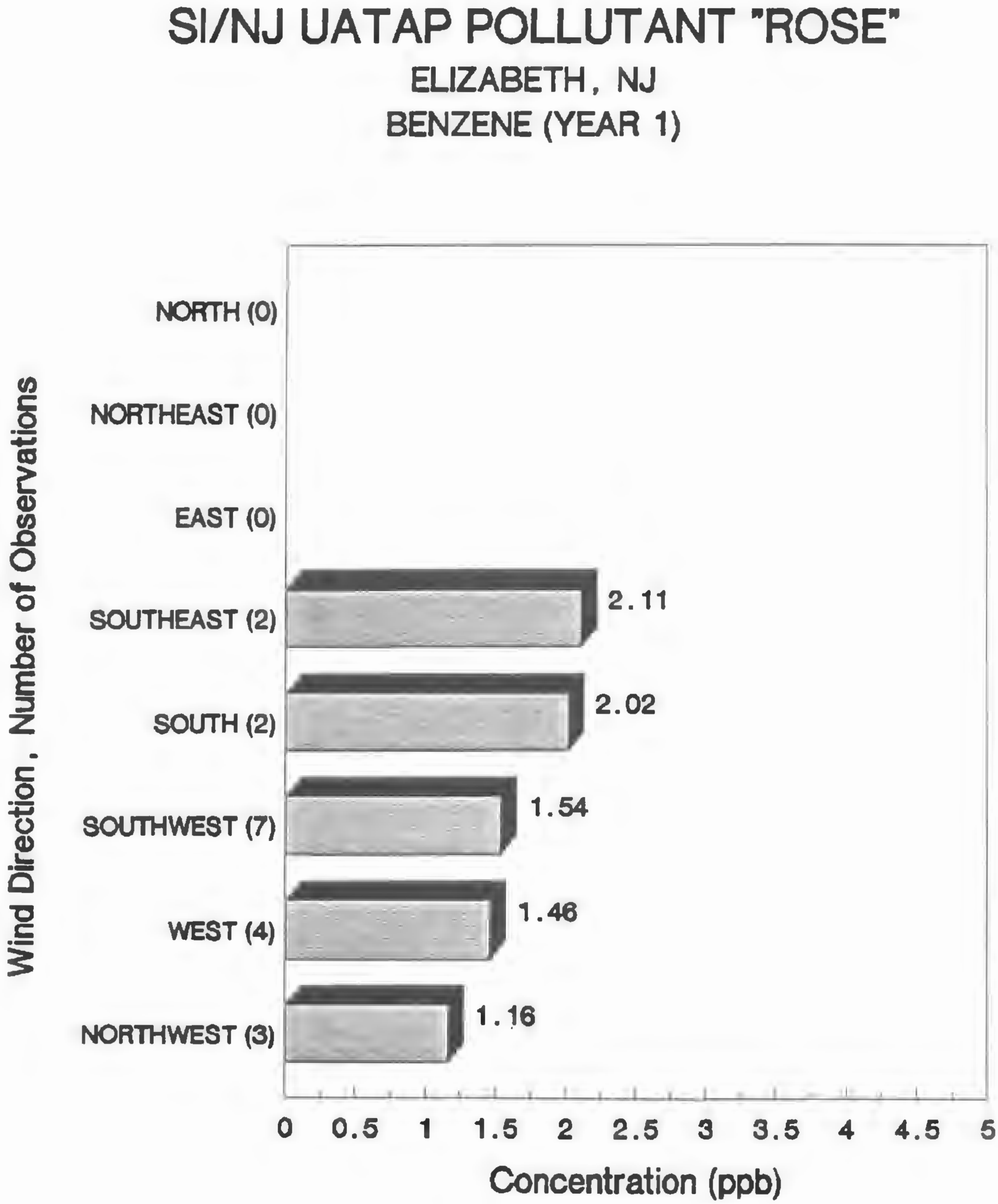
BENZENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 56

Data: October/87 thru September/88

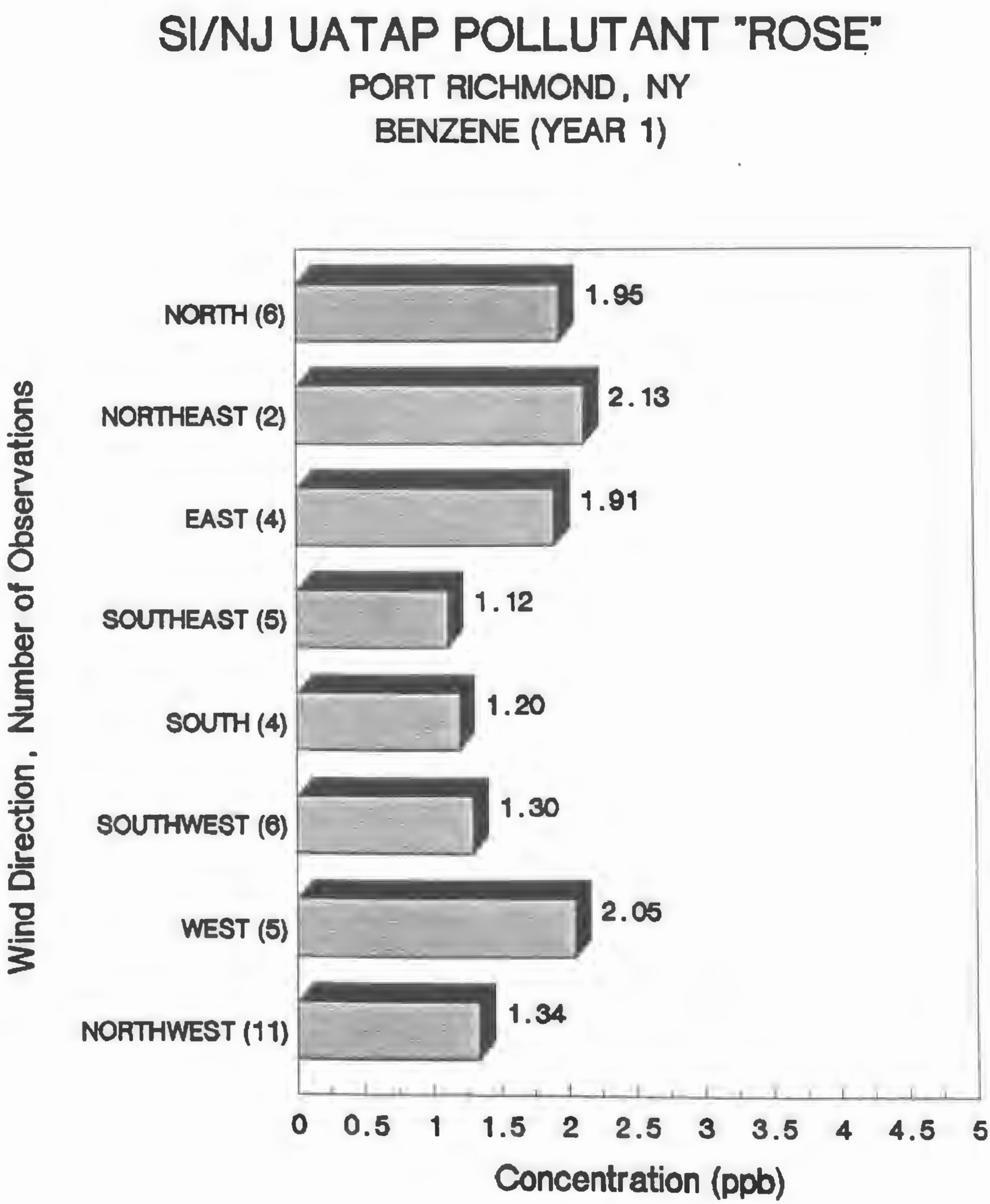
FIGURE III - 6B-2



TOTAL NUMBER OF OBSERVATIONS: 18

Data: June/88 thru September/88

FIGURE III - 6B-3



TOTAL NUMBER OF OBSERVATIONS: 43

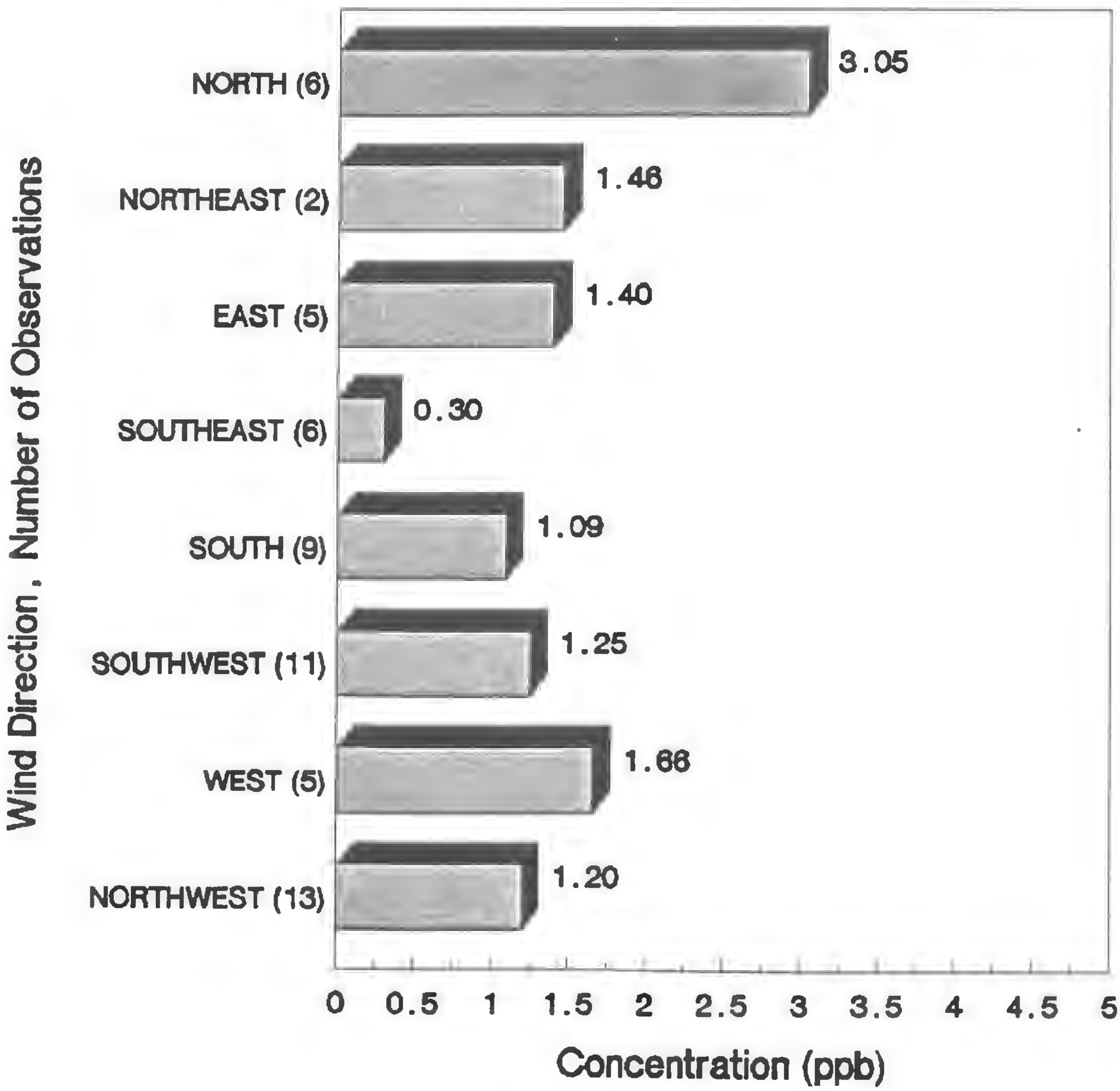
Data: October/87 thru September/88

FIGURE III - 6B-4

SI/NJ UATAP POLLUTANT "ROSE"

ELTINGVILLE, NY

BENZENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 57

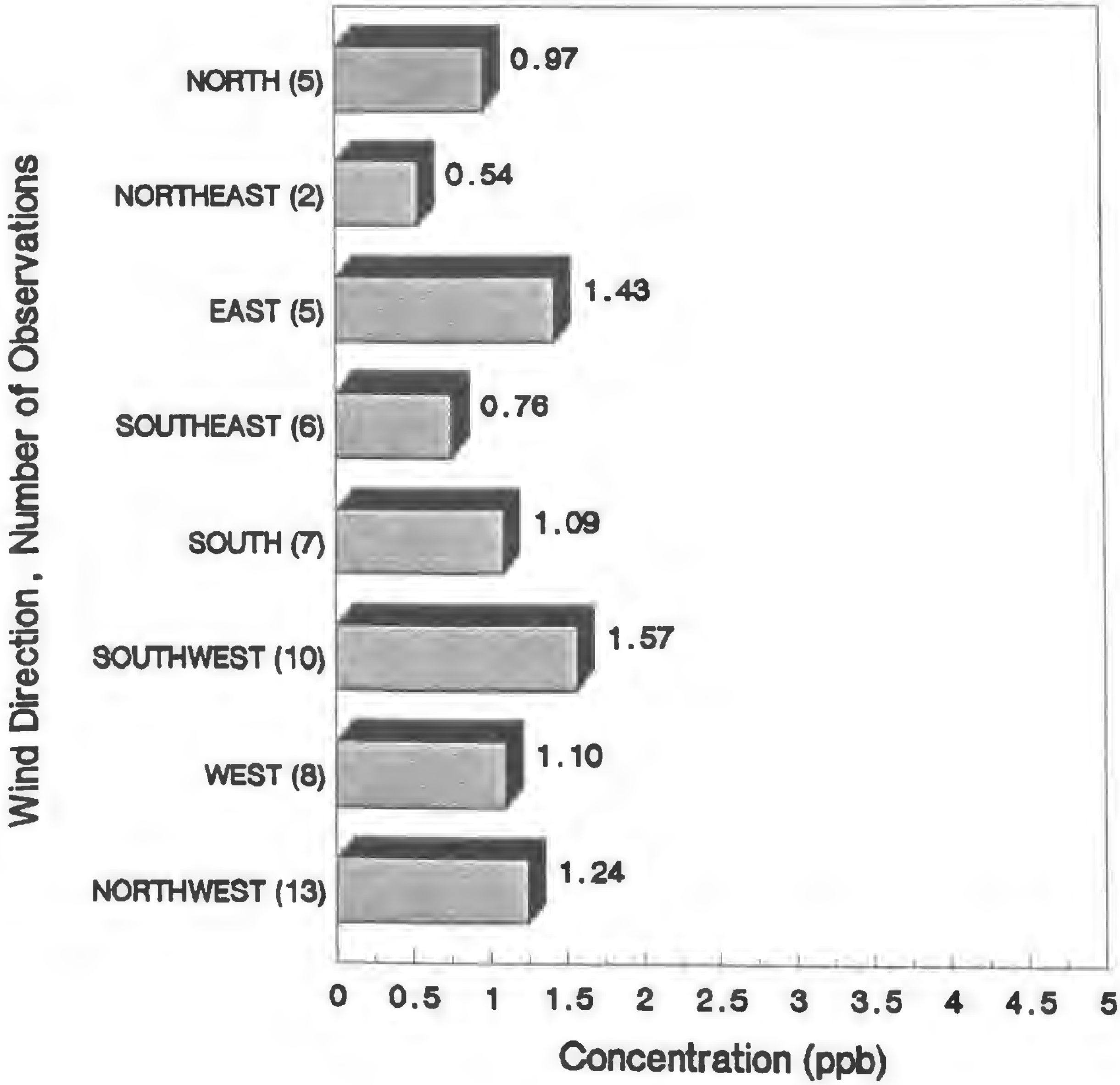
Data: October/87 thru September/88

FIGURE III - 6B-5

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NJ

BENZENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 56

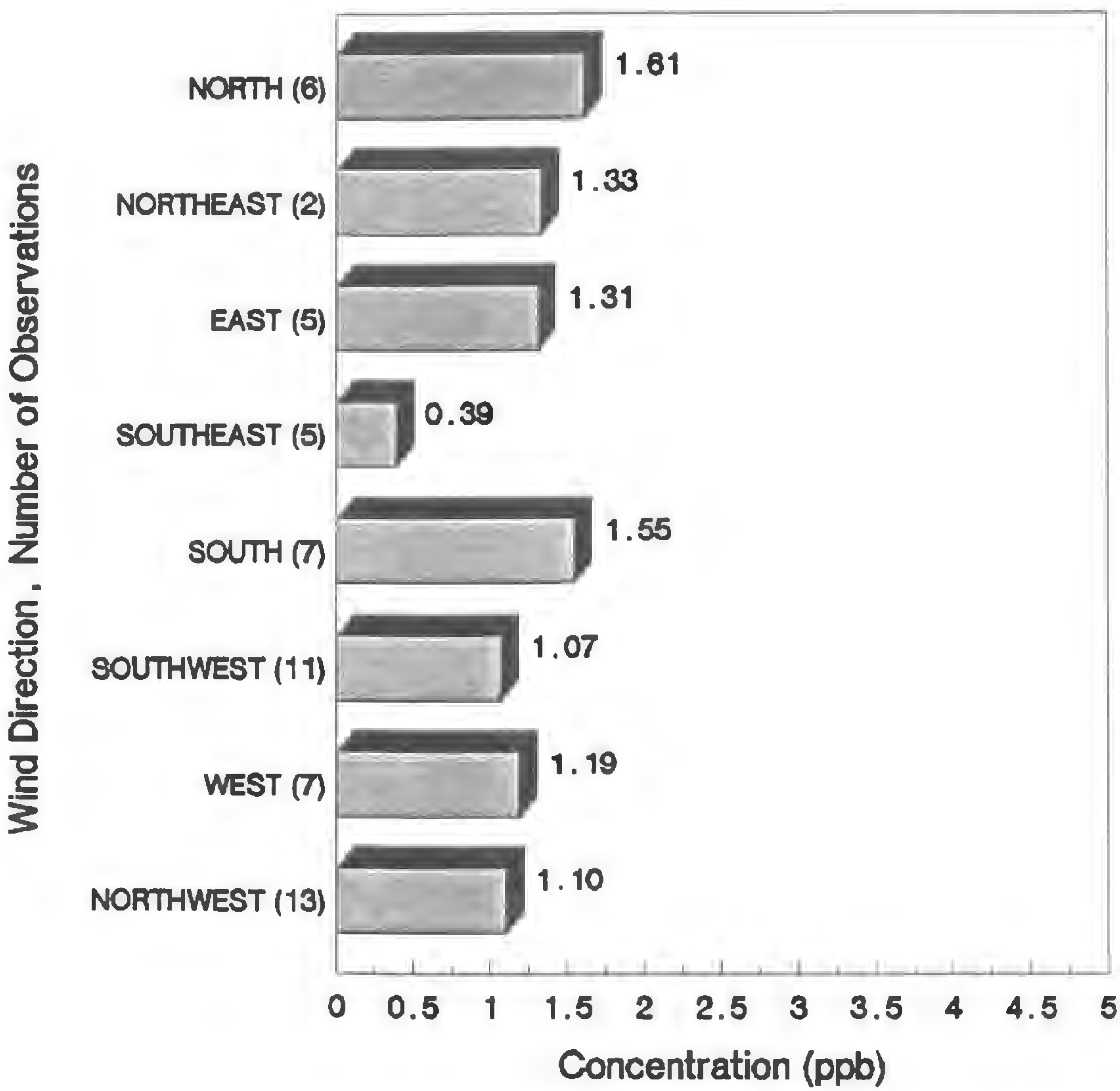
Data: October/87 thru September/88

FIGURE III - 6B-6

SI/NJ UATAP POLLUTANT "ROSE"

BAYLEY SETON HOSPITAL, NY

BENZENE (YEAR 1)



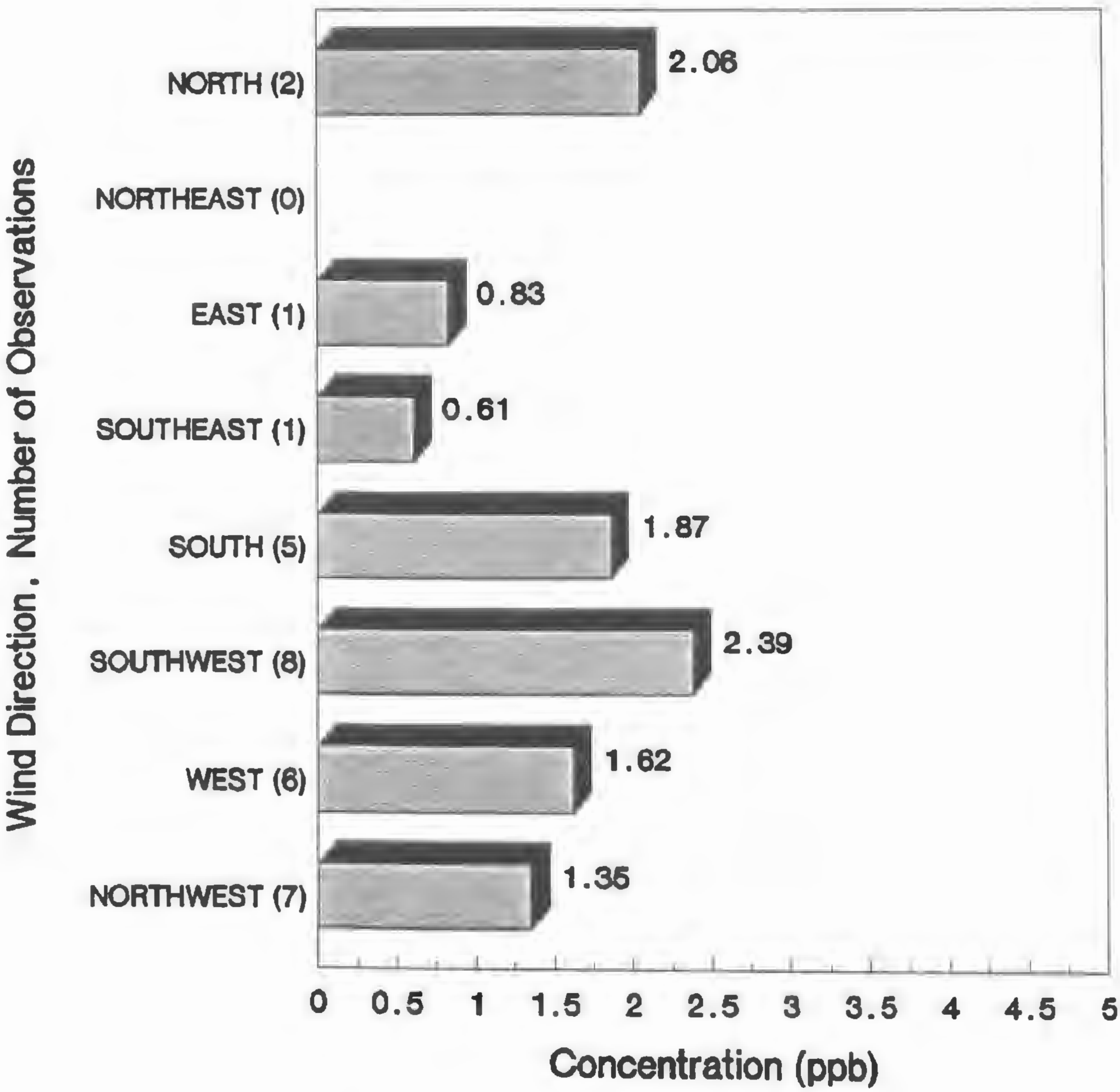
TOTAL NUMBER OF OBSERVATIONS: 56

Data: October/87 thru September/88

FIGURE III - 6B-7

SI/NJ UATAP POLLUTANT "ROSE"

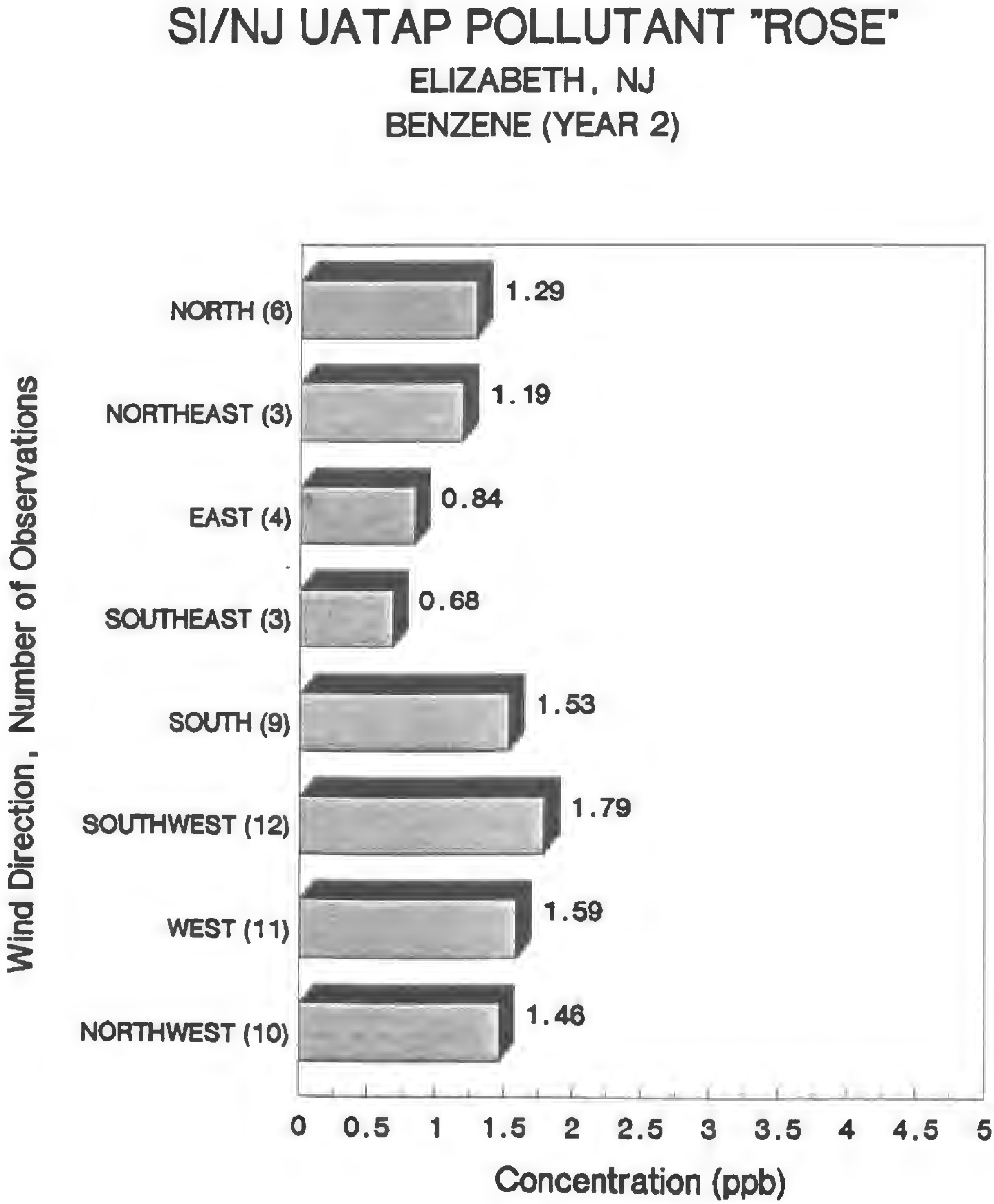
DONGAN HILLS, NY
BENZENE (YEAR 2)



TOTAL NUMBER OF OBSERVATIONS: 30

Data: October/88 thru September/89

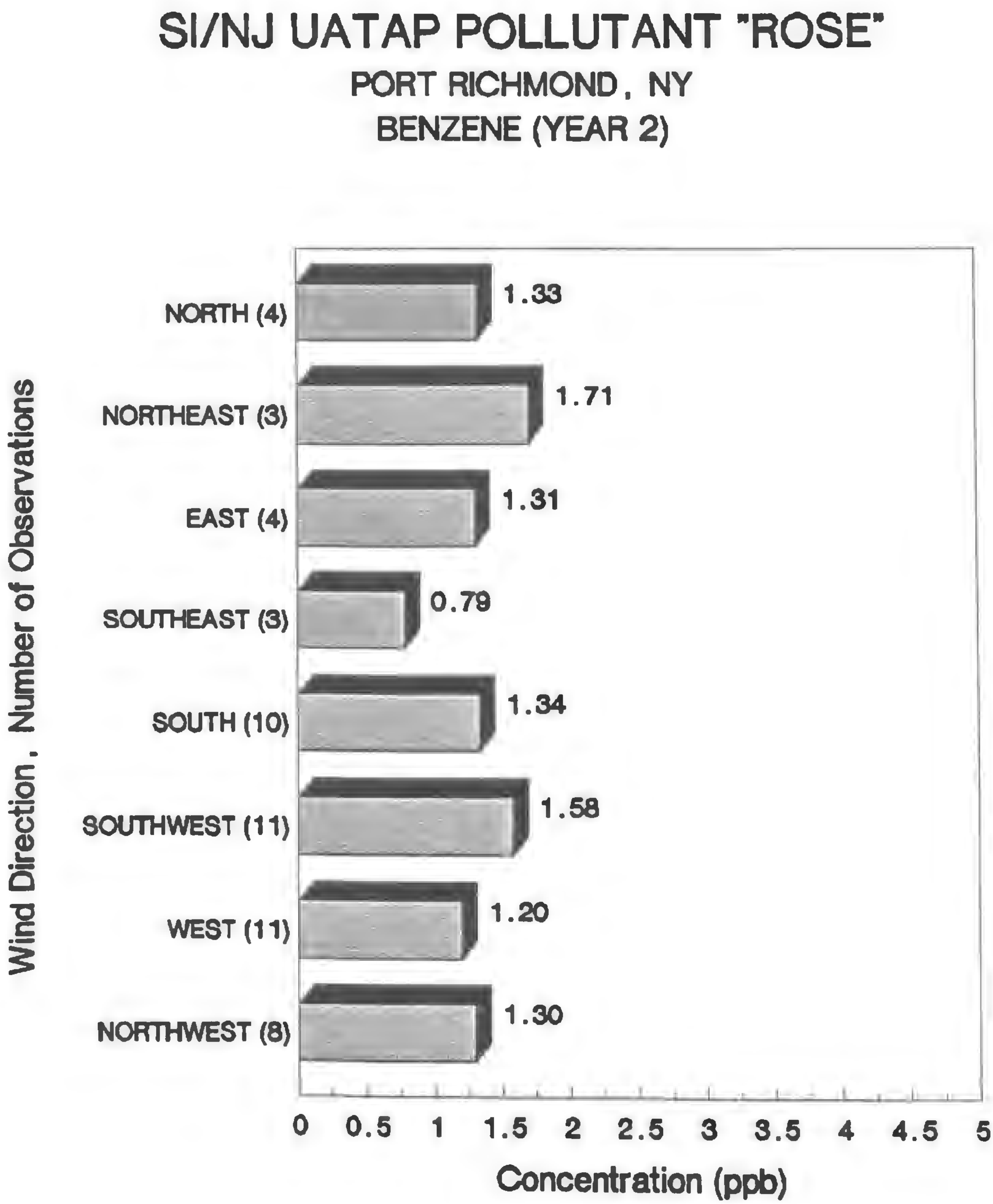
FIGURE III - 6B-8



TOTAL NUMBER OF OBSERVATIONS: 58

Data: October/88 thru September/89

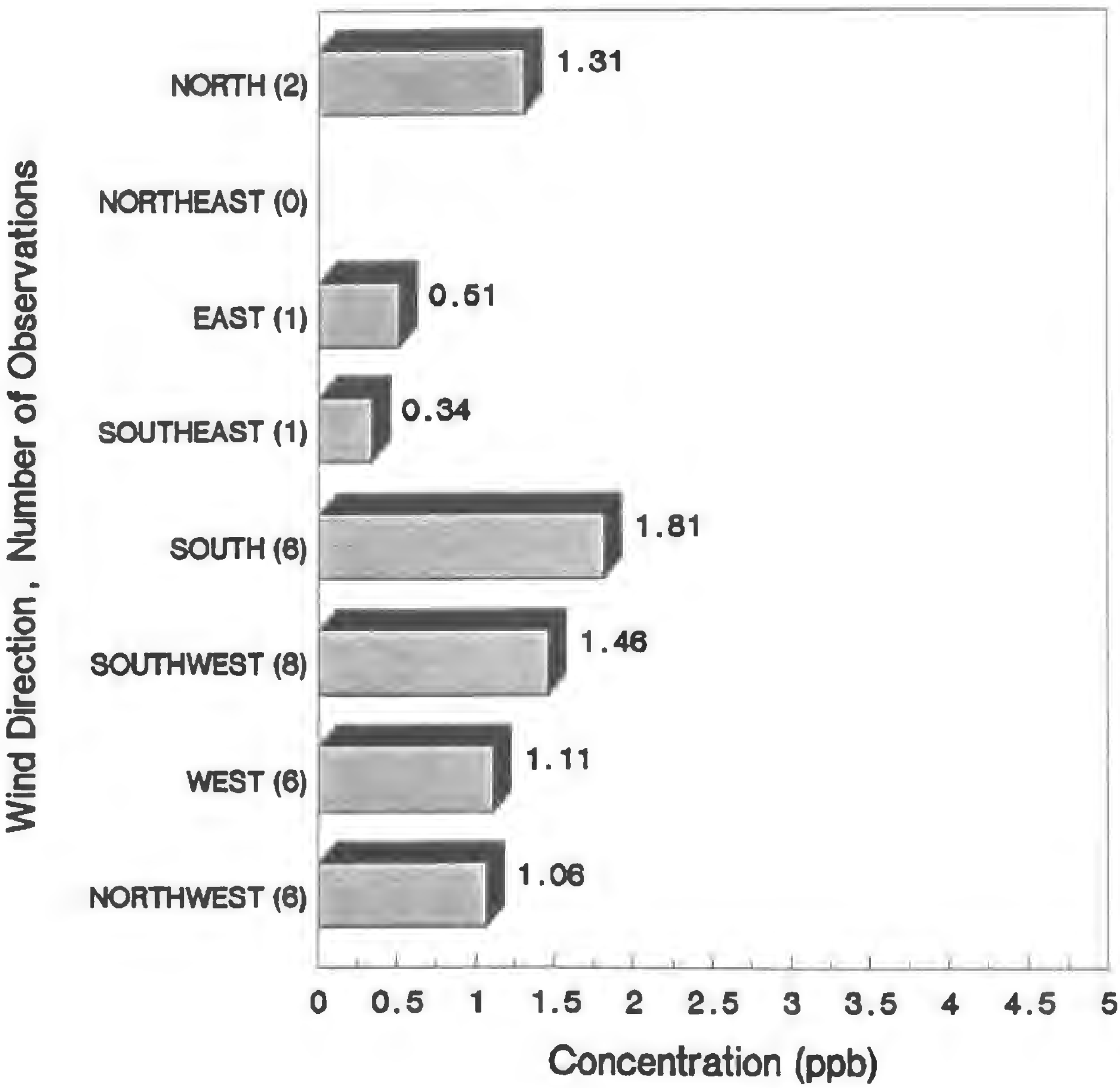
FIGURE III - 6B-9



TOTAL NUMBER OF OBSERVATIONS: 54

Data: October/88 thru September/89

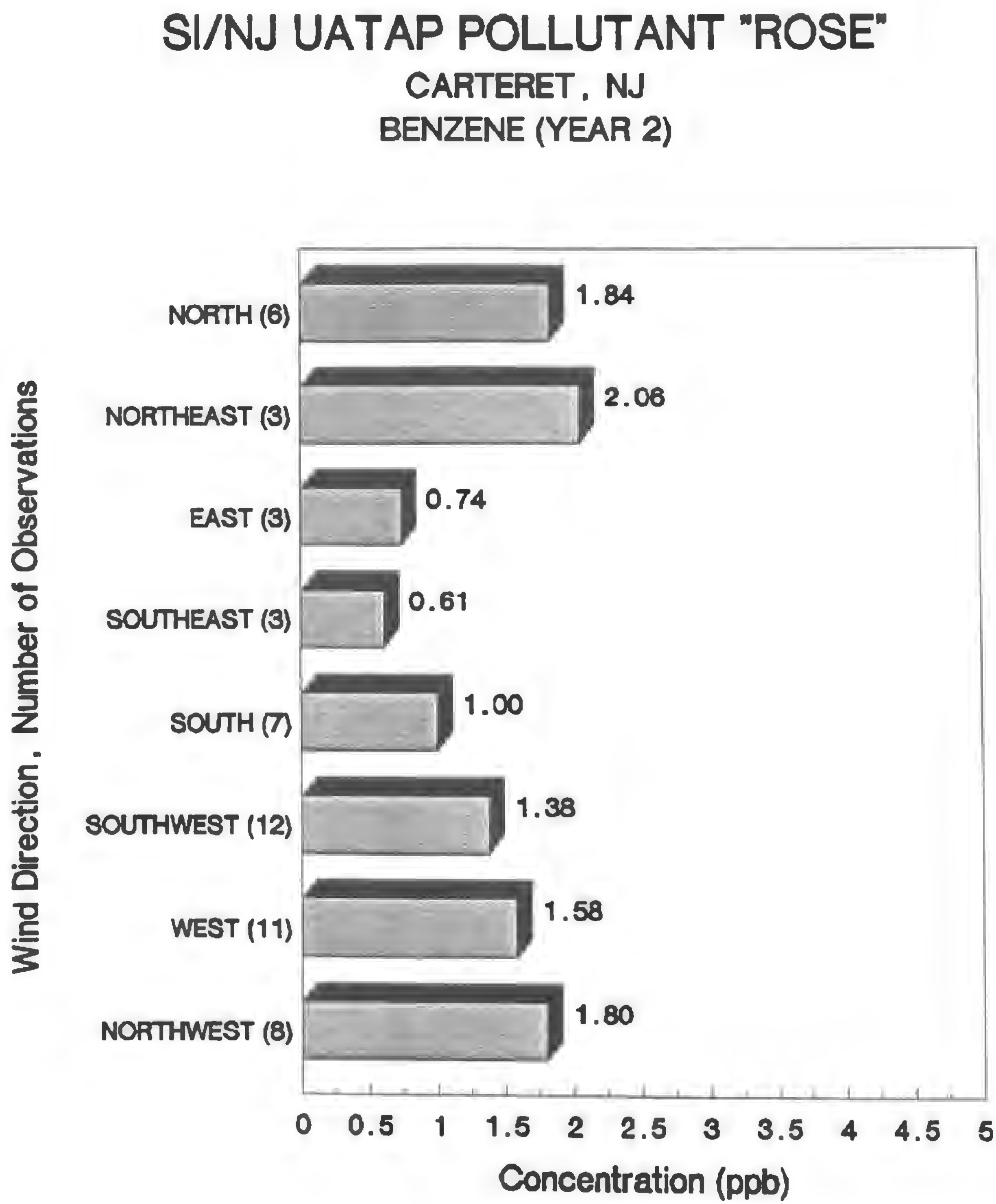
SI/NJ UATAP POLLUTANT "ROSE"
ELTINGVILLE, NY
BENZENE (YEAR 2)



TOTAL NUMBER OF OBSERVATIONS: 57

Data: October/88 thru September/89

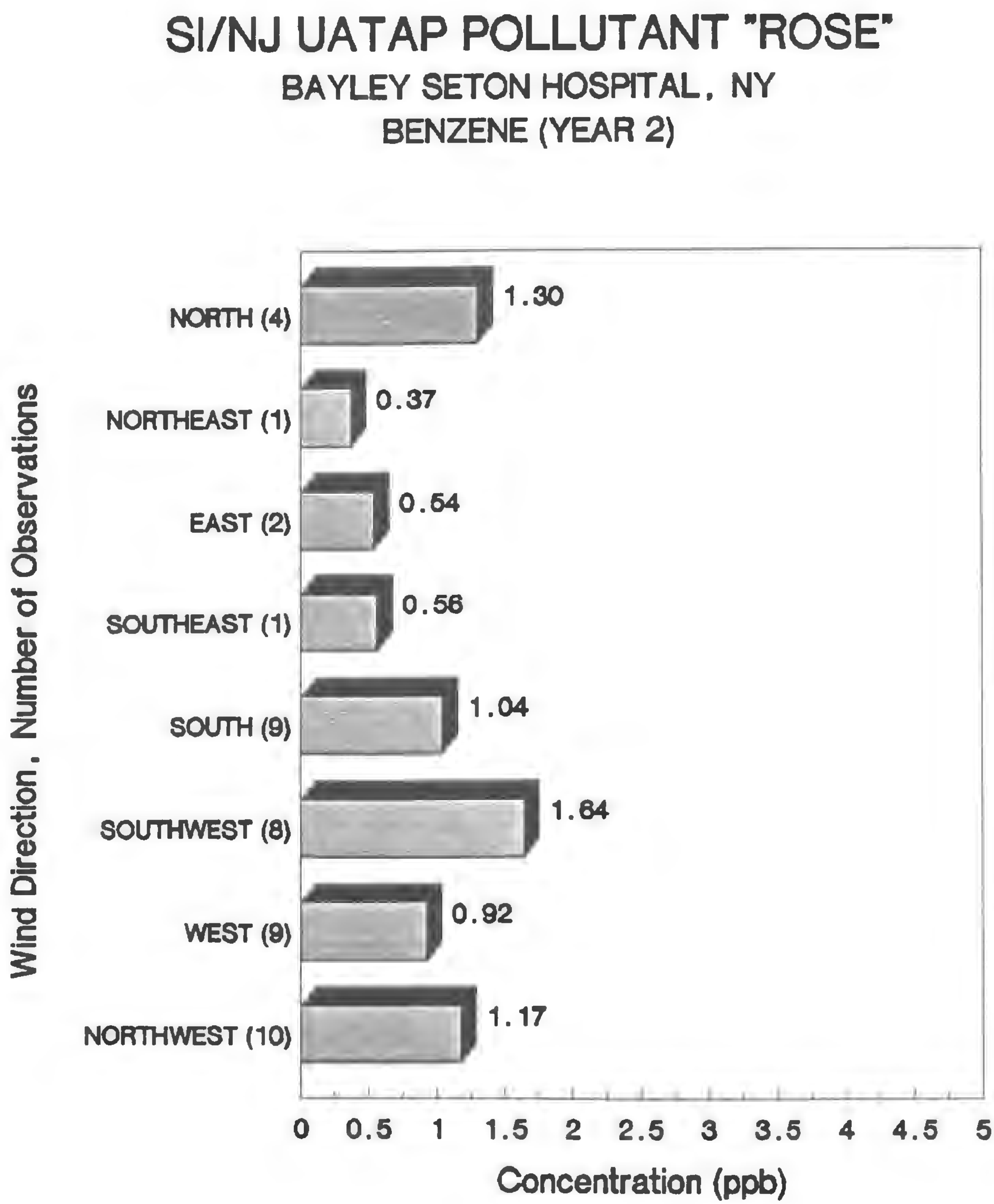
FIGURE III - 6B-11



TOTAL NUMBER OF OBSERVATIONS: 53

Data: October/88 thru September/89

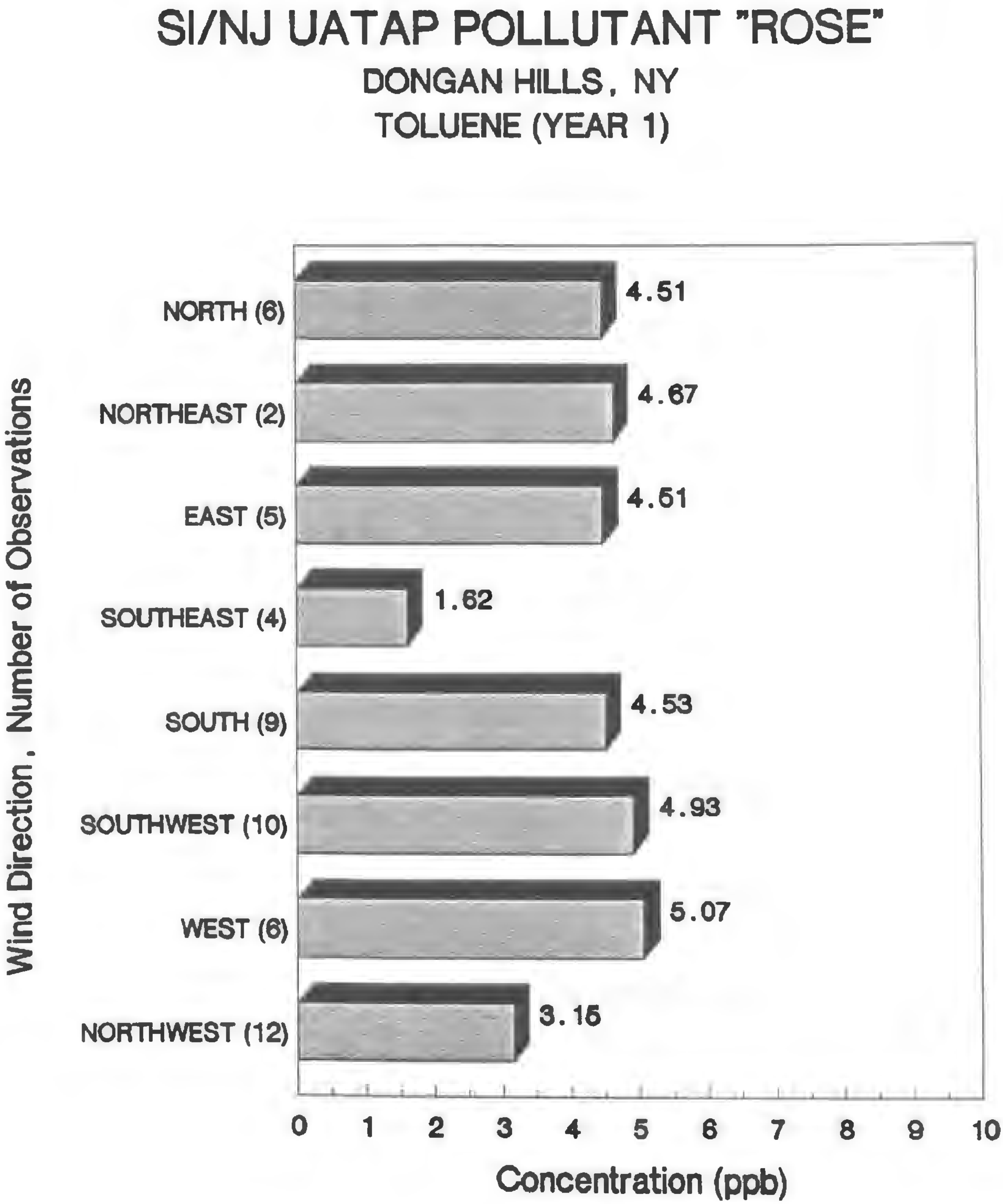
FIGURE III - 6B-12



TOTAL NUMBER OF OBSERVATIONS: 44

Data: October/88 thru September/89

FIGURE III - 6B-13



TOTAL NUMBER OF OBSERVATIONS: 54

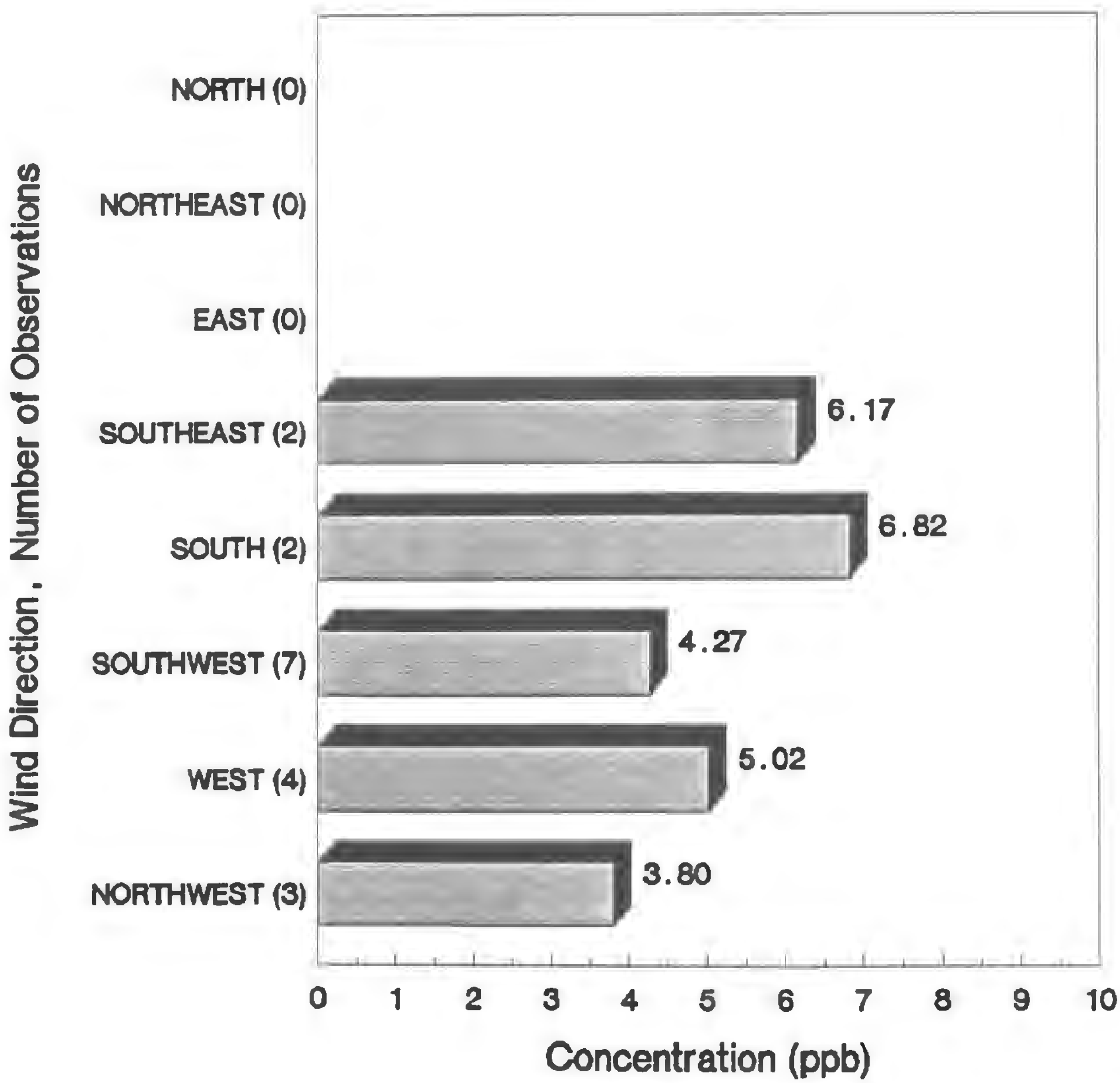
Data: October/87 thru September/88

FIGURE III - 6B-14

SI/NJ UATAP POLLUTANT "ROSE"

ELIZABETH, NJ

TOLUENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 18

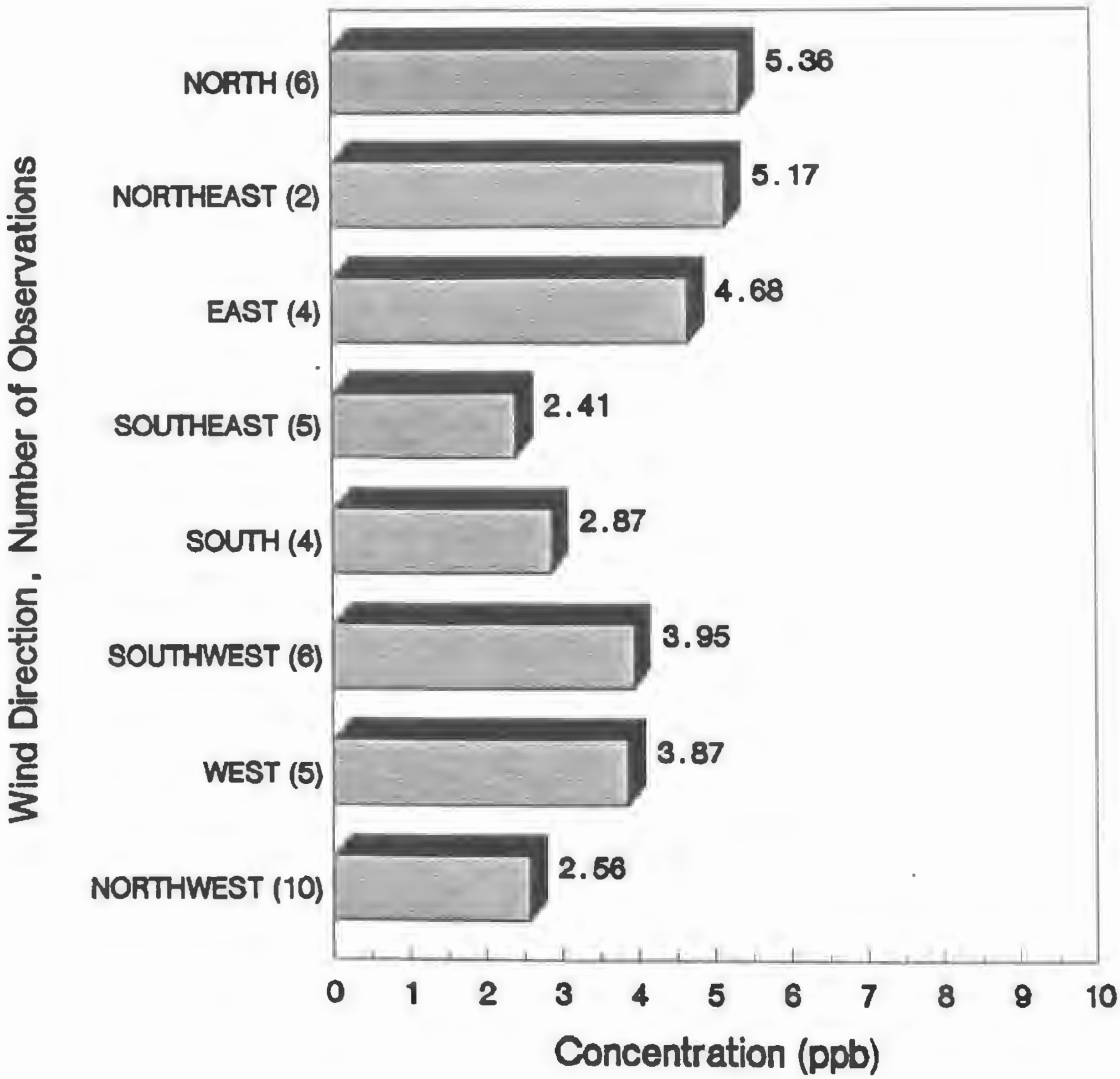
Data: June/88 thru September/88

FIGURE III - 6B-15

SI/NJ UATAP POLLUTANT "ROSE"

PORT RICHMOND, NY

TOLUENE (YEAR 1)

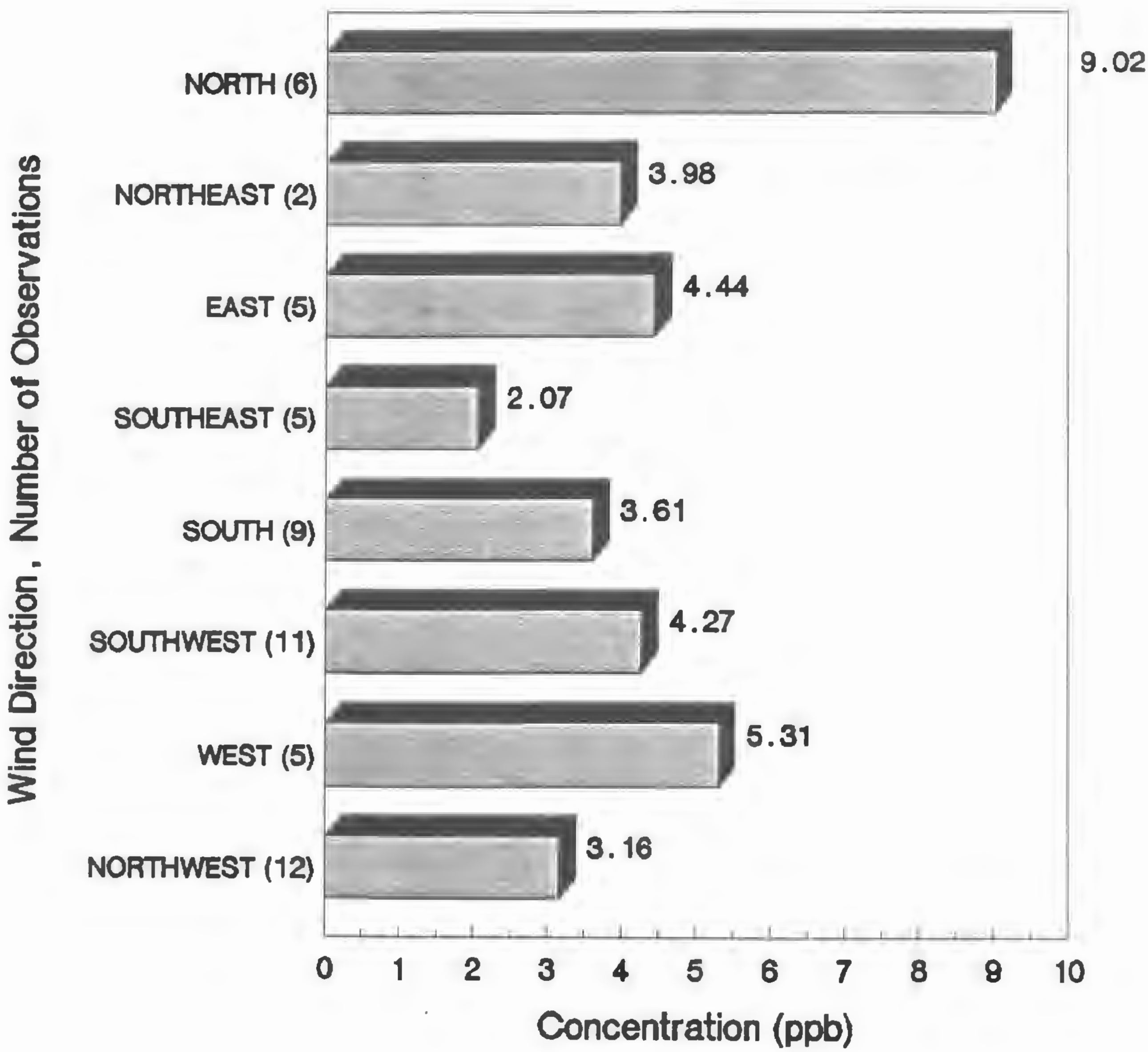


TOTAL NUMBER OF OBSERVATIONS: 42

Data: October/87 thru September/88

FIGURE III - 6B-16

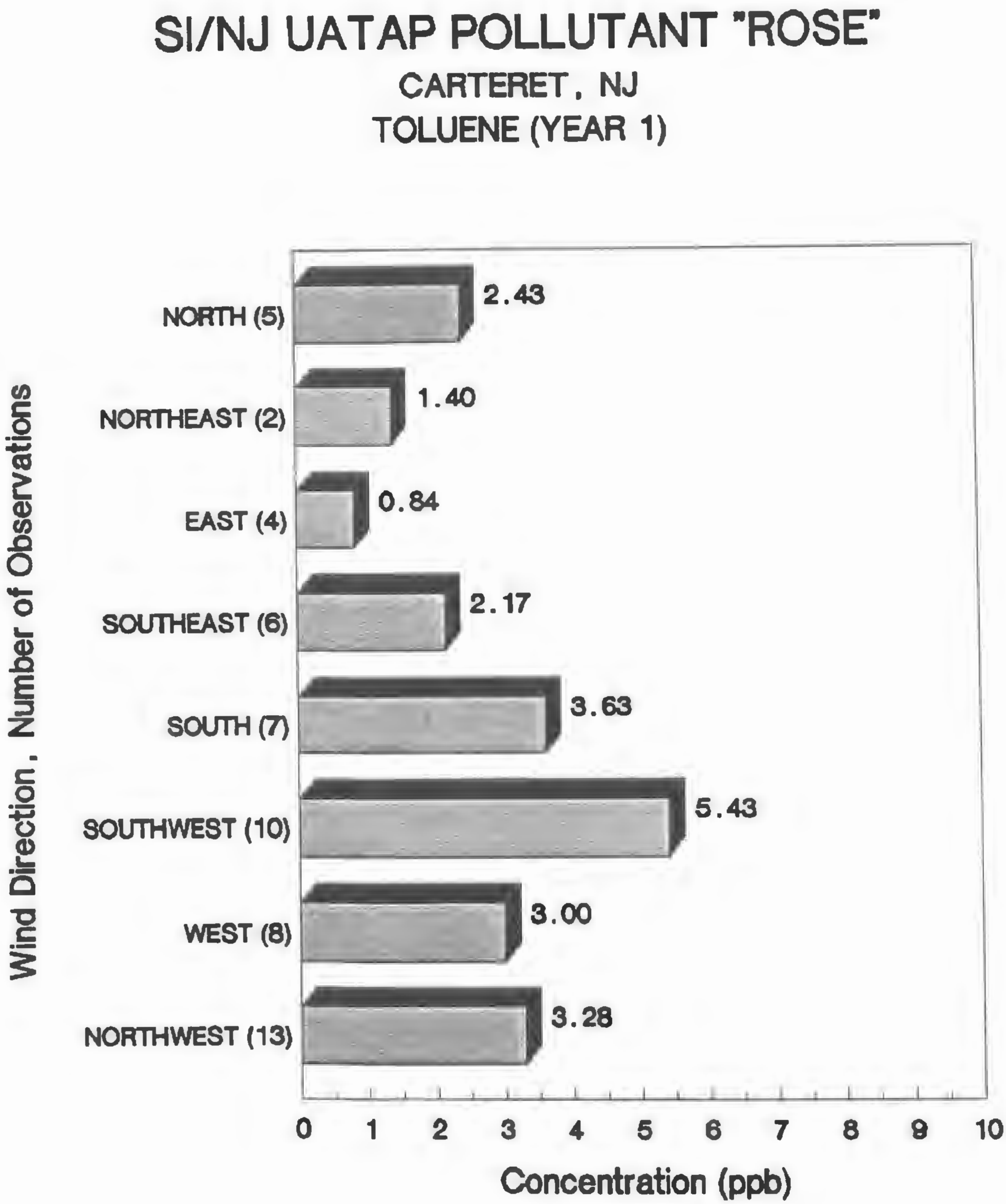
SI/NJ UATAP POLLUTANT "ROSE"
ELTINGVILLE, NY
TOLUENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 55

Data: October/87 thru September/88

FIGURE III - 6B-17



TOTAL NUMBER OF OBSERVATIONS: 55

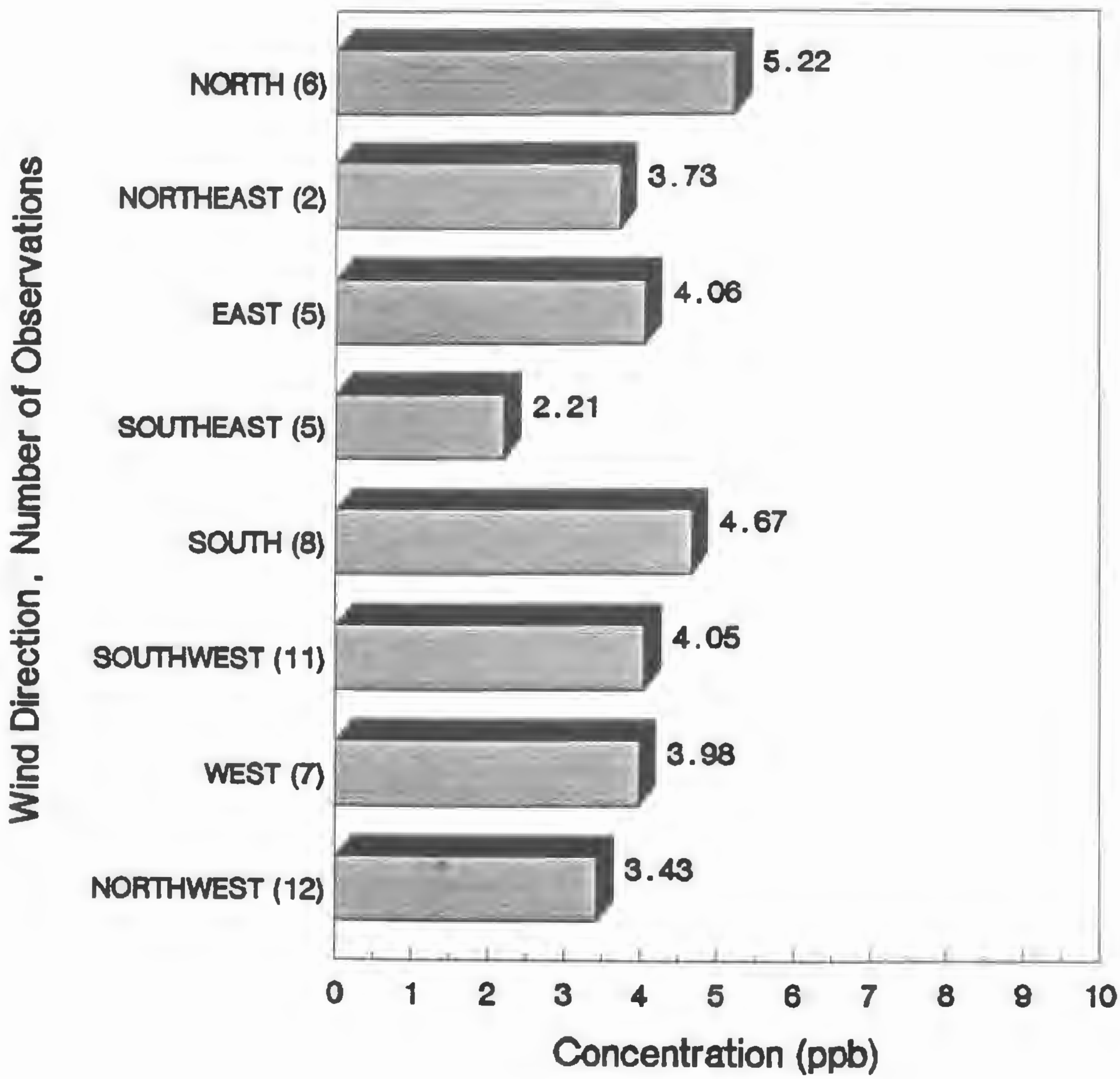
Data: October/87 thru September/88

FIGURE III - 6B-18

SI/NJ UATAP POLLUTANT "ROSE"

BAYLEY SETON HOSPITAL, NY

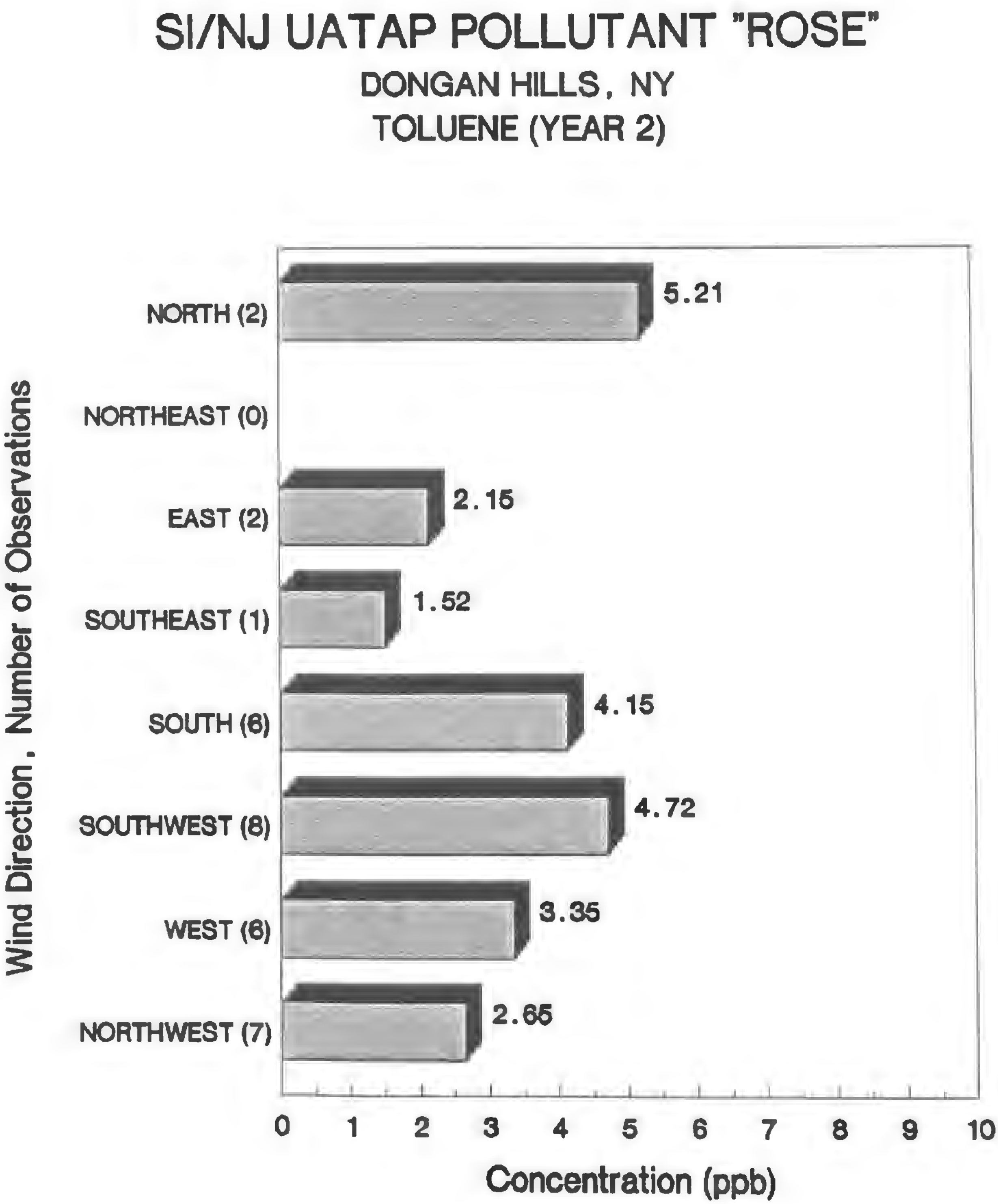
TOLUENE (YEAR 1)



TOTAL NUMBER OF OBSERVATIONS: 56

Data: October/87 thru September/88

FIGURE III - 6B-19



TOTAL NUMBER OF OBSERVATIONS: 32

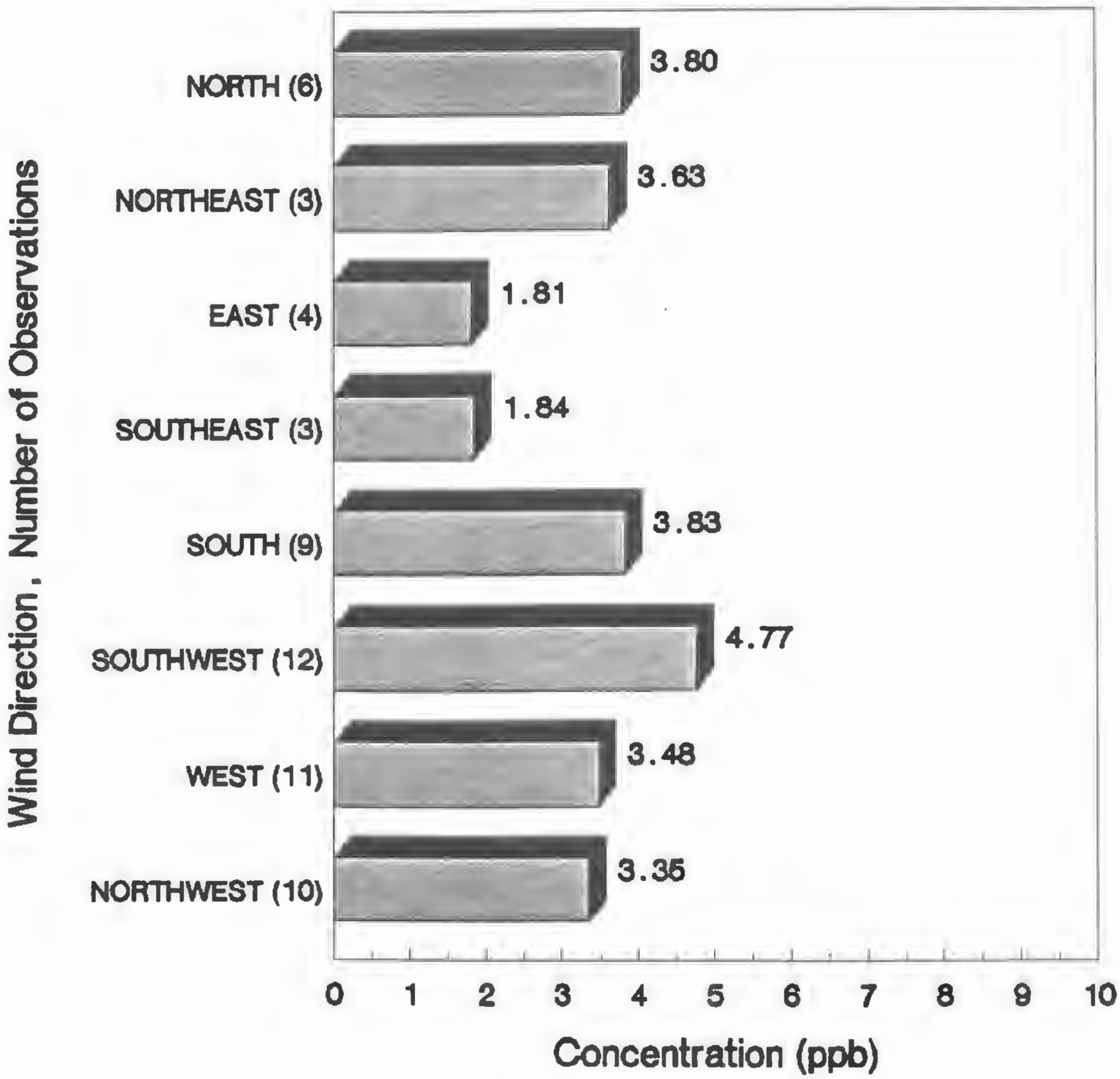
Data: October/88 thru September/89

FIGURE III - 6B-20

SI/NJ UATAP POLLUTANT "ROSE"

ELIZABETH, NJ

TOLUENE (YEAR 2)



TOTAL NUMBER OF OBSERVATIONS: 58

Data: October/88 thru September/89

FIGURE III - 6B-21

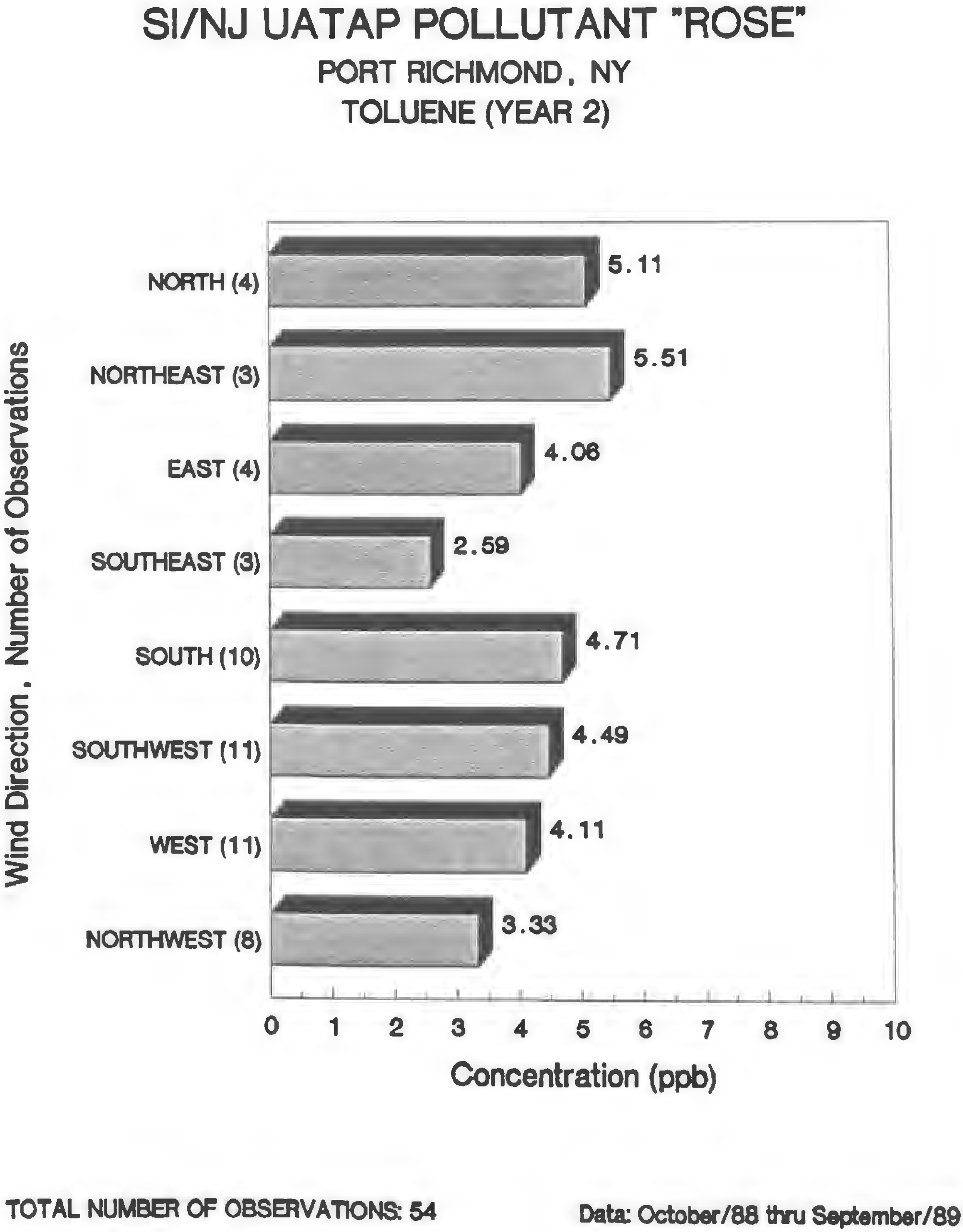
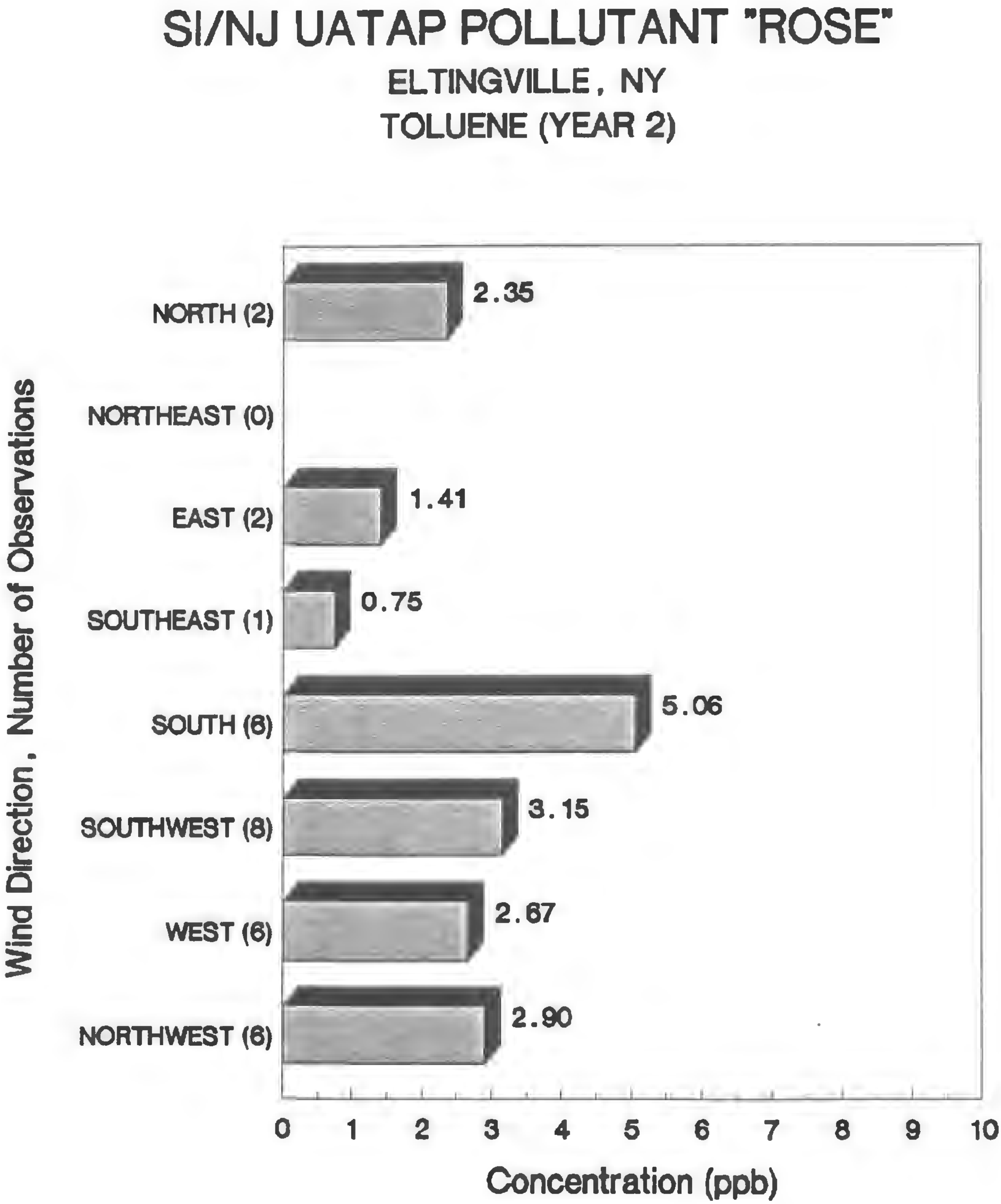


FIGURE III - 6B-22



TOTAL NUMBER OF OBSERVATIONS: 31

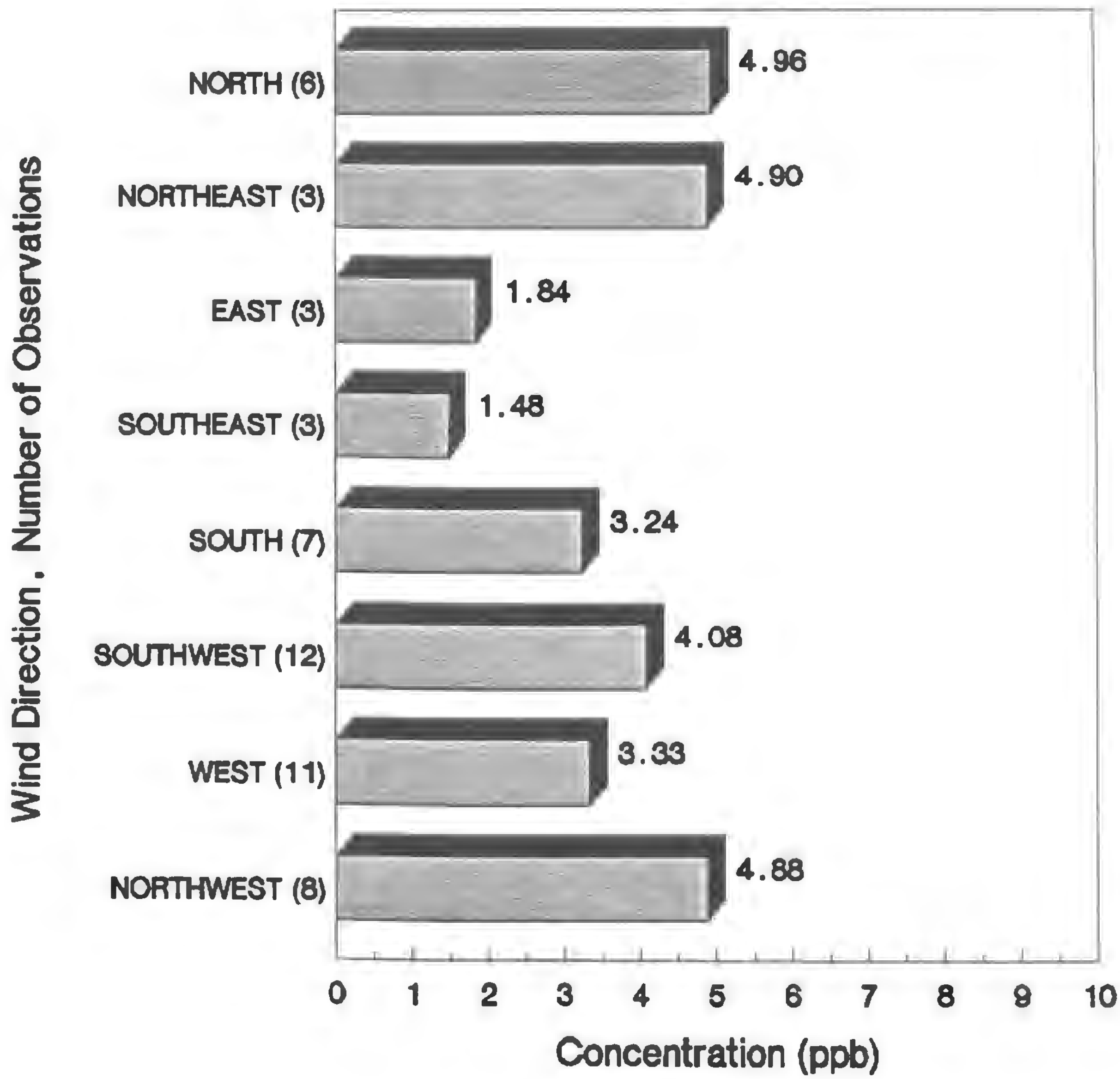
Data: October/88 thru September/89

FIGURE III - 6B-23

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NJ

TOLUENE (YEAR 2)

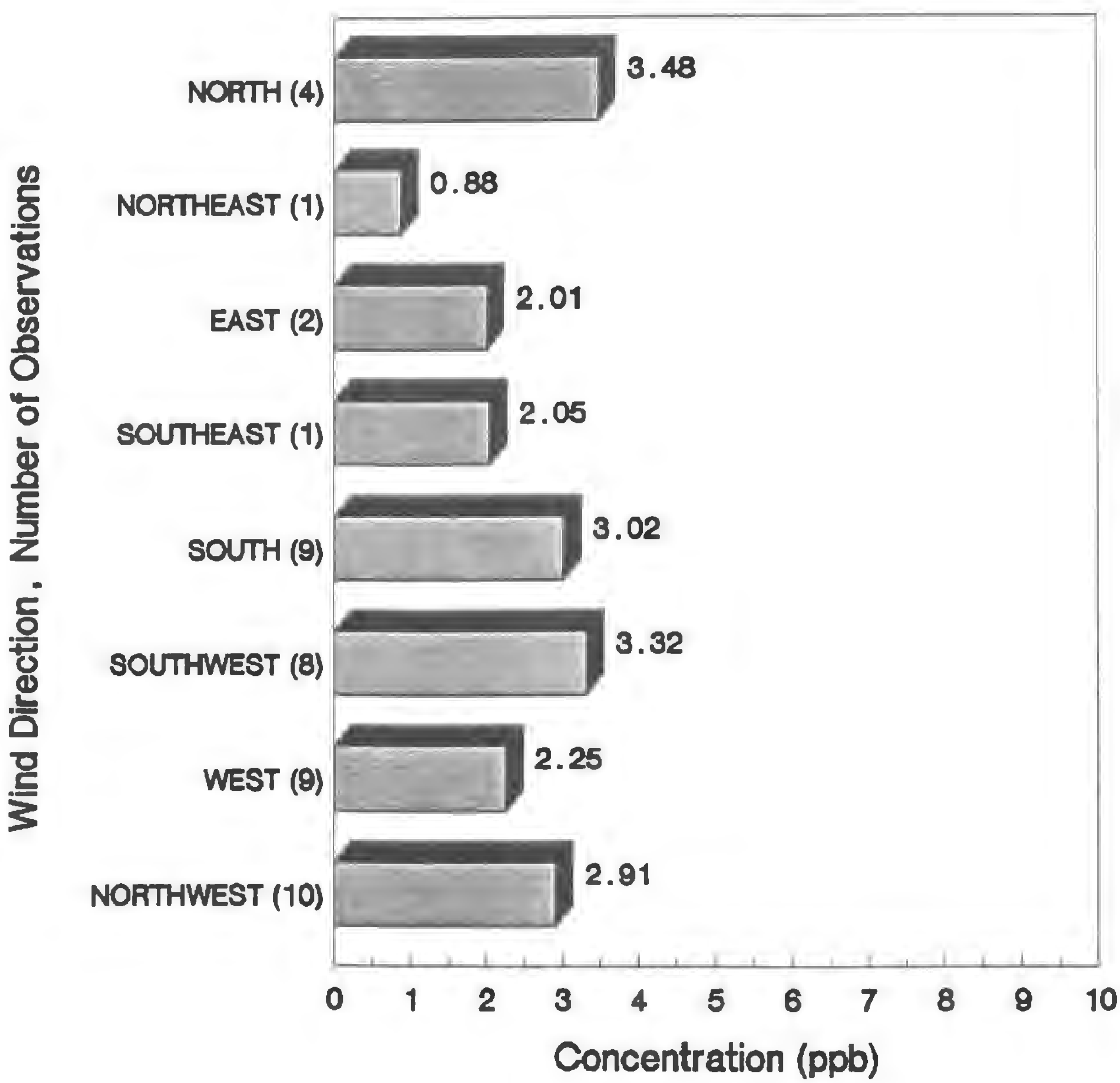


TOTAL NUMBER OF OBSERVATIONS: 53

Data: October/88 thru September/89

FIGURE III - 6B-24

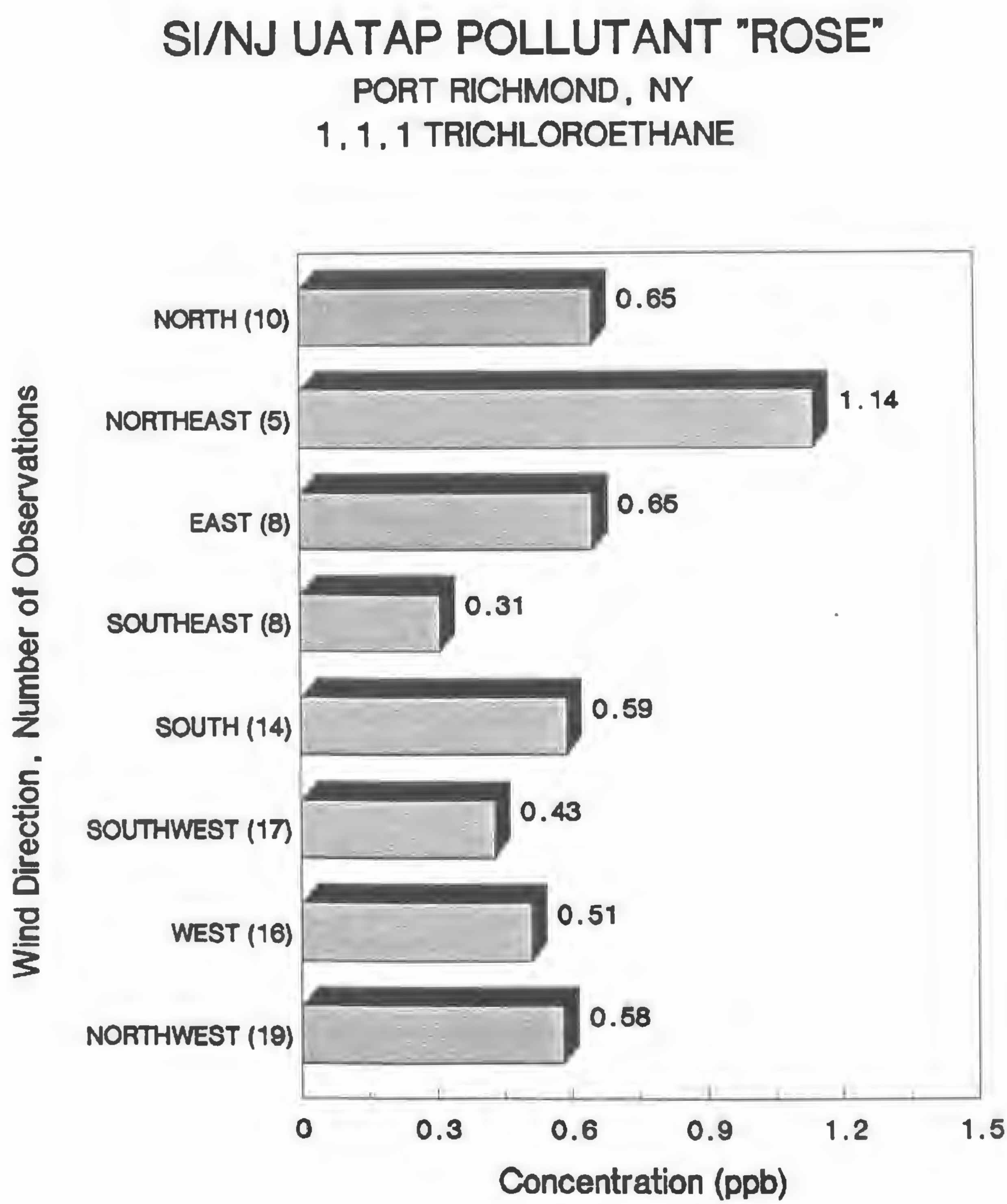
SI/NJ UATAP POLLUTANT "ROSE"
BAYLEY SETON HOSPITAL, NY
TOLUENE (YEAR 2)



TOTAL NUMBER OF OBSERVATIONS: 44

Data: October/88 thru September/89

FIGURE III - 6B-25



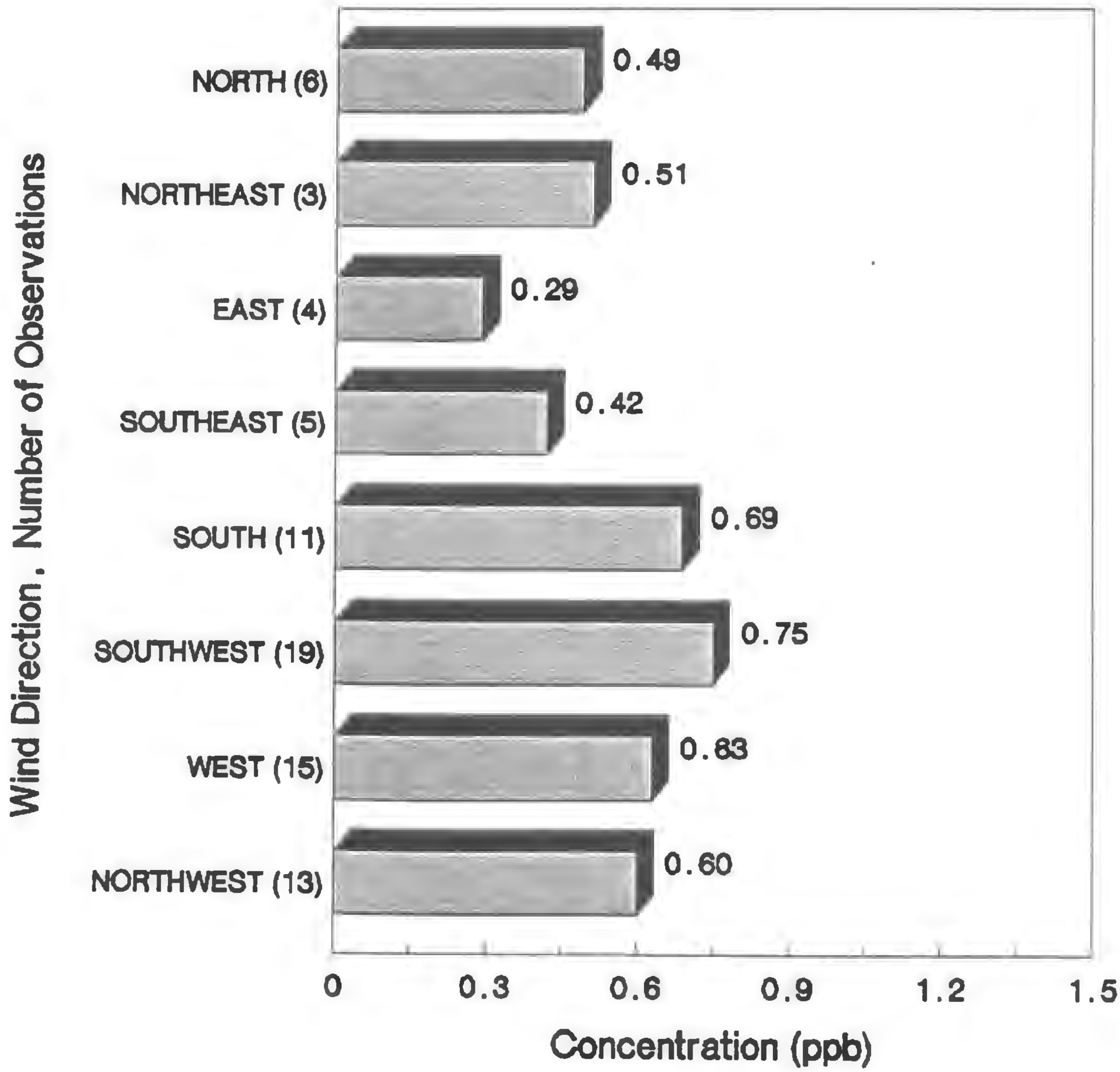
TOTAL NUMBER OF OBSERVATIONS: 97

Data: October/87 thru September/89

SI/NJ UATAP POLLUTANT "ROSE"

ELIZABETH, NJ

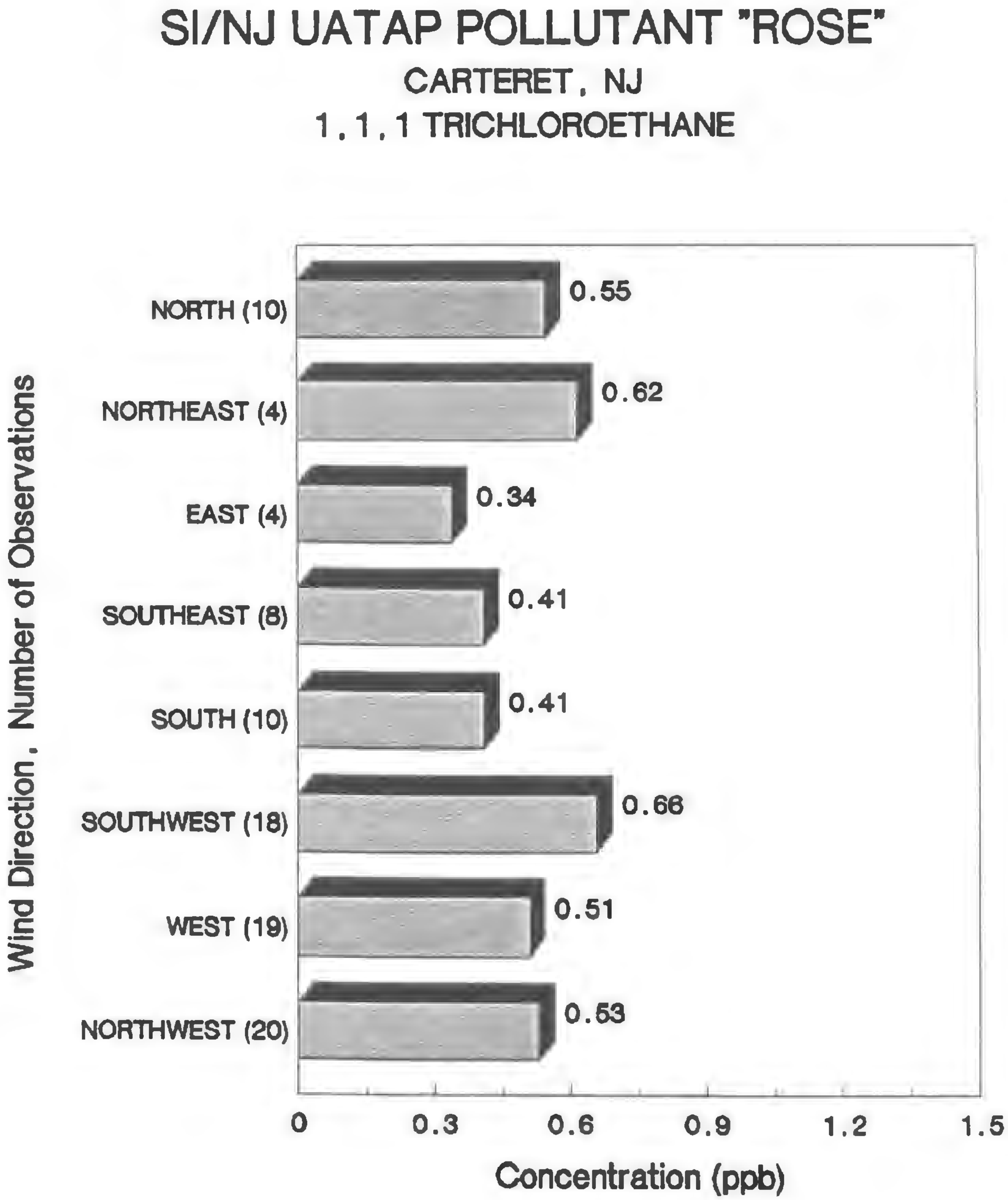
1,1,1 TRICHLOROETHANE



TOTAL NUMBER OF OBSERVATIONS: 76

Data: June/88 thru September/89

FIGURE III - 6B-27



TOTAL NUMBER OF OBSERVATIONS: 93

Data: October/87 thru September/89

FIGURE III - 6B-28

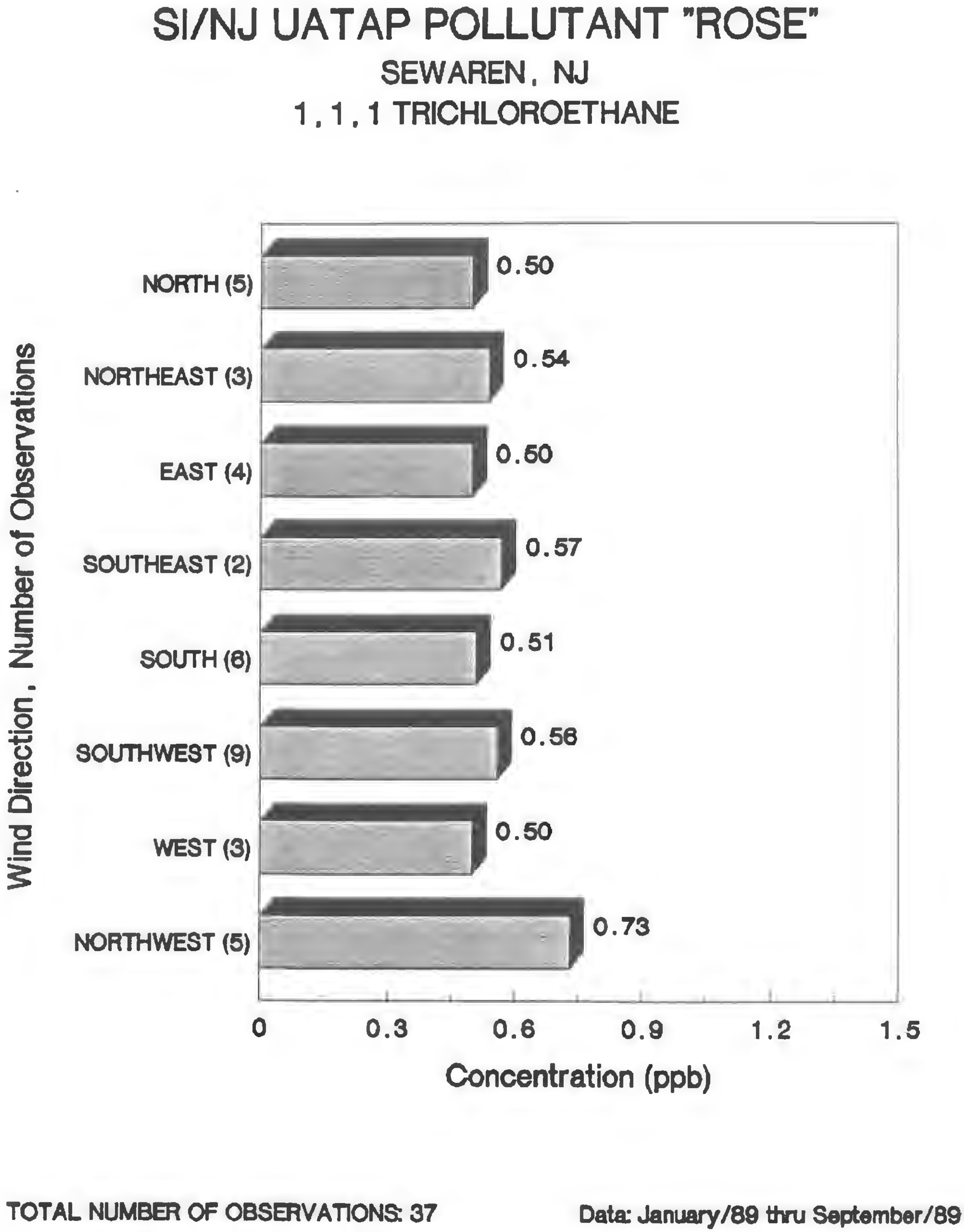
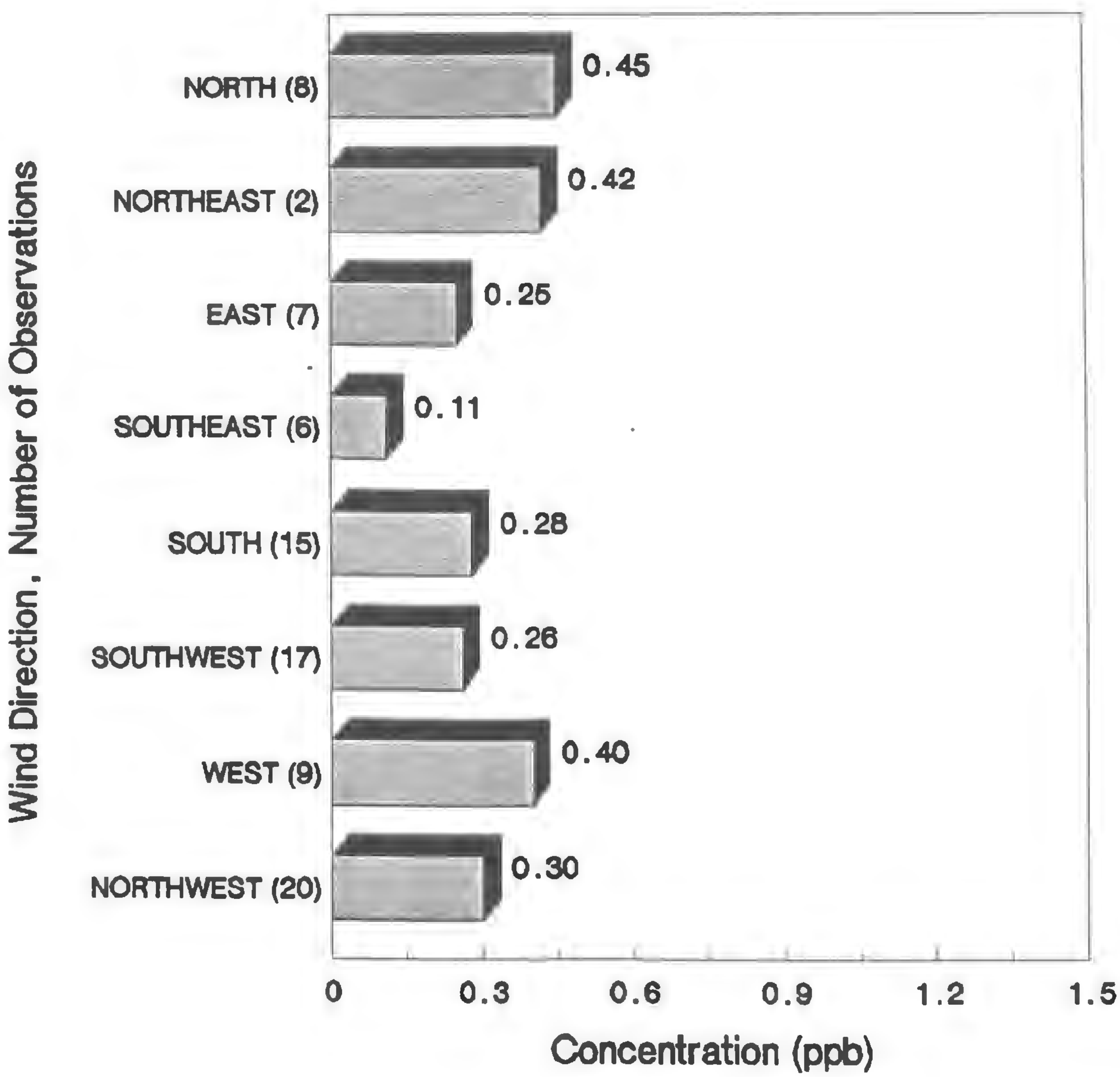


FIGURE III - 6B-29

SI/NJ UATAP POLLUTANT "ROSE"

DONGAN HILLS, NY

1,1,1 TRICHLOROETHANE



TOTAL NUMBER OF OBSERVATIONS: 84

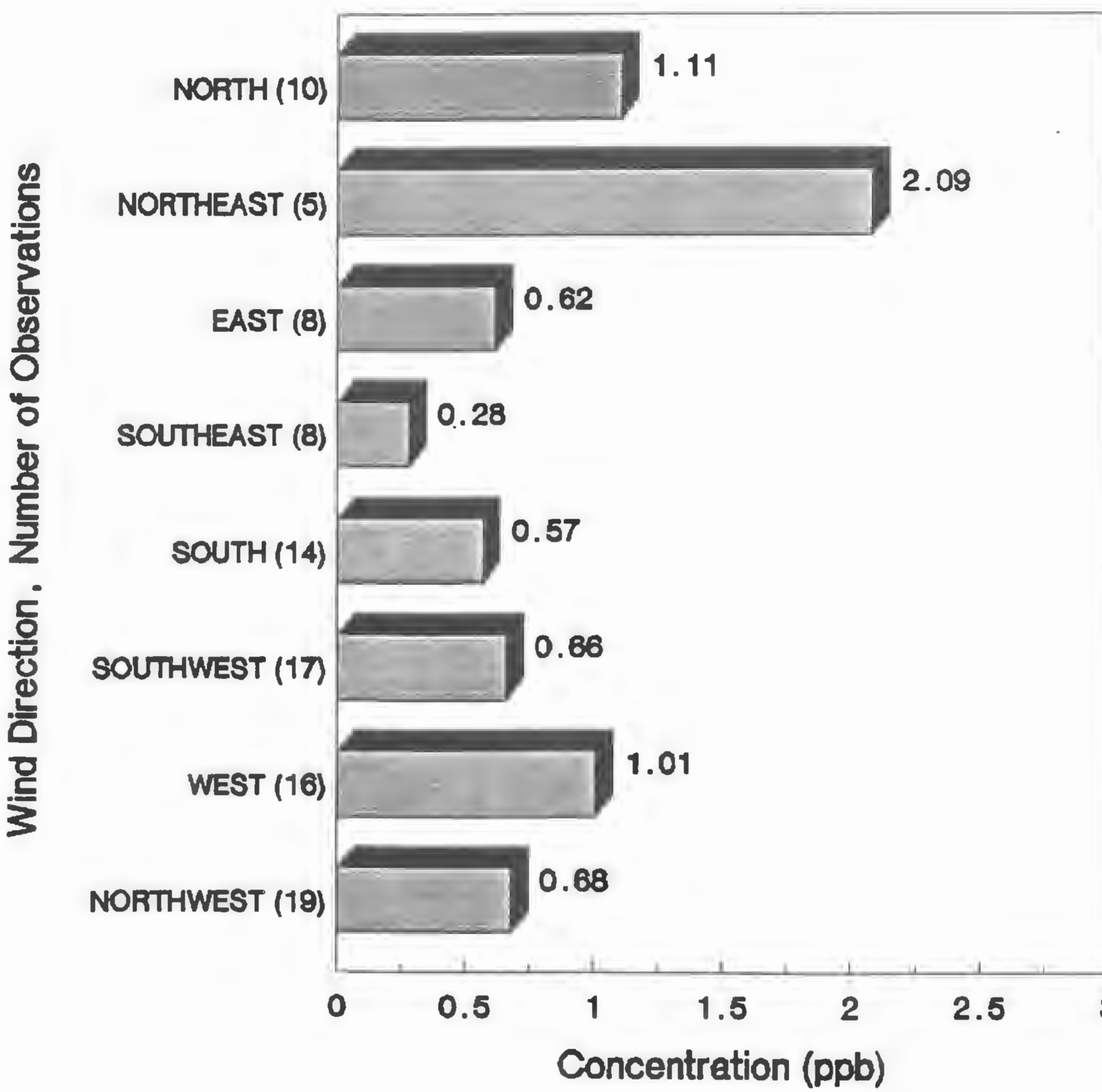
Data: October/87 thru September/89

FIGURE III - 6B-30

SI/NJ UATAP POLLUTANT "ROSE"

PORT RICHMOND, NY

DICHLOROMETHANE



TOTAL NUMBER OF OBSERVATIONS: 97

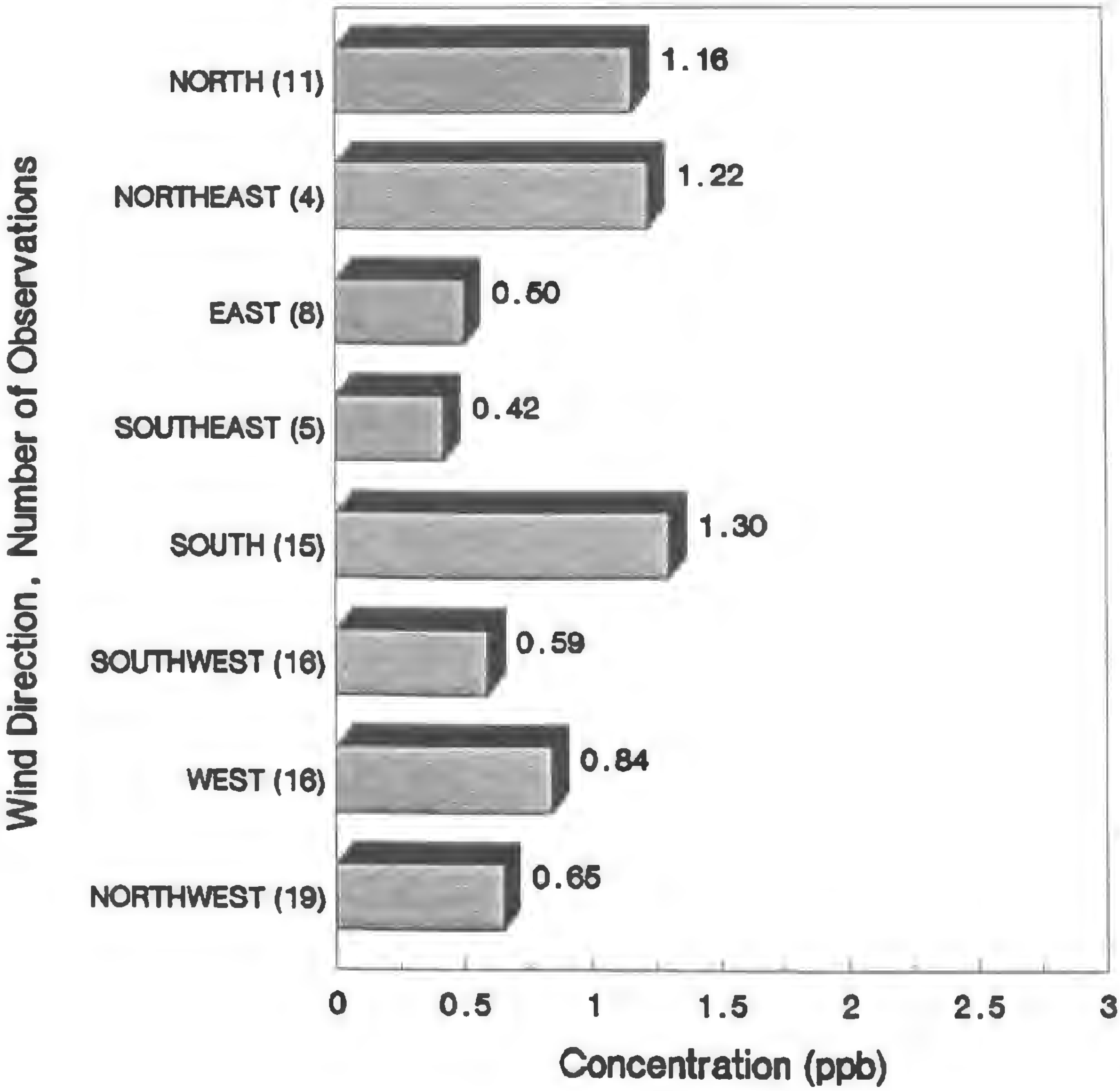
Data: October/87 thru September/89

FIGURE III - 6B-31

SI/NJ UATAP POLLUTANT "ROSE"

PS 26, TRAVIS

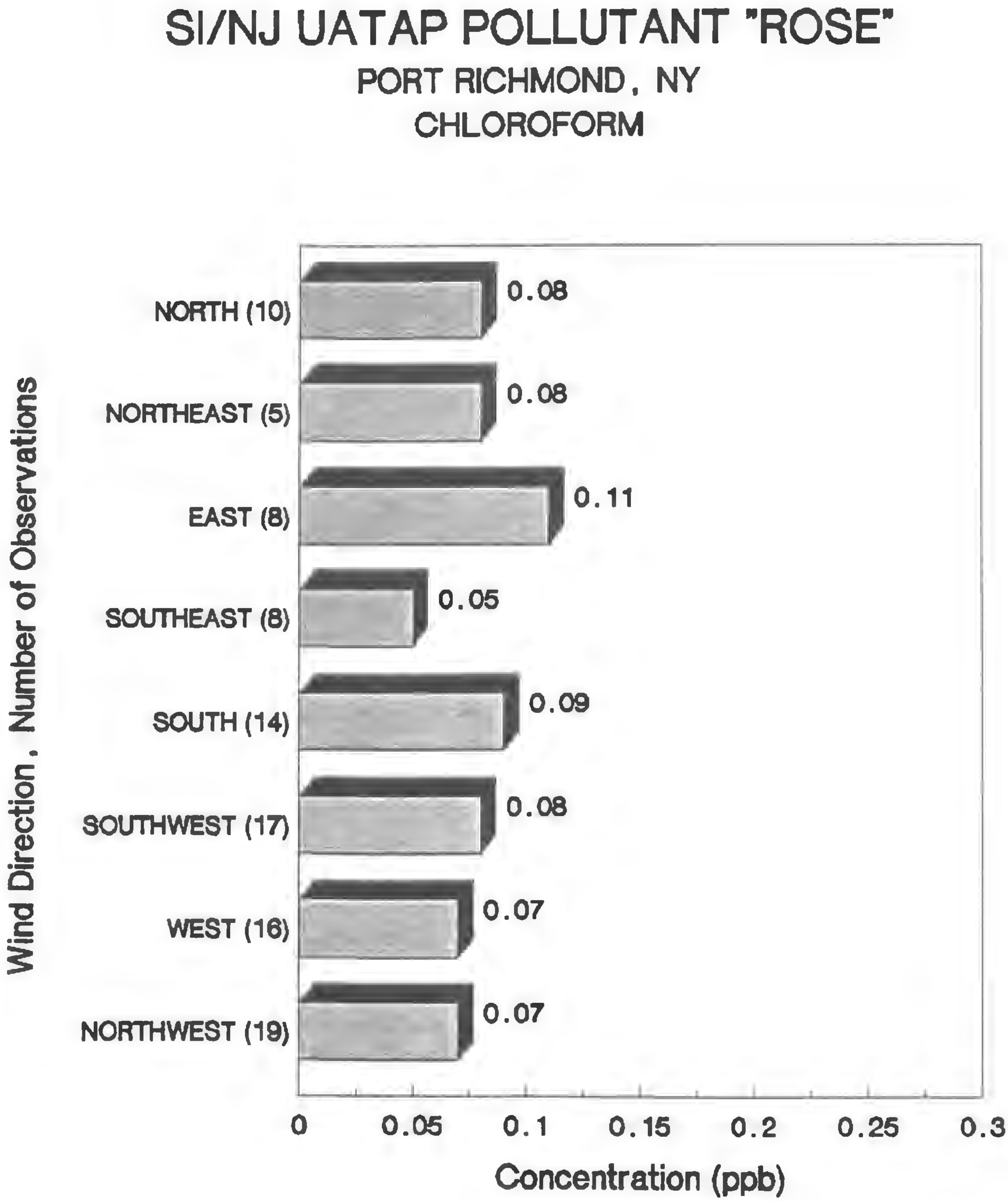
DICHLOROMETHANE



TOTAL NUMBER OF OBSERVATIONS: 94

Data: October/87 thru September/89

FIGURE III - 6B-32



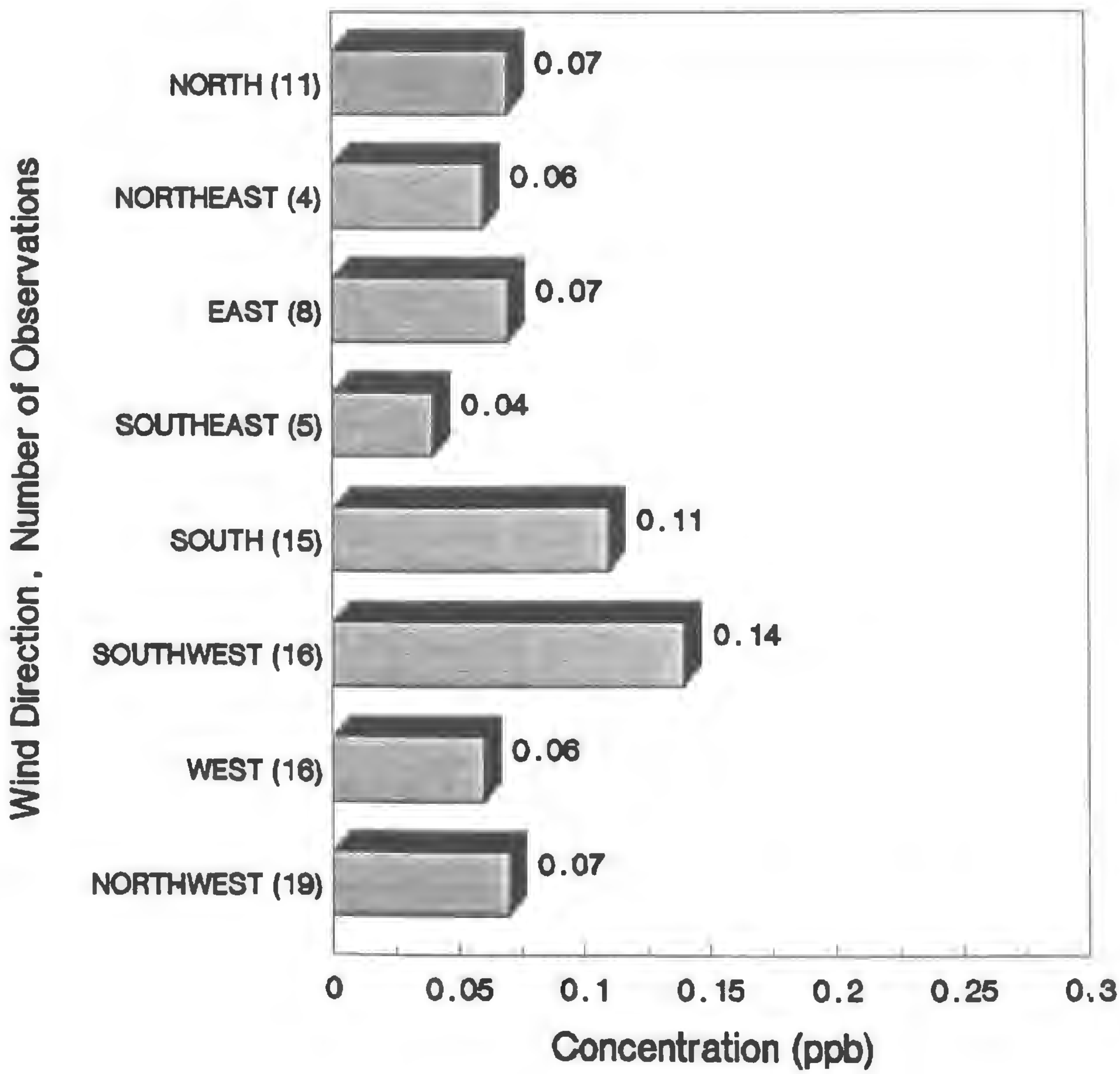
TOTAL NUMBER OF OBSERVATIONS: 97

Data: October/87 thru September/89

FIGURE III - 6B-33

SI/NJ UATAP POLLUTANT "ROSE"

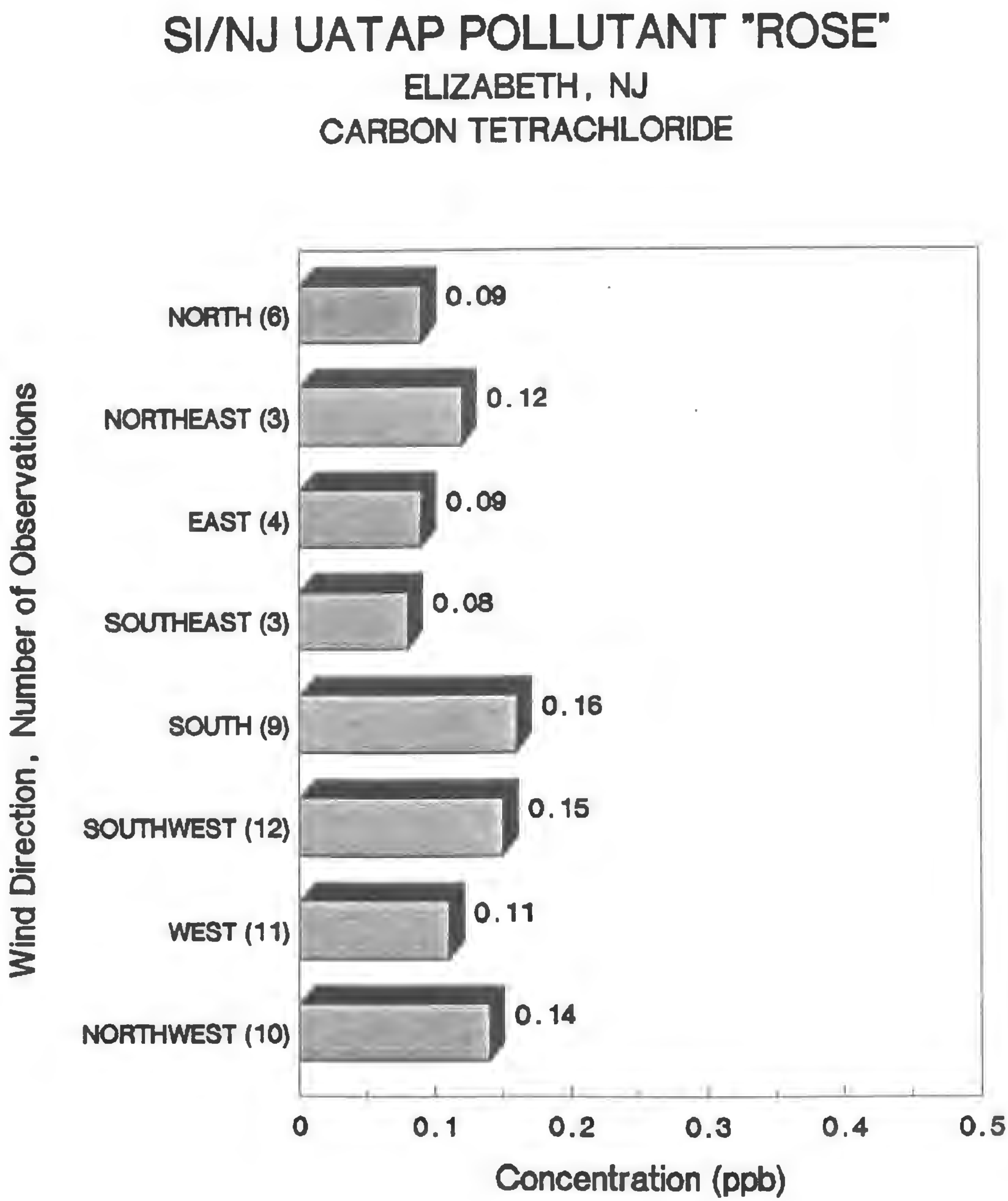
PS 26, TRAVIS
CHLOROFORM



TOTAL NUMBER OF OBSERVATIONS: 94

Data: October/87 thru September/89

FIGURE III - 6B-34



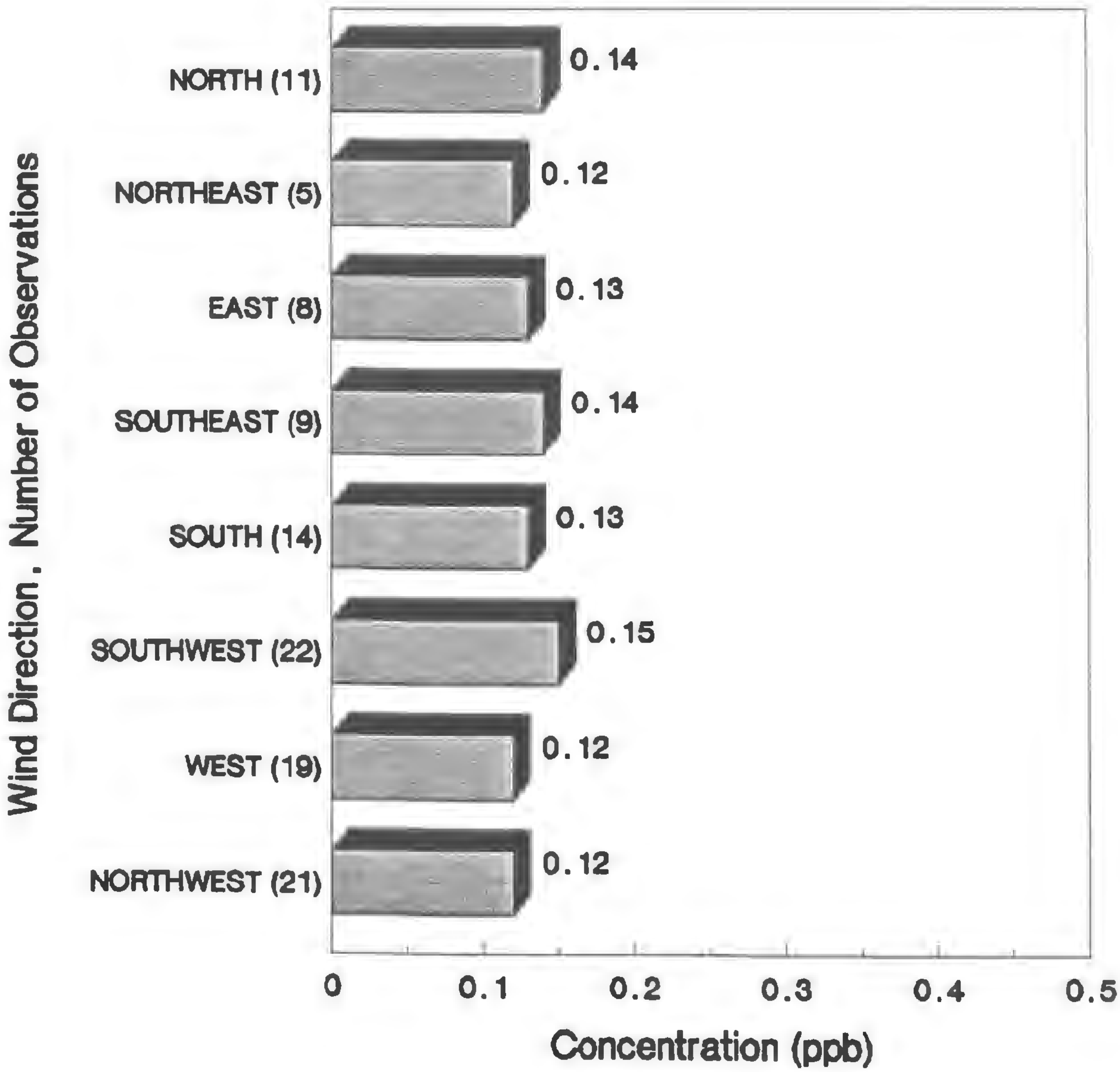
TOTAL NUMBER OF OBSERVATIONS: 58

Data: June/88 thru September/89

FIGURE III - 6B-35

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY
CARBON TETRACHLORIDE



TOTAL NUMBER OF OBSERVATIONS: 109

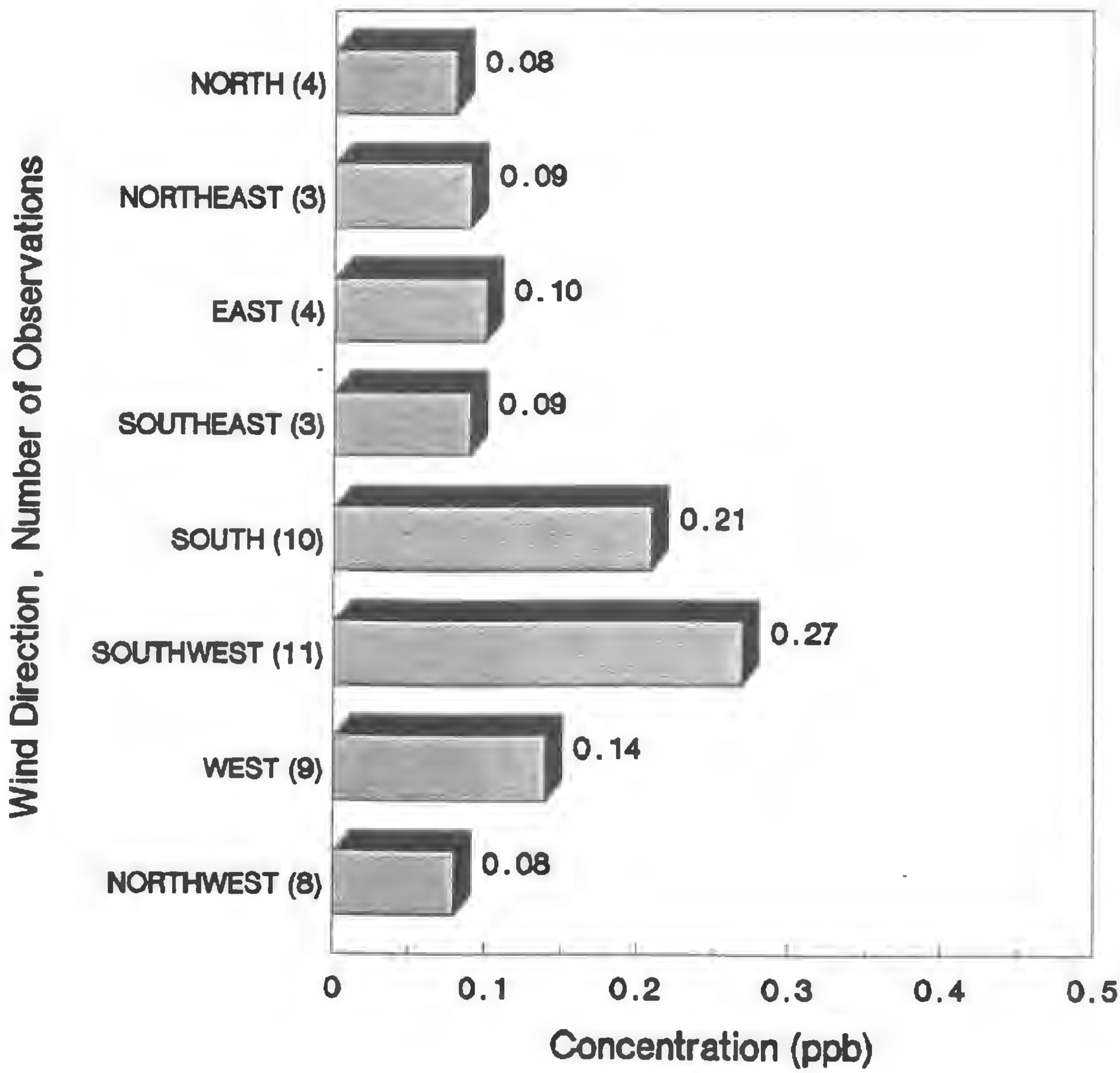
Data: October/87 thru September/89

FIGURE III - 6B-36

SI/NJ UATAP POLLUTANT "ROSE"

TOTTENVILLE, NY

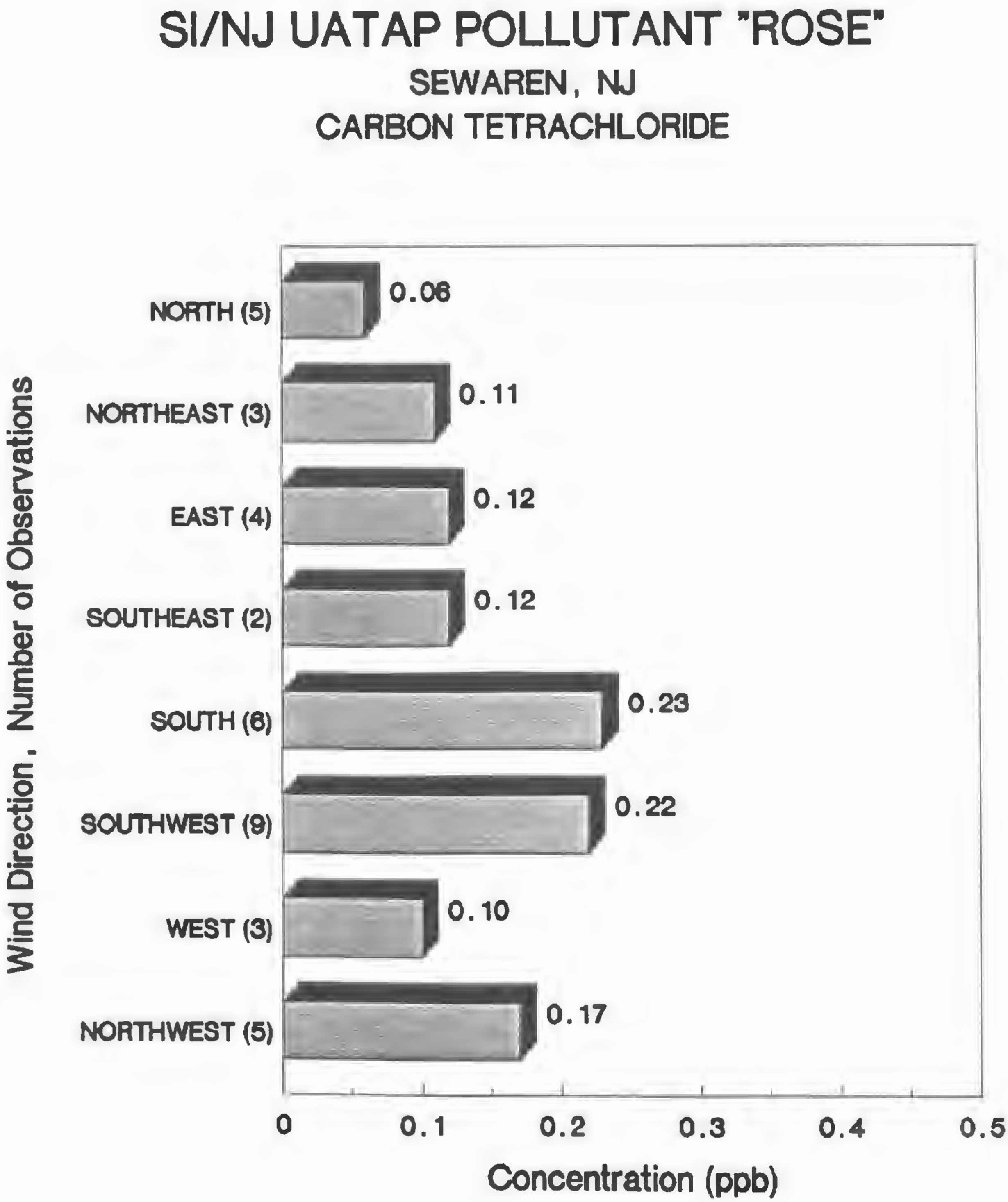
CARBON TETRACHLORIDE



TOTAL NUMBER OF OBSERVATIONS: 52

Data: October/88 thru September/89

FIGURE III - 6B-37



TOTAL NUMBER OF OBSERVATIONS: 37

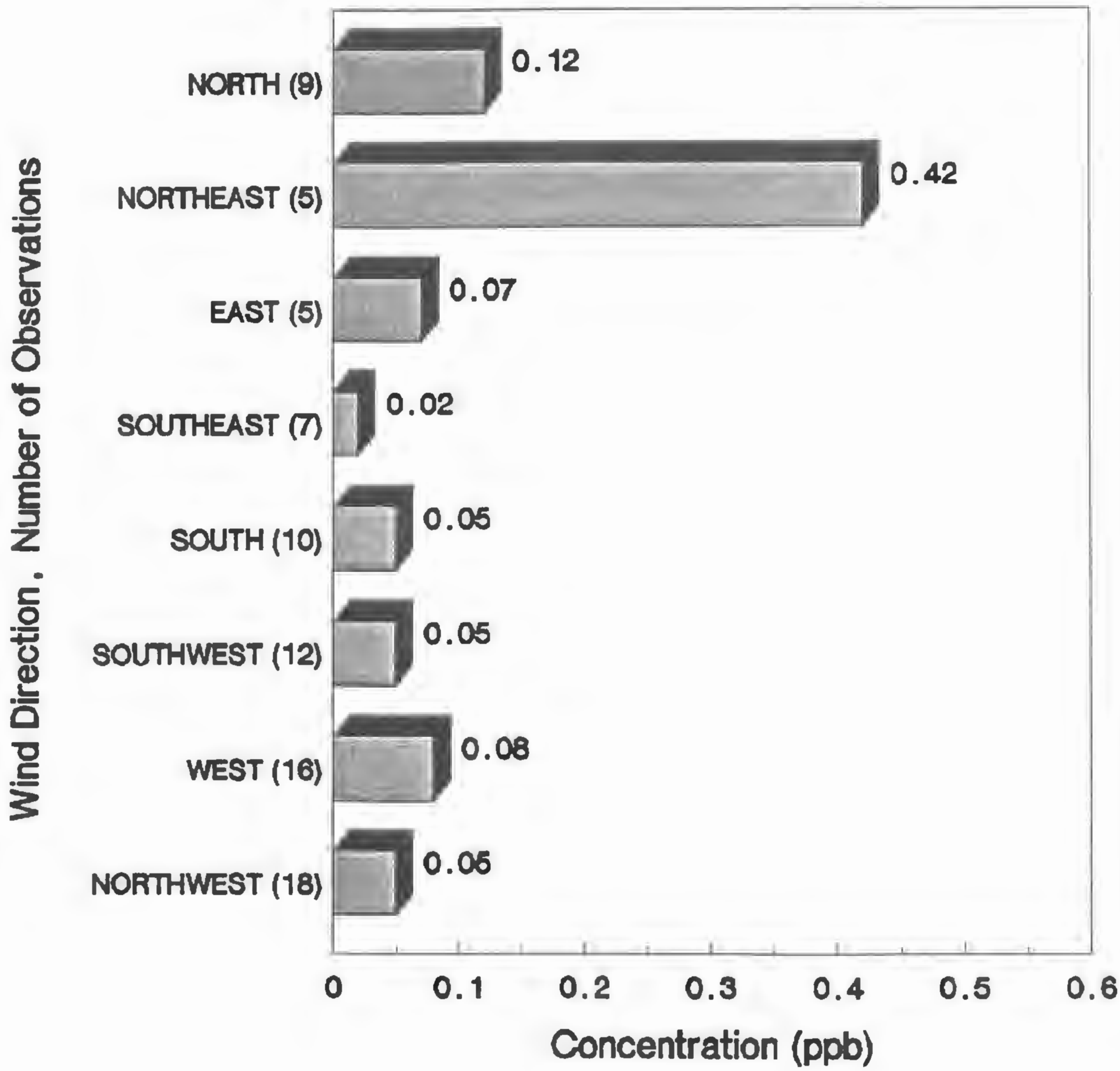
Data: January/89 thru September/89

FIGURE III - 6B-38

SI/NJ UATAP POLLUTANT "ROSE"

PORT RICHMOND, NY

TRICHLOROETHYLENE



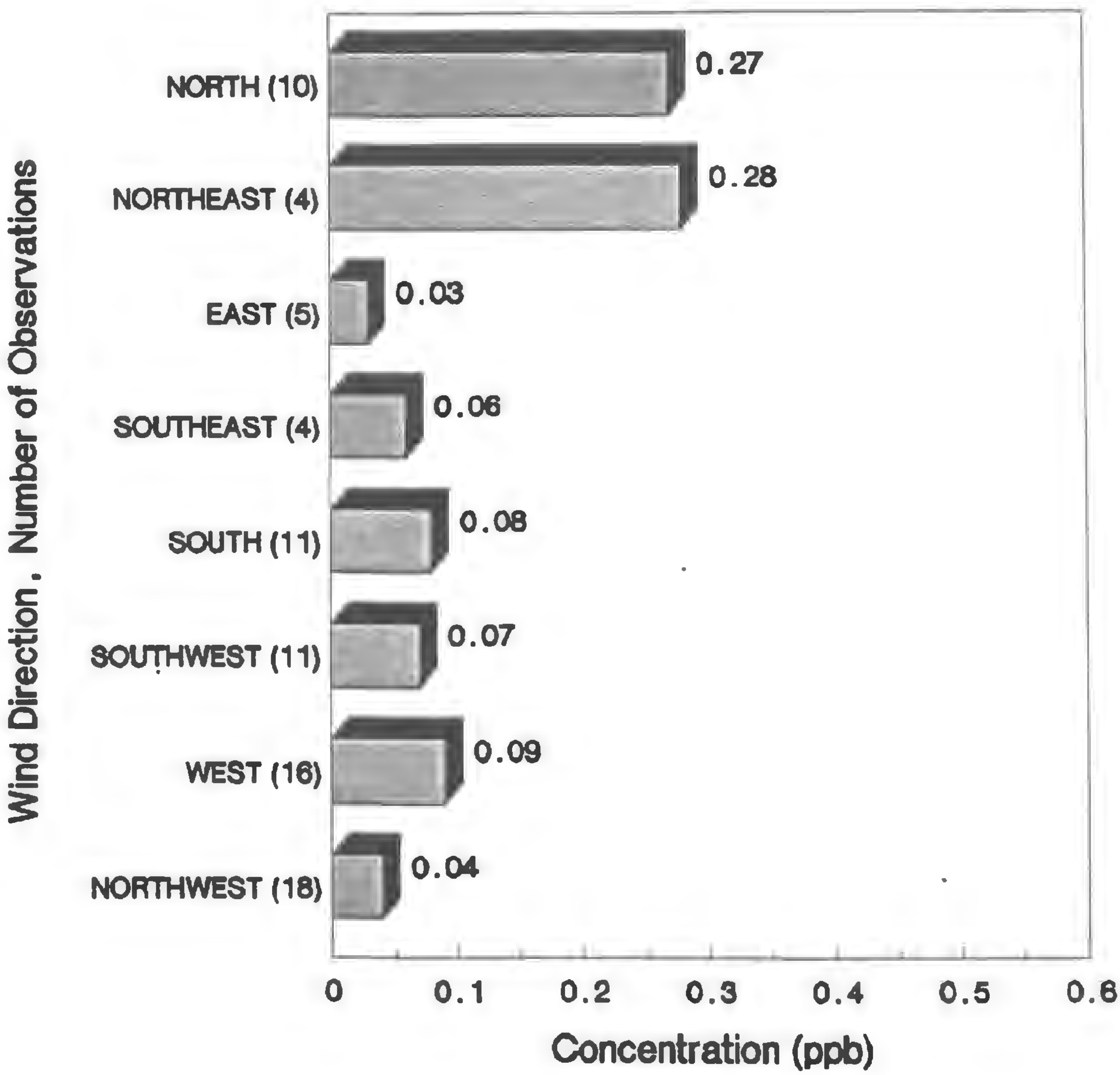
TOTAL NUMBER OF OBSERVATIONS: 82

Data: October/87 thru September/89

FIGURE III - 6B-39

SI/NJ UATAP POLLUTANT "ROSE"

PS 26, TRAVIS
TRICHLOROETHYLENE



TOTAL NUMBER OF OBSERVATIONS: 79

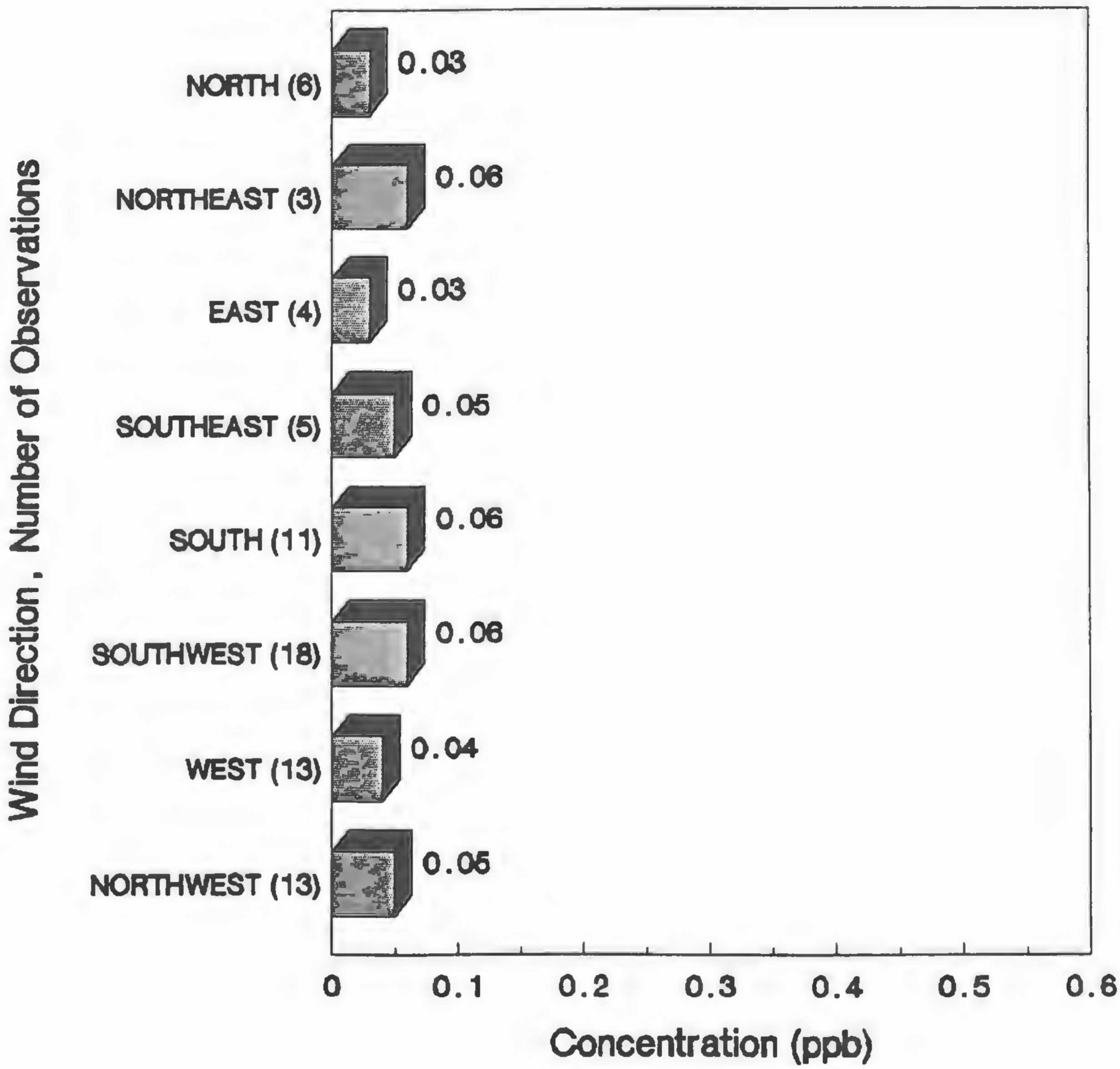
Data: October/87 thru June/89

FIGURE III - 6B-40

SI/NJ UATAP POLLUTANT "ROSE"

ELIZABETH, NJ

TRICHLOROETHYLENE



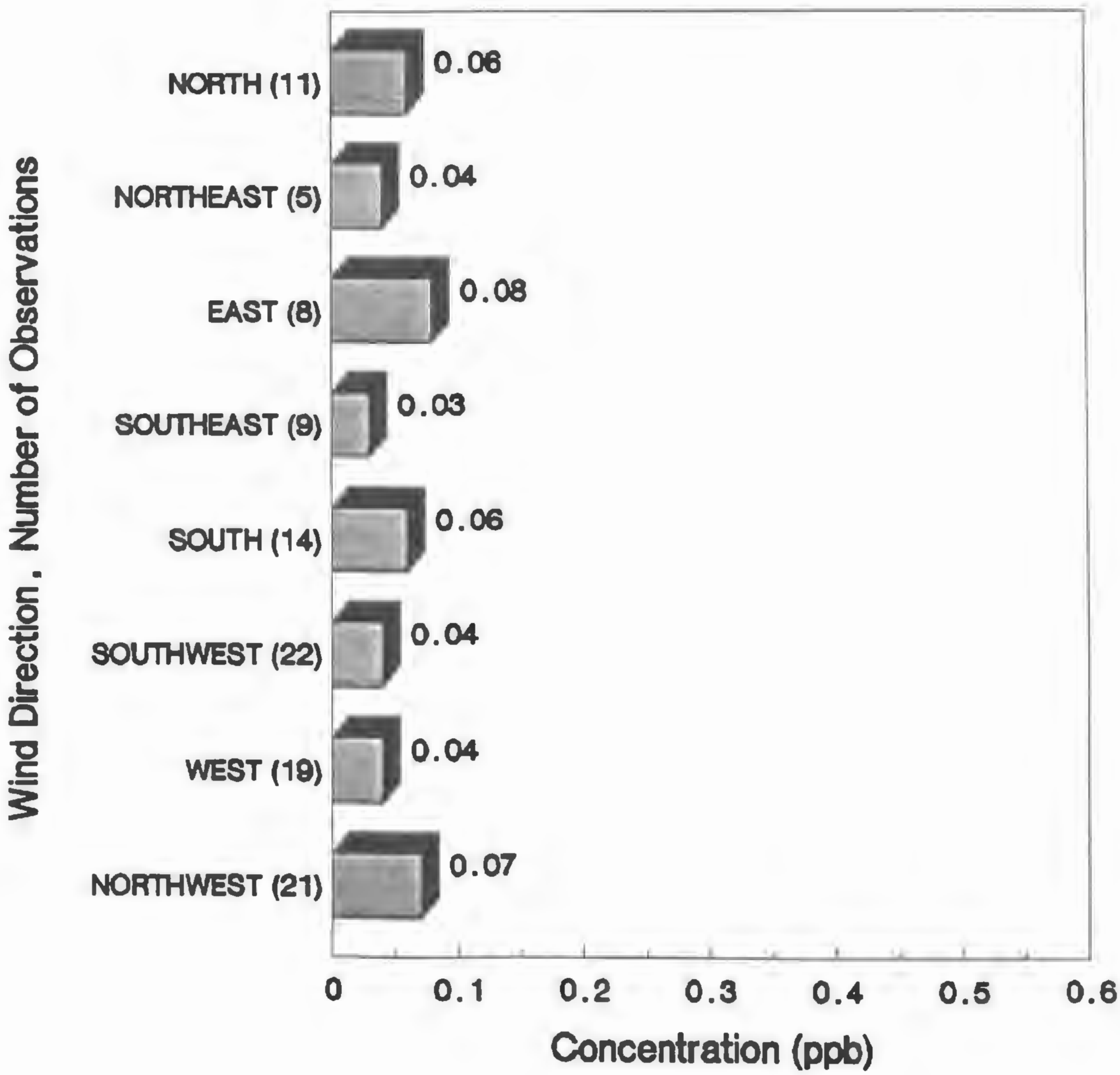
TOTAL NUMBER OF OBSERVATIONS: 73

Data: June/88 thru September/89

FIGURE III - 6B-41

SI/NJ UATAP POLLUTANT "ROSE"

CARTERET, NEW JERSEY
TRICHLOROETHYLENE



TOTAL NUMBER OF OBSERVATIONS: 109

Data: October/87 thru September/89

SOURCE IDENTIFICATION APPENDIX C -

INITIAL SURFACE TRAJECTORY ANALYSES

6C.1 Introduction

The pollutant/site/date sets selected for the initial back trajectory analyses included the following:

site locations representative of some more general section of the overall study area,

both aromatic and chlorinated hydrocarbon pollutants,

cases of peak concentrations and of lower average concentrations, and

bases for examination of seasonal trends or some other particular interest.

Six dates were selected for the initial phase of surface trajectory analysis. SO_2 concentrations were used in the analyses to attempt to differentiate chemical/source area relationships from more general air pollution or air stagnation periods. The dates and the reasons for their selection are as follows:

December 3-4, 1988: Aromatic compounds exhibited their highest (peak) concentrations, while chlorinated hydrocarbons and SO_2 did not.

January 22-23, 1989: Concentrations of all the VOCs and SO_2 exhibited major peaks. In addition, this date marked the beginning of an extensive air stagnation period in the northeastern United States.

February 9-10, 1989: This day was unique in that concentrations of all compounds were very low (valleys).

February 15-16, 1989: On this date, concentrations of aromatic compounds and SO_2 were at peaks, while concentrations for the chlorinated compounds were low.

August 14-15, 1989: This date was similar to February 15-16 with respect to concentration profile (peaks for the aromatics and SO_2, low concentrations for the chlorinated hydrocarbons), but it is a summer day, not winter. This date is for use in a winter versus summer comparison.

September 1-2, 1989: All of the chlorinated compounds were at peak levels, while the aromatics and SO_2 exhibited valleys.

Trajectories for these six periods of time are depicted graphically in Figures III-6C-1 through 6.

This section presents the results of the surface trajectory analyses on a day-by-day basis, and a summary that compares the various days. The trajectories are valid from 9 a.m. to 9 a.m. local time; this was designed to coincide with the 24-hour sampling period for VOCs.

Results are discussed in terms of aromatics and chlorinated compounds. While hexane is neither aromatic nor chlorinated, it followed the concentration patterns exhibited by the aromatics in this analysis; therefore, the discussion of aromatics in this section applies to hexane as well.

6C.2 Results

6C.2.1 December 3-4, 1988 (Map III-6C-1)

Synoptic Situation: Zonal air flow at all atmospheric levels, fast-moving cold front passed project area between midnight and dawn on the 4th.

Discussion: Consistent with a frontal passage, the surface winds veered from southwest on the 3rd to a more swift northwest direction at midnight into the morning of the 4th. This date featured high concentrations of aromatic hydrocarbons (benzene, toluene, xylenes) which are attributable, in large part, to mobile sources. It is probable that highest concentrations occurred when the winds were from the southwest, since the passage of the cold front and associated fresh northwest winds should tend to increase dispersion and minimize concentrations. This suggests auto emissions from Route 440 to the southwest of Susan Wagner H.S. as a contributor to the high aromatic compounds concentrations.

6C.2.2 January 22-23, 1989 (Map III-6C-2)

Synoptic Situation: High pressure off the coast of Virginia and low wind speeds aloft combined to produce a period of air stagnation over the project area. The worst of the stagnation occurred after the sampling period, on January 24.

Discussion: Trajectories for each three-hour interval are consistently from the southwest, in general from the Perth Amboy area of New Jersey. All pollutants exhibited major peaks during this sampling period. This is probably more likely due to the trapping of pollutant near the surface (inhibiting dispersion) than transport from a particular direction. For example, on the 24th, the winds were light and quite variable, but the SO_2 concentration remained extremely high. Toxic pollutant concentration data are not available for all sites for the 24th.

6C.2.3 February 9-10, 1989 (Map III-6C-3)

Synoptic Situation: Broad pressure trough in the upper air over the northeast with a wind shift from northwest to southwest through the period. This is the first situation in these analyses of this type of wind shift.

Discussion: This was the so-called valley day, when concentrations of all pollutants were very low. There were no frontal passages, and temperatures were uniformly cold. A connection between meteorology and low concentrations is not immediately apparent in this trajectory.

6C.2.4 February 15-16, 1989 (Map III-6C-4)

Synoptic Situation: Front passed through just before beginning of sampling period, rain and drizzle fell during the morning of the 15th. Wind speeds were low during the sampling period, shifting from the north early, to a northwesterly direction later in the sampling period.

Discussion: This scenario featured a trajectory from the north; this occurred early on. As the front moved further south, winds backed into the northwest. The pollutant scenario on this date matches that of December 3-4,1988, in that concentrations of aromatics and SO_2 peaked, while chlorinated compound concentrations were low. A case can be made that the Staten Island Expressway, to the north of the monitor, acted as a source of aromatic emissions during the slow northerly airflow early in the sampling period. It is more difficult to determine why the chlorinated compounds were at such low levels during this period.

6C.2.5 August 14-15, 1989 (Map III-6C-5)

Synoptic Situation: This day is an example of a summertime stagnation period. This is borne out by the presence of an upper ridge off the mid-Atlantic coast. The trajectories also indicate very variable and slow air flow for each three hour-interval.

Discussion: Once more it appears that the stagnation, to a greater extent than any particular source, caused the high concentrations of aromatics and SO_2. None of the eight three-hour trajectories was from the same direction; all directions were accounted for over the 24-hour period.

6C.2.6 September 1-2, 1989 (Map III-6C-6)

Synoptic Situation: Frontal passage late in sampling period, wind shifted from south to west-northwest. This is the first time the southerly wind direction was well-represented in the trajectories.

Discussion: This situation is unique among the dates selected in that it is the only one featuring high concentrations of chlorinated compounds contemporaneous with low aromatic and SO_2 levels. The wind speeds, generally fast, could account for greater dispersion and lower concentrations in the cases of aromatics and SO_2; however it seems that for chlorinated pollutants, specific point sources (dry cleaners for PCE, for example), and not meteorological conditions, are the controlling factors. Emission points and emission rates of these chemicals are needed to confirm this hypothesis, the subject of analyses presented in Volume III.

6C.3 Summary and Conclusions for the Initial Surface Trajectory Analysis

Inspection of the surface trajectory analyses reveals no markedly discernable meteorological episode signatures. The extremes seem to be well-defined: the January 22-23, 1989, stagnation episode (high aromatic, chlorinated hydrocarbon, and SO_2 concentrations) was associated with southwesterly winds; while the February 9-10, 1989, well-ventilated period (very low concentrations) was associated with westerly winds. The January 22-23 period found the New York metropolitan region in a forced surface ridge beneath an upper east-west oriented ridge between the northern and southern jets. Thus, the stagnation and high concentrations had been heralded.

The December 3-4, 1988, day (high aromatics) was similar aloft (cyclonic west northwesterly flow) to the February 9-10 valley day (both had SW to NW trajectories), but the former contained a frontal passage from the NW. The September 1-2, 1989, case (high chlorinated compounds) was similar to the December 3-4 case, except for expected seasonal modifications.

The August 14-15, 1989, case (high aromatics and SO_2) featured a surface ridge with an embedded precipitation-producing trough, beneath an upper level short wave trough which was advancing against a northwestward extension of the sub-tropical ridge. Quite a different trajectory pattern is depicted for the February 15-16, 1989, case, but similar concentration patterns. The February 15-16, 1989, case featured stable precipitation in a confluent southwesterly flow aloft, as a surface low pressure wave passed to the south of the region (generally northerly trajectories).

The concentrations of chlorinated compounds were at peaks during the wintertime stagnation episode (January 22-23), and at valleys during the summertime stagnation period (August 14-15). However, the summertime period featured wind recirculation patterns, whereas the winter period (at least during the sampling interval) showed southwesterly winds. During the only other time that chlorinated compounds exhibited peaks (September 1-2), the trajectories were from the southwest. This seems to suggest that the primary source area of chlorinated compounds is in the corridor from Perth Amboy, New Jersey, northeastward into central Staten Island.

INTERPRETING SURFACE TRAJECTORY OUTPUT

BACKGROUND

The surface trajectory model prints output as a backward surface trajectory of an atmospheric parcel; that is, assuming one is standing at the point of origin, the location of the air packet is traced **back in time.**

EXAMPLE

Consider a 3 p.m.-6 p.m. trajectory. This trajectory assumes that a parcel of air is located at the origin at 6 p.m., with the positions of the parcel at 5, 4, and 3 p.m. indicated by successive points which are connected by straight lines. To cover the 24-hour period of each air sample, the trajectory maps contain eight three-hour trajectories superimposed on the same map of the project area; therefore, one must carefully follow the trace of separate trajectories on the map. The solid square symbol completely obscures the other symbols at the parcel terminal point; i.e., the 6 a.m. point obscures the 12 noon, 3 p.m., 6 p.m., 9 p.m., 12 midnight, 3 a.m., and 9 p.m. points on each map.

```
Parcel terminal point->     o  6pm
                           /
                          /
                         x   5pm
                         |
                         |
                         x   4pm
                        /
                       /
                      /
                     x  3pm
```

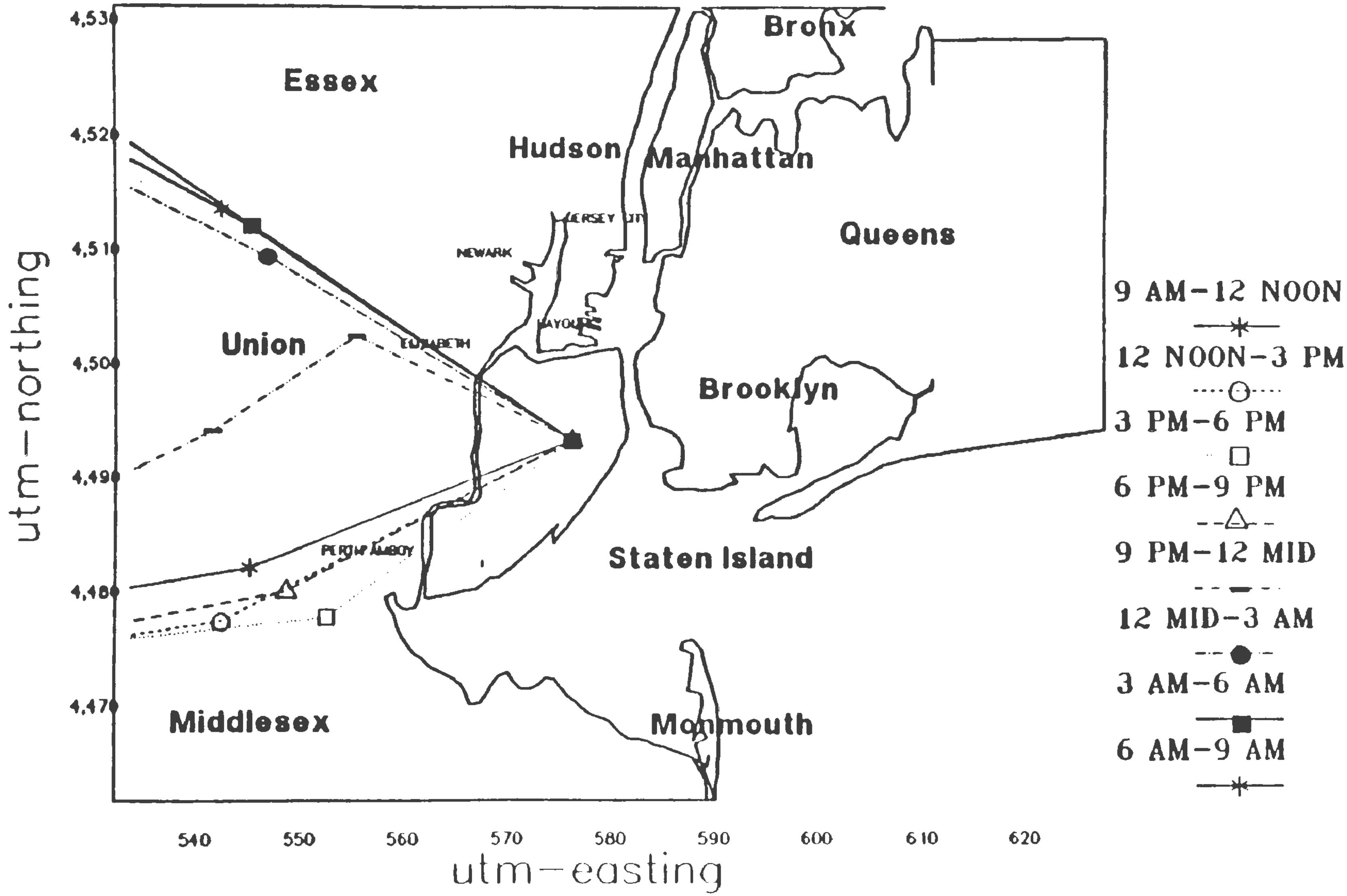
Consistent trajectories, i.e., those with eight lines which more or less followed each other very closely, could indicate or point out source areas of pollutants. In some instances trajectory consistency was observed; in others it was not, especially during periods of air stagnation and recirculation.

Sometimes, only one or two previous hours are observed on the trajectory; in these instances, wind velocities were relatively high and the missing points are beyond the map boundary, in Pennsylvania, western New Jersey, or eastern Long Island, for example.

MAP III - 6C-1

SURFACE TRAJECTORY PLOT - 12/3-4/88

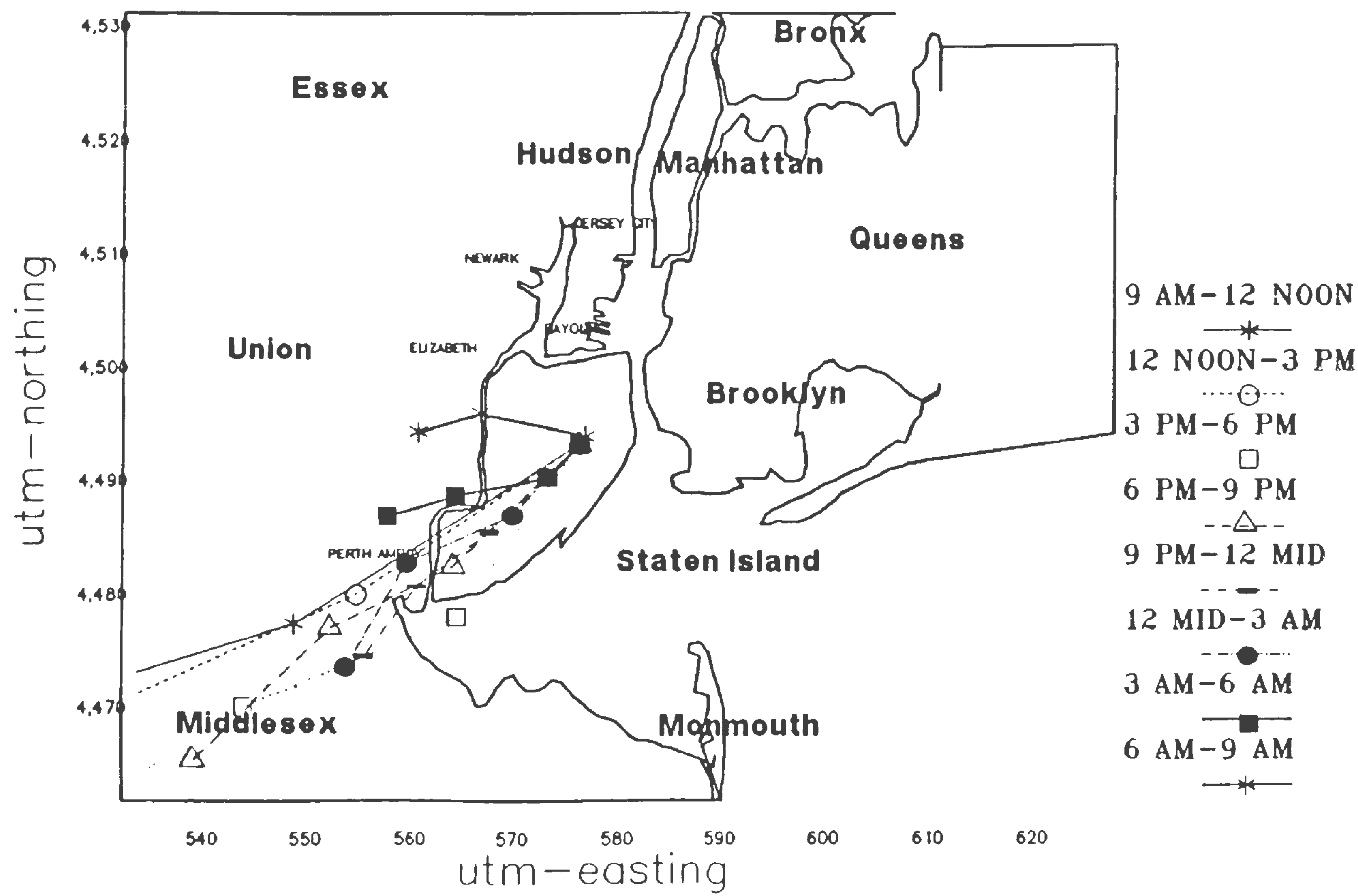
Ending Point: Susan Wagner High School



MET DATA FROM STATIONS #1-7

SURFACE TRAJECTORY PLOT - 1/22-23/89

Ending Point: Susan Wagner High School

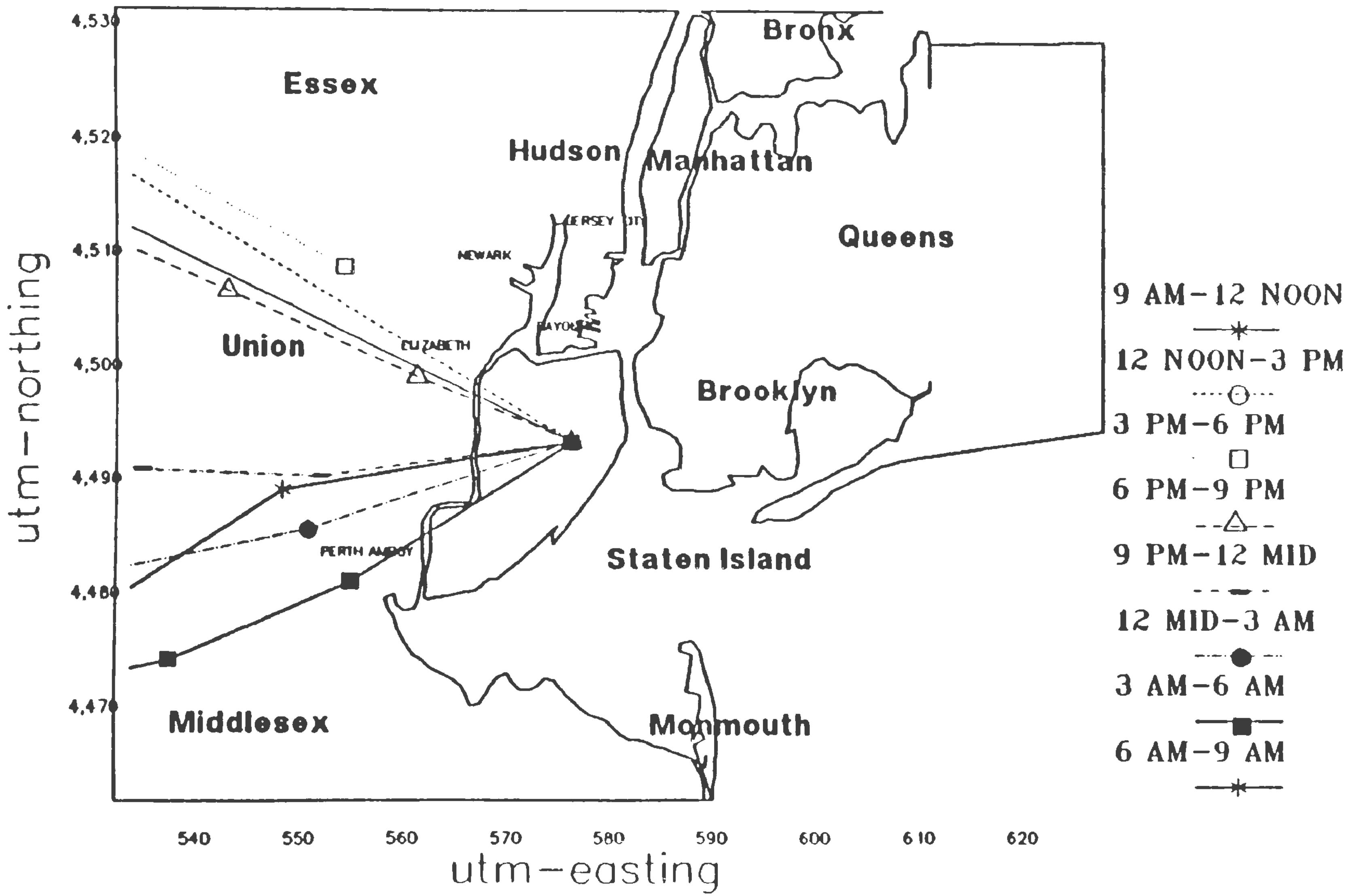


MET DATA FROM STATIONS #1-7

MAP III - 6C-3

SURFACE TRAJECTORY PLOT - 2/9-10/89

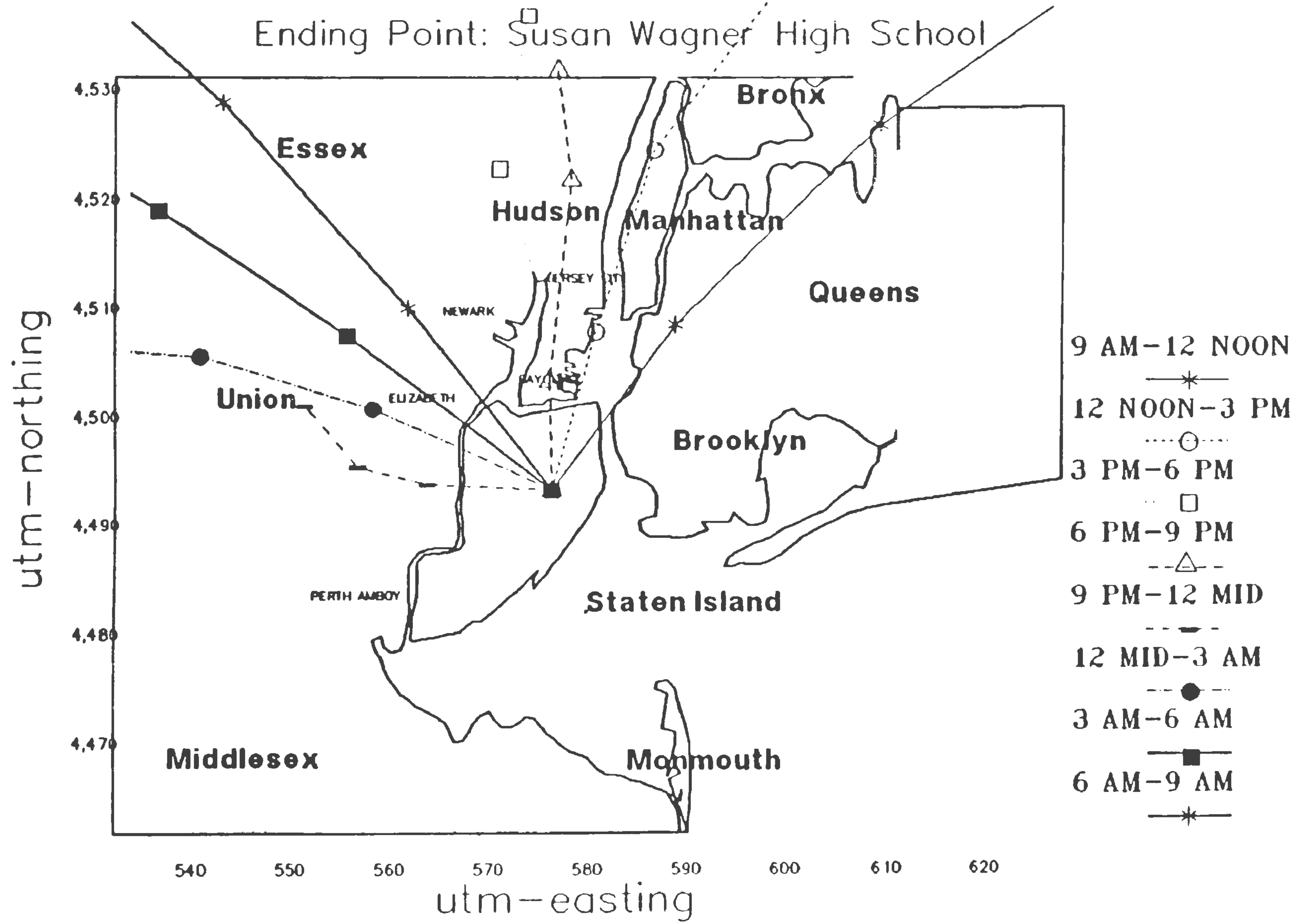
Ending Point. Susan Wagner High School



MET DATA FROM STATIONS #1-7

SURFACE TRAJECTORY PLOT - 2/15-16/89

Ending Point: Susan Wagner High School

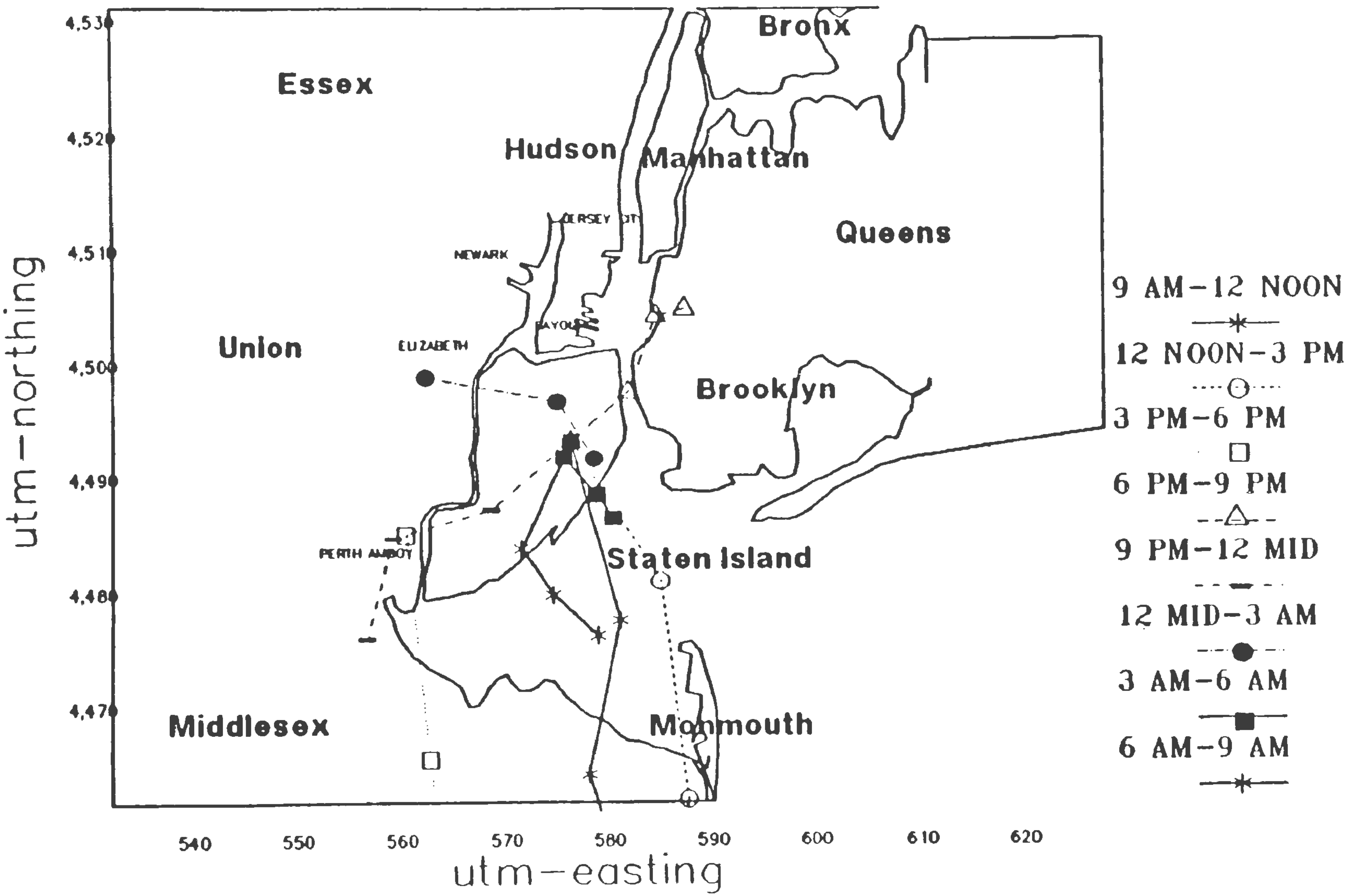


MET DATA FROM STATIONS #1-7

MAP III - 6C-5

SURFACE TRAJECTORY PLOT - 8/14-15/89

Ending Point: Susan Wagner High School

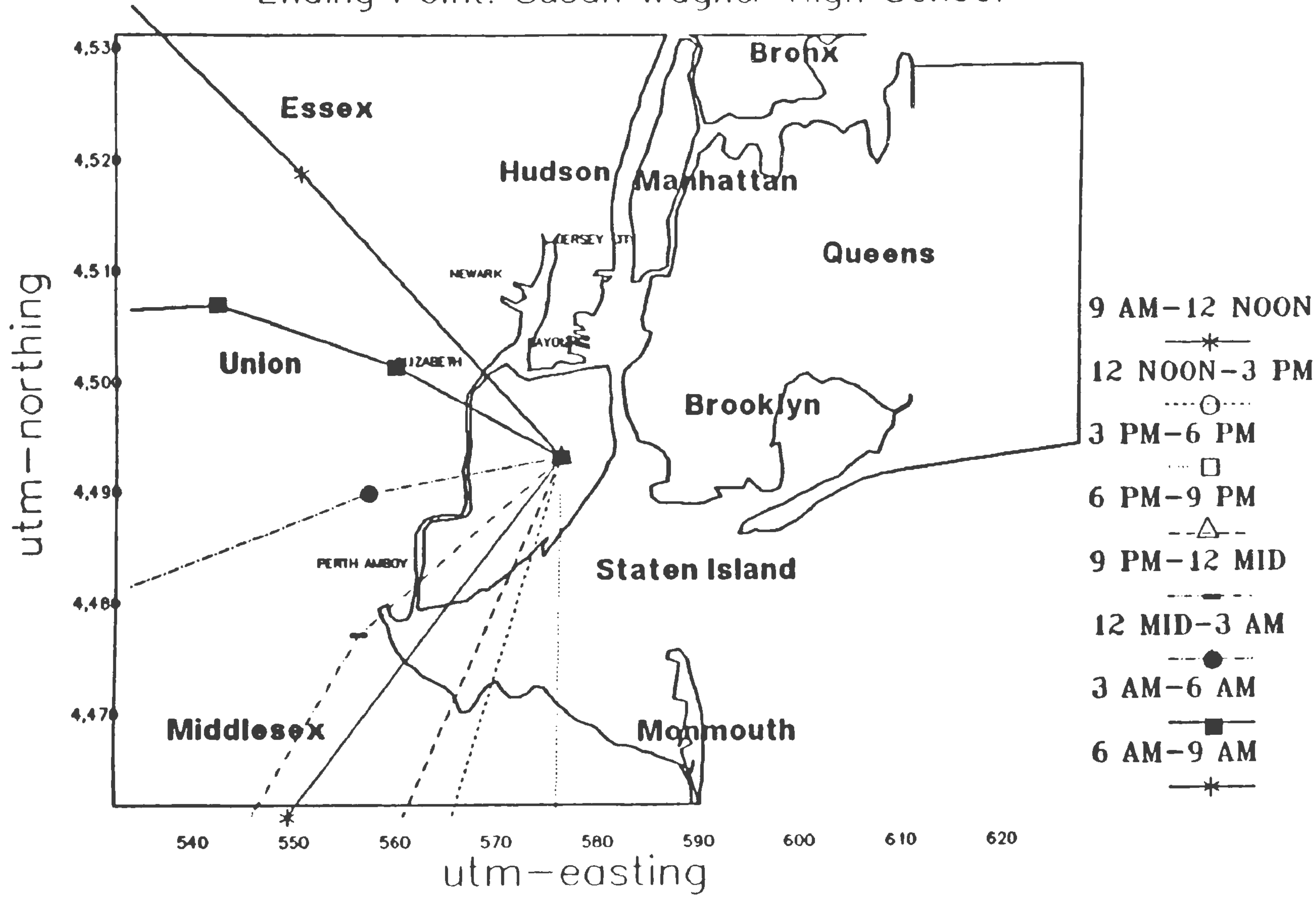


MET DATA FROM STATIONS #1-5

MAP III - 6C-6

SURFACE TRAJECTORY PLOT - 9/1-2/89

Ending Point: Susan Wagner High School



MET DATA FROM STATIONS #1-5

SOURCE IDENTIFICATION APPENDIX D - SURFACE TRAJECTORY ANALYSIS FOR SOURCE IDENTIFICATION FOR CARBON TETRACHLORIDE

6D.1 June 20-21, 1988 (Map III-6D-1)

Concentrations of carbon tetrachloride were highest at the Carteret monitor during this time period, when surface trajectories were from the west and southwest.

The microinventory lists several sources that are located west and southwest of the monitor microinventory; included are two dry cleaners, a gas station, and two auto refinishing shops.

In the point source inventory for carbon tetrachloride, only the Middlesex County POTW has emissions greater than 1 tpy; located 17.8 km from the Carteret monitor, its carbon tetrachloride emissions are listed as 1.23 tpy.

Carteret POTW should be mentioned here; although it's annual emissions are less than 1 tpy (0.45 tpy), its location only 0.4 km from the Carteret monitor makes it a potential contributor to the high concentrations mentioned there.

6D.2 July 9-10, 1989 (Map III-6D-2)

Concentrations of carbon tetrachloride were highest at Sewaren and Elizabeth during this period when the surface trajectories were from the southwest.

The point source inventory for carbon tetrachloride lists the following with emissions greater than 1 tpy:

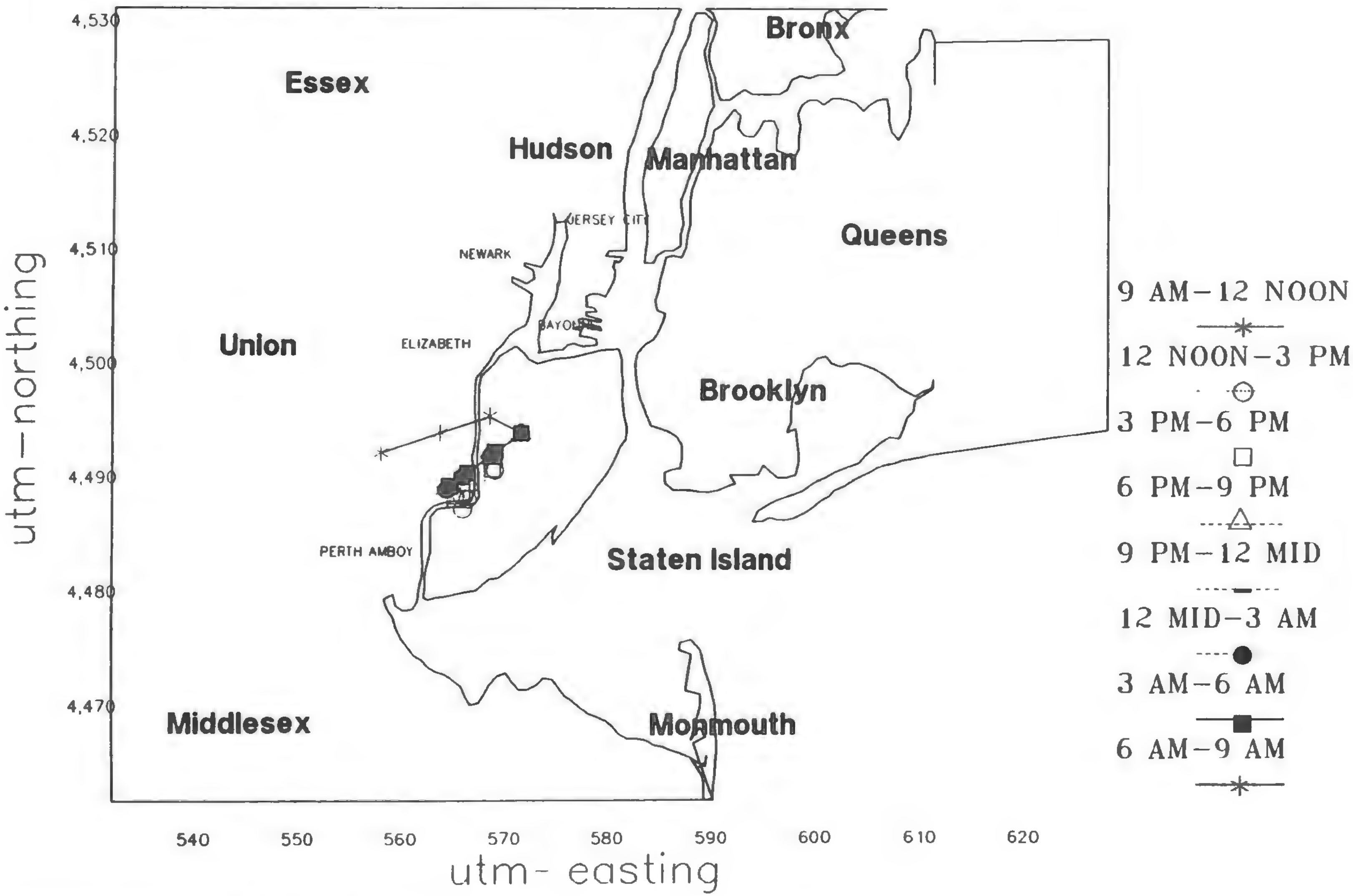
Source	Emissions (tpy)	Distance (km) to Sewaren
Hercules, Inc.	447.74	13.7
Middlesex County POTW	1.23	13.3

Here, once again, the principal contributor to the carbon tetrachloride concentration at the monitor was an industrial source.

MAP III - 6D-1

SURFACE TRAJECTORY PLOT - 6/20 - 21/88

Ending Point: Richmond Rd. Pump Station

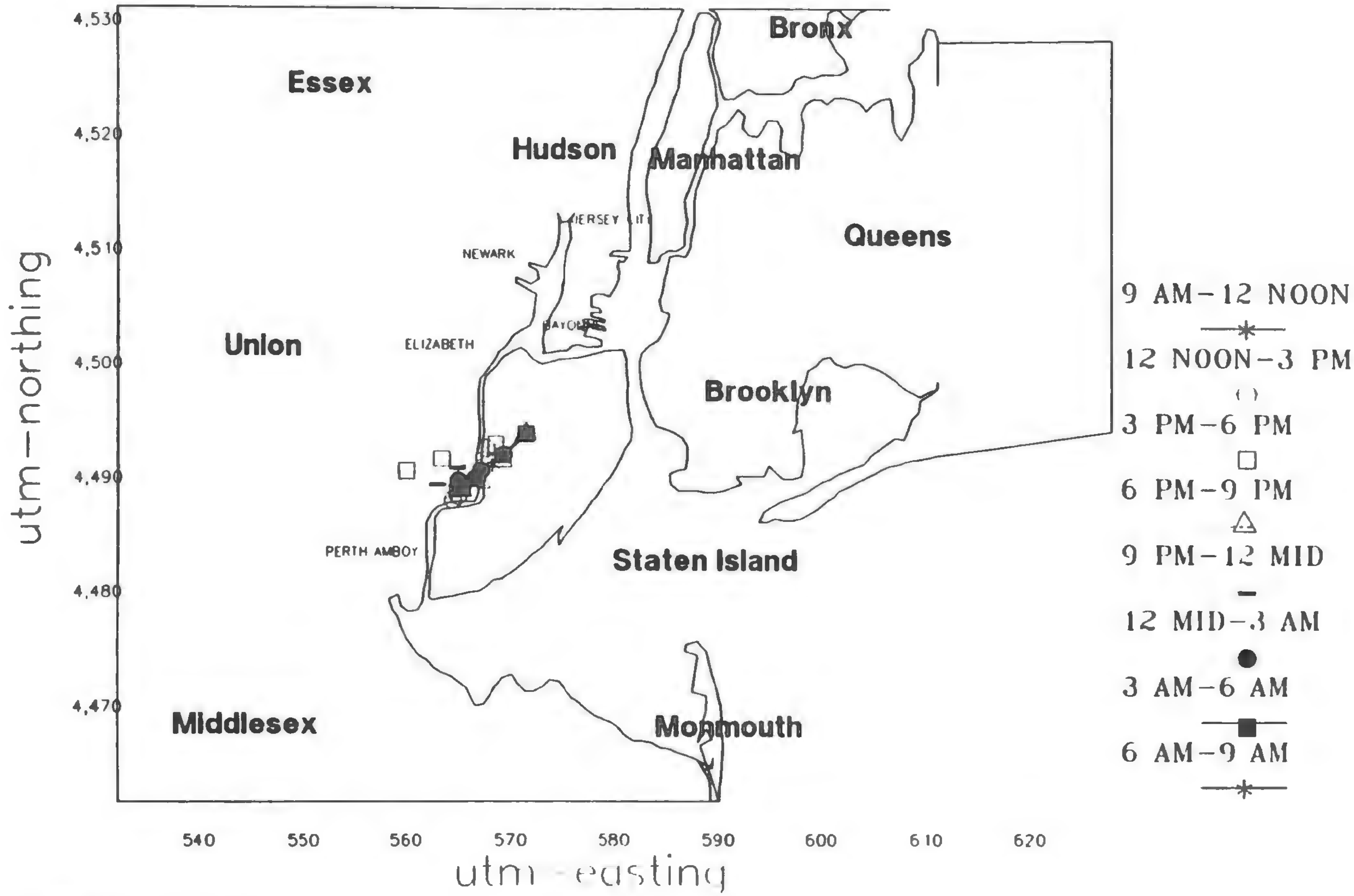


MET DATA FROM STATIONS # 1 - 5

MAP III - 6D-2

SURFACE TRAJECTORY PLOT - 7/09 - 10/89

Ending Point: Richmond Rd. Pump Station



MET DATA FROM STATIONS # 1 - 6

**SOURCE IDENTIFICATION APPENDIX E -
RELATIVE SOURCE IMPACT**

6E.1 Introduction

This section presents a technique which can be used to demonstrate the relative extents to which air quality impacts at a monitor are a function of distance and emission rates of the sources and source areas in the project study area. In general, the relative impacts of sources with high emissions at large distances from the monitor were compared with relative impacts of sources with low emissions at small distances from the monitor. The goal of this analysis was to establish the relative importance of emissions and distance in the source-receptor relationships.

6E.2 Methodology

The SCREEN dispersion model was used with assumed stack parameters (i.e. exit velocity, exit temperature, ambient temperature, stack diameter). Unit emission rates were used, and the computed impacts were multiplied by actual source emissions to determine source contribution. Source distances from monitors were simulated by using discrete receptors.

The objective of this analysis was to determine relative impacts of several sources. Hence, it is the difference in impact that is significant, not the impact values computed using the assumed parameters.

The pollutant rose analyses were assessed, and source/monitor relationships that were representative of a straight line were chosen. This was necessary since the SCREEN model computes impacts based on persistence of wind direction for one hour. In addition to the straight line geometry of sources and monitors, the sources farthest from the monitor must have greater emissions than the sources closer to the monitor. It is assumed that nearby sources with high emissions will have more of an impact on the monitor than more distant sources with similar or lower emission rates.

6E.3 Limitations of Analyses

The use of assumed stack parameters in these analyses is probably the greatest limitation in the credibility of this undertaking. Analyses should be more credible for those sources in the same category, e.g., POTWs, since sources in the same category are more likely to have similar stack parameters than are a mixture of several source categories. This should be kept in mind when interpreting results.

The usual limitations of any dispersion model must be considered as well. These limitations include approximations such as constant wind direction for one hour periods, Gaussian pollutant distribution, and constant ambient temperature.

6E.4 Relative Source Impact Analyses

This analysis used a different approach from that used in Section 6.3 of this volume.

6E.4.1 Analysis #1 - Toluene, year 2

This analysis considered Pollutant Rose D - toluene (year 2). This rose indicated a relationship between southwest winds and high average concentrations of this pollutant at the Elizabeth monitor.

See the appendix for the earlier pollution rose results, where nine sources were listed with emissions of greater than 5 tpy. From these nine, five sources were selected. Relative contributions to impact from each source as determined by the screening modeling are presented in the following table.

Source	Emission Rate (g/s)	Distance (km)	Unit impact, ($\mu g/m^3$)/(g/s)	Estimated Impact, $\mu g/m^3$
General Motors	3.08	5.9	5.913	18.21
Safety Kleen	1.90	5.7	6.161	11.71
Merck & Co.	1.34	6.5	5.274	7.07
Middlesex POTW	1.32	23.7	1.257	1.66
Midatlantic Container	0.17	4.2	8.926	1.52

For the first three facilities, more or less equidistant from the monitor, the ratio of their impacts is approximately equal to the ratio of their emissions. The proportionality holds for two sources with equal emissions and varying distances from the monitor; see Merck & Co. and Middlesex POTW. It can be seen from the chart that the relative contributions of the last two sources are approximately equal; the higher emissions of Middlesex POTW are offset by the closer distance of Midatlantic Container.

6E.4.2 Analysis #2 - 1,1,1-trichloroethane

This relative source impact analysis considered Pollutant Rose E - 1,1,1-trichloroethane. This rose depicted a strong association of northeast winds with high concentrations of 1,1,1 trichloroethane at the Port Richmond monitor.

Sources were located from the inventory as shown in the Appendix. Of the nine sources listed, seven were selected. Relative contributions to impact from each source as determined by screening modeling are presented in the following table.

Source	Emission Rate (g/s)	Distance (km)	Unit impact, $(\mu g/m^3)/(g/s)$	Estimated Impact, $\mu g/m^3$
PD Oil/Chem Stor.	1.93	3.0	13.66	26.36
Gordon Term. Svce.	0.42	2.7	15.66	6.58
Edison Price, Inc.	0.30	19.1	1.58	0.47
Newtown Creek POTW	0.21	16.5	1.85	0.39
Simplex Ceiling Co.	0.20	12.7	2.46	0.49
Bayonne POTW	0.05	2.5	17.32	0.87
Port Richmond POTW	0.03	1.2	47.45	1.42

The top two emitters in the inventory contribute the most to the total impact at the monitor, not surprising considering their short distance from the monitor. The third highest contributor here is the lowest emitting source -- the Port Richmond POTW. This illustrates the importance of distance from the monitor; a very small source like the Port Richmond POTW can still have a significant impact on the monitor relative to sources that are larger but more distant.

6E.5 Comments

It should be mentioned here that very stable meteorological conditions and low wind speeds were assumed for computing relative impacts. It is assumed that the actual monitored impacts were at maxima when meteorological conditions were indicative of a stable situation. Thus, there is confidence that the dispersion regime used in computing highest impacts was reflective of the actual dispersion environment during days of high pollutant concentration.

QUALITY ASSURANCE

6F.1 Internal Quality Assurance

6F.1.1 Wind measurements

Quality assurance of the wind instruments is provided by the National Weather Service for the airport stations used, and by NYSDEC for the three wind sites located on Staten Island. Quality Assurance procedures include system and performance audits of instruments and recording systems.

6F.1.2 Concentration data

The air toxics data used as input for pollution rose models and for the selection of days for the surface trajectory model analyses are regarded as having undergone proper quality assurance by the Quality Assurance Subcommittee. This includes quality assurance for the instruments as well as the chemical analyses.

6F.2 Quality Assurance for the Trajectory Model and the Pollutant Rose

The surface trajectory model was adapted from a model developed to study the transport of ozone and its precursors (U.S. EPA, 1989).

The pollution rose program simply assembles a chart and provides graphical output derived from this chart.

6F.3 Wind Instruments

6F.3.1 Instrument siting

The following principles concerning meteorological measurements for air pollution monitoring (U.S. EPA, 1983) have been followed to the extent possible. Specific comments regarding siting for the instruments used in this project can be found in a memorandum (Barrett, 1989) in Volume VI, Appendix, of the SI/NJ UATAP project report.

The primary objective of instrument siting is to place the instrument in a location where it can make precise measurements that are representative of the general state of the atmosphere in that area, consistent with the objectives of the data collection program. Because most atmospheric properties change dramatically with height and surroundings, certain somewhat arbitrary conventions must be observed so that measurements can be compared.

> "The standard exposure of wind instruments over level, open terrain is 10 meters above the ground" (U.S. EPA, 1983); however optimum measurement height may vary according to data needs. Open terrain is defined as an area where the horizontal distance between the instrument and any obstruction is at least ten times the height of the obstruction. An obstruction may be man made (such as a building) or natural (such as a tree). The wind instrument should be securely mounted on a mast that will not twist, rotate, or sway. If it is necessary to mount the wind instrument on the roof of a building, it should be mounted high enough to be out of the area in which the air flow is disturbed by the building. This is usually 1.5 times the height of the building above the roof so that the instrument is out of the wake of the obstruction. This is not a good practice, however; it should be resorted to only when absolutely necessary. Sensor height and its height above the obstructions, as well as the character of nearby obstructions, should be documented.

6F.3.2 Meteorological towers

Towers should be located in an open, level area representative of the area under study. They should be of the open grid type of construction, typical of most radio and television broadcast towers. Enclosed towers, stacks, water storage tanks, grain elevators, cooling towers, and similar structures should not be used (U.S. EPA, 1983). Towers must be rugged enough so that they may be safely climbed to install and service the instruments. Folding or collapsible towers that make the instruments available to be serviced or calibrated at the ground are desirable provided they are sufficiently rigid to hold the instruments in the proper orientation and attitude during normal weather conditions.

Wind instruments should be mounted above the top of the tower or on booms projecting horizontally out from the tower. If a boom is used, it should support the sensor at a distance equal to twice the maximum diameter or diagonal of the tower away from the nearest point on the tower. The boom should project into the direction which provides the least distortion for the most important wind direction. For example, a boom mounted to the east of the tower will provide least distortion for north or south winds.

An assessment of the meteorological towers used in this project can be found in a memorandum (Barrett, 1989) in Volume VI, the appendix of the SI/NJ UATAP project report.

6F. 3.3 Station Siting

It is important that care be taken in selecting station location with respect to major man-made and topographic features such as cities, mountains, and large bodies of water, since they affect meteorological variables. Some of these features are found within the project study area. The effect of cities has been studied extensively (U.S. EPA, 1983). Documented effects include a decrease in average wind speed, decrease in atmospheric stability, increase in turbulence, increase in temperature, and changes in precipitation patterns. These changes have an impact on the evaluation and interpretation of meteorological and air quality data from an urban area.

Almost any physical object has an effect on atmospheric motion. It is probably impossible to find a site that is completely free from obstruction; such was the case with the meteorological towers for this project. If obstructions are present, the monitoring site chosen should be appropriate for study of the area of interest. For example, if the area of interest is in a valley or sea coast, then the meteorological instruments should be in that valley or near the coast, not on a nearby hilltop or 30 km inland at a more convenient airport site.

The meteorological sites for this project were chosen with the different physical features in mind. These sites are representative of the typical air flow regimes present on Staten Island. The Tottenville site represents sea-breeze flow from nearby Raritan Bay, the Pump Station site reflects flat terrain conditions, and the Susan Wagner High School site represents a hillier terrain.

SOURCE IDENTIFICATION APPENDIX G -

SUMMARY TABLES FOR ALL SURFACE TRAJECTORIES GENERATED FOR PERCHLOROETHYLENE ANALYSIS

Key to symbols: N=North, NE=Northeast, E=East, SE=Southeast, S=South, SW=Southwest, W=West, NW=Northwest

Table III-6G-1: High five perchloroethylene concentration dates ordered from highest to lowest

	Pump Station	Carteret	Travis
1.	1/22-23 1989	12/23-24 1988	2/15-16 1989
2.	1/10-11 1989	11/23-24 1988	11/30-12/1 1988
3.	11/5-6 1988	10/30-31 1988	1/22-23 1989
4.	1/16-17 1989	10/18-19 1988	2/27-28 1989
5.	10/24-25 1988	1/16-17 1989	2/21-22 1989

Table III-6G-2: Low five perchloroethylene concentration dates ordered from lowest to highest

	Pump Station	Carteret	Travis
1.	1/4-5 1989	2/15-16 1989	12/11-12 1988
2.	2/9-10 1989	2/21-22 1989	1/4-5 1989
3.	12/11-12 1988	2/27-28 1989	12/17-18 1989
4.	3/5-6 1989	3/5-6 1989	2/9-10 1989
5.	12/23-24 1988	10/12-13 1988	10/30-31 1988

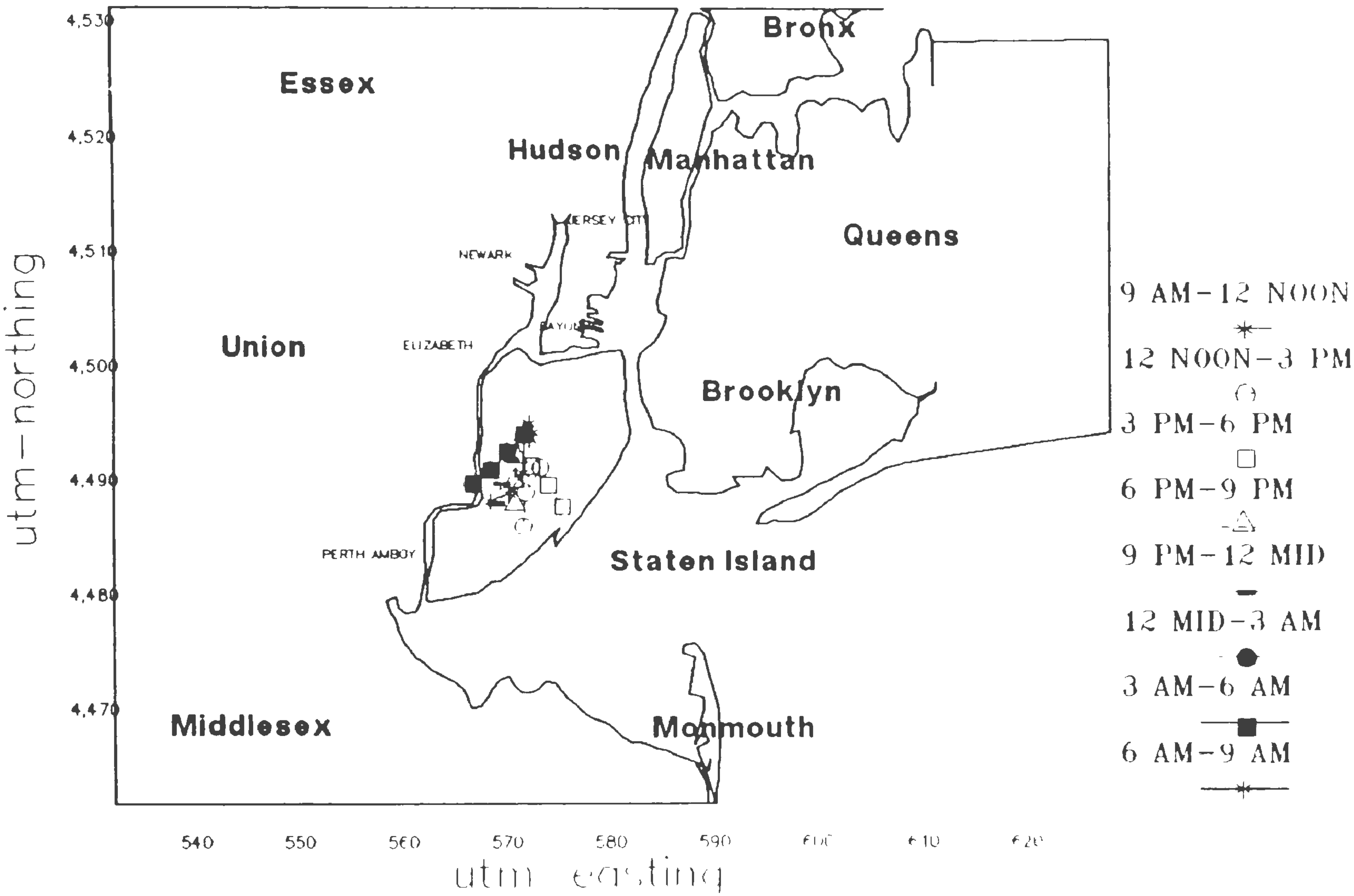
SOURCE IDENTIFICATION APPENDIX H -

SURFACE TRAJECTORIES NOT DISCUSSED IN SECTION 6.5

MAP III - 6H-1

SURFACE TRAJECTORY PLOT - 3/11 - 12/89

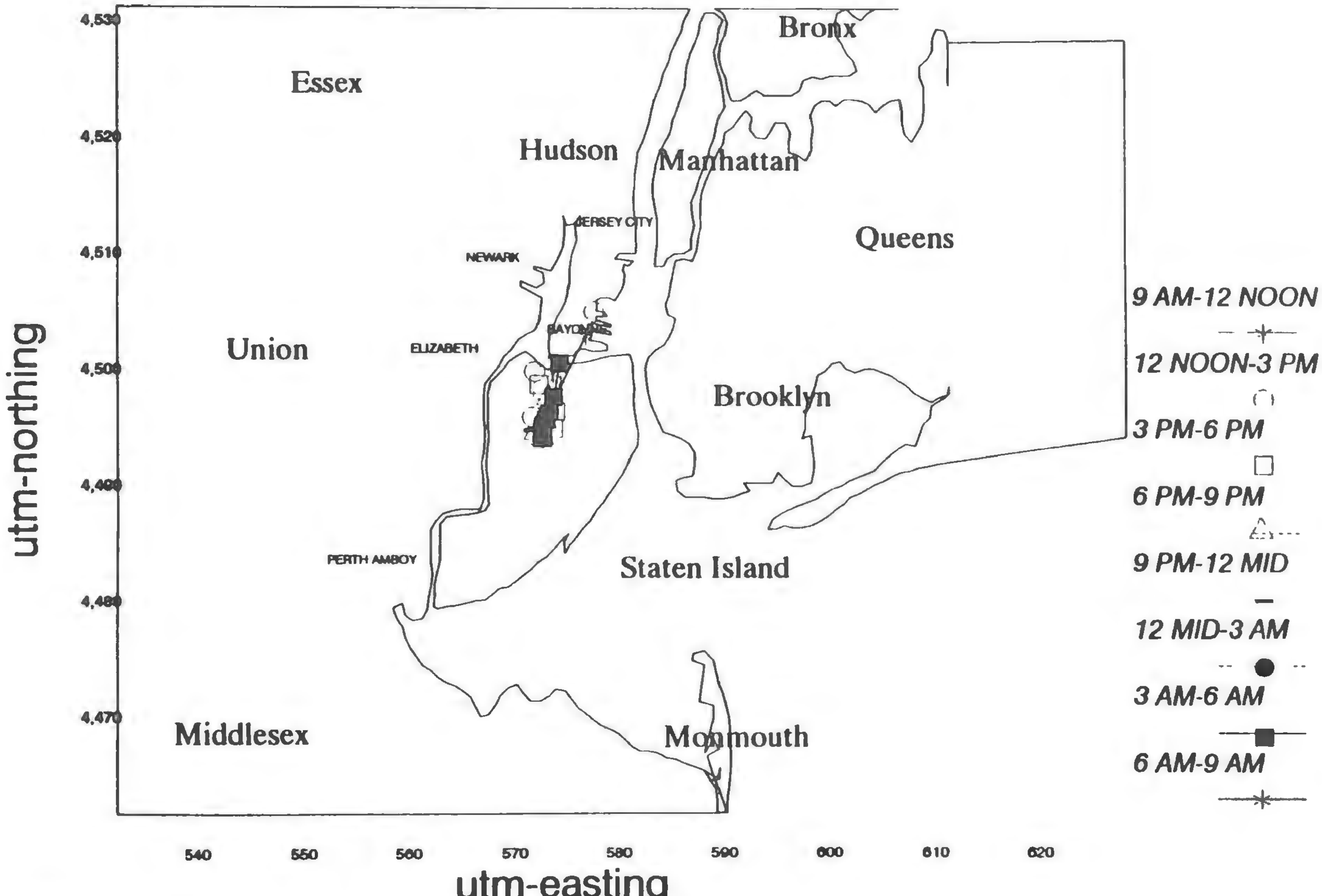
Ending Point: Richmond Rd. Pump Station



MET DATA FROM STATIONS # 1 - 5

SURFACE TRAJECTORY PLOT - 10/15-16/87

Ending Point: Richmond Rd. Pump Station



MET DATA FROM STATIONS #1-5