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DEVELOPMENT AND IMPLEMENTATION OF EXPOSURE ASSESSMENT PROCEDURES FOR TOXIC AIR POLLUTANTS IN SEVERAL LOS ANGELES COUNTY, CA COMMUNITIES

By

E. D. Pellizzari, L. C. Michael, K. Perritt, D. J. Smith,
T. D. Hartwell, and J. Sebestik

Research Triangle Institute
Post Office Box 12194
Research Triangle Park, NC 27709-2194

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Dr. Dane Westerdahl, Project Officer

Air Resources Board
1102 Q Street
Sacramento, California 95812

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SECTION 1
INTRODUCTION

OVERVIEW

The Toxic Exposure Assessment Methodology (TEAM) study was conceived in 1979 to: 1) develop methods to measure personal total exposure (air, water and food) and resulting body burden of toxic and carcinogenic chemicals and 2) apply these methods within a probability-based sampling strategy to estimate exposures and body burdens of urban populations in several U.S. cities. A pilot study, conducted in July and December 1980, tested preliminary sampling and analysis protocols, for chemicals potentially present in air, water, food, house dust, blood, breath, urine and human hair. Volatile and semi-volatile organics, metals and PAHs were included as target species in the pilot phase. The results of conducting this study on nine participants from New Jersey and three from North Carolina indicated that the overall goals of the TEAM program could be met by monitoring only the volatile organic compounds in personal and ambient air, exhaled breath and drinking water.

The main TEAM study monitored exposures of approximately 600 people in Bayonne and Elizabeth, New Jersey (1981, 1982, 1983, 1987); Greensboro, North Carolina (1982); Devils Lake, North Dakota (1982); Antioch and Pittsburgh, California (1984) and Los Angeles County, California (1984, 1987). Target chemicals (20) were selected on the basis of their toxicity/carcinogenicity, production volume, detection in previous studies and facility to collection on Tenax. In addition to outdoor stationary air samplers, each participant carried a small battery-powered, personal air sampler for two consecutive (overnight and daytime) sampling periods. A single breath sample was collected from each participant at the end of the 24 hours. Two drinking water samplers were also collected from each participant. The 600 participants selected and monitored represented a total population of 700,000 residents.

In addition to the pilot and main TEAM studies, four special studies were undertaken: 1) a nursing mothers study conducted on 17 nursing

mothers in Bayonne and Elizabeth, NJ to assess accumulation of the target chemicals in mother's milk and the relationship between exposure and body burden; 2) a dry cleaners study to investigate employee exposure to tetrachloroethylene, 1,1,1-trichloroethane, and aromatic solvents; 3) a swimming pool study to monitor lifeguards for elevated chloroform exposure; 4) an indoor air study to measure volatile organics, pesticides, PCBs, respirable particulates, metals and formaldehyde in four public buildings.

The significnat findings of the TEAM study may be summarized (1):

1. Personal exposures to most of the target chemicals can be effectively measured using Tenax monitors.
2. Exhaled breath provides a sensitive and non-invasive means to determine the target compounds in blood.
3. Mean personal air levels of the eleven prevalent target chemicals were almost always greater than mean outdoor concentrations suggesting significant indoor air exposures at home and at work.
4. Elevated indoor air levels may be attributed to consumer products, building materials and personal activities.
5. For nearly all chemicals, breath levels showed significant correlation with personal air concentrations but not with outdoor air levels.
6. Specific exposure sources included:
   a. Smoking (benzene, xylenes, ethylbenzene, styrene in breath)
   b. Passive smoking (same chemicals in indoor air)
   c. Visiting dry cleaners (tetrachloroethylene in breath)
   d. Auto exhaust (benzene in breath)
   e. Various occupations, including: chemicals, plastics, wood processing, scientific laboratories, garage or repair work, metal work, printing (mostly aromatic chemicals in daytime personal air)
7. The overall impact of these sources far surpassed that of residential proximity to chemical plants, petroleum refineries, petrochemical plants, drycleaners and service stations on personal exposure.
8. With the exception of the trihalomethanes, greater than 99% of the exposure was attributed to air. Nearly all of the exposure to the three brominated trihalomethanes and more than half of most exposure to chloroform was attributed to drinking water.

OBJECTIVES

A TEAM study was conducted on 117 participants in Los Angeles County in February of 1984 and on a subset of 52 participants in May of 1984 (1, 2, 3). The California Air Resources Board (CARB) in collaboration with the Environmental Protection Agency (EPA) has conducted a follow-up study in the previously studied homes in Los Angeles County. This follow-up study is the subject of this report and, in addition to personal sampling, also included a comparison of daytime and nighttime levels of vapor-phase organics in both indoor and outdoor residential environments, and at a centrally-located fixed-site.

In as much as the study population was not selected using probability sampling techniques, the purpose of this follow-up study was not to gather monitoring data for the purpose of risk assessment nor to make inferences from this data to the general population.

The principal objectives in this follow-up study were:

1. To determine the contribution of outdoor pollution to indoor levels of approximately 24 vapor-phase toxic, carcinogenic substances;
2. To determine the air exchange rates in homes and to calculate the source strengths in each of the homes;
3. To compare monitoring data obtained from a centrally-located fixed-site with that obtained outside of the home;
4. To compare different sampling and analysis techniques employed at the centrally located fixed-site, and
5. To examine the above relationships in two different seasons; winter (February) and summer (July).

The target population for the TEAM followup study included all the participants still living in the homes which were sampled in 1984 in communities near Los Angeles, California. Fifty-one and 43 households were sampled during the winter season and summer season, respectively. The following samples were collected in each home

1. two, personal 12-hour samples (day and night);
2. three, indoor air samples, representing 12-hour sampling periods from the living room and a single 12-hour period in the kitchen area;
3. two, 12-hour outdoor air samples (day and night);
4. air exchange measurements;

5. two, 12-hour sampling periods of indoor and outdoor air from each residence using a canister for sampling (from a subset of ten homes); and
6. two, 12-hour sampling periods at a centrally-located fixed-site using three different sampling and analysis methods.

Household questionnaires were designed to supplement the questionnaires from the 1984 study and were administered by field interviewers to the selected participants. The 24-hour recall exposure questionnaire was also filled out immediately following the monitoring period by the analytical chemists visiting the home.

This report describes the results obtained for this effort. Breath and drinking water samples were collected as part of the concurrently executed US EPA TEAM monitoring program. Brief references to these two sample types are included in this report for completeness. Detailed presentation of sample collection and analysis, as well as statistical data analysis, for breath and drinking water appear in a separate document (4).

SURVEY OPERATIONS

The follow-up California TEAM Study was conducted in Los Angeles County in two seasons, Winter 1987 and Summer 1987. The study involved the collection of environmental and biological samples, and questionnaire data from individuals in order to investigate exposure to various chemicals found in the environment, and to determine if previous TEAM results could be replicated and corroborated. For the follow-up study, the same residences were contacted that were involved in the 1984 California TEAM Study. If possible, the same person was recruited to participate in the study again. If that person no longer lived at the address, then any household member 7 years of age or older who lived at the address was eligible to participate in the study. Field interviewers made a personal visit to the homes, fully explained the study, obtained signed consent, administered the Study Questionnaire, entered the data into a Toshiba T1100 Plus lap-top personal computer, and arranged for RTI chemists to come to the residence four times during a 48-hour period to collect air, breath, and water samples.

Section 2 discusses the various survey operation activities undertaken for each season of the follow-up California TEAM Study. These include: preparation of data collection materials and forms, selection and training

of the field interviewing staff, field data collection, data receipt, coding and editing, and data entry.

CHEMICAL SAMPLING AND ANALYSIS

Personal air, fixed-site air, and canister air samples were collected during two sampling efforts in Los Angeles County, California, as part of the TEAM study. This phase involved one trip to the Los Angeles County area in February, 1987 (Winter Season), and a follow-up trip in July, 1987 (Summer Season). Table 1-1 lists the samples collected from each participant. The target compounds selected for each sample type are shown in Table 1-2. Personal and fixed-site air (indoor and outdoor) samples were collected from each participant. Canister air samples were also collected indoors and outdoors at the homes of a subset of participants. Tracer gas emitters were deployed and air exchange samples were collected at each residence. Real-time monitoring using a portable gas chromatograph was performed at selected ("canister") homes during the winter trip to assist in the placement of indoor fixed-site samplers.

Field control and blank samples, equal to 7 percent of the field samples of that sample type, were exposed in the field. Similarly, duplicate samples, equal to 10 percent of the total number of samples, were collected for each matrix, except canisters in Winter Season when no duplicates were collected. Prior to actual field work, a schedule for collecting, exposing, preparing, and shipping of field, blank and control, and duplicate samples was prepared. This schedule was strictly adhered to during field sampling.

In addition to the participant sampling, fixed-site samples were collected at a central location during the summer sampling effort. Three sampling devices were colocated at this site: Tenax GC cartridges, canisters and Tedlar bags.

Prior to any project activities relating to sample collection, Standard Operating Procedures (SOPs) were drafted/revised and subjected to an internal review process. These documents are derived from the extensive experience in sampling and analysis gained during previous phases of the TEAM study. In summary, it was the intent of the SOPs to provide rigid and uniform guidelines for the collection and analysis of all samples. Thorough familiarity with all details of the procedures was required of each member of the analytical sampling staff prior to departure to the

field, with quality assurance audits of the sampling practices made to assess adherence to the procedures.

A schedule of events, and approximate times, is shown in Table 1-3. Actual sampling times were strictly scheduled to facilitate a maximum efficiency by the analytical sampling team. Under this regimen, a team (consisting of two chemists) was able to initiate sampling on two participants per day (i.e., two morning, two afternoon, two evening appointments). As in previous phases of this study, the sampling teams were supervised by a Site Administrator. In addition to this function, the Site Administrator was the primary liaison to RTI, CARB and EPA from the field and was responsible for computer entry of all sample collection data for each study participant.

A center of operations, consisting of a conference-type room with additional work tables, was set up at the sampling site. All sampling equipment, with the exception of the spirometers, were contained in this room and all sampling preparation and post-sampling activities, including sample storage (e.g., Tenax cartridges), were conducted in this room.

All samples were inventoried and shipped from the field site by express air carrier to the analytical laboratory at regular intervals (generally weekly) where they were again listed, examined for contamination and breakage and stored at either -20°C (air), 4°C (water), or ambient (canister and air exchange), awaiting analysis. Selected samples were shipped to independent (QA) laboratories for analysis. Personal and fixed-site air QA samples were analyzed by IIT Research Institute (Chicago, IL). No QA analysis was performed on canister samples. Air exchange collectors were analyzed by Brookhaven National Laboratory (BNL, Upton, NY).

QUALITY ASSURANCE

Six analytical protocols were prepared for this TEAM study and are included in Part II of the Work Plan (5). In addition, Standard Operating Procedures (SOPs) which had been in use on previous TEAM studies (6) were implemented. These documents covered every project activity and are listed in Table 1-4. In addition, a Quality Assurance Project Plan (QAPP) (7) was prepared for this study to outline quality assurance (QA) and quality control (QC) objectives and procedures.

New Protocols for the California TEAM Study include air exchange measurements, canister sampling, air exchange measurements, and survey sampling using a portable gas chromatograph.

TABLE 1-1. SAMPLES COLLECTED FROM EACH PARTICIPANT

Sample Type	Number Collected/Participant
Personal Air	2
Indoor Fixed-Site Air	3
Outdoor Fixed-Site Air	2
Indoor Canister Air[a]	2
Outdoor Canister Air[a]	2
Air Exchange	6
Breath (for EPA)	3
Drinking Water[b] (for EPA)	2
Portable GC[c]	8

[a]Collected from a subset of ten participants, each trip.
[b]Collected from a subset of eight participants, each trip.
[c]Collected from a subset of ten participants, February trip only.

TABLE 1-2. TARGET COMPOUNDS SELECTED FOR MONITORING IN ENVIRONMENTAL MEDIA

Matrix: Personal and Fixed-Site Air

- Chloroform
- 1,1,1-Trichloroethane
- Benzene
- Carbon tetrachloride
- Trichloroethylene
- Tetrachloroethylene
- n-Decane
- Dodecane
- 1,4-Dioxane
- α-Pinene
- Chlorobenzene[a]
- Styrene
- o,m,p-Dichlorobenzene
- Ethylbenzene
- o,m,p-Xylenes
- 1,2-Dibromethane
- Undecane
- n-Octane
- 1,2-Dichloroethane
- 1,1,2,2-Tetrachloroethane[a]
- Limonene
- Nonane

Matrix: Drinking Water (for EPA)

- Chloroform
- Dibromochloromethane
- Chlorobenzene
- 1,1,1-Trichloroethane
- Bromodichloromethane
- Tetrachloroethylene
- Bromoform

Matrix: Breath (for EPA)

- Chloroform
- 1,1,1-Trichloroethane
- Benzene
- Carbon tetrachloride
- Tetrachloroethylene
- n-Decane
- Dodecane
- 1,4-Dioxane[a]
- 1,1,1,2-Tetrachloroethane[a]
- Limonene
- Chlorobenzene[a]
- Styrene
- o,m,p-Dichlorobenzene
- Ethylbenzene
- o,m,p-Xylenes
- Trichloroethylene[a]
- 1,2-Dibromoethane[a]
- n-Octane
- Undecane
- 1,2-Dichloroethane[a]
- 1,1,2,2-Tetrachloroethane[a]
- α-Pinene

Matrix: Canister Air

- Methyl chloride[b]
- Ethyl chloride[b]
- Allyl chloride[b]
- trans-1,2-Dichloroethylene[b]
- cis-1,2-Dichloroethylene[b]
- 1,1-Dichloroethane[b]
- Octane[a,c]
- Toluene[a,c]
- Chloroform
- Benzene[a,c]
- Vinyl chloride
- Vinylidene chloride
- Methylene chloride
- n-Decane[a,c]
- 1,1,1-Trichloroethane
- Styrene
- Ethylbenzene
- o,m,p-Xylenes[a,c]
- 1,1,2,2-Tetrachloride
- Carbon tetrachloride

TABLE 1-2. (continued)

Trichloroethylene	Chlorobenzene
o,m,p,-Dichlorobenzenes[a,c]	1,2-Dibromoethane
Tetrachloroethylene	n-Dodecane[a,c]

[a]Target compound in summer season only.
[b]Target compound for GC/ECD/FID analysis only.
[c]Target compound for GC/MS/COMP analysis only.

TABLE 1-3. SCHEDULE FOR COLLECTING STUDY SAMPLES

Day	Time	Function
1	Various	1. Deploy air exchange emitters. 2. Collect portable GC samples (if specified). 3. Explain sampling procedures to participant. 4. Measure room dimensions.
2	7-9 pm	1. Set up personal and fixed-site air samplers (Tenax and canister). 2. Collect presampling questionnaires. 3. Collect first breath sample (for EPA). 4. Place air exchange sample collectors.
3	6-9 am	1. Collect personal and fixed-site air samples. 2. Retrieve air exchange sample collectors. 3. Set up second set of personal and fixed-site air samplers (Tenax and canister). 4. Place second set of air exchange sample collectors. 5. Collect first water sample (if specified). 6. Collect second breath sample.
4	4-6 pm	1. Collect second set of personal and fixed-site air samples (Tenax and canister). 2. Retrieve second set of air exchange sample collectors. 3. Collect second water sample (if specified). 4. Collect first breath sample. 5. Administer Exposure Activity Questionnaire. 6. Present incentive.

TABLE 1-4. ANALYTICAL PROTOCOLS AND SOPs FOR CALIFORNIA TEAM STUDY

RTI/ACS-Protocol No.	Analytical Protocol Title
200-001	Survey Sampling Using a Portable Gas Chromatograph to Identify Chemical Sources
200-002	Volatile Organohalides in Drinking Water by the Purge and Trap Method
200-003	Indoor and Outdoor Monitoring of Vapor-Phase Organic Compounds in Ambient Air - Canisters
200-004	Fixed-Site and Personal Monitoring of Vapor-Phase Organic Compounds in Ambient Air (RTI)
200-005	Sampling and Analysis Procedure for Organics in Human Breath Samples (RTI)
200-006	Air Infiltration Measurement for TEAM Follow-Up Study
RTI/ACS-SOP No.	**SOP Title**
320-001	Tenax Cleanup and Preparation
322-001	Cleanup of Water Collection Bottles
331-001	Collection of Personal Air Samples
331-002	Collection of Fixed Site Air Samples
331-003 (Tentative)	Collection of Indoor Fixed Site Air Samples
332-001	Collection of Water Samples
336-001	Collection of Breath Samples
340-001	Shipment of Field Sampling Equipment
350-001	Site Workroom Procedures and Rules
350-002	Maintenance and Use of the Van
361-001	Calibration of DuPont P-125A Constant Flow Samples
366-002	Calibration of Nutech Model 221 Gas Sampler with a Dry Gas Meter

(continued)

TABLE 1-4. (continued)

RTI/ACS-Protocol No.	SOP Title
410-001	Using Sampling Protocol/Chain-of-Custody Sheet in the Field
431-001 (Air) 432-001 (Water) 436-001 (Breath)	Storage of Samples at the Field Sampling Site
461-001 (Air) 462-001 (Water) 466-001 (Breath)	Shipment of Samples from the Field to RTI
470-001	Receipt of Air, Breath, and Water samples at RTI
482-001	Storage of Water Samples at RTI
481-001 (Air) 486-001 (Breath)	Storage of Tenax Samples at RTI
512-001	Analysis of Drinking Water by Purge and Trap/Gas Chromatography
533-001	Analysis of Organic Compounds Collected on Tenax Using the Finnigan 3300 GC/MS/COMP System
533-002	Analysis of Organic Compounds Collected on Tenax Using the Finnigan 4021 GC/MS/COMP System
612-001	Preparation of Purge and Trap Calibration Solutions
630-001	Preparing Relative Molar Response Tenax Cartridges Using a Permeation System
630-002	Preparing Relative Molar Response and Column Performance Evaluation Tenax Cartridges Using a Flash Evaporation System
630-003	Loading External Standards on Tenax Cartridges Via Injection Using a Permeation System
630-004	Loading Deuterium Standards on Tenax Cartridges Using a Permeation System
712-001	Quantitation of Volatile Organic Compounds in Water

(continued)

TABLE 1-4. (continued)

RTI/ACS-Protocol No.	SOP Title
711-001 (Air) 716-001 (Breath)	Quantitation of Volatile Organic Compounds in Tenax Samples
810-001	Preparation and Handling of QA Performance Audit Samples on Tenax for GC/MS Analysis
812-001	Conducting a QA System Audit of Sample and Data Collection in the Field
860-001	Preparing Quality Control Samples on Tenax Cartridges
862-001	Preparation of Water Blanks and Controls
861-002 (Air) 862-002 (Water) 866-002 (Breath)	Shipment of QC Samples to the Field Sampling Site
861-003 (Air) 862-003 (Water) 866-003 (Breath)	Exposure of QC Samples
881-001 (Air) 882-001 (Water) 886-001 (Breath)	Submission of QA Samples to and Receipt of Data from a QA Laboratory

SECTION 2
MATERIALS AND METHODS

SURVEY OPERATIONS

Winter Season

Materials and Forms--

All forms, questionnaires and letters necessary for conducting the follow-up study in the Winter Season were written, reviewed, finalized, and duplicated prior to the start of data collection.

Three different instruments were designed to collect survey data and are included in Appendix A. The Study Questionnaire was administered by the field interviewer and was designed to obtain demographic information and data on smoking behavior, sources of drinking water, and use of or exposure to various chemicals.

The Exposure Activity Questionnaire was administered by an RTI chemist at the last visit of the 24-hour monitoring period to obtain information about the participant's activities during the past 24 hours that could have had an effect on exposure.

The Inventory Form was used by the RTI chemists for a subsample of homes where specially designed canisters were used to collect air samples. Placement of canisters was determined by a portable gas chromatograph (PGC) which detected areas of highest chemical concentration. The Inventory Form was used to list the name and ingredients of every product found or stored in that area.

Other forms used in data collection were a Control Form, a Participant Consent Form and Incentive Receipt and two versions of an advance letter, one of which was accompanied by an Information Sheet. These forms appear in Appendix B.

A Control Form was prepared for each case. On it was an ID number, the name of the person or family thought to be living at the address, and the address. A letter code, (H)igh, (M)edium, and (L)ow, referred to the level of exposure measured at that residence in the 1984 California TEAM Study.

Residences having a high level of exposure were also given a numeric rank, with 1 having the highest level of exposure, 2 the next highest and so on. These cases were attempted for the canister sampling using the portable GC. Ten homes were required for this alternate sampling technique. The remaining residences with high exposure and the residences with low exposure were given priority for participation in the follow-up study.

Another letter code on the Control Form, (O)riginal, (N)ew, or (D)on't know, referred to information about the name of the person on the Control Form. Based on information from the Haines Address Directory and directory assistance, we tried to determine whether the original participant or family still lived at the residence. If so, our advance contact by letter and the interviewer's contact with them would be different than if a new resident now lived at the address. For those cases where we could not determine this information (D), we assumed the original participant or family still lived at the address.

The rest of the information on the Control Card was provided by the interviewers, including the participant's sex, age, telephone number, and whether the original or a new participant was recruited. This information, along with the appointment times for the 24-hour monitoring were given to the RTI chemists on a daily basis.

The study participant was asked to sign a Participant Consent Form (PCF), after receiving an explanation of the study, detailing the requirements of participation, and the level of risk and the benefits in participating. For minors, a legal guardian was asked to co-sign. The PCF, along with other materials used by the chemists, were left at the home. At the conclusion of the 24-hour monitoring period, the chemist paid the participant $100 and asked him or her to sign the lower portion of the PCF to acknowledge receipt of payment. A copy was given to the participant and the original copy was returned to RTI by the chemist.

Based on information we were able to obtain about the current resident, one of two versions of an advance letter was sent prior to data collection. We designed a letter for previously sampled participants from one used in the 1984 California TEAM Study which acknowledged their participation in that study. Accompanying the letter was a news magazine article, (Appendix B) describing results of the previous study. A different letter was designed for new residents. The same news magazine article was sent

with this letter, as well as an Information Sheet describing the TEAM Study in greater detail. For situations where we did not know whether the original participant lived at the address, we combined procedures. We assumed the original participant still lived there and mailed that appropriate version of the letter. In addition, if our assumption was incorrect, we included the Information Sheet and the news magazine article. In all cases, we added "Current Occupant" underneath the name of the person on the envelope.

Selection and Training of the Field Interviewing Staff--

RTI's permanent Field Supervisor in the Los Angeles area, Jerry Durham, was contacted and requested to recruit and retain a field interviewing staff. Mr. Durham, who had supervised the previous California TEAM Study, hired four interviewers. They were all females ranging in age from 52 to 65, with an average age of 58. Their years of interviewing experience ranged from 17 to 30. Of the four, two had worked on the previous TEAM Study, as well as other RTI studies. Two were high school graduates and two were college graduates.

Training was conducted by the survey operations Survey Manager, with assistance from the Field Supervisor, in Los Angeles, January 26-28, 1987. During the 2 1/2 days of training, all aspects of field survey data collection were covered, including contacting the resident, obtaining cooperation, administering the Study Questionnaire, using both the hardcopy instrument and the programmed instrument on the computer, setting up appointments for the 24-hour monitoring, reporting progress of work, and administrative responsibilities. In addition, interviewers participated in mock interviews and training exercises, which involved practice in administering the Study Questionnaire and in transmitting the data using an automated telecommunications system.

A Field Interviewer Manual documented the information covered during training. It served as a guide at the training session and as a reference for the interviewers during data collection. A copy of the Table of Contents of the manual is displayed in Appendix C.

At the conclusion of training, interviewers were given their assignments. One interviewer who had worked on the 1984 California TEAM Study, was assigned all of the canister sampling cases, which were

considered to be more difficult because they placed greater burden on the participants. On the afternoon of the third day of training and during the entire next day, the Field Supervisor and Survey Manager accompanied the interviewers on their initial data collection attempts to observe them and provide immediate feedback on their weaknesses or shortcomings.

Field Data Collection--

Field data collection for the Follow-up Study began on January 29, 1987 and was concluded on February 15, 1987. The air monitoring activities to collect environmental and biological samples began February 6, 1987 and ended on February 23, 1987. Each interviewer was assigned specific days and time "windows" on which to schedule the air monitoring appointments. There were some problems in this scheduling procedure. The chemists found that they frequently did not have enough time to get to their next appointment. Consequently, many appointments had to be rescheduled. We concluded that specific appointment times, as well as specific appointment days, should have been assigned to the interviewers.

Data Receipt, Editing, Coding and Data Entry--

The Study Questionnaire data, which was entered into a personal lap-top computer, was transmitted via automated telecommunications from Los Angeles to RTI on a daily basis. After each transmission session, the telecommunications program produced a log of all activities occurring during the session - the date, time, and outcome of all calls and file transfers. Each day the files were processed, and the log files were read, the data files were archived, and a list of ID numbers for the transmitted cases were prepared. This served as the data receipt control system for the Study Questionnaires. Data processing was done using the same software package, Computer-Assisted Survey System (CASS), that executed the questionnaire program. Using a group of programs in CASS, the data passed through several processing steps prior to becoming part of a data file that was suitable for analysis. These steps included a visual scan of the data to insure that all appropriate questions had been answered, range checks on numeric variables, and coding of open-ended questions. After all problems or inconsistencies were resolved, the data were copied into a standard data file for analysis.

The Exposure Activity Questionnaires were returned to survey research staff by the chemists at the end of the environmental and biological sampling. The questionnaires were edited for completeness and legibility, and open-ended questions were coded. All Participant Consent Forms were stored in the Survey Manager's office for security.

Exposure Activity Questionnaires were grouped into batches of ten and header sheets were created. After batch numbers were assigned, the batches were delivered to Data Entry for processing. All data was key-verified and a survey data tape was prepared and delivered on May 31, 1987 for analysis.

Summer Season

Materials and Forms--

All forms, questionnaires and letters necessary for conducting the follow-up study in the Summer Season were written, reviewed, finalized, and duplicated prior to the start of data collection.

Two versions of the Study Questionnaire were designed for the Summer Season. Examples of these instruments are in Appendix D. The Exposure Activity Questionnaire from the Winter Season was again used in the Summer Season, and was administered by an RTI chemist at the last visit of the 24-hour monitoring period.

The version of the Study Questionnaire administered depended on whether the person recruited for the Summer Season participated in the Winter Season. Version 1 was administered if the person recruited was the previous participant. It included a subsample of questions from the Study Questionnaire used in the Winter Season, focusing on changes since the last time the participant was interviewed. Version 2 was administered if the person recruited was a different participant. It was essentially the same as the Study Questionnaire administered in the Winter Season. Forty of the participants were the original participant from the Winter Season; five were different participants, but from the same family.

The Study Questionnaire was administered by either the Survey Manager by telephone from RTI, or the field interviewing staff in Los Angeles, by telephone, depending on who made the initial contact with the participant. Contact with the participants was conducted in two stages in order to obtain the 45 completed cases required for the Summer Season. In the first stage, a letter, (Appendix E), was sent to the 51 participants from the

Winter Season requesting their repeated participation and asking them to call RTI, using a toll-free number, to schedule their appointments for the monitoring period. When they called, the survey operations Survey Manager administered the appropriate version of the Study Questionnaire and scheduled the appointments. Seventeen cases were completed at the first stage. One person called to refuse participation because of illness.

The remaining 33 cases were contacted in the second stage. In this stage, the field interviewing staff in Los Angeles contacted the participants by telephone to request their participation and administer the appropriate version of the Study Questionnaire. The remaining 28 cases required for the Summer Season were obtained in the second stage, although two participants cancelled their monitoring appointments, after it was too late to replace them with other cases. One cancelled because of a family emergency and the other refused to reschedule when the chemists missed their first appointment.

Provisions were made for a third-stage contact which involved the field interviewing staff making personal visits. However, no personal visits were made because all 45 required cases were obtained through the telephone contacts.

Other forms used in data collection were a Control Form and a Participant Consent Form and Incentive Receipt like the ones used in the Winter Season. A Control Form was prepared for each of the 51 cases. On it was an ID number, the name of the participant from the Winter Season, the address, and telephone number. The rest of the information on the Control Card was provided by the person who administered the Study Questionnaire, including the participant's sex, age, and whether the Winter Season participant was recruited. This information, along with the appointment times for the 24-hour monitoring were given to the RTI chemists.

The study participant was asked to sign a Participant Consent Form when the RTI chemists made their initial visit to the home. For minors, a legal guardian was asked to co-sign. At the conclusion of the 24-hour monitoring period, the chemist administered the Exposure Activity Questionnaire, paid the participant $100 and asked him or her to sign the lower portion of the PCF to acknowledge receipt of payment. A copy was given to the participant and the original copy was returned to RTI by the chemist.

Selection and Training of the Field Interviewing Staff--

The field interviewing staff for the Summer Season consisted of Jerry Durham, who was the Field Supervisor for the Winter Season, and one other interviewer, also from the Winter Season. Training took place on June 28, 1987 in Los Angeles and was conducted by the Survey Manager. The training covered all aspects of field survey data collection, including contacting the resident, obtaining cooperation, administering both versions of the Study Questionnaire which was done on hardcopy, setting up appointments for the 24-hour monitoring, reporting progress of work, and administrative responsibilities. The Interviewer Instructions (Appendix F) documented the information covered during the training. It served as a guide at the training session and as a reference during data collection.

Field Data Collection--

Field data collection for the Summer Season began on June 29, 1987 and ended on July 12, 1987. The air monitoring activities to collect environmental and biological samples began July 8, 1987 and ended on July 20, 1987. The field interviewing staff was assigned specific days and specific times on which to schedule the air monitoring appointments. The specific times were established by the chemists in order to assure enough time between appointments. For the most part, this procedure worked effectively.

Data Receipt, Editing, Coding, and Data Entry--

The Survey Manager maintained a hand tally of completed Study Questionnaires as they were received from the field interviewing staff. These data were then entered into an electronic version of the Study Questionnaire instrument. The data processing was done using the CASS software package which generated a standard data file for analysis.

The Exposure Activity Questionnaires were returned to survey research staff by the chemists at the end of the environmental and biological sampling. The questionnaires were edited for completeness and legibility. Open-ended questions were coded several months after the data collection due to lack of funds for this task at that time. All Participant Consent Forms were stored in the Survey Manager's office for security.

The Exposure Activity Questionnaires were grouped into batches of ten and Batch Header Sheets were created. After batch numbers were assigned, the batches were delivered to Data Entry for processing. All data were key-verified and a survey data tape was prepared and delivered on March 18, 1988 for analysis.

CHEMICAL SAMPLING AND ANALYSIS

Air Volatiles

Volatile organic compounds in personal and fixed-site air samples were collected by pulling air through a 6.0 x 1.3 cm I.D. bed of Tenax GC contained in a glass tube using a constant flow pump (DuPont Model P125A). Preparation of these cartridges followed an extremely rigorous procedure (described in detail in the SOP) to ensure minimal background from the sampling device. Pump flows were adjusted to provide for sampling approximately 18 liters of air over the anticipated sample collection period. Glass fiber filters (Gelman, 25 mm) were attached to the inlet end of the Tenax cartridge to remove particulates from the sampled air. For personal air sampling, the pump and cartridge were carried by the participant with the inlet of the sample cartridge located in the subject's breathing zone. A sampling vest was designed to provide for this location and to minimize participant inconvenience during sampling. For fixed-site air sampling, the pump and cartridge were placed inside a metal box for protection, with only the inlet end of the sample cartridge protruding. Tenax GC cartridges were stored in a helium environment at all times, except during actual sample collection.

Fixed-site air samples were also collected in evacuated Summa-polished stainless steel canisters (6 L nominal volume) using mass flow controllers to provide a fixed flow over the collection period. The canisters were meticulously cleaned prior to sampling by alternately pressurizing with N_2 followed by evacuation to 0.1 Torr. Background checks were performed on 25 percent of the canisters to confirm the absence of contaminants.

Accuracy and precision of air collection procedures were evaluated by analyzing field and laboratory control samples. Controls were Tenax cartridges fortified with approximately 200 ng of each compound prior to sampling. Some control cartridges were stored in the laboratory (lab controls), others were transported to the field sampling site and treated

as field samples (field controls). Blank and control cartridges were exposed with field samples at a frequency equal to 7 percent of the field samples by transporting unopened into the participant's house along with the sample cartridges and then returning to sealed storage. Exposed Tenax GC cartridges were analyzed by thermal desorption - injection capillary gas chromatography/mass spectrometry/computer (GC/MS/COMP). In brief, volatile organics were thermally desorbed from the Tenax GC at 260°C with a nominal helium flow and into a liquid nitrogen-cooled nickel-capillary trap (8,9, 10). The condensed vapors were then introduced into a high resolution fused silica capillary chromatography column by balistic heating of the trap to 250°C (9,11). Sample constituents were characterized and quantitated by electron impact mass spectrometry by measuring the intensity of the extracted ion current profile (9,12,13).

Relative response factors (RRF) were used to quantitate target compounds found on exposed Tenax cartridges. At the start of each day of analysis, a response factor cartridge was analyzed, which contained known amounts of all of the analytes (plus the quantitation standards, perfluorobenzene and perfluorotoluene) loaded via a permeation system. Where permeation tubes were not available the flash evaporation loading process was used.

Relative response factors were calculated according to the equation:

$$(1) \quad RRF_{anal/std} = \frac{A_{anal} / g_{anal}}{A_{std} / g_{std}}$$

where: A = system response (integrated peak area)
g = number of grams of analyte present
anal = analyte
std = standard

The value of the RRF was determined from a database constructed from at least five independent analyses prior to analysis of samples. Sample mass (g_{anal}) of volatile organics per cartridge was then calculated from:

$$(2) \quad g_{anal} = \frac{A_{anal} \times g_{std}}{A_{std} \times RRF_{anal/std}}$$

Since the volume of air collected for a given sample is accurately known and the quantity of substance per cartridge was determined, the level

in ambient air could be calculated from:

$$(3) \quad \mu g/m^3 = \frac{(\mu g_{anal} - \mu g_{bkg})\ 1000\ L/m^3}{m^3 \text{ X Volume sampled (L) x Rec}}$$

where: Rec = the recovery factor obtained from analysis of field control samples.

Control and RRF cartridges were prepared using permeation and flash evaporation techniques to encompass all target compounds. Permeation tubes were regularly calibrated to ensure accurate loading. Calibration results for the period encompassing sampling and analysis for both trips are shown in Table 2-1. The percent relative standard deviations during the periods of use never exceeded 10 percent and were generally less than 5 percent, indicating a high degree of permeation tube stability.

Computer Software for Data Reduction

A SYMPHONY spreadsheet computer program was used to process the amounts found in each sample (either ng or ng/mL) with background, recovery, limit of detection and breakthrough volume (as appropriate) data. An example output for air samples is shown in Figure 2-1. ASCII file extracts of each sample file were concatenated into a single file for subsequent statistical analyses.

Air Exchange Measurements

Air exchange measurements were conducted in each study residence to determine the integrated outside air infiltration rate during indoor and outdoor air sampling for volatile organic compounds. During the Winter Season, each house was considered as a single zone with an overall air infiltration rate with the exception of the ten subset homes which were treated as a three-zone model. A three-zone model was used during the Summer Season. In each residence, permeation devices (different perfluoro-tracer compounds in different zones) were placed in each zone. The tracer compounds were emitted at a known rate into the zone where they mixed with the indoor air. Tracer concentrations were passively monitored using capillary adsorbent tube samplers concurrent with volatile organic sampling. Analysis of the tube samplers by gas chromatography/electron capture detection (GC/ECD) was followed by application of a multicompartment mass

balance model for determining the infiltration rate in each zone and the mixing rate between zones. Raw data and correspondence are presented for winter and summer seasons in Appendix G.

Real-Time Monitoring

During the Winter Season sampling effort, a portable gas chromatograph (Photovac Model 10S10) was used to locate sources of emissions in selected residences to aid in the placement of indoor canister samplers. This real-time monitoring was performed prior to actual monitoring on the subset of ten homes which included the canister sampling. A household inventory was taken to supplement/document the sources of volatile organics proposed by the portable GC.

A detailed analytical protocol was followed for applying the portable GC to source location. In brief, after locating the GC in a central location, connecting to 110 vac and adjusting the carrier gas flows, an injection of a mixture of standard compounds was made to verify chromatographic and detector performance. Subsequent samples included a zero-air blank followed by eight, 1 mL indoor air samples. The indoor air samples were typically collected first from kitchen and bath areas followed by living room and bedroom areas. All blanks, standards and samples were analyzed at ambient temperature on a 0.66 m, 3% SP2100 column operated at 60 mL/min. In total, ten injections were made at each residence.

Canister Volatiles

The same homes in which real-time monitoring was conducted were sampled using Summa-polished stainless steel canisters (6 L nominal volume). Sampling was executed both indoors and outdoors at each home during two, 12-h periods corresponding to collection of fixed-site air samples on Tenax. Prior to sampling, the canisters were carefully cleaned by sequential evacuation (0.1 Torr) and pressurizing with nitrogen while maintaining the canister temperature at 150°C. Background checks were performed on 25 percent of the cleaned, evacuated devices to verify that all measurable contaminants had been removed. During the Winter Season sampling trip, 4 L time-integrated air samples were collected into pre-evacuated 6 L canisters using a programmable interval timer. A 110 μm I.D. x 16 mm restrictive orifice was used on the canister inlet to control the flow of air during the times the canister was "open."

Collection of air samples into canisters during the Summer Season was conducted at a subset of eight homes and followed a somewhat different procedure. Calibrated mass flow controllers, connected directly to the canisters, allowed continuous air sampling at 6 mL/min. All canisters were stored in their shipping containers in the field operations workroom. Samples were analyzed by cryogenic trapping of ~100 cm^3 aliquots followed by GC/ECD/FID and GC/MS/COMP.

Central Fixed-Site Monitoring

Cooperative fixed-site sampling between Research Triangle Institute and the California Air Resources Board was planned as part of this study. This simultaneous sampling was intended to address two monitoring issues: (1) the agreement in identity and amount of selected atmospheric compounds collected using time-integrated Tenax, Summa-polished canister and Tedlar bag sampling techniques and, to a lesser degree, (2) the extent to which a centrally-located fixed sampling location reflects the chemical micro-environment of a study participant's backyard. This evaluation was concurrent with the canister sampling at the participants' homes.

The centrally-located fixed-site collection station was operated in the Summer Season throughout the entire two-week period. A book storage room of the Madronna Middle School in Torrance was outfitted with fixed-site monitoring equipment (Figure 2-2). Outside air was drawn through a one-fourth inch Teflon tube extended through the wall of the room to the roof of the building. A continuous flow of air was passed through the manifold by means of either a single rubber diaphragm pump or later by a stainless steel bellows pump, both operated at approximately 3 liters/min. Time-integrated Tedlar bag and Tenax GC samples were collected from the manifold over 12-hour periods beginning each day at approximately 0800 and 2000 hours. On days when canister sampling was conducted at participants' homes, canister samples were similarly collected from the common manifold at the central fixed-site. In this manner, 20 Tedlar bag, 20 Tenax GC and 12 canister samples were collected from a common source. Tenax GC and canister samples were collected and handled as described above. Tedlar bag samples were collected (as prescribed by CARB staff) in 60 L bags using a portion of the effluent of the single diaphragm pump (ca. 30 mL/min) and transferred to the custody of CARB staff for analysis. Sample codes were

constructed to allow facile identification of inter-collection device replicates.

QUALITY ASSURANCE

Winter Season

Field Operations--

The first collection of TEAM samples in the greater Los Angeles area was performed between February 6 and 23, 1987. Sampling supplies and equipment were sent to the site by air freight and stored in a workroom at the Holiday Inn in Torrance, California. A systems audit was performed at the sampling site by the RTI QA Officer February 11 through February 14, 1987. The audit report was submitted March 3, 1987.

Environmental and breath sample collection was accomplished by four two-person teams. Two teams were at the site simultaneously. Three teams included one individual experienced in TEAM sampling techniques; the fourth team did not. In addition, an individual portable GC operator was at the site during this sampling season. Two site administrators were also in the field, each for two weeks with a two-day overlap. The Site Administrator was responsible for the successful execution of the day-to-day sampling efforts and the overall adherence to the study protocol. The Project Coordinator was also at the site during the initial setup and the beginning of sampling.

The sample identification numbers reserved for this California (Winter Season) study were 71251 through 71399. An additional number, computer-generated check digit, was appended to ensure correctness of the first five digits. The first two numbers indicate that the sampling was conducted during the first trip to California during 1987. The next three digits were unique and descriptive for this sampling trip and were utilized as the participant number.

A sample collection schedule was prepared at the start of the study. The schedule identified the participants from whom D-type and Q-type duplicates were to be collected. It also indicated the time at which matrix field controls and blanks (QC sets) were scheduled for exposure. The frequency of duplicate collections and QC set exposure was based on guidelines issued by the Project Director and incorporated into the schedule such that the additional burden on the participant and sample collector was minimal.

The study participants were selected from those whose homes were sampled in Southern California (TEAM) in February 1984 and May 1984 (14). The samples collected in each home were two 12-hour personal air samples, three indoor air samples, two 12-hour outdoor air samples, two air exchange samples. Canister samples, water samples, and portable GC samples were scheduled for collection in subsets of the homes. Samples were also scheduled at a centrally-located fixed-site monitoring station.

Sample Analysis--

Tenax Cartridges--The air and breath samples collected during the Winter Season were analyzed by GC/MS/COMP employing procedures described in Analytical Protocols 200-004 and 200-005. All matrix types were analyzed on the Finnigan 3300 quadrupole mass spectrometer on 44 analysis days between February 2 and May 13,1987. The majority of the samples analyzed on Finnigan 3300 were indoor air samples. All matrix types were also analyzed on the Finnigan 4021 quadrupole system during 34 analysis day between February 23 and April 27, 1987 (the majority were breath samples for EPA).

Prior to sample analysis, relative response factors (RRF) for each target compound were established by analyzing a minimum of five calibration cartridges containing known amounts of all the targets plus perfluorobenzene (PFB) and perfluorotoluene (PFT). These cartridges were prepared using permeation and flash evaporation techniques. Based on these data, average RRF values were calculated and used to quantitate the volatile organic levels in samples collected from this sampling trip. This operation was carried out on each analytical system used (Finnigan 3300 and 4021 GC/MS/COMP).

A response factor (RF) cartridge was run at the beginning of each sample analysis day and the agreement with the previously determined RRF value recorded. Permeation tubes were calibrated regularly to insure accurate loading. Note that the daily RF was not used to quantitate target levels but only served as a check on the constancy of instrument performance.

In addition, the instrument tune was checked by measuring the intensity of PFT fragment ions relative to the base peak. The performance of each

gas chromatography system was monitored for peak resolution and symmetry. The PFT instrument tune was within the acceptable range on both instruments during the analysis period. Peak resolution and symmetry were also acceptable on both systems.

Canister Samples--Canister samples collected during the Winter Season in California were analyzed by GC/ECD/FID. A standard was run each analysis day and all samples run that day were quantitated using the calibration data obtained. Each day's standard run was compared to previous determinations and corrective action taken if significant differences were observed.

Air Exchange--All analyses were carried out by Brookhaven National Laboratory (BNL). Problems were reported in the calibration of one tracer (Perfluorotracer 3) and in the analysis of the samples resulting in an uncertainty of 25 to 30 percent in the tracer (Perfluorotracer 3) concentrations.

Field Control and Blank QC Samples--

Tenax Cartridges--Twenty-nine blanks and controls were prepared, sent to the field, exposed, returned and analyzed with samples.

Canisters--Three canisters filled with clean air were sent to the field as blanks; three canisters fortified with target compounds were also sent to the field as controls. Upon return, these canisters were analyzed along with sample canisters.

Air Exchange Samples--Blank and control tubes were prepared and transported to the field. Upon return from the field they were shipped to BNL along with the field samples for analysis. Results were reported back to RTI.

Duplicate Sample Analysis--

Tenax Cartridges--Fifty-four duplicate Tenax cartridges were collected for analysis by RTI. An additional 54 cartridges were collected for analysis by IITRI.

Canisters--No duplicate canister samples were scheduled for collection in the field and none were collected for analysis at a quality assurance laboratory.

Air Exchange--Duplicate tracer collection tubes (CATs) were placed in four homes (day and nighttime). Total air exchange rates (ACH) were calculated for each home, day and nighttime; therefore, eight pairs of F/D duplicate data were calculated.

Performance Evaluation Sample Analysis--

Tenax Cartridges--Performance evaluation samples were prepared by fortifying Tenax cartridges with selected aromatic and aliphatic target compounds. The Tenax for all audit samples was supplied by RTI and fortified by Environmental Monitoring Systems Laboraotry (EMSL), Research Triangle Park, NC.

The analysis of the audit cartridges was carried out blind; each cartridge was given a legitimate study number and a chain-of-custody form before being introduced into the sample analysis chain.

Summer Season

Field Operations--

The second collection of environmental and breath samples in the greater Los Angeles area was performed between July 8 and 20, 1987. Equipment and other sampling supplies sent from RTI were located in a workroom at the Holiday Inn in Torrance, California. A systems audit was performed at the sampling site July 9 through July 11, 1987; a report was issued August 3, 1987.

Sample collection was accomplished by two, two-person teams. All of the sampling personnel were experienced, each having participated in previous field collections. In addition, a chemist with air exchange experience was at the site and responsible for all activities associated with air exchange measurements. The Site Administrator was also at the site and was responsible for day-to-day activities.

The participant identification numbers reserved for this Los Angeles study were 72251 to 72399. Each number was appended with a computer-generated check digit. Digits 3,4, and 5 of this number were utilized as the participant number; the first two describe the study.

A sample collection schedule was prepared at the start of the study. The schedule identified the participants from whom D-type and Q-type duplicates were to be collected. It also indicated the time at which matrix field controls and blanks (QC sets) were scheduled for exposure. The frequency of duplicate collections and QC set exposure was based on guidelines issued by the Project Director and incorporated into the schedule.

The participants were selected from the individuals enlisted during the Winter Season trip of 1987. The design of this study required the collection of samples from at least 40 former participants.

The methodology employed during the field operations was essentially the same as the Winter Season; however, the portable GC was not employed. Canister and Tenax sampling were also employed at a central fixed-site along with Tedlar bag sampling (CARB).

Sample Analysis--

Tenax Cartridges--The air and breath samples collected during the Summer Season trip to Los Angeles were analyzed by capillary column gas chromatography/mass spectrometry/computer (GC/MS/COMP) employing procedures described previously. All breath samples and some fixed-site and personal air samples were analyzed on the Finnigan 3300 quadrupole system on 43 analysis days between August 3 and November 20, 1987. The remainder of the fixed-site and personal air samples were analyzed on the Finnigan 4021 quadrupole system on 12 analysis days between August 21 and September 8, 1987.

Prior to sample analysis, relative response factors for each target compound were established by analyzing a minimum of five cartridges containing known amounts of all the targets plus perfluorobenzene and perfluorotoluene (RRF cartridge). Based on these data, average RRF values were calculated and used to quantitate the volatile organic levels in samples collected from this sampling trip. This operation was carried out on each analytical system used (Finnigan 3300 and 4021 GC/MS/COMP).

A response factor (RF) cartridge was run during each sample analysis day and the agreement with the previously determined RRF value recorded.

In addition, the instrument tune was checked by measuring the intensity of PFT fragment ions relative to the base peak. The performance of each gas chromatographic system was monitored for peak resolution and symmetry. The PFT tune was within the acceptable range on the Finnigan 4021 GC/MS/COMP during the analysis period; peak resolution and symmetry were also acceptable.

Cansiter Samples--Canister samples collected during the Winter Season in California were analyzed by GC/ECD/FID. A standard was run each analysis day and all samples run that day were quantitated using the

calibration data obtained. Each day's standard run was compared to previous determinations and corrective action taken if significant differences were observed.

Air Exchange--All analyses were carried out by BNL.

Field Control and Blank QC Samples--

Tenax Cartridges--Blanks and controls were prepared for each of the Tenax batches used for air sampling during this study.

Canisters--Three canisters filled with clean air were sent to the field as blanks; three canisters fortified with target compounds were also sent to the field as controls. Upon return, these canisters were analyzed along with sample canisters.

Air Exchange Samples--Blank and control tubes were prepared and transported to the field. Upon return from the field they were shipped to BNL along with the field samples for analysis. Results were reported back to RTI.

Duplicate Sample Analysis--

Tenax Cartridges--Forty duplicate Tenax cartridges were collected for analysis by RTI. An additional 20 cartridges were collected for analysis by IITRI.

Canisters--Two duplicate canister samples were scheduled for collection in the field; none were collected for analysis at a quality assurance laboratory. Both duplicates were collected at the central fixed-site.

Air Exchange--CATs were placed in four homes (daytime and nighttime). Total air exchange rates (ACH) were calculated for each home, day and nighttime; therefore, eight pairs of F/D duplicate data were calculated.

Performance Evaluation Sample Analysis--

Tenax Cartridges--Performance evaluation samples were prepared by fortifying Tenax cartridges with selected aromatic and aliphatic target compounds. The Tenax for all audit samples was supplied by RTI and fortified by EMSL/EPA-RTP.

The analysis of the audit cartridges was carried out blind; each cartridge was given a simulated study number and a chain-of-custody form before being introduced into the sample chain.

Statistical Analysis of Data

This section gives the statistical analysis for the two seasons (winter and summer) of data collected in Los Angeles in 1987. Each season is analyzed separately followed by a comparison of the two seasons. In general, as described previously, data were collected on twenty-two volatile organics (VOCs) in personal air, indoor air, outdoor air, and fixed-site (residence and central location) outdoor air samples. Additional analyses including breath, correlations between media, analyses of variance using questionnaire responses will be included in an subsequent report to EPA (4). Comparisons between seasons are included in this report as Appendix H.

Creating the Analysis File--

Before statistical analysis could be undertaken on the data collected, several manipulations were necessary to process the data and create computer analysis files. First, a few data observations were deleted due to their questionable nature, as deemed by RTI chemists. Second, because of the difficulty of maintaining sufficient GC resolution for a pair of chemicals, the quantitative values of m-xylene and p-xylene were combined to give a single concentration for m,p-xylene. In this manner, all samples could be more readily compared. Third, values below the level of detection (LOD) were set to 1/2 LOD and values at trace were set equal to 5/8 QL (quantifiable limit) where 5/8 QL was the midpoint between the LOD and QL. Finally, duplicate samples were averaged. The maximum QL for a particular media and compound was then defined as the maximum of the individual quantifiable limits for each sample. This step was necessary to allow data to be compared between media and seasons.

Winter Season--

The analysis for the Winter Season (February, 1987) consists of a study of the quantifiable limits, percentages measurable, and summary statistics for the fifty-one individuals sampled. The 51 individuals represent a revisit to the 117 participants/households in the 1984 study.

Summer Season--

The analysis of data for the Summer Season (July, 1987) parallels that for the Winter Season but applies to the 43 individuals sampled. Thirty-eight of these individuals also participated in the winter study.

TABLE 2-1. PERMEATION TUBE STABILITY - WINTER AND SUMMER SEASONS

	Tube Code	Winter Season			Summer Season		
		Rate[a]	%RSD[b]	No. Calib.[c]	Rate	%RSD	No. Calib.
Chloroform	28	148	0.4	2	148	1.5	2
1,1,1-Trichloroethane	50	181	2.7	3	181	5.9	2
Benzene	38	396	1.2	2	399	0.1	2
Carbon tetrachloride	117	262	0.5	2	264	0.0	2
1,2-Dichloroethane	24	525	5.4	3	480	0.2	2
Trichloroethylene	52	530	0.4	3	538	0.8	2
Tetrachloroethylene	14	716	9.3	5	528	1.5	2
Ethylbenzene	124	125	2.3	2	124	0.2	2
m-Dichlorobenzene	323	232	0.3	2	230	1.8	2
1,4-Dioxane	54	668	7.0	4	412	1.0	2
1,2-Dibromoethane	25	215	3.1	3	209	0.5	2
Perfluorobenzene	6X	6447	6.3	3	7445	2.0	3
Perfluorotoluene	2X	3118	7.1	3	3618	3.3	3
	2	3368	8.1	3	3821	1.6	3

[a]Permeation rate (ng/min).
[b]Percent relative standard deviation.
[c]Number of calibrations performed during the period specified.

TEAM CALIFORNIA DATA SHEET - SUMMER 1987

Backgnd./Recovery Filename: BKRC129
LOD Filename: LODF3300
M.S. Filename: 387A1023
Spreadsheet Datafile Name: 2744AVF1

SAMPLE CODE	MATRIX	COMPOUND	CMPD. ID #	AMOUNT (NG)	BKG (NG)	REC(1) (%)	BTV (L)	LOD (UG/M3)	QL (UG/M3)	CORRECTED CONC. (UG/M3)	I--CONCENT.--I (UG/M3)	(PPB)	MEASURE CODE	M.S. NOTES	DATE COLL.	DATE ANAL.	DATE PROC.	COLL. I.D.	ANAL. I.D.	PROC. I.D.	TEMP. (F)	VOL. (L)	TENAX BATCH	INSTR. CODE	INIT. TIME	FINAL TIME
722744AVF1	AV	CHLOROFORM	2	27	28	82	20	0.14	0.5	-0.04	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	1,2-DICHLOROETHANE	3	1	0	110	27	0.03	0.1	0.01	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	1,1,1-TRICHLOROETHANE	4	52	8	95	13	0.08	0.3	3.65	3.6	0.7	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	BENZENE	5	37	7	72	45	0.06	0.2	2.17	2.2	0.7	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	CARBON TETRACHLORIDE	6	8	1	107	19	0.12	0.5	0.36	T	T	2		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	TRICHLOROETHYLENE	7	0	1	94	43	0.11	0.4	-0.05	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	1,4-DIOXANE	25	2	1	103	500	0.05	0.2	0.06	T	T	2		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	1,2-DIBROMOETHANE	27	0	1	100	500	0.04	0.1	-0.04	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	N-OCTANE	28	30	2	98	500	0.08	0.3	1.51	1.5	0.3	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	TETRACHLOROETHYLENE	11	NC	5	93	168	0.20	0.8	0.00	NC	NC	4		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	CHLOROBENZENE	12	1	1	98	403	0.12	0.5	-0.02	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	ETHYLBENZENE	19	24	0	99	582	0.17	0.7	1.27	1.3	0.3	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	M-XYLENE	21	NC	0	94	500	0.02	0.1	0.00	NC	NC	4		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	P-XYLENE	22	111	1	105	500	0.09	0.4	5.50	5.5	1.3	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	STYRENE	15	NC	0	100	500	0.00	0.0	0.00	NC	NC	4		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	O-XYLENE	20	35	2	101	500	0.05	0.2	1.70	1.7	0.4	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	1,1,2,2-TETRACHLOROETHANE	30	0	0	109	500	0.03	0.1	0.00	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	N-NONANE	33	NC	0	102	500	0.13	0.5	0.00	NC	NC	4		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	A-PINENE	31	0	0	119	500	0.14	0.5	-0.01	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	M-DICHLOROBENZENE	16	8	0	106	500	0.05	0.2	0.39	0.4	0.1	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	P-DICHLOROBENZENE	17	117	0	110	1106	0.15	0.6	5.55	5.6	0.9	1		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	N-DECANE	23	NC	0	98	500	0.09	0.4	0.00	NC	NC	4		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	O-DICHLOROBENZENE	18	0	0	114	755	0.14	0.5	-0.00	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	LIMONENE	32	7	0	96	500	0.13	0.5	0.38	T	T	2		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	N-UNDECANE	29	0	0	93	500	0.12	0.5	0.00	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810
722744AVF1	AV	N-DODECANE	24	0	0	104	500	0.09	0.4	0.00	ND	ND	3		071487	100587	012288	3511	3681	2341	78	19.1	129	F3300	1907	0810

(1) m-Xylene was not loaded into control samples - recovery value of 100 assigned.

Figure 2-1. Quantitated data output format for air samples.

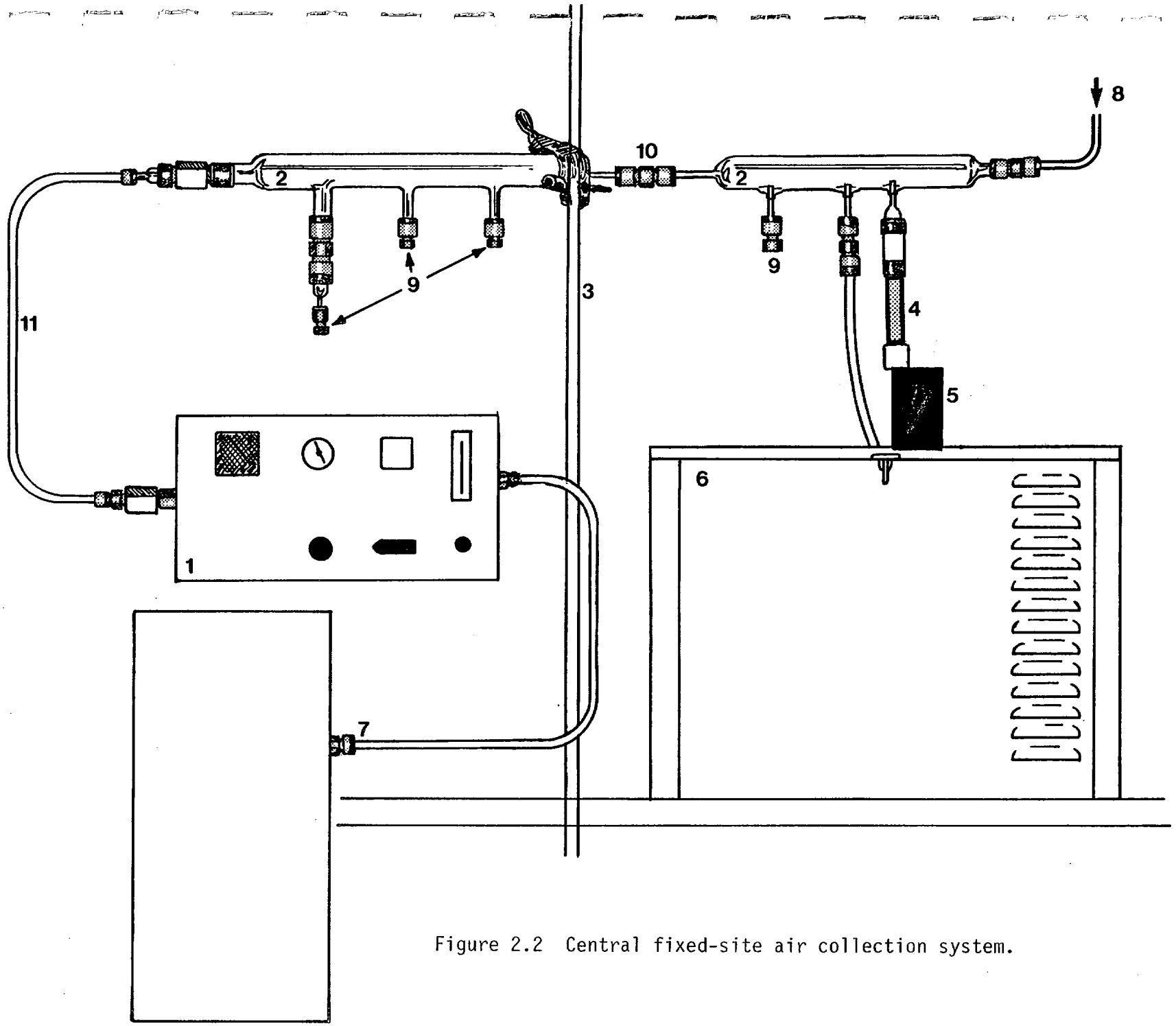

Figure 2.2 Central fixed-site air collection system.

Legend to Figure 2-2.

1. Metal (stainless steel) bellows pump - operated at ca. 10 L/min.
2. Glass manifold.
3. Support pole.
4. Tenax GC cartridge (10 cm x 1.3 cm I.D.).
5. DuPont P125A personal sampling pump - operated at ca. 25 mL/min.
6. Canister sampler.
7. Tedlar bag housed in cardboard box.
8. Air inlet.
9. Capped manifold inlets - used alternately for collection of duplicate samples.
10. Swagelok stainless steel unions.
11. Teflon (PTFE) tubing.

SECTION 3
RESULTS AND DISCUSSION

SURVEY OPERATIONS

Field Data Collection

Of the 112 cases that were assigned to the interviewers in the Winter Season, 51 participants completed the Study Questionnaire and participated in air monitoring activities. Table 3-1 summarizes the results of the re-enlistment of 1984 study participants. One participant who completed the Study Questionnaire, cancelled the monitoring appointments due to illness. Another participant completed the Study Questionnaire but no convenient times for the air monitorings could be scheduled.

As noted in Table 3-2, there were 112 cases from the 1984 Winter Season California TEAM Study from which the required 55 participants were to be obtained. Of these, 48 were measured as having a high level of exposure in the previous study, 53 had a medium level of exposure, and 11 had a low level of exposure. Of the 48 high-level exposure cases, 43 were attempted in the field and 26 were completed. Nine of these were to include canister sampling. Of the 53 medium-level exposure cases, 43 were attempted and 17 were completed. And, of the 11 low-level exposure cases, all were attempted and 8 were completed.

The results of field data collection for the Summer Season study by final field status codes are presented in Table 3-3. Forty-three participants were secured from the 51 who had participated during the Winter Season.

CHEMICAL SAMPLING AND ANALYSIS

Winter Season

Introduction--

During the period February 6 through February 23, 1987, 52 people from Los Angeles County, California, participated in the Total Exposure Assessment Methodology Study. These individuals were residents of Torrance, Carson, Hermosa Beach, Redondo Beach, Manhattan Beach, Lomita, and Harbor City, California (Figure 3-1). Table 3-4 summarizes the environmental and

biological sample collection results. Missing samples were accounted for in all cases and were generally due to accidental sample container breakage, pump malfunction or improper collection by study participants.

In general, the logistical aspects of sample collection proceeded as described in Table 1-3 and in the Standard Operating Procedures. However, neither of these accurately describe the actual daily execution of the sample collection. Pervasive and debilitating participant scheduling problems were encountered at the very outset of the trip due to the significantly increased time requirements at each residence relative to previous TEAM studies. Time constraints were compounded by the large geographical area covered by the study population and severe traffic problems inherent in the greater Los Angeles area. These scheduling difficulties were resolved only after lengthy negotiations between the analytical chemists, survey operations staff and many study participants. Every effort was made by the field sampling staff to maximize efficiency during all aspects of the sampling operation. Nevertheless, the physical burden on the sampling staff, imposed by the increase in intensity and complexity of the sampling operations, was acute from the outset of the field study. A usual day for all members of the field staff began at 0500 h and continued through at least 2300 h. Average rest time in any given 24-hour period was 6 hours. Time was almost never taken for breakfast or lunch and dinner was never eaten before 2200 h. Aside from the physical burden to the sampling staff, this pace placed the actual samples at significant risk. Fatigue often made proper execution of sample collection and storage procedures very difficult and subject to error.

Air Volatiles--

Collection of personal and fixed-site air samples on Tenax was accomplished as described in the respective SOPs. Sampling pump flows were set so as to achieve an 18 L sample over the sampling period. Since the overnight sampling period (11-13 h) was somewhat longer than the daytime sampling period (8-10 h), specific sampling pumps were calibrated and assigned for use exclusively in each period. This resulted in minimized pump recalibration and flow irregularities. Loss of samples due to actual pump failure was controlled by installation of new nickel-cadmium cells and careful attention to each pump's discharge/charge history.

Since many of the study participants had been sampled previously, participant compliance with the requirements of personal air sampling was quite high. The sampling vests which facilitate carrying the sampling pump and Tenax cartridge train, but which are strictly a convenience, were largely rejected by the study participants. This did not compromise personal air sample integrity.

Indoor and outdoor fixed-site air samplers were placed to facilitate collection of representative samples without obstructing family traffic patterns or being accessible to pets or children.

Personal and fixed-site Tenax samples were analyzed on two Finnigan GC/MS/COMP instruments, Models 3300 and 4500, both interfaced to an INCOS Nova 3 data system. Instrumental limits of detection, calculated for each of these mass spectrometers, are listed in Table 3-5.

Air Exchange--

Deployment of emitters and exposure of collectors for determining residential air exchange proceeded largely as described in the analytical protocol. Placement of the collectors was sometimes difficult, particularly in apartments where the zones were poorly defined. Contemporary architectural features of some residences made the measurement of the whole-house volume a very time-consuming task. Surprisingly little resistance was encountered to the emission of the tracer gas into the participant's home.

Canister Volatiles--

Canister sampling during the Winter Season trip to California was difficult for several important reasons:

1. the limited development of the sampling approach which preceded the trip,
2. equipment failures in the field,
3. internal and external power requirements, and
4. physical space and security requirements of the sampling device.

The programmable interval timers which were used to open the canisters and allow collection of ambient air were difficult to operate since longer open periods were required as the collection period progressed. This programming operation was very tedious. Furthermore, several of these interval timers were not functional when received at the field sampling

site. Placement of the canisters, both inside and outside the participant's residence was somewhat limited by the size of the samplers and the need for 110 vac power. This was especially difficult for apartment residences.

Samples collected in canisters whose interval mechanism operated properly were analyzed by GC/ECD/FID. Limits of detection for this analysis, shown in Table 3-6, reflect decreased instrument sensitivity over what might be expected for an ECD. Consequently, many analytes were not detected which might have been reported under typical analysis conditions. This sensitivity problem was corrected prior to the summer season sampling trip.

Real-Time Monitoring - Evaluation of the Photovac 10S10 Portable GC--

A Photovac Model 10S10 portable gas chromatograph was evaluated during the winter season sampling effort as a means for identifying indoor chemical sources. Approximately ten indoor air samples were collected using this device from ten selected participants in Los Angeles County, California. Each of these participants were selected for this activity based on previously detected high levels of TEAM target compounds (15).

A detailed analytical protocol was employed for this survey sampling (15). Results are presented in Appendix I. In summary, 1.0 mL gas samples were collected with a gas sampling syringe, injected onto a 3% SP2100 on 100/120 Supelcoport (0.66 mm x 3.2 mm I.D.), and eluted with zero air (0.1 total hydrocarbons). Eluting components were detected with a photoionization detector (PID). Approximately 2.5-3.5 hours in each house were required to collect and analyze the eight samples plus blank and calibration standard. This time was consumed with the following functions:

15-20 min	Instrument Setup - including battery charging, carrier gas adjustment, assembly of miscellaneous equipment, collection of forms, and explanation of participant's responsibilities.
30-45 min	Instrument Calibration - analysis of calibration standards and blanks. In general, standards were not run for the full 15 minutes, but only until standard compounds had eluted and the baseline was stabilized. Zero air blanks were analyzed after the calibration standards and always for the full 15 minutes.
2-2.5 hours	Survey Sampling and Analysis. Gas samples, 1.0 mL, were collected from each room of the house and analyzed on the 3% SP2100 column. During this time, system performance

criteria were computed from the results of the analysis of the calibration standards. in addition, a sketch of the floor plan of the house was made and the air exchange functions were performed. Typically during the last injection, a household inventory was made in areas suggested by the results of previous injections. If the last injection revealed highest and most numerous levels of volatile organics, the inventory was performed on that room.

Several general comments are appropriate concerning this instrument.

1. The GC must be powered at least 1 hour prior to the first injection in order to avoid acceptable baseline drift. Such drift usually occurred during the first injection but occasionally also during later injections without provocation. This may suggest temperature instability in the column chamber.

2. Switching from the 3% SP2100 column to the alternate 5% SE30 column to improve resolution of early eluting peaks was not feasible. Baseline drift on the unequilibrated column was too severe to render the column useful, even after 30 minutes.

3. The syringe valves on the calibration gases (Scotty I, Scott Specialty Gases) were difficult to use. Large differences in delivery pressure between aliquoting undermined the accuracy of the amount of calibrant gas contained in the syringe.

4. A digital flowmeter was substituted for the rotometer to improve carrier flow accuracy. Both the inaccuracies of the carrier flow measurements and the amount of calibrant gas contributed to large variation in standard peak response. The calibrant gas response (V-sec/ng) for trichloroethylene ranged from 1.8 to 54 for the ten homes. The trichloroethylene retention time (min.) varied from 0.63 to 1.11 and the benzene/trichloroethylene resolution ranged from 0.44 to 1.1.

5. Injections of zero air yielded several significant peaks which were not seen in either the calibrant gases or in the room air samples. This was seen in more than one of the blank cylinders. Figures I-1 to I-4 illustrate these findings.

Specific comments on surveys of individual homes follow:

House 1--The chromatographic profile of all the rooms sampled were similar. Figures I-5 to I-7 are shown as examples.

Figure I-5: Next to the door leading to the garage (first floor).

Figure I-6: Den (First floor)

Figure I-7: Participant's bedroom (second floor)

Note than in Figure I-4 the baseline was drifting upward and 30 minutes later in Figure I-7 the baseline was drifting steeply downward. This house was sampled late in the day after the GC had been on all day. No explanation can be offered for this drift.

House 2--The GC profiles of all the rooms sampled were similar. Figure I-8 (living room) is shown as an example.

House 3--The GC profiles of all the rooms sampled were similar. late eluting (>5 minutes) peaks were larger in the kitchen. Figure I-9 (kitchen) is shown as an example.

House 4--The GC profiles of all the rooms sampled were similar except for the bath. Unfortunately, the bath was too small to accommodate the indoor canister sampler. Figures I-10 and I-11 are shown as examples.

Figure I-10: Living room

Figure I-11: Bath

House 5--The GC profiles of all the rooms sampled were similar. Although one bedroom had a strong perfume odor and a bath had an odor of chlorinated cleanser, the profiles of both of these rooms were similar to the rest of the house. Figures I-12 to I-14 are shown as examples.

Figure I-12: Kitchen

Figure I-13: Bedroom

Figure I-14: Bath

House 6--The GC profiles of all the rooms sampled were similar. The profile of the kitchen had similar peaks with larger areas than the profiles for the other rooms. Figures I-15 and I-16 are shown as examples.

Figure I-15: Kitchen (ground floor)

Figure I-16: Bath (basement)

House 7--The GC profiles of all the rooms sampled were similar. The kitchen had a food odor, but its profile was indistinguishable from those seen for the rest of the rooms. Figures I-17 and I-18 are shown as examples.

House 8--The GC profiles of all the rooms sampled were basically similar. However, the profiles of second floor rooms had larger peak areas than profiles of first floor rooms. Figures I-19 and I-20 are shown as examples.

Figure I-19: Kitchen (first floor)

Figure I-20: Bedroom (second floor)

House 9--The GC profiles of all the rooms sampled were similar. However, larger peak areas were observed in rooms not ventilated by open windows relative to those in rooms with open windows. Unfortunately, the nonventilated rooms were small bedrooms without a suitable place for canister samples. Figures I-21 and I-22 are shown as examples.

Figure I-21: Kitchen (ventilated)

Figure I-22: Bedroom (unventilated)

House 10--As with all previous residences, the GC profiles of all the rooms sampled were basically similar. However, the areas of the peaks, especially the peak at 0.75 min, in samples from second floor rooms were greater than the peak areas of samples from first floor plans. Figures I-23 and I-24 illustrate these differences.

Figure I-23: Bath (first floor)

Figure I-24: Bedroom (second floor)

In conclusion, the effect of central air conditioning on number and levels of volatile organics could not be adequately assessed since only one house (House 6) was so equipped. however, samples from rooms in most houses without central air conditioning gave very similar GC profiles to these collected in homes with central air conditioning. A significant difference between profiles of different floors was seen only in two of the multi-storied houses sampled. Summarily, the GC was not sensitive enough to detect room-to-room differences in levels of volatile organics unless they were quite large. Furthermore, the GC alone did not provide enough information to locate the canister sampler. Consequently, only the visual household inspection was used for this purpose. In eight instances the location suggested by visual and instrumental means was the same.

Throughout the method development and testing phases of the evaluation of the portable GC, sensitivity was a noticeable limitation. This was particularly true for the saturated halogenated compounds, which comprise an appreciable portion of the TEAM targets. Limits of detection for aromatic substances are often 100 to 1000 times lower than for halogenated materials. Furthermore, since the chromatography has been developed to embrace the widest range of analyte volatilities (i.e., benzene to limonene), severe peak broadening with accompanying loss of sensitivity occurs for late eluting peaks.

Ambient temperature chromatography and photoionization detection, both of which figure largely into instrumental sensitivity, are inherent features of the Photovac portable GC design. Capillary chromatography offers some encouragement in achieving lower detection limits. Jerpe and Davis (16) report 20 pg detection for benzene using a 30 m x 0.75 m I.D. glass column coated with SPB-1 (1 μm film). Their results illustrate a

volatility range from trichlorofluoromethane to bromoform in a single chromatogram. Fused-silica columns (wide-bore) should provide comparable results and are proposed as an improvement to the portable GC approach to source identification.

Modest elevated oven temperatures (10-15°C) might also provide improved peak shape and, hence, greater sensitivity. This modification, however, would require significant instrument alterations. Similarly, alternate halogen-sensitive detectors (e.g., ECD) would provide enhanced sensitivity to the specific compounds of interest, but are not available in the Photovac design.

Central Fixed-Site Monitoring--

Tenax GC and canister samples were not collected at the central fixed-site during the winter season due to serious equipment, location, and scheduling difficulties. These problems were resolved prior to the summer sampling effort.

Summer Season

Introduction--

The second season Los Angeles County study was conducted on 43 participants during the period July 8 through July 20, 1987. The sample collection results are summarized in Table 3-7. Participants in this second season study had all participated in the first season study and consequently were familiar with the sample collection procedure.

Participant scheduling problems which plagued the Winter Season study were eliminated by allocating unique appointment times and dates to the various field interviewers. This did not appear to adversely affect their ability to schedule appointments. The level of effort required of the analytical chemists was largely unchanged and the problems of exhaustion were evident as the Winter Season. No additional field staff were assigned to the Summer Season sampling trip.

Air Volatiles--

Collection of personal and fixed-site air samples on Tenax was accomplished as described in the respective SOPs. No major problems were encountered. Performance of sampling equipment was satisfactory and equivalent to the winter season.

Tenax sample analysis was performed on Finnigan 3300 and 4500 GC/MS/COMP instruments. Limits of detection for the Summer Season are shown in Table 3-5.

Air Exchange--

Unlike the Winter Season sampling effort in which each residence was treated as a single zone (three zones in "canister" homes only), all residences during the Summer Season were treated as three zones. The three zones consisted of a living zone, a bedroom zone and a kitchen zone. The definition of the three zones inside the residence was often highly subjective as clear boundaries between zones did not always exist. Deployment of the tracer emitters and collectors was otherwise accomplished without significant difficulty. The air exchange rates for most homes sampled in the Summer Season may be elevated appreciably by the predominance of open doors and windows observed during sampling.

Canister Volatiles--

Collection of volatile compounds in canisters during the Summer Season was accomplished with significantly less difficulty than during the Winter Season. This was, in part, due to a completely different collection mechanism and to experience gained by the staff in canister sampling during previous sampling efforts. Canister samplers were placed both inside and outside the homes of ten participants for each of the two sampling periods (overnight and daytime). Ambient air flow into the canister was attenuated with a mass flow controller set at 6 mL/min.

Each canister was analyzed by GC/ECD/FID and GC/MS/COMP. Limits of detection for the compounds monitored by each approach are shown in Table 3-8. For those analytes which were determined by both GC/ECD/FID and GC/MS/COMP, significant differences in the limits of detection are observed. The range of LODs for GC/MS/COMP is 0.35 to 1.50 $\mu g/m^3$, while the equivalent range for GC/ECD/FID is 0.006 to 148 $\mu g/m^3$. This extreme range for GC/ECD/FID is attributable to the inherent increase in sensitivity of an electron capture detector to compounds with increasing numbers of halogen atoms. In this case, the increase is 10^4 from vinyl chloride (1 Cl) to carbon tetrachloride (4 Cl).

Central Fixed-Site Monitoring--

Extensive effort was invested in the Summer Season trip toward execution of a central fixed-site sampling program. Site location and equipment preparations were initiated several weeks before departure to California. The Madronna Middle School site in Torrance was chosen on the basis of its central location (Figure 3-1), its proximity to "typical" residential neighborhoods, and its accessibility to RTI sampling staff.

Sample collection for Tenax, canister and Tedlar bags was accomplished without major difficulty.

QUALITY ASSURANCE

All tabulated blank and control data for Tenax cartridges, canisters and air exchange, as well as, results of performance evaluation and duplicate sample analysis, are presented in Appendix J.

Winter Season

Field Operations--

Projections for this study included the recruitment and sampling of 55 participants. However, only 51 individuals, or 92.7 percent of the projected number, were enlisted as respondents and utilized for sampling purposes. The corresponding completion figures for sample collection and analysis are shown in Table J-1.

Sample Analysis--

Tenax Cartridges--The relative response factor values used during this study and their variability are shown in Table J-2.

Canisters--Calibration data are shown in Table J-3.

Air Exchange--Problems were reported in the calibration of one tracer (PFT3) and in the analysis of the samples resulting in an uncertainty of 25 to 30 percent in these tracer concentrations.

Field Control and Blank QC Samples--

Tenax Cartridges--In general, the field control samples associated with air collections gave blank-corrected recoveries of 80 to 115 percent (1,1,1-trichloroethane is higher, limonene lower). Recoveries are shown in Table J-4. When these results for air matrices are examined by Tenax

batch, however, it can be seen that recoveries for one batch are much lower, while two batches are higher. These results reflect instrument performance rather than contamination or losses from the Tenax cartridges.

The field blank data (Tables J-5) show that the batches of Tenax used were uniform and had very low background of target compounds.

Canisters--The field blank data (Table J-6) show that the canisters were uniform and had very low background of target compounds. The recovery data (Table J-7) obtained was acceptable; however, no data could be reported for a number of compounds, due, in part, to high detection limits.

Air Exchange Samples--Results of the control sample analysis are shown in Table J-8, blank sample analysis in Table J-9. All of the blanks showed low background except Number 18. The recovery for controls is acceptable; BNL reported that analytical difficulties accounted for some of the variability, especially for PFT3.

Duplicate Sample Analysis--

Tenax Cartridges--The agreement between duplicate sample pairs is summarized in Table J-10 for the target compounds found in measurable amounts in both the field (F) and corresponding duplicate (D) samples. The percent relative standard deviation (%RSD) for those sample pairs was calculated and the median tabulated.

The agreement between field (F) and quality assurance (Q) duplicate pairs is similarly summarized in Table J-11.

The agreement between F/D duplicate sample pairs was, in general, very acceptable with calculated precision estimates below 30 percent median RSD. Excluding 1,4-dioxane, no targets in personal air exceeded 25 percent; all targets in outdoor air were below 35 percent median RSD. Chloroform exceeded 30 percent median RSD in indoor air (44.4%) as did styrene (41.1%) and n-dodecane (32.7%). The agreement between F/Q duplicate pairs was not as good as F/D pairs overall.

Canisters--No duplicate samples were collected.

Air Exchange--The data and percent relative standard deviations are shown in Table J-12. The agreement was acceptable (<40% RSD) for all sample pairs.

Performance Evaluation Sample Analysis--

Tenax Cartridges The results were reported to EPA without any background correction and are summarized in Table J-13. Precision estimates (CV) were good overall except for chloroform at the lowest fortification level. Approximately equal numbers of targets exhibited a positive and negative bias; o-xylene, tetrachloroethylene and chloroform showed the highest positive bias.

Summer Season

Field Operations--

The completion Figures for the collection and analysis of samples from the 45 individuals selected into this study are shown in Table J-14.

Sample Analysis--

Tenax Cartridges--The relative response values used during this study and their variability are shown in Table J-15. The perfluorotoluene tune was within the acceptable range on the Finnigan 4021 GC/MS/COMP during the analysis period; peak resolution and symmetry were also acceptable. Insufficient data are available for the Finnigan 3300 GC/MS/COMP to evaluate its performance.

Canisters--Calibration data are shown in Table J-16.

Air Exchange--No calibration or analytical problems were reported by Brookhaven National Laboratory.

Field Control and Blank QC-Samples--

Tenax Cartridges

The field blank data (Table J-17) show that batches of Tenax were uniform and had low background of target compounds. In general, recoveries (Table J-18) analytes from control cartridges were between 80 and 115 percent, the exceptions are low recoveries reported for Tenax batches 128F and 131. The recoveries associated with these batches are due largely to the operation of one analytical system.

Canisters--The results for controls are shown in Table J-9, the results for blanks in Table J-20. The recovery of analytes from canisters was lower than expected (approximately 50%). Extensive investigation failed to

reveal the reasons. The canisters were free of background contamination of the target analytes.

Air Exchange--Results of the control sample analysis are shown in Table J-21. All of the blanks (Table J-22) showed low background; the recovery for controls is acceptable. Brookhaven National Laboratory reported no analytical difficulties.

Duplicate Sample Analysis--

Tenax Cartridges--The agreement between duplicate sample pairs is summarized in Table J-23 for the target compounds found in measurable amounts in both the field (F) and corresponding duplicate (D) samples. The percent relative standard deviation (%RSD) for those sample pairs was calculated and the median tabulated. Agreement between F and D duplicates at the central fixed-site is shown in Table J-24.

The agreement between field (F) and quality assurance (Q) duplicate pairs is similarly summarized in Table J-25.

The agreement between F/D duplicate pairs, using calculated precision estimates was acceptable (<40% RSD) for all target compounds except chloroform in indoor air and outdoor air. The agreement between F/D pairs was greater than 40 %RSD for tetrachloroethylene (57.6%), n-octane (64.9%), n-undecane (54.1%), and n-nonane (53.2%) in personal air.

The agreement between F/Q duplicate pairs, in general was good (<40% RSD). Only p-dichlorobenzene (48.5%) was higher than 40% median RSD in personal air, and only n-undecane was high (45.7%) in outdoor air. All data agreed well in the indoor air sample pairs.

Canisters--The available data are shown in Table J-26. No conclusions can be drawn from this limited amount of data.

Air Exchange--The data and percent relative standard deviations are shown in Table J-27. The agreement was very good; all but two determinations showed RSD below 10%.

Performance Evaluation Sample Analysis--

Tenax Cartridges

The results were reported to EPA without any background correction and are summarized in Table J-28. Precision (estimated as CV) was acceptable overall, and was very good at the highest fortification level. All CVs

were below 40 percent except chlorobenzene and ethylbenzene at the medium fortification level. Most compounds overall showed a negative bias; carbon tetrachloride had a positive bias at all levels; tetrachloroethylene and o-xylene had positive bias at the lowest fortification level.

STATISTICAL ANALYSIS OF DATA

Winter Season

Household Questionnaire and 24-Hour Exposure Recall Questionnaire--

A description of the 51 people studied in the Los Angeles communities in the Winter Season (February, 1987) is given by the results of the household questionnaire in Appendix K. Slightly more than half (53%) were female. The age range was from 11 to 90 years. Approximately 57 percent were employed and of those not employed, 55 percent were housewives. Eighteen percent were students and 27 percent were retired. Only 11 of the 51 people were currently employed.

Approximately 22 percent of the participants were current smokers, 25 percent ex-smokers and 53 percent had never smoked. The vast majority of smokers used cigarettes. As indicated by the results of the questionnaire, often visitors or quests smoked in the house (59%). The predominant areas of smoking in the home were in the dining room, den and kitchen (37, 31, and 20%, respectively).

Of the six hobbies which were represented on the questionnaire (painting, furniture refinishing, scale models, gardening, attending to house plants and automobile or bicycle repair) a frequently occurring hobby was attending house plants and gardens (41 and 18%, respectively). Fifty-seven percent of these homes possessed a fireplace and sixty-five percent of those with fireplaces left their dampers open (a potentially predominant effect on air exchange rate). Few houses had air conditioning.

Only one house indicated the use of mothballs, while 36 homes used indoor air fresheners and 11 homes utilized bathroom deodorants. Forty-nine of the 51 homes utilized the municipal water supply.

Approximately 55 percent of the homes had an attached garage. In a few of these homes (four) the respondents indicated they often smelled gasoline or automobile odors in rooms adjacent to the garage. Storage of pesticides, insecticides, lawn and garden chemicals, as well as automobiles and gasoline in the garages occurred in a number of the homes. Furthermore, 80

percent of the homes stored cleaning supplies in the kitchen, utility room, and bathrooms. Paints, varnishes, and paint removers were also found to be stored in the attached garage (41%).

To gain insight on the activity of the participants during the 24-hour study period, a 24-hour recall exposure and activity questionnaire was administered at the end of the monitoring period. The results of this 24-hour recall exposure questionnaire are given in Appendix L. More people were exposed to smoking (51%), service stations, garages (approximately 12%), odorous chemicals, auto or truck exhaust, and cleaning solutions during the 24-hour period than any other substances covered by the exposure questionnaire. In addition to tobacco smoke, the participants were exposed to air fresheners and bathroom deodorizers (27%), petroleum products (18%), auto/truck/lawn mower exhaust (22%), cleaning solutions (31%), and aerosols (47%). Most of these exposures to chemicals from various consumer products were, for the most part, less than one hour. Over one-fourth of the participants were exposed to moth crystals, room air fresheners, or bathroom deodorizers.

Since a significant source of chloroform is municipal water, the frequency of shower and/or bath use was determined. Eighty-eight percent of the participants used either a shower or bath. Six people did not bathe or shower during the study period. Of these, 57 percent reported the use of water for one to ten minutes, while 39 percent utilized the water eleven to twenty minutes. Also, a small percentable of the subjects used swimming pools, saunas, spas, or hot tubs during the past 24 hour period. Forty-five percent of the participants took two baths or showers during the 24-hour monitoring period. The water usage rate in dishwashers and clothes washers was also determined. Fourteen percent of the homes had employed their dishwasher during the 24-hour monitoring period while 25 percent had utilized their clothes washers.

Another interesting statistic were the number of hours that were spent indoors at home or indoors at occupational work. Forty-three percent of the individuals spent the past 24 hour indoors for a period of 20 to 24 hours. Another 23 percent spent 15 to 19 hours in their home. Sixteen percent spent 6 to 10 hours indoors at occupational work while only four percent spent their time outdoors for six to ten hours at occupational work. During the 24-hour period, 40 of the 51 participants spent one to

five hours outdoors. This interesting set of statistics indicates that the predominant integrated exposure time principally comes from indoor activities.

During the Winter Season, 37 percent of the respondents used a gas furnace for heating while eight percent used their fireplaces. Fifty-three percent of the homes employed a gas cooking range.

Eighty percent of the participants had travelled by car during the past 24 hours. The length of time spent in the automobile was generally from one to fifteen minutes.

Quantifiable Limits for Tenax Samples--

Table 3-9 presents a summary of the sample sizes available for the volatile compounds collected in the environmental and breath samples. This indicates that not all information was available on each person.

Before presenting the percents measurable and summary statistics, the quantifiable limits for the various media and the twenty-two compounds were examined. The purpose of this examination was to indicate how these limits varied for each compound; thus, caution should be exercised in comparing data from medium to medium and season to season. The QL varies with each sample due to the variation in the volume of air collected and the GC/MS instrument employed for analysis.

The minimum quantifiable limits (min QL), maximum quantifiable limits (max QL), ratios of max QL to min QL, percentages of concentrations above the max QL, percentages measurable (above the quantifiable limit), and the ratios of percent above the max QL to percent measurable are shown in Tables 3-10 through 3-16 for the personal air, indoor air, and outdoor air samples collected using Tenax.

Overall, the range between the min QL and the max QL was small as demonstrated by the small values for the ratio of max QL to min QL. The largest, by far, of the ratios were for 1,4-dioxane with ratios of 10.9 for the overnight personal air samples, 9.93 for the daytime living area samples, and 11.8 for the overnight outdoor air samples. Because of little variation in the quantifiable limits, there appeared to be little difference in the percentage measurable and the percentage above the max QL as

shown by their ratio. Some compounds which did show large differences were 1,4-dioxane in overnight and daytime personal air samples; carbon tetrachloride in daytime living area and daytime kitchen samples; and chloroform, 1,2-dichloroethane, and carbon tetrachloride in overnight and daytime outdoor air samples.

Percent Measurable for Tenax Samples--

The percentages of concentrations measurable (above the quantifiable limit) by compound for breath, personal air, indoor air, and outdoor air samples are summarized in Table 3-17. The percentages for the various compounds present several patterns. Benzene, 1,1,1-trichloroethane, tetrachloroethylene, and m,p-xylene were measurable in over ninety percent of the samples in all media. Ethylbenzene, p-dichlorobenzene, o-xylene, and n-octane were measurable in at least fifty percent of the samples in each media. Chloroform, 1,2-dichloroethane, trichloroethylene, and n-dodecane showed higher percentages in personal air and indoor samples than in outdoor samples. Limonene and α-pinene showed higher breath, personal air, and indoor percentages then outdoor percentages. 1,4-Dioxane, m-dichlorobenzene, and 1,2-dibromoethane showed low percentages in all media.

Summary Statistics for Tenax Samples--

Additional analyses were done on those compounds and media with at least 20 percent measurable. In particular, summary statistics were computed for twenty compounds for personal air samples; nineteen compounds for living area, kitchen, and outdoor samples.

The median quantifiable limits, arithmetic means, arithmetic standard errors, geometric means, geometric standard error, percentiles, and ranges for the selected compounds by media are given in Tables 3-18 through 3-24.

In comparing the measures of central tendency, the arithmetic mean appears higher than the median and the geometric mean for almost all compounds. The difference in these statistics seemed quite large as for p-dichlorobenzene in personal and indoor air, n-decane and limonene in daytime personal air. This may be explained by the skewness of the data caused by a few very high concentrations.

Generally, daytime personal air samples showed higher maximum concentrations than overnight personal air samples while overnight personal air

showed higher median values. The highest concentrations of volatile organic chemicals were observed for 1,1,1-trichloroethane, p-dichlorobenzene, o- and m,p-xylene in in the overnight personal air samples. The levels of these same compounds were elevated in the daytime personal air samples and, in addition, tetrachloroethylene, n-decane, n-octane, n-undecane, and n-nonane all exceeded an arithmetic mean of 10 $\mu g/m^3$. However, the geometric mean for 1,1,1-trichloroethane, benzene, o-xylene, m,p-xylene, and limonene were the only chemicals above 10 $\mu g/m^3$. Similar trends were found for the air samples taken in the living area and kitchen during either daytime or overnight periods. These same chemicals were elevated above 10 $\mu g/m^3$ in the samples taken at fixed-site locations within the home. As and interesting contrast, the levels of limonene in the overnight and daytime outdoor fixed-site samples at the residences were considerably lower than those for personal or indoor air samples. The arithmetic means in the outdoor air samples were approximately an order of magnitude less than the indoor air values. Finally, the levels for the daytime outdoor fixed-site Tenax samples were approximately one-half the arithmetic mean found for these same chemicals in the overnight outdoor air samples. The lower values for each of the measured chemicals in the outdoor daytime samples suggest a more active meteorological condition during the daytime than at night resulting in the removal or depletion of these chemicals from the atmosphere surrounding the homes.

The indoor air levels, as shown in Tables 3-20 through 3-22, tended to be lower than the personal air levels. The overnight kitchen median concentrations also tended to be higher than those during the daytime. (Limonene, m,p-xylene, and p-dichlorobenzene showed high levels in all three indoor samples.)

For the outdoors, overnight levels tended to be higher than daytime levels. Personal and indoor air levels, overall, were higher than outdoor levels in both time periods. Benzene, 1,1,1-trichloroethane, and m,p-xylene showed the highest concentrations in outdoor air.

Quantifiable Limits for Canister Samples--

Canister samples for eleven compounds were collected in the primary living area and outdoors for a small subset of homes. The analyses of these samples were conducted by GC/ECD/FID. Of the eleven compounds, chloroform,

1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, and tetrachloroethylene were also reported for Tenax. The quantifiable limits for these samples are given in Tables 3-25 through 3-28. These quantifiable limits (QLs) tended to be higher than those for the Tenax samples. With the exception of the daytime living area samples, however, the ratios of maximum QL to minimum QL were 2 or less, showing relatively small ranges. Also, the ratios of percent above maximum QL to percent measurable were generally close to 1, showing little difference.

Five of the chemicals had sufficiently high quantifiable limits so that the chemicals could not be detected. The remaining chemicals which included chloroform, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, tetrachloroethylene, and methylene chloride all were detected at sufficient levels to quantify above the maximum quantifiable limit. Because of the extraordinarily high detection limits for the five chemicals, it was decided that canister sampling and analysis would be included also in the Summer Season with improvements in the ECD/FID detection limits. In addition, mass spectrometry was included as a second analytical system for the analysis of canister samples.

Percents Measurable for Canister Samples--

The percentages of concentrations measurable (above the quantifiable limit) for living area and outdoor canister samples are given in Table 3-29. The effect of the high quantifiable limits discussed above can be seen here in the number of compounds with zero percent measurable. However, for those compounds with lower QLs such as 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, and tetrachloroethylene, high percents measurable were found.

Summary Statistics for Canister Samples--

Summary statistics for overnight and daytime indoor and outdoor canister samples are given in Tables 3-30 through 3-33. The predominant chemicals measured in the overnight and daytime living area using canister sampling was for 1,1,1-trichloroethane and methylene chloride. In contrast, the levels of these two chemicals were considerable lower in the outdoor samples both for the overnight and daytime periods. The levels of each of the chemicals was approximately 50 percent of the indoor levels

for the corresponding period. Conversely, the levels of carbon tetrachloride were greater in the outdoor overnight and daytime samples by a factor of approximately 2 as indicated in the geometric means. The elevated concentrations during the daytime period may reflect an increased photochemical activity on the larger molecules that contain halogens producing smaller molecules including carbon tetrachloride via photochemical reactions.

House Source Strengths--

Whole house source strengths based on kitchen and living area concentrations were calculated using the following model:

$$S = A*V(C_n-C_o)$$

where S = whole house source strength (μg/hr),
A = air exchange rate (1/hr),
V = house volume in m^3,
C_n = indoor concentration ($\mu g/m^3$),
C_o = outdoor concentration ($\mu g/m^3$).

These calculations were done only on concentrations that were measurable. Concentrations that had been set to 1/2 LOD or 5/8 QL as described earlier were excluded. Thus the sample sizes show more variability. The results of these calculations using overnight and daytime kitchen and daytime living area concentrations are summarized in Tables 3-34 through 3-36. The tables show wide ranges for whole house source strengths and even include some negative values (when the outdoor levels exceeded the indoor levels). While all of the means were greater than zero, there were large differences with p-dichlorobenzene showing an average house source strength of more than 10,000 μg/hr while carbon tetrachloride had means in the 1 to 10 μg/hr range.

Smokers Versus Nonsmokers--

The mean concentrations for smokers and nonsmokers are compared for selected compounds and media Table 3-37. The means were significantly different at the 0.05 level for benzene and ethylbenzene in overnight and

daytime breath samples and for m,p-xylene and n-octane in overnight breath. For the other compounds and media, the smokers tended to show higher levels. One exception to this was tetrachloroethylene in the daytime living area samples.

Regression plots of benzene versus ethylbenzene concentrations for overnight and daytime personal air; overnight and daytime kitchen; and daytime living area samples are shown in Figures 3-2 through 3-6. In these plots, smokers are designated with an 'S' and nonsmokers with an 'N'. For the breath samples, the smokers tend to be grouped separately from the nonsmokers with the smokers showing higher levels in both compounds. The divisions are less distinct in personal and indoor air.

Summer Season

Household and 24-Hour Recall Questionnaires--

The frequencies and percentages of responses to the household questionnaire are given in Appendix M. These questions pertain to general characteristics of the participant and his home. Since all of the homes and most of the respondents were a subset of the winter study, the distributions of the responses are similar to those for the previous season. Almost 60 percent of the participants were employed. Others were housewives, students, or retired. Smokers made up less then a quarter of the sample. Gardening was still the most popular hobby. Two thirds of the participants used indoor air fresheners. Almost all had water supplied by a municipality or corporation.

The responses to the 24-hour recall exposure and activity questionnaire are shown in Appendix N. These questions pertain to what the respondent did or was exposed to during the 24 hours of the study. Responses to this questionnaire show that over half were exposed to tobacco smoke. Less than 20 percent went to work. Almost 40 percent used or had been near moth crystals, room air fresheners, or bathroom deodorizers. Thirty-seven of the 43 people took a shower or bath during the 24 hours of the study period. Most of the time was spent indoors. Even though it was summer, no one used an air conditioner and few used a portable or ceiling exhaust fan.

Table 3-38 presents a summary of the samples sizes available for the volatile compounds collected in the environmental samples. The variation in sample size, that is the number of samples in which the measurements

were made, reflects the fact that not all the analyses for each compound for each media could be done for each subject, because of an attrition rate for a variety of reasons such as breakage of samples during transportation, lost during analysis, etc. Also, indoor and outdoor fixed-sites were setup at each home and a subset of homes had canister sampling both indoors and outdoors. Finally, a central fixed-site location was identified and samples were collected utilizing Tenax samplers, canisters and Tedlar bags (CARB).

Quantifiable Limits for Tenax

Before presenting the percents measurable and summary statistics, the quantifiable limits for the various media and compounds were examined. The purpose of this examination was to indicate how these limits varied for each compound.

The minimum quantifiable limits (min QL), maximum quantifiable limits (max QL), ratios of max QL to min QL, percentages of concentrations above the max QL, percentages measurable (above the quantifiable limit), and the ratios of percent above max QL to percent measurable are given in Tables 3-39 through 3-45 for personal air, indoor air, and outdoor air samples collected using Tenax.

Overall, the range between the min QL and the max QL was small as demonstrated by the small values for the ratio of max QL to min QL (i.e. less than 2). Some exceptions to this were 1,4-dioxane, chlorobenzene, 1,1,2,2-tetrachloroethylene, and trichloroethylene in overnight personal air with ratios of 11.5, 9.60, 8.00, and 6.40, respectively. These compounds also showed high ratios in daytime personal air and, excluding tetrachloroethylene, in indoor air samples. Because of little variation in the quantifiable limits, there appeared to be little difference in the percents measurable and the percents above the max QL as shown by their ratio. Some compounds which did show large differences were 1,2-dichloroethane, carbon tetrachloride, and trichloroethylene in overnight personal air; carbon tetrachloride in daytime personal air; and 1,2-dichloroethane and carbon tetrachloride in overnight and daytime kitchen samples.

Percents Measurable for Tenax Samples--

The percentages of concentrations measurable (above the quantifiable limit), by compound, for personal air, indoor air, and outdoor air samples are given in Table 3-44. The percentages for the various compounds exhibited several patterns. Benzene, tetrachloroethylene, and 1,1,1-trichloroethane were were measured in over 75 percent of the samples for all media while ethylbenzene and m,p-xylene were measured in over half of the samples for all media. Carbon tetrachloride, n-nonane, o-xylene, n-octane, and n-decane showed lower percentages in breath than the other media. Styrene, α-pinene, n-undecane, and n-dodecane showed lower percentages in breath and outdoors than in personal or indoor air. Limonene showed lower percentages outdoors than in the other media. Chlorobenzene, m-dichlorobenzene, 1,4-dioxane, o-dichlorobenzene, 1,1,2,2-tetrachloroethane, and 1,2-dibromoethane showed low percentages in all media.

Summary Statistics for Tenax Samples--

Additional analyses were done on those compounds and media with at least 20 percent measurable. In particular, summary statistics were computed for nineteen compounds for personal and indoor air samples; twelve compounds for breath samples; and fourteen compounds for outdoor air samples.

The median quantifiable limits, arithmetic means, arithmetic standard errors, geometric means, geometric standard errors, percentiles, and ranges for the selected compounds by media are given in Tables 3-47 through 3-53. As in the Winter Season, the arithmetic means appeared higher than the geometric means and medians for most compounds. This could be in part caused by large outliers.

Most of the relationships between media found in the Winter Season were also present in the Summer Season. Generally, daytime personal air levels were higher than overnight personal air levels as shown in Tables 3-47 and 3-48. Exceptions to this trend were p-dichlorobenzene and α-pinene. Relatively large concentrations were found for 1,1,1-trichloroethane, p-dichlorobenzene, and m,p-xylene in overnight personal air and 1,1,1-trichloroethane, m,p-xylene, and limonene in daytime personal air. Examination of the levels found in the daytime personal air samples versus

the overnight personal air samples reveals that the arithmetic mean and geometric mean for the daytime samples are higher than the overnight samples. This may be a reflection of the overnight air sampler principally representing a fixed-site sampling in the bedroom during the sleeping hours. Nevertheless, this trend verifies the observations found in the samples collected during the 1984 study. Examination of the percentiles for the daytime and overnight personal Tenax air samples as well as the range further substantiates that the daytime samples consistently have higher levels than the overnight samples.

Tables 3-50 and 3-51 present the levels for Tenax samples collected in the kitchen for the overnight and daytime periods, respectively. The arimethic means and geometric means for the overnight kitchen samples appear to be higher for many of the chemicals as compared to the daytime kitchen samples. The highest levels were observed for 1,1,1-trichloroethane with an arithmetic mean of 13.1 and for m,p-xylene with a mean of 13 μg/cubic meter. A comparison of the levels of the chemicals for living area and kitchen area during the daytime period appear to be similar for most of the chemicals.

Tables 3-52 and 3-53 present summaries of the levels for the selected compounds for overnight and daytime outdoor Tenax samples during the Summer Season. The geometric means for the chemicals depicted in these tables are very similar for the overnight and daytime samples. The percentile values are also comparable.

Quantifiable Limits for Canister Samples--

Canister samples were collected for a subset of homes in the primary living area and outdoors. Each sample was analyzed using two methods: (1) GC/MS/COMP and (2) GC/ECD/FID. The use of mass spectrometry allowed for the analysis of a wider range of compounds (Tables 3-54 through 3-57). Thus, the list of chemicals that were analyzed by mass spectrometry does not entirely overlap with those samples analyzed with GC/ECD/FID. A few of the halogenated hydrocarbons were analyzed by both detection systems. However, mass spectrometry also measured aromatics and hydrocarbons. Vinyl chloride was not detected in any of the overnight daytime living area and overnight daytime outdoor samples. The quantifiable limits employing mass spectrometry were for some chemicals lower than GC/ECD/FID and thus many of the chemicals were found and measurable above the quantifiable limit. The

range of minimum to maximum quantifiable limit was small as evidence by the ratio of these two values. 1,1,1-Trichloroethane, benzene, toluene, ethylbenzene, o-xylene, m,p-xylene and methylene chloride were measured in 100 percent of these samples. Note that the sample size in these tables indicate the number of samples yielding nonmeasurable values.

The GC/ECD/FID quantifiable limits were on average much lower than those for the Winter Season as shown in Tables 3-58 through 3-61. Also the ranges for the QLs as reflected in the ratio of maximum QL to minimum QL were lower. With few exceptions the percentage above the maximum QL was equal to the percentage measurable.

Percents Measurable for Canister Samples--

The percentages of concentrations measurable (above the quantifiable limit) for the living area and outdoor canister samples are given in Tables 3-62 and 3-63. For the GC/ECD/FID samples, chloroform, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, and tetrachloroethylene were found most often. Methylene chloride, allyl chloride, and trans-1,2-dichloroethylene were rarely found. Vinylidene chloride, 1,1-dichloroethane, cis-1,2-dichloroethylene, and vinyl chloride were never found.

For the MS samples, 1,1,1-trichloroethane, benzene, toluene, tetrachloroethylene, ethylbenzene, o-xylene, m,p-xylene, n-decane, and methylene chloride were found in most samples while chloroform, p-dichlorobenzene, n-dodecane, and n-octane were often found. Vinylidene chloride and trichloroethylene were occasionally found while carbon tetrachloride and vinyl chloride were never found.

Summary Statistics for Canister Samples--

Additional analyses were performed on those compounds with at least 20 percent measurable in the media. In particular, summary statistics were computed for six compounds for GC/ECD/FID living area samples, five compounds for GC/ECD/FID outdoor samples, fourteen compounds for GC/MS living area samples, and twelve compounds for GC/MS outdoor samples. For the GC/ECD/FID samples (Tables 3-64 through 3-67), the overnight indoor levels showed some tendency to be higher than the daytime indoor levels while the reverse appeared true for the outdoor levels. These trends are also reflected in the tendency for indoor overnight levels to be higher

than outdoor overnight levels. Methylene chloride showed the highest concentrations indoors while 1,1,1-trichloroethane and carbon tetrachloride showed the highest levels outdoors.

For the GC/MS/COMP samples (see Tables 3-68 through 3-71), the overnight indoor levels show a slight tendency to be lower overnight then during the day. For outdoor samples no trend was apparent. Toluene showed the highest concentrations indoors while n-dodecane was was highest outdoors.

The GC/MS/COMP and GC/ECD/FID levels for chloroform, 1,1,1-trichloroethane, and methylene chloride in overnight living area air and 1,1,1-trichloroethane in overnight outdoor air are compared in Appendix O (O-1 through O-4). These regression plots show a general agreement between the two methods.

Central Fixed Site Tenax and Canister Samples--

During the Summer Season, data were also collected at a centrally-located outdoor site in Torrance. This site was chosen because it was near a residential area included in the study and was not in a high traffic area. Data were collected using three types of collectors in twelve hour segments during the course of the study. The three collectors were Tenax, Tedlar bags, and canisters. As before, the canisters were analyzed using gas chromatography/mass spectrometry and gas chromatography with electron capture and flame ionization detection. Table 3-72 gives the number of samples available for the different methods.

The quantifiable limits are examined in Tables 3-73 through 3-76. The tables show that the GC/ECD/FID canister samples showed by far the highest QLs. However, there was little variation in the ranges of the QLs for the four methods as reflected in the small values for the ratio of max QL to min QL and the ratio of percent above max QL to percent measurable.

The percents measurable for the four methods are compared in Table 3-77. This demonstrates the differences in the compounds reported by the various methods. Only 1,1,1-trichloroethane was detected in sufficient quantity in all four methods to give a good comparison. However, carbon tetrachloride, tetrachloroethylene, ethylbenzene, o-xylene, m,p-xylene, n-decane, and methylene chloride were measurable in sufficient quantity in pairs of methods to allow pairwise comparisons.

The summary statistics including median QL, arithmetic mean, arithmetic standard error, geometric mean, geometric standard error, percentiles, and ranges were then computed for those compounds with over 20 percent measurable. For GC/ECD/FID canister samples only three compounds met this requirement while nine for Tenax and seven for GC/MS/COMP canister and Tedlar bag met it (Tables 3-78 through 3-81). For GC/MS/COMP and GC/ECD/FID canister samples and Tedlar bag samples, 1,1,1-trichloroethane showed the highest levels. For Tenax, m,p-xylene was highest.

The coefficients of variation (CVs) for the various pairs of methods were then calculated. The CV was included only if both observations were measurable. This restriction limited the number of compounds that could be included in the analysis. As seen in Table 3-82, there were few large differences between the methods. For chemicals for which there were data the GC/ECD/FID and GC/MS/COMP analysis of canisters gave the lowest CVs as indicated by the mean median, minimum and maximum values. The analysis by GC/ECD/FID of the canister samples and GC/MS/COMP analysis of Tenax samples gave relatively good CVs, but somewhat larger than for the canister analysis by GC/ECD/FID and GC/MS/COMP. The worst CVs were observed for chemicals sampled with the canister and Tedlar bag and analyzed by mass spectrometry and GC/ECD/FID, respectively. A poor comparison also was demonstrated for n-decane for GC/MS/COMP analysis of canister and Tenax samples.

The ratios for the various pairs of methods are given in Table 3-83. The same inclusion restrictions used for the CVs were also applied here. As with the CVs, no large differences are apparent. However, GC/ECD/FID canister concentrations tended to be higher than GC/MS/COMP canister or Tenax concentrations.

Regression plots of selected compounds for the various pairs of sampling/analysis methods are presented in Appendix O (O-5 through O-17). With the exception of 1,1,1-trichloroethane in MS vs ECD/FID canister and, perhaps, benzene in MS canister vs Tenax, correlations appear to be highly insignifant.

The fixed-site levels were then compared with the outdoor levels found at participants' homes. The outdoor levels at the homes were paired with the fixed-site outdoor levels taken on the same date during the same twelve hour period. CVs and ratios were then computed (Tables 3-84 and 3-85)

using the same inclusion criteria as above. The ratios show that the home outdoor samples tended to be higher than the fixed-site outdoor samples (i.e., ratios in 3-85 were less than 1.0).

In conclusion, the analysis of canisters and Tenax samples using mass spectrometers provides the greatest versatility and lowest detection limits of the analytical methods employed in this study. Furthermore, fewer positive interferences are experienced with GC/MS/COMP, since qualitative confirmation of molecular structure is obtained with this technique.

House Source Strengths--

Whole house source strengths based on kitchen and living area concentrations were calculated using the model described previously. These calculations were done only on concentrations that were measurable. Concentrations that had been set to 1/2 LOD or 5/8 QL, as described earlier, were excluded. Thus the sample sizes show more variability. The results of these calculations using overnight and daytime kitchen and daytime living area concentrations are given in Tables 3-86 through 3-88. The tables show a wide range for the house source strengths. While all of the means were greater then zero, there were large differences with p-dichlorobenzene showing an average house source strength of more than 22,000 μg/hr in daytime kitchen and living area samples while carbon tetrachloride had means of 123 or less.

Smokers Versus Nonsmokers--

The mean concentrations for smokers and nonsmokers are compared for selected compounds and media in Table 3-89. Only the means for benzene in daytime breath sample were significantly different at the 0.05 level. For the breath and indoor samples, the means were generally higher for smokers but not significantly so. While these means sometimes showed what appeared to be large differences, the standard errors associated with these means were also large. Also the sample sizes were a problem with only ten people smoking.

Plots of benzene versus ethylbenzene for overnight and daytime personal air; initial, overnight, and daytime breath; overnight and daytime kitchen; and daytime living area samples are shown in Appendix O (O-18 through O-22) In these plots, smokers are designated with an 'S' and nonsmokers with an 'N'. For breath samples the smokers tend to be grouped separately from the

nonsmokers with smokers showing higher levels in both compounds. For personal and indoor air, the distinctions between smokers and nonsmokers were less obvious.

Comparison of Percent Measurable Between 1984 and 1987 Study

Tables 3-90 through 3-93 provide a comparison of the percent measurable values for overnight/daytime and personal/outdoor air Tenax samples for the 1984 and 1987 studies conducted on the same homes. The trends are very similar between the two studies. The percent measurable values (i.e., those chemicals providing a value above the quantifiable limit of the method) for the overnight samples are, for the most part, higher than daytime samples. This trend is more pronounced for outdoor air samples. The lowest percent measurable values for these chemicals generally occurred in the daytime outdoor samples.

A comparison of the summary statistics data between the two studies (1984 and 1987) should be made to determine whether Winter versus Summer trends in chemical levels are the same.

TABLE 3-1. SUMMARY OF RE-ENLISTMENT OF 1984 STUDY RESPONDENTS - WINTER, 1987

Final Status	Assumed Status of Resident			
	Original Participant	New Participant	Don't Know Participant	Total
Original Participant	11	6	14	31
Original Family, Different Participant	2	2	5	9
Different Family, Different Participant	1	1	9	11
Total	14	9	28	51

TABLE 3-2. RESULTS OF FIELD DATA COLLECTION - WINTER SEASON

Field Status Codes	Number of Participants
Study Questionnaire and Environmental Sampling Completed	51
Study Questionnaire Completed, Environmental Sampling Not Performed	2
Refusal to Participate by Household	13
No One at Home	24
Other	7
Not Worked in the Field	15
TOTAL	112

TABLE 3-3. RESULTS OF FIELD DATA COLLECTION - SUMMER SEASON

Field Status Codes		Number of Participants
Study Questionnaire and Environmental Sampling Completed		43
Study Questionnaire Completed, Environmental Sampling Not Performed	2	
Refusal to Participate by Household		4
Vacant Housing Unit	1	
Original Participant Moved		1
TOTAL		51

TABLE 3-4. STATUS OF COLLECTION AND ANALYSIS OF CALIFORNIA SAMPLES - WINTER SEASON

		Fixed-Site Air		Canister Air			Drinking	Air
	Personal Air	Outdoor	Indoor	Outdoor	Indoor	Breath	Water	Exchange
Field Samples (scheduled/collected)	110/102	110/102	165/153	20/16	20/26	165/153	16/20	240/226
Field Duplicates (scheduled/collected)	12/12	12/10	15/15	0/0	0/0	15/15	2/2	22/18
Field QA Samples (scheduled/collected)	12/12	12/12	15/15	0/0	0/0	15/15	3/3	0/0
Field Blanks (scheduled/utilized)	9/8	8/7	10/8	1/1	1/2	---	3/5	18/14
Spirometer Blanks (scheduled/utilized)	---	---	---	---	---	12/12	---	
Field Controls (scheduled/utilized)	9/8	8/7	10/8	1/1	1/2	12/12	3/5	18/12
Lab Blanks (scheduled/utilized)	4/4	4/4	6/6	0/0	0/0	6/6	5/5	---
Lab Controls (scheduled/utilized)	4/4	4/4	6/6	0/0	0/0	6/6	5/5	---

TABLE 3-5. INSTRUMENTAL LIMITS OF DETECTION (NG/CARTRIDGE) FOR MASS SPECTRAL ANALYSIS - WINTER AND SUMMER SEASONS

Compound	m/z	GC/MS/COMP Instrument 3300[a]	GC/MS/COMP Instrument 4500[b]
Chloroform	83	2.6	4.1
1,2-Dichloroethane	62	0.6	0.8
1,1,1-Trichloroethane	97	1.0	2.8
Benzene	78	1.1	1.7
Carbon tetrachloride	117	2.2	3.0
Trichloroethylene	134	2.1	5.6
1,4-Dioxane	88	2.6	11.2
1,2-Dibromoethane	107	1.0	2.6
n-Octane	114	2.9	2.1
Tetrachloroethylene	166	0.9	3.1
Chlorobenzene	112	0.7	2.1
n-Nonane	128	1.7	2.4
Ethylbenzene	106	0.4	1.5
Limonene	136	2.2	2.4
p-Xylene	106	1.0	2.0
Styrene	104	1.6	2.3
o-Xylene	106	1.7	2.2
1,1,2,2-Tetrachloroethane	168	2.6	7.7
α-Pinene	136	2.5	2.1
m-Dichlorobenzene	146	3.8	3.1
p-Dichlorobenzene	146	2.2	2.1
n-Decane	142	0.5	2.7
o-Dichlorobenzene	146	3.2	2.0
n-Undecane	156	1.8	2.5
n-Dodecane	170	2.5	2.1

[a]Finnigan Model 3300.
[b]Finnigan Model 4500.

TABLE 3-6. LIMITS OF DETECTION FOR CANISTER ANALYSIS - WINTER SEASON

Compound	LOD (μg/L)
Methyl chloride	NC[a]
Vinyl chloride	NC
Ethyl chloride	NC
Vinylidene chloride	6.0
Methylene chloride	29.5
Allyl chloride	57.5
trans-1,2-Dichloroethylene	50.8
1,1-Dichloroethane	155
Chloroform	0.34
Carbon tetrachloride	0.08
1,1,1-Trichloroethane	0.13
cis-1,2-Dichloroethylene	69.4
Trichloroethylene	0.26
Tetrachloroethylene	0.36

[a]Not calculated.

TABLE 3-7. STATUS OF COLLECTION AND ANALYSIS OF CALIFORNIA SAMPLES - SUMMER SEASON

	Personal Air	Fixed-Site Air		Canister Air		Breath	Drinking Water	Air Exchange	Central Fixed-Site	
		Outdoor	Indoor	Outdoor	Indoor				Canister	Tenax GC
Field Samples (scheduled/collected)	90/86	90/86	135/129	16/16	16/16	135/129	14/14	270/258		20/20
Field Duplicates (scheduled/collected)	8/8	8/8	12/12	0/0	0/0	12/12	2/2	24/24	2/2	2
Field QA Samples (scheduled/collected)	4/4	4/4	6/6	0/0	0/0	6/6	2/2	0/0	---	---
Field Blanks (scheduled/utilized)	5/5	5/5	9/9	3/3	3/3	---	4/4	12/12	2/2	2/2
Spirometer Blanks (scheduled/utilized)	---	---	---	---	---	9/9	---	---	---	---
Field Controls (scheduled/utilized)	5/5	5/5	9/9	3/3	3/3	9/9	4/4	9/9	2/2	2/2
Lab Blanks (scheduled/utilized)	3/3	3/3	5/5	---	---	5/5	4/4	---	---	---
Lab Controls (scheduled/utilized)	3/3	3/3	5/5	---	---	5/5	4/4	---	---	---
COLLECTION TOTALS (excl. QA samples)	110	110	159	22	22	159	32	303		26
TOTAL SAMPLES COLLECTED ---------->	956									

TABLE 3-8. LIMITS OF DETECTION FOR CANISTER ANALYSIS - SUMMER SEASON

Compound	LOD ($\mu g/m^3$) GC/MS/COMP	GC/ECD/FID
Vinyl chloride	0.55	148
Vinylidene chloride	0.35	0.59
Methylene chloride	0.45	2.8
Chloroform	0.45	0.04
1,1,1-Trichloroethane	1.50	0.01
Carbon tetrachloride	0.75	0.006
Benzene	0.35	-[a]
Trichloroethylene	0.55	0.04
n-Octane	1.15	-
Toluene	0.75	-
Tetrachloroethylene	0.70	0.01
Ethylbenzene	0.50	-
p-Xylene	0.80	-
o-Xylene	0.60	-
n-Decane	2.55	-
p-Dichlorobenzene	0.50	-
n-Dodecane	0.70	-
Methyl chloride	-[a]	119
Ethyl chloride	-	78.7
Allyl chloride	-	6.6
trans-1,2-Dichloroethylene	-	3.6
1,1-Dichloroethane	-	11.3
cis-1,2-Dichloroethylene	-	4.8

[a]Not determined.

TABLE 3-9. DATA AVAILABLE FOR STATISTICAL ANALYSIS BY MEDIA - WINTER SEASON

Media	Sample Size Range
TENAX	
Initial Breath	44 - 49
Overnight Breath	46 - 48
Daytime Breath	45 - 48
Overnight Personal Air	32 - 43
Daytime Personal Air	33 - 45
Daytime Living Area	36 - 45
Overnight Kitchen	34 - 42
Daytime Kitchen	38 - 47
Overnight Outdoor	39 - 46
Daytime Outdoor	37 - 41
CANISTER	
Indoor Overnight	8
Indoor Daytime	17
Outdoor Overnight	8
Outdoor Daytime	7

TABLE 3-10. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT PERSONAL AIR TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	16	0.36	1.00	2.78	48.8	62.8	0.78
1,2-Dichloroethane	6	0.10	0.20	2.00	73.5	82.4	0.89
1,1,1-Trichloroethane	1	0.30	0.30	1.00	97.7	97.7	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	8	0.40	0.70	1.75	44.2	81.4	0.54
Trichloroethylene	21	0.40	1.40	3.50	32.6	51.2	0.64
Tetrachloroethylene	1	0.20	0.20	1.00	97.7	97.7	1.00
Styrene	2	0.32	0.40	1.25	95.3	95.3	1.00
m-Dichlorobenzene	31	0.52	0.92	1.77	13.9	13.9	1.00
p-Dichlorobenzene	2	0.48	0.52	1.08	93.0	95.3	0.98
Ethylbenzene	1	0.08	0.08	1.00	97.6	97.6	1.00
o-Xylene	1	0.36	0.36	1.00	97.7	97.7	1.00
m,p-Xylene	1	0.20	0.20	1.00	97.7	97.7	1.00
n-Decane	1	0.12	0.12	1.00	97.7	97.7	1.00
n-Dodecane	5	0.52	0.60	1.15	88.4	88.4	1.00
1,4-Dioxane	35	0.26	2.80	10.9	2.33	18.6	0.13
1,2-Dibromoethane	41	0.16	0.64	4.00	0.00	0.00	.
n-Octane	2	0.60	0.60	1.00	95.3	95.3	1.00
n-Undecane	1	0.36	0.36	1.00	97.7	97.7	1.00
α-Pinene	1	0.52	0.52	1.00	97.7	97.7	1.00
Limonene	2	0.40	0.50	1.25	95.3	95.3	1.00
n-Nonane	1	0.30	0.30	1.00	97.7	97.7	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-11. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME PERSONAL AIR TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	26	0.40	0.92	2.30	33.3	42.2	0.79
1,2-Dichloroethane	14	0.10	0.20	2.00	40.0	60.0	0.67
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	6	0.40	0.68	1.70	44.4	86.7	0.51
Trichloroethylene	21	0.29	1.30	4.42	29.5	52.3	0.57
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	2	0.30	0.52	1.73	95.6	95.6	1.00
m-Dichlorobenzene	39	0.60	1.04	1.73	0.00	0.00	.
p-Dichlorobenzene	3	0.48	0.50	1.04	90.9	93.2	0.98
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	1	0.48	0.48	1.00	97.8	97.8	1.00
m,p-Xylene	1	0.44	0.44	1.00	97.8	97.8	1.00
n-Decane	4	0.08	0.60	7.50	90.9	90.9	1.00
n-Dodecane	2	0.48	0.56	1.17	95.5	95.5	1.00
1,4-Dioxane	35	0.40	2.52	6.30	8.89	22.2	0.40
1,2-Dibromoethane	43	0.16	0.60	3.75	0.00	2.27	0.00
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	1	0.56	0.56	1.00	97.7	97.7	1.00
α-Pinene	6	0.40	0.70	1.75	84.4	86.7	0.97
Limonene	2	0.48	0.52	1.08	95.5	95.5	1.00
n-Nonane	2	0.48	0.52	1.08	95.6	95.6	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-12 SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME LIVING AREA TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	14	0.52	1.10	2.12	40.0	68.9	0.58
1,2-Dichloroethane	11	0.10	0.20	2.00	46.3	73.2	0.63
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	10	0.50	0.80	1.60	24.4	77.8	0.31
Trichloroethylene	25	0.40	1.50	3.75	22.2	44.4	0.50
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	1	0.36	0.36	1.00	97.8	97.8	1.00
m-Dichlorobenzene	37	0.48	1.04	2.17	2.63	2.63	1.00
p-Dichlorobenzene	3	0.50	0.50	1.00	93.3	93.3	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	1	0.12	0.12	1.00	97.8	97.8	1.00
n-Dodecane	2	0.56	0.60	1.07	95.5	95.5	1.00
1,4-Dioxane	39	0.30	3.00	9.93	0.00	13.3	0.00
1,2-Dibromoethane	45	0.16	0.68	4.25	0.00	0.00	.
n-Octane	1	0.64	0.64	1.00	97.8	97.8	1.00
n-Undecane	0	.	.	.	100.	100.	1.00
α-Pinene	2	0.50	0.60	1.20	93.3	95.6	0.98
Limonene	0	.	.	.	100.	100.	1.00
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-13. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT KITCHEN TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	17	0.36	0.90	2.50	52.4	59.5	0.88
1,2-Dichloroethane	6	0.10	0.10	1.00	82.4	82.4	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	4	0.50	0.70	1.40	50.0	90.5	0.55
Trichloroethylene	21	0.40	1.40	3.50	23.8	50.0	0.48
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	0	.	.	.	100.	100.	1.00
m-Dichlorobenzene	34	0.43	0.96	2.25	0.00	0.00	.
p-Dichlorobenzene	1	0.50	0.50	1.00	97.6	97.6	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	0	.	.	.	100.	100.	1.00
n-Dodecane	3	0.50	0.60	1.20	92.9	92.9	1.00
1,4-Dioxane	35	0.30	2.80	9.27	0.00	16.7	0.00
1,2-Dibromoethane	42	0.20	0.64	3.20	0.00	0.00	.
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	0	.	.	.	100.	100.	1.00
α-Pinene	0	.	.	.	100.	100.	1.00
Limonene	0	.	.	.	100.	100.	1.00
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-14. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME KITCHEN TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	20	0.50	1.10	2.20	51.1	57.4	0.89
1,2-Dichloroethane	15	0.10	0.20	2.00	34.9	65.1	0.54
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	1	0.28	0.28	1.00	97.4	97.4	1.00
Carbon Tetrachloride	5	0.50	0.80	1.60	25.5	89.4	0.29
Trichloroethylene	27	0.19	1.52	7.84	21.3	42.6	0.50
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	5	0.36	0.50	1.39	89.4	89.4	1.00
m-Dichlorobenzene	41	0.50	0.96	1.92	0.00	0.00	.
p-Dichlorobenzene	7	0.44	0.60	1.36	82.6	84.8	0.97
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	2	0.12	0.70	5.83	87.2	95.7	0.91
n-Dodecane	7	0.40	0.60	1.50	85.1	85.1	1.00
1,4-Dioxane	43	0.36	3.08	8.46	0.00	8.51	0.00
1,2-Dibromoethane	46	0.12	0.72	6.00	0.00	0.00	.
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	1	0.40	0.40	1.00	97.9	97.9	1.00
α-Pinene	5	0.40	0.60	1.50	89.4	89.4	1.00
Limonene	1	0.50	0.50	1.00	97.9	97.9	1.00
n-Nonane	1	0.36	0.36	1.00	97.9	97.9	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-15. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT OUTDOOR TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	38	0.31	1.56	5.03	2.17	17.4	0.13
1,2-Dichloroethane	19	0.10	0.30	3.00	5.00	52.5	0.10
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	1	0.20	0.20	1.00	97.8	97.8	1.00
Carbon Tetrachloride	4	0.48	1.10	2.29	15.2	91.3	0.17
Trichloroethylene	35	0.30	2.12	7.07	0.00	14.6	0.00
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	6	0.30	0.60	2.00	76.1	87.0	0.88
m-Dichlorobenzene	43	0.48	1.16	2.42	0.00	4.44	0.00
p-Dichlorobenzene	7	0.40	0.80	2.00	71.1	84.4	0.84
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	0	.	.	.	100.	100.	1.00
n-Dodecane	17	0.48	0.80	1.67	35.9	56.4	0.64
1,4-Dioxane	40	0.36	4.24	11.8	0.00	13.0	0.00
1,2-Dibromoethane	42	0.16	1.00	6.25	0.00	2.33	0.00
n-Octane	2	0.44	0.60	1.36	95.7	95.7	1.00
n-Undecane	2	0.40	0.90	2.25	68.2	95.5	0.71
α-Pinene	17	0.40	0.60	1.50	58.5	58.5	1.00
Limonene	6	0.40	0.60	1.50	86.7	86.7	1.00
n-Nonane	1	0.40	0.40	1.00	97.8	97.8	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-16. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME OUTDOOR TENAX SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	31	0.36	1.12	3.11	9.76	24.4	0.40
1,2-Dichloroethane	25	0.10	0.20	2.00	7.50	37.5	0.20
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	7	0.50	0.80	1.60	24.4	82.9	0.29
Trichloroethylene	34	0.32	1.56	4.88	0.00	8.11	0.00
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Styrene	16	0.30	0.60	2.00	41.5	61.0	0.68
m-Dichlorobenzene	40	0.52	1.40	2.69	0.00	2.44	0.00
p-Dichlorobenzene	19	0.36	0.80	2.22	43.9	53.7	0.82
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	0	.	.	.	100.	100.	1.00
n-Dodecane	29	0.30	0.90	2.98	13.5	21.6	0.63
1,4-Dioxane	40	0.40	3.08	7.70	0.00	2.44	0.00
1,2-Dibromoethane	40	0.16	0.72	4.50	0.00	0.00	.
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	4	0.32	0.70	2.19	53.7	90.2	0.59
α-Pinene	29	0.40	0.90	2.25	10.8	21.6	0.50
Limonene	21	0.40	0.80	2.00	36.6	48.8	0.75
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-17. PERCENT MEASURABLE FOR TENAX SAMPLES BY MEDIA AND TIME - WINTER SEASON

Compound	Overnight Personal Air	Daytime Personal Air	Overnight Kitchen	Daytime Kitchen	Daytime Living Area	Overnight Outdoor	Daytime Outdoor
Sample Size Range:	32-43	33-45	34-42	38-47	36-45	39-46	37-41
Chloroform	62.8	42.2	59.5	57.4	68.9	17.4	24.4
1,2-Dichloroethane	82.4	60.0	82.4	65.1	73.2	52.5	37.5
1,1,1-Trichloroethane	97.7	100.	100.	100.	100.	100.	100.
Benzene	100.	100.	100.	97.4	100.	97.8	100.
Carbon Tetrachloride	81.4	86.7	90.5	89.4	77.8	91.3	82.9
Trichloroethylene	51.2	52.3	50.0	42.6	44.4	14.6	8.11
Tetrachloroethylene	97.7	100.	100.	100.	100.	100.	100.
Styrene	95.3	95.6	100.	89.4	97.8	87.0	61.0
m-Dichlorobenzene	13.9	0.00	0.00	0.00	2.63	4.44	2.44
p-Dichlorobenzene	95.3	93.2	97.6	84.8	93.3	84.4	53.7
Ethylbenzene	97.6	100.	100.	100.	100.	100.	100.
o-Xylene	97.7	97.8	100.	100.	100.	100.	100.
m,p-Xylene	97.7	97.8	100.	100.	100.	100.	100.
n-Decane	97.7	90.9	100.	95.7	97.8	100.	100.
n-Dodecane	88.4	95.5	92.9	85.1	95.5	56.4	21.6
1,4-Dioxane	18.6	22.2	16.7	8.51	13.3	13.0	2.44
1,2-Dibromoethane	0.00	2.27	0.00	0.00	0.00	2.33	0.00
n-Octane	95.3	100.	100.	100.	97.8	95.7	100.
n-Undecane	97.7	97.7	100.	97.9	100.	95.5	90.2
α-Pinene	97.7	86.7	100.	89.4	95.6	58.5	21.6
Limonene	95.3	95.5	100.	97.9	100.	86.7	48.8
n-Nonane	97.7	95.6	100.	97.9	100.	97.8	100.

TABLE 3-18. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT PERSONAL AIR TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	43	0.60	2.42	0.98	0.86	1.23	0.37	0.98	2.01	3.47	9.72	0.06 - 41.7
1,2-Dichloroethane	34	0.12	0.24	0.02	0.19	1.17	0.17	0.26	0.32	0.37	0.45	0.01 - 0.59
1,1,1-Trichloroethane	43	0.30	26.3	3.26	17.4	1.19	10.7	19.4	40.5	58.7	69.5	0.19 - 97.7
Benzene	32	.[e]	13.6	1.52	10.4	1.17	6.35	11.9	18.8	22.5	32.5	0.42 - 42.2
Carbon Tetrachloride	43	0.50	0.70	0.05	0.63	1.09	0.54	0.68	0.84	1.06	1.23	0.05 - 2.19
Trichloroethylene	43	0.50	2.77	0.85	0.72	1.30	0.17	0.67	2.50	7.58	16.1	0.05 - 31.1
Tetrachloroethylene	43	0.20	8.56	1.02	5.61	1.20	3.39	6.82	12.7	19.2	24.4	0.02 - 24.9
Styrene	43	0.36	8.11	4.77	2.66	1.21	1.54	3.04	4.78	6.44	9.10	0.04 - 208.
p-Dichlorobenzene	43	0.50	22.5	7.57	3.31	1.35	0.97	1.85	7.09	93.2	179.	0.06 - 218.
Ethylbenzene	42	0.08	6.74	0.90	4.62	1.20	3.25	5.54	8.61	12.8	18.8	0.01 - 34.4
o-Xylene	43	0.36	13.3	1.80	9.13	1.19	5.89	11.6	16.6	24.8	35.4	0.04 - 70.5
m,p-Xylene	43	0.20	35.3	4.17	25.1	1.18	16.7	31.0	42.6	67.0	88.0	0.12 - 158.
n-Decane	43	0.12	6.39	2.12	3.34	1.20	2.31	3.13	5.77	9.54	15.9	0.01 - 92.8
n-Dodecane	43	0.56	3.80	1.02	1.92	1.21	1.27	2.19	3.59	7.12	15.4	0.06 - 42.5
1,4-Dioxane	43	0.60	0.80	0.30	0.31	1.21	0.07	0.37	0.94	1.54	1.67	0.06 - 13.0
n-Octane	43	0.60	6.27	0.91	4.06	1.19	2.68	4.54	7.21	14.6	18.8	0.07 - 32.6
n-Undecane	43	0.36	6.79	1.96	4.04	1.17	2.54	4.08	5.92	11.3	17.2	0.04 - 86.2
a-Pinene	43	0.52	7.55	1.32	4.52	1.19	2.28	4.70	10.9	17.6	22.4	0.06 - 49.0
Limonene	43	0.45	40.4	8.46	21.3	1.23	12.4	23.3	50.1	86.0	131.	0.25 - 337.
n-Nonane	43	0.30	6.01	1.52	3.77	1.15	2.43	3.42	5.79	9.42	18.4	0.19 - 65.8

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-19. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME PERSONAL AIR TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	45	0.60	0.80	0.14	0.40	1.21	0.08	0.44	1.26	1.96	3.16	0.06 - 4.19
1,2-Dichloroethane	35	0.10	0.23	0.04	0.16	1.16	0.06	0.17	0.26	0.41	1.18	0.02 - 1.22
1,1,1-Trichloroethane	45	.[e]	38.2	11.3	16.7	1.19	8.73	14.0	28.7	101.	194.	1.04 - 456.
Benzene	33	.	21.6	5.85	12.7	1.18	6.48	13.2	21.1	40.2	139.	2.49 - 163.
Carbon Tetrachloride	45	0.50	0.71	0.05	0.62	1.10	0.60	0.66	0.82	1.15	1.57	0.06 - 1.75
Trichloroethylene	44	0.50	1.13	0.20	0.55	1.22	0.25	0.71	1.41	3.46	4.24	0.04 - 5.97
Tetrachloroethylene	45	.	14.7	4.41	6.27	1.19	2.75	5.29	12.1	28.5	113.	0.35 - 146.
Styrene	45	0.41	3.48	0.55	2.16	1.17	1.26	2.07	4.67	9.47	10.6	0.06 - 19.2
p-Dichlorobenzene	44	0.48	19.5	7.62	3.22	1.32	1.01	2.38	9.20	58.0	198.	0.06 - 232.
Ethylbenzene	45	.	13.4	4.51	6.42	1.17	3.21	5.92	11.5	22.5	55.6	0.63 - 198.
o-Xylene	45	0.48	19.7	4.32	10.3	1.21	5.63	11.4	18.3	48.2	94.7	0.06 - 160.
m,p-Xylene	45	0.44	51.5	11.5	27.4	1.22	15.7	31.4	52.9	112.	223.	0.05 - 462.
n-Decane	44	0.14	12.5	4.33	2.93	1.34	1.89	2.96	5.91	37.4	103.	0.01 - 134.
n-Dodecane	44	0.52	4.96	1.21	2.37	1.21	1.22	2.19	4.42	15.1	22.3	0.06 - 45.2
1,4-Dioxane	45	0.60	1.21	0.49	0.32	1.24	0.07	0.31	0.58	2.70	8.66	0.06 - 19.8
n-Octane	45	.	10.5	4.28	4.86	1.15	2.69	3.96	8.21	16.3	34.3	0.90 - 193.
n-Undecane	44	0.56	12.1	4.07	4.24	1.22	2.21	3.15	8.01	26.9	92.9	0.07 - 136.
α-Pinene	45	0.50	2.90	0.36	1.88	1.19	1.06	2.77	3.73	5.65	7.70	0.05 - 12.6
Limonene	44	0.50	69.8	23.2	22.6	1.31	12.0	25.3	67.5	165.	273.	0.06 - 986.
n-Nonane	45	0.50	11.4	3.11	4.13	1.24	2.29	3.16	6.90	51.3	72.2	0.06 - 83.6

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-20. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME LIVING AREA TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	45	0.60	1.44	0.27	0.82	1.19	0.44	0.87	1.73	3.65	6.35	0.06 - 9.41
1,2-Dichloroethane	41	0.12	0.21	0.02	0.17	1.12	0.12	0.20	0.30	0.36	0.40	0.01 - 0.46
1,1,1-Trichloroethane	45	.[e]	14.9	1.77	11.7	1.116.	1612.6	17.2	32.9	45.6	3.63	- 59.9
Benzene	36	.	9.86	1.42	7.30	1.14	4.17	7.14	13.0	19.0	32.4	1.26 - 44.1
Carbon Tetrachloride	45	0.55	0.68	0.04	0.63	1.06	0.53	0.65	0.81	1.05	1.19	0.31 - 1.33
Trichloroethylene	45	0.50	1.10	0.23	0.50	1.22	0.20	0.63	1.43	2.64	5.60	0.05 - 7.54
Tetrachloroethylene	45	.	5.27	0.56	4.35	1.09	2.76	4.38	6.40	9.65	16.4	1.31 - 19.0
Styrene	45	0.36	3.57	0.92	2.10	1.17	1.20	2.08	3.94	6.60	9.07	0.04 - 41.6
p-Dichlorobenzene	45	0.50	26.6	9.32	3.53	1.33	1.00	1.59	9.26	91.7	232.	0.31 - 273.
Ethylbenzene	45	.	5.16	0.83	3.66	1.13	1.81	4.11	5.83	10.6	18.1	0.61 - 32.4
o-Xylene	45	.	10.2	1.60	7.36	1.12	3.73	7.99	11.5	24.0	41.5	2.17 - 55.8
m,p-Xylene	45	.	26.2	3.75	19.3	1.12	9.77	21.3	30.9	58.6	91.6	3.95 - 136.
n-Decane	45	0.12	4.33	0.68	2.85	1.18	1.81	2.99	4.89	9.56	17.7	0.01 - 23.6
n-Dodecane	44	0.58	2.42	0.27	1.84	1.13	1.23	1.89	3.12	5.56	7.05	0.07 - 7.49
n-Octane	45	0.64	4.85	0.73	3.28	1.15	1.99	3.22	4.93	11.7	19.1	0.08 - 22.3
n-Undecane	44	.	4.39	0.57	3.38	1.11	1.99	2.89	5.64	8.70	15.7	0.91 - 17.7
α-Pinene	45	0.55	3.89	0.68	2.66	1.14	1.57	2.81	4.42	7.51	11.0	0.31 - 29.1
Limonene	45	.	34.5	5.37	21.6	1.16	10.8	23.2	45.1	87.7	123.	3.23 - 171.
n-Nonane	45	.	4.45	0.66	3.39	1.11	2.05	3.05	5.05	9.34	12.4	1.30 - 26.8

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-21. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT KITCHEN TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	42	0.60	1.46	0.31	0.71	1.22	0.36	0.93	1.70	3.91	5.16	0.07 - 11.6
1,2-Dichloroethane	34	0.10	0.24	0.02	0.21	1.12	0.17	0.24	0.29	0.42	0.53	0.60 - 0.61
1,1,1-Trichloroethane	42	.[e]	24.2	2.97	17.1	1.16	8.12	19.2	35.2	50.4	67.6	1.32 - 90.0
Benzene	36	.	14.6	2.22	9.66	1.18	5.05	11.4	18.1	39.9	45.7	0.70 - 53.7
Carbon Tetrachloride	42	0.50	0.78	0.05	0.72	1.06	0.58	0.70	0.88	1.17	1.62	0.31 - 2.16
Trichloroethylene	42	0.50	1.38	0.39	0.59	1.22	0.25	0.72	1.38	4.05	5.50	0.06 - 15.2
Tetrachloroethylene	41	.	7.71	1.21	5.17	1.15	2.61	4.76	9.65	17.2	30.2	0.59 - 35.0
Styrene	42	.	3.13	0.39	2.42	1.12	1.49	2.70	3.72	6.38	8.61	0.44 - 14.0
p-Dichlorobenzene	42	0.50	36.2	12.1	5.04	1.34	1.36	2.32	18.5	159.	282.	0.31 - 320.
Ethylbenzene	42	.	6.64	0.94	4.91	1.13	3.13	5.50	7.85	12.0	23.9	0.90 - 31.0
o-Xylene	42	.	12.9	1.71	9.77	1.12	5.83	9.95	15.4	23.9	44.8	1.96 - 56.2
m,p-Xylene	42	.	33.6	3.98	26.2	1.12	17.6	30.1	40.4	59.8	107.	5.29 - 123.
n-Decane	41	.	8.73	2.22	4.48	1.18	2.64	3.71	7.43	28.4	54.6	0.71 - 66.4
n-Dodecane	42	0.56	3.42	0.73	1.98	1.18	1.13	2.10	2.84	8.34	17.7	0.07 - 23.7
n-Octane	42	.	6.18	0.76	4.90	1.11	3.04	4.69	7.38	15.0	18.8	1.71 - 23.5
n-Undecane	42	.	8.91	2.59	4.23	1.18	2.20	3.98	6.73	15.2	66.2	0.67 - 72.8
α-Pinene	42	.	6.13	0.96	4.22	1.14	2.12	4.21	7.43	13.3	25.0	0.61 - 30.9
Limonene	42	.	39.9	6.21	25.9	1.17	12.0	30.6	58.8	82.8	96.8	3.49 - 233.
n-Nonane	42	.	6.91	1.46	4.51	1.14	2.27	4.60	6.56	14.7	30.4	1.32 - 55.1

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-22. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME KITCHEN TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	47	0.60	1.38	0.22	0.73	1.21	0.37	1.11	1.86	3.05	5.23	0.07 - 6.95
1,2-Dichloroethane	43	0.10	0.19	0.02	0.15	1.13	0.06	0.18	0.23	0.34	0.51	0.01 - 0.65
1,1,1-Trichloroethane	47	.[e]	14.0	1.70	10.8	1.11	6.53	9.59	18.6	30.5	43.7	2.25 - 56.9
Benzene	38	0.28	11.0	2.55	6.52	1.21	3.71	7.48	12.1	21.2	29.8	0.03 - 97.4
Carbon Tetrachloride	47	0.60	0.72	0.04	0.67	1.07	0.58	0.70	0.82	1.05	1.29	0.06 - 1.38
Trichloroethylene	47	0.50	0.99	0.20	0.44	1.21	0.17	0.31	1.36	3.37	4.59	0.05 - 5.86
Tetrachloroethylene	47	.	5.86	1.16	4.17	1.11	2.64	4.07	5.97	9.63	18.6	0.73 - 53.4
Styrene	47	0.40	2.58	0.51	1.56	1.17	1.01	1.64	2.70	5.30	7.37	0.04 - 23.1
p-Dichlorobenzene	46	0.50	23.5	9.84	2.16	1.36	0.64	1.39	6.12	68.0	235.	0.05 - 331.
Ethylbenzene	47	.	5.02	0.93	3.42	1.13	1.74	3.18	5.75	9.16	18.1	0.78 - 40.4
o-Xylene	47	.	10.2	1.74	6.94	1.13	3.70	6.63	11.0	19.0	40.9	1.28 - 68.1
m,p-Xylene	47	.	26.5	4.21	18.9	1.12	9.70	17.8	29.7	46.5	93.5	3.84 - 173.
n-Decane	47	0.41	5.35	1.16	2.53	1.22	1.22	2.49	6.73	10.9	27.5	0.01 - 41.1
n-Dodecane	47	0.50	2.82	0.54	1.69	1.17	1.28	1.80	3.16	6.65	9.89	0.07 - 23.0
n-Octane	47	.	4.64	0.60	3.49	1.11	1.97	3.18	5.32	11.5	12.5	0.88 - 22.5
n-Undecane	47	0.40	6.75	1.87	3.41	1.17	1.79	2.86	6.82	12.1	34.4	0.25 - 78.2
α-Pinene	47	0.52	4.03	0.69	2.47	1.18	1.36	3.30	4.83	7.34	11.7	0.06 - 30.6
Limonene	47	0.50	34.0	4.68	19.2	1.21	9.19	23.6	51.3	90.7	113.	0.31 - 128.
n-Nonane	47	0.36	4.38	0.69	2.90	1.16	1.77	2.71	5.92	7.76	14.3	0.04 - 28.3

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-23. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT OUTDOOR TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	46	0.58	0.46	0.16	0.22	1.17	0.07	0.31	0.39	0.81	1.09	0.06 - 7.53
1,2-Dichloroethane	40	0.12	0.15	0.02	0.10	1.18	0.06	0.14	0.20	0.28	0.31	0.01 - 0.42
1,1,1-Trichloroethane	46	.[e]	15.5	1.75	10.2	1.17	4.70	12.3	26.3	32.6	37.6	0.77 - 40.2
Benzene	46	0.20	9.58	1.01	6.66	1.17	3.64	7.86	15.0	19.0	23.5	0.12 - 25.1
Carbon Tetrachloride	46	0.64	0.79	0.05	0.70	1.09	0.63	0.70	0.88	1.29	1.60	0.06 - 1.76
Trichloroethylene	41	0.48	0.28	0.05	0.19	1.16	0.06	0.25	0.31	0.71	0.79	0.05 - 1.59
Tetrachloroethylene	46	.	5.72	0.76	3.48	1.18	1.41	4.22	8.94	14.9	16.1	0.38 - 17.6
Styrene	46	0.33	2.68	0.42	1.44	1.21	0.64	1.89	3.85	6.96	8.80	0.04 - 13.2
p-Dichlorobenzene	45	0.50	2.66	0.43	1.55	1.19	0.66	1.83	3.72	6.09	9.82	0.06 - 14.2
Ethylbenzene	46	.	4.58	0.57	3.10	1.15	1.88	2.97	7.14	10.2	12.4	0.21 - 16.4
o-Xylene	46	.	9.10	1.10	6.28	1.15	3.81	5.68	14.2	21.6	25.5	0.44 - 29.2
m,p-Xylene	46	.	25.5	3.08	17.5	1.15	9.64	16.6	40.0	57.3	68.2	1.10 - 89.9
n-Decane	41	.	2.48	0.33	1.75	1.15	0.96	1.29	3.65	5.67	8.02	0.12 - 8.28
n-Dodecane	39	0.50	0.76	0.10	0.55	1.15	0.31	0.57	1.03	1.86	2.33	0.06 - 2.64
n-Octane	46	0.52	3.08	0.35	2.25	1.14	1.44	2.18	4.44	6.89	8.52	0.05 - 10.5
n-Undecane	44	0.65	1.78	0.20	1.39	1.11	0.78	1.22	2.67	3.75	5.07	0.25 - 5.61
α-Pinene	41	0.50	0.93	0.12	0.62	1.17	0.31	0.90	1.30	2.14	3.07	0.06 - 3.17
Limonene	45	0.50	2.09	0.29	1.30	1.19	0.87	1.32	2.76	4.80	6.10	0.05 - 10.2
n-Nonane	46	0.40	2.64	0.28	2.09	1.11	1.36	1.68	3.77	5.27	7.27	0.25 - 8.67

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-24. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME OUTDOOR TENAX SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	41	0.60	0.48	0.12	0.21	1.21	0.07	0.12	0.58	1.18	1.91	0.06 - 4.32
1,2-Dichloroethane	40	0.10	0.11	0.01	0.09	1.11	0.06	0.06	0.15	0.20	0.26	0.01 - 0.29
1,1,1-Trichloroethane	41	.[e]	6.84	0.70	5.55	1.11	3.07	5.91	9.51	13.2	17.8	1.43 - 19.5
Benzene	41	.	4.69	0.48	3.83	1.11	2.64	3.78	6.20	8.73	12.5	0.53 - 13.6
Carbon Tetrachloride	41	0.50	0.67	0.03	0.64	1.05	0.54	0.67	0.81	0.96	1.03	0.31 - 1.09
Trichloroethylene	37	0.49	0.16	0.02	0.11	1.14	0.05	0.07	0.22	0.34	0.51	0.04 - 0.73
Tetrachloroethylene	41	.	2.94	0.29	2.23	1.14	1.38	2.72	4.10	5.65	6.67	0.35 - 6.77
Styrene	41	0.40	0.76	0.11	0.47	1.18	0.25	0.51	1.24	1.68	2.45	0.04 - 3.17
p-Dichlorobenzene	41	0.50	1.45	0.37	0.57	1.26	0.25	0.72	1.53	3.42	7.03	0.04 - 13.0
Ethylbenzene	41	.	1.93	0.19	1.61	1.10	1.00	1.50	2.56	4.34	4.79	0.51 - 4.83
o-Xylene	41	.	3.88	0.39	3.25	1.10	2.16	3.06	4.49	9.27	9.48	0.83 - 9.68
m,p-Xylene	41	.	10.5	1.05	8.75	1.10	5.66	8.11	12.9	24.5	25.7	2.22 - 26.5
n-Decane	37	.	1.19	0.13	1.02	1.09	0.68	0.94	1.52	2.33	2.84	0.37 - 4.21
n-Dodecane	37	0.50	0.46	0.07	0.32	1.17	0.28	0.37	0.46	1.29	1.55	0.04 - 1.74
n-Octane	41	.	1.69	0.20	1.42	1.09	1.03	1.27	1.97	3.30	4.89	0.57 - 7.60
n-Undecane	41	0.55	0.97	0.11	0.77	1.12	0.55	0.75	1.15	2.15	2.61	0.04 - 3.25
α-Pinene	37	0.60	0.44	0.08	0.27	1.18	0.08	0.31	0.42	1.13	1.85	0.05 - 2.33
Limonene	41	0.50	1.03	0.24	0.54	1.19	0.31	0.50	1.04	2.89	5.80	0.05 - 7.41
n-Nonane	41	.	1.40	0.13	1.23	1.08	0.81	1.08	1.89	2.36	3.46	0.52 - 4.89

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-25. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT LIVING AREA CANISTER ECD/FID SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	20.8	34.8	1.67	0.00	0.00	.
Chloroform	6	1.37	1.71	1.25	25.0	25.0	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	0	.	.	.	100	100.	1.00
Trichloroethylene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	2	0.32	0.43	1.36	75.0	75.0	1.00
Methylene chloride	6	118.	148.	1.25	25.0	25.0	1.00
Allyl Chloride	8	200.	334.	1.67	0.00	0.00	.
trans-1,2-Dichloroethylene	8	177.	296.	1.67	0.00	0.00	.
1,1-Dichloroethane	8	540.	900.	1.67	0.00	0.00	.
cis-1,2-Dichloroethylene	8	242.	404.	1.67	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-26. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME LIVING AREA CANISTER ECD/FID SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	17	20.2	149.	7.40	0.00	0.00	.
Chloroform	16	1.15	8.48	7.39	0.00	5.88	0.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	2	0.66	2.09	3.16	23.5	88.2	0.27
Trichloroethylene	4	1.10	1.36	1.24	76.5	76.5	1.00
Tetrachloroethylene	8	0.31	2.28	7.40	23.5	52.9	0.44
Methylene chloride	15	112.	735.	6.56	0.00	11.8	0.00
Allyl Chloride	16	194.	1430	7.40	0.00	5.88	0.00
trans-1,2-Dichloroethylene	17	171.	1270	7.41	0.00	0.00	.
1,1-Dichloroethane	17	520.	3860	7.42	0.00	0.00	.
cis-1,2-Dichloroethylene	17	234.	1730	7.40	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-27. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT OUTDOOR CANISTER ECD/FID SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	16.7	34.8	2.08	0.00	0.00	.
Chloroform	5	0.95	1.40	1.47	37.5	37.5	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	0	.	.	.	100.	100.	1.00
Trichloroethylene	1	0.74	0.74	1.00	87.5	87.5	1.00
Tetrachloroethylene	4	0.26	0.38	1.47	50.0	50.0	1.00
Methylene chloride	7	82.4	121.	1.47	12.5	12.5	1.00
Allyl Chloride	8	160.	334.	2.08	0.00	0.00	.
trans-1,2-Dichloroethylene	8	142.	296.	2.08	0.00	0.00	.
1,1-Dichloroethane	8	432.	900.	2.08	0.00	0.00	.
cis-1,2-Dichloroethylene	8	194.	404.	2.08	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-28. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME OUTDOOR CANISTER ECD/FID SAMPLES - WINTER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	7	17.2	35.4	2.07	0.00	0.00	.
Chloroform	6	0.98	2.02	2.07	14.3	14.3	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	1	0.50	0.50	1.00	71.4	85.7	0.83
Trichloroethylene	6	0.76	1.56	2.06	0.00	14.3	0.00
Tetrachloroethylene	7	0.26	0.54	2.08	0.00	0.00	.
Methylene chloride	6	84.4	175.	2.07	14.3	14.3	1.00
Allyl Chloride	7	165.	341.	2.07	0.00	0.00	.
trans-1,2-Dichloroethylene	7	146.	301.	2.07	0.00	0.00	.
1,1-Dichloroethane	7	444.	916.	2.06	0.00	0.00	.
cis-1,2-Dichloroethylene	7	199.	412.	2.07	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-29. PERCENTS MEASURABLE BY ECD/FID CANISTER MEDIA AND TIME FOR THE WINTER SEASON

Compound	Overnight Living Area	Daytime Living Area	Overnight Outdoor	Daytime Outdoor
Sample Size:	8	17	8	7
Vinylidene Chloride	0.00	0.00	0.00	0.00
Chloroform	25.0	5.88	37.5	14.3
1,1,1-Trichloroethane	100.	100.	100.	100.
Carbon Tetrachloride	100.	88.2	100.	85.7
Trichloroethylene	100.	76.5	87.5	14.3
Tetrachloroethylene	75.0	52.9	50.0	0.00
Methylene chloride	25.0	11.8	12.5	14.3
Allyl Chloride	0.00	5.88	0.00	0.00
trans-1,2-Dichloroethylene	0.00	0.00	0.00	0.00
1,1-Dichloroethane	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.00	0.00	0.00	0.00

TABLE 3-30. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT LIVING AREA CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	1.46	1.19	0.27	0.96	1.32	0.94	0.19 - 2.43
1,1,1-Trichloroethane	8	.[e]	11.9	4.02	7.73	1.43	6.16	2.20 - 33.5
Carbon Tetrachloride	8	.	2.56	0.47	2.25	1.23	2.12	0.72 - 4.70
Trichloroethylene	8	.	4.05	0.44	3.91	1.10	3.82	3.00 - 6.96
Tetrachloroethylene	8	0.38	1.26	0.34	0.63	1.80	1.05	0.04 - 2.49

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-31. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME LIVING AREA CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	17	1.47	1.14	0.45	0.66	1.27	0.91	0.14 - 8.23
1,1,1-Trichloroethane	17	.[e]	6.30	1.33	4.66	1.21	4.10	1.64 - 20.8
Carbon Tetrachloride	17	1.38	1.75	0.52	1.20	1.22	1.25	0.26 - 9.56
Trichloroethylene	17	1.17	4.73	1.66	2.66	1.28	2.58	0.69 - 28.1
Tetrachloroethylene	17	0.40	1.74	0.58	0.55	1.56	1.14	0.04 - 8.87

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-32. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT OUTDOOR CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	1.21	1.95	0.78	1.09	1.52	0.82	0.16 - 6.13
1,1,1-Trichloroethane	8	.[e]	7.14	1.94	5.23	1.38	5.58	1.26 - 16.3
Carbon Tetrachloride	8	.	3.81	1.22	2.61	1.39	1.92	0.96 - 9.54
Trichloroethylene	8	0.74	1.69	0.34	1.45	1.25	1.68	0.46 - 3.54
Tetrachloroethylene	8	0.34	1.05	0.51	0.27	2.07	0.62	0.03 - 4.25

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-33. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME OUTDOOR CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - WINTER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	7	1.68	0.74	0.46	0.36	1.53	0.25	0.12 - 3.50
1,1,1-Trichloroethane	7	.[e]	3.40	0.76	2.93	1.25	2.79	1.50 - 6.65
Carbon Tetrachloride	7	0.50	2.09	0.74	1.08	1.79	2.14	0.06 - 5.68
Trichloroethylene	7	1.30	0.73	0.18	0.50	1.53	0.86	0.09 - 1.33
Tetrachloroethylene	7	0.44	0.05	0.01	0.05	1.12	0.06	0.03 - 0.07

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-34. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON OVERNIGHT KITCHEN CONCENTRATIONS FOR SELECTED COMPOUNDS - WINTER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	32	1,310	730	-6,350	20,500
Benzene	27	984	583	-2,670	10,900
Carbon Tetrachloride	29	0.81	16.3	-269	267
Tetrachloroethylene	31	126	141	-1,210	3,230
Styrene	28	20.2	80.7	-824	1,270
p-Dichlorobenzene	26	12,500	5,160	-753	104,000
Ethylbenzene	32	314	233	-1,780	6,010
m,p-Xylene	32	1,200	1,040	-8,100	28,100
n-Octane	30	419	232	-1,080	6,750
n-Undecane	29	531	177	-703	3,790
Limonene	26	6,153	1,490	343	32,900
n-Nonane	31	814	408	-1,230	9,630

TABLE 3-35. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON DAYTIME KITCHEN CONCENTRATIONS FOR SELECTED COMPOUNDS - WINTER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	32	1,390	356	-775	8,390
Benzene	25	1,570	817	-877	20,500
Carbon Tetrachloride	25	1.60	9.98	-90.0	168
Tetrachloroethylene	32	424	89.6	-485	1,670
Styrene	19	341	89.1	-82.5	1,200
p-Dichlorobenzene	13	10,300	4,100	-168	37,100
Ethylbenzene	32	644	281	-494	8,570
m,p-Xylene	32	3,310	1,240	-1,570	36,300
n-Octane	32	653	196	-1,450	4,750
n-Undecane	28	541	112	-249	2,260
Limonene	13	8,900	1,790	864	21,600
n-Nonane	31	679	208	-467	5,930

TABLE 3-36. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON DAYTIME LIVING AREA CONCENTRATIONS FOR SELECTED COMPOUNDS - WINTER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	33	1,430	305	-1,360	6,980
Benzene	26	993	356	-985	8,470
Carbon Tetrachloride	22	10.4	11.9	-40.8	205
Tetrachloroethylene	33	413	84.4	-283	1,650
Styrene	19	487	138	-116	1,800
p-Dichlorobenzene	17	10,900	4,230	-32.4	52,600
Ethylbenzene	33	633	218	-90.1	6,780
m,p-Xylene	33	3,070	933	-516	27,900
n-Octane	32	724	242	-1,120	6,440
n-Undecane	28	598	94.3	-176	2,050
Limonene	15	11,000	4,740	496	75,200
n-Nonane	33	751	204	-564	5,600

TABLE 3-37. MEANS AND STANDARD ERRORS FOR SMOKERS AND NONSMOKERS BY MEDIA FOR SELECTED COMPOUNDS -- WINTER SEASON

		Smokers			Nonsmokers		
Media	Compound	Sample Size	Mean	Std. Error	Sample Size	Mean	Std. Error
Overnight Personal Air	1,1,1-Trichloroethane	12	35.9	8.05	31	22.6	3.13
	Benzene	8	18.6	3.79	24	12.0	1.48
	Tetrachloroethylene	12	9.07	1.97	31	8.36	1.21
	p-Dichlorobenzene	12	13.0	7.59	31	26.1	10.1
	Ethylbenzene	11	7.21	1.03	31	6.57	1.18
	m,p-Xylene	12	39.4	4.85	31	33.6	5.49
	n-Octane	12	8.64	2.53	31	5.35	0.77
Daytime Personal Air	1,1,1-Trichloroethane	11	19.2	4.42	34	44.3	14.8
	Benzene	7	33.9	15.9	26	18.3	6.09
	Tetrachloroethylene	11	6.50	0.65	34	17.3	5.77
	p-Dichlorobenzene	10	18.7	10.9	34	19.8	9.41
	Ethylbenzene	11	26.3	17.3	34	9.25	2.11
	m,p-Xylene	11	73.7	39.3	34	44.3	8.68
	n-Octane	11	22.1	17.2	34	6.74	1.33

(continued)

TABLE 3-37. (continued)

Media	Compound	Smokers			Nonsmokers		
		Sample Size	Mean	Std. Error	Sample Size	Mean	Std. Error
Daytime Living Area	1,1,1-Trichloroethane	12	12.1	2.62	33	15.9	2.21
	Benzene	9	11.0	2.06	27	9.48	1.78
	Tetrachloroethylene	12	3.97	0.42	33	5.74[a]	0.74
	p-Dichlorobenzene	12	29.8	22.7	33	25.5	9.91
	Ethylbenzene	12	4.26	0.64	33	5.48	1.10
	m,p-Xylene	12	22.1	3.13	33	27.7	4.98
	n-Octane	12	4.65	1.20	33	4.92	0.90
Overnight Kitchen	1,1,1-Trichloroethane	9	31.6	7.03	33	22.2	3.22
	Benzene	8	17.2	5.68	28	13.8	2.39
	Tetrachloroethylene	9	6.55	1.33	32	8.04	1.50
	p-Dichlorobenzene	9	10.2	8.69	33	43.2	15.0
	Ethylbenzene	9	5.65	0.81	33	6.91	1.17
	m,p-Xylene	9	30.3	4.47	33	34.5	4.93
	n-Octane	9	6.37	1.26	33	6.13	0.91
Daytime Kitchen	1,1,1-Trichloroethane	12	13.1	2.92	35	14.3	2.07
	Benzene	9	11.2	2.58	29	10.9	3.26
	Tetrachloroethylene	12	4.03	0.42	35	6.49	1.54
	p-Dichlorobenzene	12	34.7	27.6	34	19.6	9.35
	Ethylbenzene	12	3.76	0.68	35	5.45	1.23
	m,p-Xylene	12	20.2	3.56	35	28.7	5.51
	n-Octane	12	4.16	0.88	35	4.80	0.76

[a]Means significantly different at .05 level.

TABLE 3-38. DATA AVAILABLE FOR STATISTICAL ANALYSIS BY MEDIA -- SUMMER SEASON

Media	Sample Size Range
TENAX	
Initial Breath	18 - 40
Overnight Breath	20 - 40
Daytime Breath	22 - 40
Overnight Personal Air	30 - 40
Daytime Personal Air	27 - 40
Daytime Living Area	33 - 40
Overnight Kitchen	28 - 37
Daytime Kitchen	30 - 38
Overnight Outdoor	35 - 40
Daytime Outdoor	27 - 39
CANISTER	
Indoor Overnight	8
Indoor Daytime	7-8
Outdoor Overnight	8
Outdoor Daytime	8

TABLE 3-39. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT PERSONAL AIR TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	30	0.50	1.90	3.80	12.5	25.0	0.50
1,2-Dichloroethane	28	0.10	0.36	3.60	0.00	26.3	0.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	15	0.44	1.40	3.18	0.00	57.1	0.00
Trichloroethylene	25	0.40	2.56	6.40	12.8	35.9	0.36
Tetrachloroethylene	4	0.60	0.80	1.33	86.7	86.7	1.00
Chlorobenzene	34	0.10	0.96	9.60	0.00	5.56	0.00
Styrene	5	0.30	0.60	2.00	71.1	86.8	0.82
m-Dichlorobenzene	38	0.60	1.40	2.33	0.00	0.00	.
p-Dichlorobenzene	9	0.40	0.50	1.25	71.8	76.9	0.93
o-Dichlorobenzene	36	0.36	0.94	2.61	7.69	7.69	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	5	0.12	0.60	5.00	75.8	84.8	0.89
n-Dodecane	8	0.36	0.60	1.67	69.4	77.8	0.89
1,4-Dioxane	39	0.44	5.08	11.5	0.00	2.50	0.00
1,2-Dibromoethane	39	0.16	1.20	7.50	0.00	0.00	.
n-Octane	1	0.60	0.60	1.00	97.3	97.3	1.00
n-Undecane	8	0.36	0.50	1.39	78.4	78.4	1.00
1,1,2,2-Tetrachloroethane	40	0.44	3.52	8.00	0.00	0.00	.
α-Pinene	5	0.40	0.60	1.50	84.6	87.2	0.97
Limonene	1	0.50	0.50	1.00	97.5	97.5	1.00
n-Nonane	1	0.40	0.40	1.00	97.3	97.3	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-40. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME PERSONAL AIR TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	21	0.40	1.30	3.25	21.1	44.7	0.47
1,2-Dichloroethane	26	0.10	0.20	2.00	9.09	21.2	0.43
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	10	0.50	1.00	2.00	10.8	73.0	0.15
Trichloroethylene	23	0.36	1.44	4.00	20.5	41.0	0.50
Tetrachloroethylene	1	0.60	0.60	1.00	96.3	96.3	1.00
Chlorobenzene	34	0.10	0.68	6.80	2.86	2.86	1.00
Styrene	4	0.30	0.60	2.00	81.6	89.5	0.91
m-Dichlorobenzene	38	0.56	1.00	1.79	2.56	2.56	1.00
p-Dichlorobenzene	9	0.40	0.70	1.75	64.1	76.9	0.83
o-Dichlorobenzene	35	0.40	0.80	2.00	10.3	10.3	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	2	0.60	0.70	1.17	86.5	94.6	0.91
n-Dodecane	10	0.40	0.60	1.50	60.0	66.7	0.90
1,4-Dioxane	35	0.40	3.60	9.00	0.00	5.41	0.00
1,2-Dibromoethane	39	0.16	0.84	5.25	0.00	0.00	.
n-Octane	2	0.48	0.60	1.25	94.7	94.7	1.00
n-Undecane	6	0.32	0.50	1.56	82.4	82.4	1.00
1,1,2,2-Tetrachloroethane	40	0.36	2.48	6.81	0.00	0.00	.
α-Pinene	11	0.40	0.60	1.50	66.7	69.4	0.96
Limonene	1	0.48	0.48	1.00	97.5	97.5	1.00
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-41. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME LIVING AREA TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	24	0.40	1.20	3.00	25.6	38.5	0.67
1,2-Dichloroethane	22	0.10	0.24	2.40	15.8	42.1	0.38
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	9	0.60	0.80	1.33	37.5	77.5	0.48
Trichloroethylene	29	0.30	1.64	5.43	10.0	27.5	0.36
Tetrachloroethylene	2	0.70	0.80	1.14	91.9	94.6	0.97
Chlorobenzene	37	0.10	0.64	6.40	2.56	5.13	0.50
Styrene	8	0.30	0.60	2.00	65.0	80.0	0.81
m-Dichlorobenzene	38	0.40	1.08	2.70	0.00	2.56	0.00
p-Dichlorobenzene	9	0.30	0.52	1.73	64.1	76.9	0.83
o-Dichlorobenzene	39	0.24	0.90	3.75	2.50	2.50	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	1	0.40	0.40	1.00	97.5	97.5	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	4	0.30	0.70	2.33	86.1	88.9	0.97
n-Dodecane	9	0.40	0.70	1.75	54.5	72.7	0.75
1,4-Dioxane	38	0.40	3.32	8.30	0.00	5.00	0.00
1,2-Dibromoethane	40	0.16	0.76	4.75	0.00	0.00	.
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	0	.	.	.	100.	100.	1.00
1,1,2,2-Tetrachloroethane	40	0.40	2.28	5.70	0.00	0.00	.
α-Pinene	10	0.50	0.70	1.40	66.7	74.4	0.90
Limonene	2	0.50	0.50	1.00	95.0	95.0	1.00
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-42. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT KITCHEN TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	21	0.52	1.08	2.08	29.7	43.2	0.69
1,2-Dichloroethane	19	0.10	0.24	2.40	9.38	40.6	0.23
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	10	0.48	0.92	1.92	24.3	73.0	0.33
Trichloroethylene	23	0.30	1.40	4.67	19.4	36.1	0.54
Tetrachloroethylene	7	0.20	0.70	3.50	78.8	78.8	1.00
Chlorobenzene	34	0.07	0.52	7.88	2.78	5.56	0.50
Styrene	5	0.28	0.68	2.43	54.3	85.7	0.63
m-Dichlorobenzene	35	0.39	1.60	4.12	0.00	0.00	.
p-Dichlorobenzene	12	0.30	0.90	3.02	47.1	64.7	0.73
o-Dichlorobenzene	32	0.40	1.36	3.40	5.88	5.88	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	2	0.30	0.70	2.33	94.4	94.4	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	1	0.60	0.60	1.00	86.7	96.7	0.90
n-Dodecane	4	0.44	1.04	2.36	57.1	85.7	0.67
1,4-Dioxane	32	0.40	2.80	6.97	0.00	8.57	0.00
1,2-Dibromoethane	36	0.16	0.64	4.00	0.00	0.00	.
n-Octane	3	0.50	1.20	2.40	85.7	91.4	0.94
n-Undecane	2	0.32	0.80	2.50	90.3	93.5	0.97
1,1,2,2-Tetrachloroethane	34	0.44	1.92	4.36	0.00	0.00	.
α-Pinene	2	0.40	1.04	2.50	76.5	94.1	0.81
Limonene	2	0.36	0.90	2.50	91.4	94.3	0.97
n-Nonane	3	0.30	0.70	2.33	88.6	91.4	0.97

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-43. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME KITCHEN TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	20	0.50	1.00	2.00	34.2	47.4	0.72
1,2-Dichloroethane	25	0.10	0.20	2.00	11.1	30.6	0.36
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	10	0.50	0.80	1.60	36.8	73.7	0.50
Trichloroethylene	27	0.30	1.40	4.70	13.2	28.9	0.45
Tetrachloroethylene	1	0.70	0.70	1.00	97.1	97.1	1.00
Chlorobenzene	34	0.09	0.52	5.53	2.78	5.56	0.50
Styrene	9	0.30	0.60	2.00	58.3	75.0	0.78
m-Dichlorobenzene	34	0.55	1.00	1.83	2.86	2.86	1.00
p-Dichlorobenzene	12	0.40	0.60	1.50	47.2	66.7	0.71
o-Dichlorobenzene	34	0.40	0.84	2.10	2.78	5.56	0.50
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	0	.	.	.	100.	100.	1.00
n-Dodecane	8	0.50	0.60	1.20	66.7	73.3	0.91
1,4-Dioxane	36	0.43	2.80	6.48	0.00	2.70	0.00
1,2-Dibromoethane	36	0.16	0.64	4.00	0.00	0.00	.
n-Octane	0	.	.	.	100.	100.	1.00
n-Undecane	3	0.36	0.60	1.67	91.2	91.2	1.00
1,1,2,2-Tetrachloroethane	36	0.44	1.92	4.36	0.00	0.00	.
α-Pinene	7	0.40	0.60	1.50	77.8	80.6	0.97
Limonene	0	.	.	.	100.	100.	1.00
n-Nonane	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-44. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT OUTDOOR TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	31	0.30	0.90	3.02	22.5	22.5	1.00
1,2-Dichloroethane	33	0.10	0.20	2.00	0.00	17.5	0.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	7	0.50	0.70	1.40	67.5	82.5	0.82
Trichloroethylene	39	0.32	1.36	4.25	0.00	2.50	0.00
Tetrachloroethylene	8	0.50	0.70	1.40	70.0	80.0	0.88
Chlorobenzene	40	0.06	0.52	8.39	0.00	0.00	.
Styrene	25	0.30	0.56	1.87	25.0	37.5	0.67
m-Dichlorobenzene	39	0.52	0.96	1.85	0.00	0.00	.
p-Dichlorobenzene	22	0.40	0.50	1.25	38.5	43.6	0.88
o-Dichlorobenzene	38	0.32	0.80	2.50	2.56	2.56	1.00
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	13	0.08	0.70	8.75	31.4	62.9	0.50
n-Dodecane	35	0.25	0.64	2.54	0.00	2.78	0.00
1,4-Dioxane	40	0.40	2.68	6.70	0.00	0.00	.
1,2-Dibromoethane	40	0.16	0.64	4.00	0.00	0.00	.
n-Octane	5	0.40	0.70	1.75	81.6	86.8	0.94
n-Undecane	20	0.24	0.60	2.54	25.6	48.7	0.53
1,1,2,2-Tetrachloroethane	39	0.40	1.84	4.60	0.00	0.00	.
α-Pinene	32	0.25	0.64	2.54	12.8	17.9	0.71
Limonene	35	0.25	0.60	2.42	10.3	10.3	1.00
n-Nonane	3	0.50	0.50	1.00	88.9	91.7	0.97

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-45. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME OUTDOOR TENAX SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	28	0.44	1.04	2.36	10.5	26.3	0.40
1,2-Dichloroethane	39	0.10	0.20	2.00	0.00	0.00	.
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	12	0.50	0.80	1.60	33.3	69.2	0.48
Trichloroethylene	39	0.32	1.44	4.50	0.00	0.00	.
Tetrachloroethylene	6	0.60	0.80	1.33	74.4	84.6	0.88
Chlorobenzene	38	0.10	0.52	5.20	0.00	0.00	.
Styrene	29	0.20	0.60	3.00	18.4	23.7	0.78
m-Dichlorobenzene	39	0.56	0.96	1.71	0.00	0.00	.
p-Dichlorobenzene	29	0.40	0.60	1.50	15.4	25.6	0.60
o-Dichlorobenzene	37	0.36	0.80	2.22	2.63	2.63	1.00
Ethylbenzene	1	0.40	0.40	1.00	94.9	97.4	0.97
o-Xylene	1	0.50	0.50	1.00	94.9	97.4	0.97
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	12	0.12	0.70	5.83	29.6	55.6	0.53
n-Dodecane	36	0.31	0.64	2.04	0.00	5.26	0.00
1,4-Dioxane	39	0.40	2.88	7.20	0.00	0.00	.
1,2-Dibromoethane	39	0.16	0.68	4.25	0.00	0.00	.
n-Octane	13	0.40	0.70	1.75	57.1	62.9	0.91
n-Undecane	21	0.34	0.64	1.88	20.6	38.2	0.54
1,1,2,2-Tetrachloroethane	39	0.40	1.96	4.90	0.00	0.00	.
α-Pinene	36	0.31	0.64	2.04	7.69	7.69	1.00
Limonene	36	0.30	0.60	2.01	0.00	2.70	0.00
n-Nonane	8	0.40	0.60	1.50	58.3	77.8	0.75

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-46. PERCENT MEASURABLE FOR TENAX SAMPLES BY MEDIA AND TIME - SUMMER SEASON

Compound	Overnight Personal Air	Daytime Personal Air	Overnight Kitchen	Daytime Kitchen	Daytime Living Area	Overnight Outdoor	Daytime Outdoor
Sample Size Range:	30-40	27-40	28-37	30-38	33-40	35-40	27-39
Chloroform	25.0	44.7	43.2	47.4	38.5	22.5	26.3
1,2-Dichloroethane	26.3	21.2	40.6	30.6	42.1	17.5	0.00
1,1,1-Trichloroethane	100.	100.	100.	100.	100.	100.	100.
Benzene	100.	100.	100.	100.	100.	100.	100.
Carbon Tetrachloride	57.1	73.0	73.0	73.7	77.5	82.5	69.2
Trichloroethylene	35.9	41.0	36.1	28.9	27.5	2.50	0.00
Tetrachloroethylene	86.7	96.3	78.8	97.1	94.6	80.0	84.6
Chlorobenzene	5.56	2.86	5.56	5.56	5.13	0.00	0.00
Styrene	86.8	89.5	85.7	75.0	80.0	37.5	23.7
m-Dichlorobenzene	0.00	2.56	0.00	2.86	2.56	0.00	0.00
p-Dichlorobenzene	76.9	76.9	64.7	66.7	76.9	43.6	25.6
o-Dichlorobenzene	7.69	10.3	5.88	5.56	2.50	2.56	2.63
Ethylbenzene	100.	100.	100.	100.	100.	100.	97.4
o-Xylene	100.	100.	94.4	100.	97.5	100.	97.4
m,p-Xylene	100.	100.	100.	100.	100.	100.	100.
n-Decane	84.8	94.6	96.7	100.	88.9	62.9	55.6
n-Dodecane	77.8	66.7	85.7	73.3	72.7	2.78	5.26
1,4-Dioxane	2.50	5.41	8.57	2.70	5.00	0.00	0.00
1,2-Dibromoethane	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Octane	97.3	94.7	91.4	100.	100.	86.8	62.9
n-Undecane	78.4	82.4	93.5	91.2	100.	48.7	38.2
1,1,2,2-Tetrachloroethane	0.00	0.00	0.00	0.00	0.00	0.00	0.00
α-Pinene	87.2	69.4	94.1	80.6	74.4	17.9	7.69
Limonene	97.5	97.5	94.3	100.	95.0	10.3	2.70
n-Nonane	97.3	100.	91.4	100.	100.	91.7	77.8

TABLE 3-47. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT PERSONAL AIR TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	40	0.60	0.92	0.26	0.34	1.25	0.07	0.37	0.78	2.51	6.52	0.06 - 7.63
1,2-Dichloroethane	38	0.12	0.11	0.01	0.08	1.13	0.06	0.09	0.13	0.21	0.25	0.01 - 0.31
1,1,1-Trichloroethane	40	.[e]	10.3	1.50	7.94	1.12	5.20	7.77	11.9	20.5	33.2	1.83 - 52.8
Benzene	40	.	7.11	0.93	5.36	1.13	3.51	5.21	8.41	15.6	21.8	0.94 - 26.1
Carbon Tetrachloride	35	0.60	0.60	0.04	0.54	1.10	0.37	0.68	0.81	0.90	1.00	0.05 - 1.02
Trichloroethylene	39	0.50	1.64	0.61	0.45	1.27	0.14	0.31	1.12	3.56	12.7	0.05 - 20.2
Tetrachloroethylene	30	0.65	5.45	3.17	2.00	1.21	1.18	1.96	3.09	5.48	48.3	0.37 - 96.8
Styrene	38	0.40	2.40	1.16	0.99	1.20	0.52	0.98	1.69	3.05	6.55	0.04 - 44.8
p-Dichlorobenzene	39	0.50	16.9	8.60	1.97	1.35	0.41	1.44	7.20	22.9	208.	0.05 - 272.
Ethylbenzene	40	.	2.84	0.37	2.28	1.11	1.72	2.26	3.55	4.94	6.13	0.38 - 15.1
o-Xylene	40	.	4.21	0.50	3.35	1.12	2.35	3.28	5.57	8.21	9.42	0.44 - 18.1
m,p-Xylene	40	.	12.2	1.62	9.55	1.12	6.98	9.53	15.3	21.6	34.8	1.46 - 60.6
n-Decane	33	0.12	3.12	0.73	1.24	1.36	0.58	1.66	4.42	7.11	13.7	0.01 - 21.9
n-Dodecane	36	0.52	2.07	0.66	0.87	1.25	0.43	0.97	1.71	3.87	15.2	0.06 - 20.2
n-Octane	37	0.60	3.15	0.60	2.36	1.13	1.55	2.43	3.43	4.62	8.55	0.37 - 23.3
n-Undecane	37	0.40	4.71	1.66	1.34	1.34	0.69	1.50	4.32	14.4	23.1	0.04 - 57.6
α-Pinene	39	0.50	2.63	0.55	1.43	1.21	0.82	1.49	2.70	9.08	9.63	0.06 - 17.7
Limonene	40	0.50	8.29	1.97	4.54	1.19	1.95	5.18	8.08	16.4	36.4	0.31 - 70.6
n-Nonane	37	0.40	2.63	0.51	1.73	1.17	0.93	1.93	2.77	4.60	14.0	0.05 - 15.2

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-48. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME PERSONAL AIR TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	38	0.70	3.82	2.18	0.60	1.30	0.22	0.59	1.17	2.83	40.5	0.06 - 75.6
1,2-Dichloroethane	33	0.10	0.10	0.01	0.08	1.13	0.06	0.06	0.12	0.20	0.30	0.02 - 0.31
1,1,1-Trichloroethane	40	.[e]	45.9	22.2	10.8	1.23	4.55	7.73	16.5	66.1	575.	2.29 - 688.
Benzene	40	.	13.7	3.08	8.88	1.14	5.05	7.07	13.1	25.9	83.9	2.11 - 98.2
Carbon Tetrachloride	37	0.60	0.70	0.06	0.63	1.08	0.46	0.66	0.83	1.17	1.32	0.31 - 2.22
Trichloroethylene	39	0.50	6.90	5.75	0.46	1.32	0.14	0.31	1.27	3.45	13.1	0.04 - 225.
Tetrachloroethylene	27	0.60	21.3	17.5	2.99	1.31	1.27	2.29	6.71	14.4	292.	0.37 - 475.
Styrene	38	0.45	2.64	0.80	1.34	1.19	0.74	1.04	2.86	4.62	12.1	0.19 - 29.5
p-Dichlorobenzene	39	0.50	4.63	1.35	1.39	1.29	0.51	1.01	4.77	12.2	32.2	0.05 - 35.0
Ethylbenzene	40	.	11.9	4.95	4.26	1.19	2.12	3.73	5.98	10.5	103.	0.90 - 172.
o-Xylene	40	.	14.2	5.04	6.03	1.18	3.55	4.99	8.18	15.6	136.	1.10 - 146.
m,p-Xylene	40	.	41.2	14.9	17.7	1.18	9.58	16.0	27.3	45.5	349.	3.37 - 492.
n-Decane	37	0.65	18.0	12.1	2.73	1.26	1.14	2.04	4.28	11.9	142.	0.37 - 440.
n-Dodecane	30	0.51	4.66	1.87	0.93	1.43	0.21	1.05	3.39	20.4	35.9	0.05 - 49.0
n-Octane	38	0.54	6.18	1.88	2.92	1.21	1.78	2.63	3.88	15.9	31.2	0.06 - 66.6
n-Undecane	34	0.40	9.98	5.44	1.83	1.37	0.81	1.88	4.75	22.0	70.4	0.04 - 185.
α-Pinene	36	0.50	1.58	0.31	0.88	1.23	0.33	1.24	2.21	3.42	4.85	0.05 - 10.5
Limonene	40	0.48	31.6	22.6	5.17	1.27	2.14	4.34	12.0	33.2	61.3	0.06 - 908.
n-Nonane	36	.	18.7	11.6	3.65	1.25	1.66	2.25	5.17	28.2	135.	0.75 - 416.

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-49. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME LIVING AREA TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	39	0.64	0.90	0.17	0.41	1.25	0.08	0.56	1.37	2.68	3.67	0.05 - 4.12
1,2-Dichloroethane	38	0.13	0.12	0.01	0.09	1.15	0.06	0.12	0.18	0.25	0.30	0.02 - 0.36
1,1,1-Trichloroethane	40	.[5/]	14.7	3.32	9.12	1.15	5.19	9.03	15.0	27.0	70.0	1.75 - 119.
Benzene	40	.	6.52	0.86	4.86	1.13	2.76	4.65	9.43	14.6	19.5	1.08 - 23.9
Carbon Tetrachloride	40	0.60	0.78	0.05	0.72	1.07	0.52	0.78	0.89	1.16	1.49	0.37 - 1.90
Trichloroethylene	40	0.52	0.66	0.17	0.31	1.20	0.15	0.25	0.72	1.87	4.09	0.06 - 4.93
Tetrachloroethylene	37	0.75	2.75	0.27	2.27	1.12	1.59	2.53	3.81	5.72	6.39	0.44 - 6.78
Styrene	40	0.45	2.03	0.74	0.95	1.18	0.47	0.72	1.65	4.02	6.44	0.19 - 29.6
p-Dichlorobenzene	39	0.50	7.18	4.04	1.16	1.30	0.41	0.93	3.54	10.5	47.8	0.05 - 153.
Ethylbenzene	40	.	2.94	0.43	2.26	1.11	1.48	2.23	3.70	5.35	10.7	0.65 - 14.9
o-Xylene	40	0.40	4.33	0.66	3.06	1.16	2.01	3.35	4.49	8.75	16.2	0.05 - 22.7
m,p-Xylene	40	.	12.3	1.82	9.33	1.12	5.99	8.91	14.8	22.9	43.8	2.78 - 63.3
n-Decane	36	0.65	4.44	2.31	1.64	1.20	0.87	1.37	2.84	6.12	22.0	0.19 - 84.4
n-Dodecane	33	0.56	2.07	0.79	0.78	1.24	0.40	0.85	1.18	4.55	18.4	0.07 - 21.0
n-Octane	39	.	3.18	0.29	2.79	1.09	2.03	2.72	3.85	5.49	7.01	1.00 - 9.84
n-Undecane	37	.	5.28	2.38	1.78	1.21	0.93	1.28	2.42	12.4	37.0	0.42 - 83.8
α-Pinene	39	0.53	1.90	0.56	1.02	1.18	0.44	1.02	2.00	3.99	5.18	0.07 - 21.9
Limonene	40	0.50	6.01	1.35	2.99	1.21	1.20	2.55	6.83	15.9	30.1	0.31 - 41.5
n-Nonane	39	.	3.26	0.99	2.17	1.12	1.44	2.03	3.08	4.69	4.85	0.67 - 40.1

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-50. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT KITCHEN TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	37	0.76	1.39	0.43	0.47	1.28	0.10	0.59	1.38	3.03	10.4	0.06 - 13.0
1,2-Dichloroethane	32	0.20	0.13	0.02	0.10	1.15	0.06	0.12	0.17	0.25	0.38	0.02 - 0.39
1,1,1-Trichloroethane	37	.[e]	13.1	2.36	8.41	1.19	5.51	9.08	14.5	23.9	63.1	0.34 - 68.8
Benzene	37	.	6.54	1.25	4.39	1.16	2.27	4.54	7.44	13.3	23.0	0.61 - 43.7
Carbon Tetrachloride	37	0.70	0.73	0.05	0.64	1.11	0.47	0.77	0.93	1.12	1.30	0.06 - 1.31
Trichloroethylene	36	0.50	1.35	0.47	0.42	1.27	0.17	0.31	1.01	4.62	9.64	0.05 - 12.6
Tetrachloroethylene	33	0.60	1.70	0.23	1.16	1.21	0.77	1.46	2.29	3.59	5.07	0.02 - 5.51
Styrene	35	0.50	3.45	2.29	0.91	1.23	0.51	0.93	1.48	3.52	20.3	0.03 - 81.2
p-Dichlorobenzene	34	0.50	4.00	1.23	1.13	1.33	0.31	0.73	3.34	14.2	22.4	0.04 - 34.2
Ethylbenzene	37	.	3.03	0.46	2.21	1.15	1.45	2.37	3.71	6.52	9.86	0.16 - 15.3
o-Xylene	36	0.50	4.89	0.73	3.44	1.17	2.20	3.58	5.88	11.2	15.4	0.19 - 22.0
m,p-Xylene	37	.	13.0	2.00	9.24	1.16	5.91	9.95	15.2	29.4	42.1	0.61 - 63.3
n-Decane	30	0.60	3.78	0.97	2.01	1.24	0.86	2.19	4.51	9.26	19.8	0.12 - 26.8
n-Dodecane	28	0.55	3.73	1.50	1.30	1.29	0.84	1.16	1.86	14.8	29.8	0.05 - 37.2
n-Octane	35	0.70	3.35	0.51	2.51	1.14	1.83	2.51	3.74	6.69	11.9	0.31 - 16.0
n-Undecane	31	0.56	6.51	2.33	2.23	1.29	1.15	1.66	4.76	30.7	47.9	0.04 - 52.4
α-Pinene	34	0.72	3.10	0.73	1.84	1.19	1.05	1.43	3.73	6.64	12.1	0.13 - 23.8
Limonene	35	0.63	7.01	1.39	4.25	1.22	2.48	5.37	6.97	13.1	36.1	0.04 - 39.0
n-Nonane	35	0.60	3.22	0.59	2.16	1.17	1.61	2.21	2.99	8.30	10.9	0.19 - 18.4

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-51. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME KITCHEN TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	38	0.62	1.13	0.23	0.49	1.27	0.08	0.63	1.35	2.99	4.90	0.06 - 6.09
1,2-Dichloroethane	36	0.16	0.12	0.01	0.09	1.13	0.06	0.12	0.14	0.23	0.30	0.02 - 0.41
1,1,1-Trichloroethane	38	.[e]	18.5	7.76	9.34	1.16	4.82	10.6	12.7	24.2	58.2	1.54 - 301.
Benzene	38	.	5.50	0.77	4.40	1.11	2.54	4.70	6.68	9.89	14.3	1.57 - 28.4
Carbon Tetrachloride	38	0.70	0.75	0.04	0.71	1.06	0.48	0.75	0.91	1.14	1.23	0.31 - 1.36
Trichloroethylene	38	0.52	0.72	0.21	0.34	1.20	0.16	0.28	0.77	1.85	3.68	0.05 - 7.08
Tetrachloroethylene	35	0.70	2.80	0.28	2.35	1.11	1.63	2.70	3.62	4.54	7.69	0.44 - 7.85
Styrene	36	0.50	1.31	0.26	0.82	1.17	0.38	0.68	1.28	3.78	5.28	0.19 - 7.21
p-Dichlorobenzene	36	0.50	6.49	4.33	1.00	1.32	0.31	0.57	3.74	7.84	33.3	0.05 - 157.
Ethylbenzene	36	.	2.48	0.32	2.03	1.11	1.32	2.13	2.89	4.20	7.86	0.65 - 10.7
o-Xylene	36	.	3.73	0.43	3.12	1.10	2.06	3.52	4.84	5.96	9.73	1.02 - 15.1
m,p-Xylene	36	.	10.3	1.28	8.45	1.11	5.35	8.84	12.6	19.1	30.0	2.67 - 40.9
n-Decane	33	.	3.75	1.20	1.96	1.18	1.09	1.49	2.60	7.36	29.1	0.56 - 30.8
n-Dodecane	30	0.51	3.47	1.75	0.96	1.31	0.36	0.91	1.75	4.95	32.8	0.06 - 51.1
n-Octane	35	.	3.13	0.34	2.73	1.09	1.99	2.62	3.69	5.07	7.45	1.03 - 12.4
n-Undecane	34	0.40	2.45	0.61	1.40	1.20	0.91	1.18	2.54	4.70	15.2	0.04 - 16.4
α-Pinene	36	0.50	1.93	0.57	1.09	1.17	0.63	0.98	1.62	3.90	7.58	0.25 - 20.6
Limonene	36	.	8.69	2.41	4.01	1.21	1.55	3.51	7.34	35.4	47.2	0.71 - 68.7
n-Nonane	36	.	2.94	0.48	2.23	1.12	1.36	2.02	2.99	6.48	8.99	0.61 - 16.4

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-52. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT OUTDOOR TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	40	0.60	1.05	0.38	0.26	1.28	0.07	0.15	0.55	4.31	6.21	0.05 - 13.1
1,1,1-Trichloroethane	40	.[e]	5.91	0.74	4.63	1.12	2.75	4.27	7.83	12.2	20.0	0.99 - 21.5
Benzene	40	.	3.96	0.47	3.15	1.11	2.01	3.32	4.54	8.95	11.3	0.83 - 14.6
Carbon Tetrachloride	40	0.60	0.73	0.04	0.70	1.06	0.56	0.76	0.87	0.97	1.20	0.31 - 1.24
Tetrachloroethylene	40	0.60	1.24	0.14	0.98	1.12	0.54	0.99	1.76	2.74	3.27	0.31 - 3.58
Styrene	40	0.40	0.42	0.07	0.25	1.19	0.10	0.25	0.56	1.11	1.63	0.04 - 1.74
p-Dichlorobenzene	39	0.47	0.81	0.17	0.48	1.17	0.25	0.31	1.23	1.70	2.92	0.05 - 6.22
Ethylbenzene	40	.	1.76	0.21	1.40	1.11	0.80	1.47	2.35	3.43	4.91	0.35 - 6.87
o-Xylene	39	.	3.07	0.40	2.35	1.13	1.23	2.39	3.95	6.58	8.81	0.42 - 12.9
m,p-Xylene	40	.	8.02	0.99	6.24	1.12	3.44	6.45	10.8	16.4	22.6	1.26 - 32.9
n-Decane	35	0.50	0.66	0.09	0.40	1.26	0.31	0.55	0.73	1.51	2.30	0.01 - 2.34
n-Octane	38	0.60	1.22	0.11	1.05	1.10	0.79	1.09	1.58	1.94	2.33	0.25 - 3.66
n-Undecane	39	0.47	0.49	0.07	0.32	1.18	0.25	0.37	0.62	1.00	1.75	0.04 - 2.20
n-Nonane	36	0.50	0.98	0.08	0.87	1.09	0.66	0.88	1.16	1.78	2.18	0.31 - 2.70

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-53. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME OUTDOOR TENAX SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	95th	Range
Chloroform	38	0.64	0.80	0.34	0.22	1.25	0.07	0.11	0.57	1.17	9.05	0.05 - 10.0
1,1,1-Trichloroethane	39	.[e]	5.95	0.67	4.74	1.12	2.60	5.62	7.46	11.3	18.6	1.45 - 18.7
Benzene	38	.	3.45	0.39	2.80	1.11	1.89	2.55	4.82	6.59	8.73	0.75 - 11.7
Carbon Tetrachloride	39	0.70	0.72	0.04	0.67	1.06	0.50	0.74	0.83	1.15	1.31	0.31 - 1.44
Tetrachloroethylene	39	0.75	2.26	0.28	1.64	1.15	0.68	1.82	3.00	4.42	5.63	0.37 - 8.74
Styrene	38	0.40	0.44	0.11	0.23	1.20	0.07	0.25	0.39	0.98	2.21	0.04 - 3.66
p-Dichlorobenzene	39	0.50	0.35	0.05	0.25	1.16	0.06	0.31	0.39	0.69	0.89	0.05 - 1.72
Ethylbenzene	39	0.40	1.61	0.23	1.23	1.12	0.78	1.38	1.80	2.94	3.74	0.25 - 8.81
o-Xylene	39	0.50	2.60	0.38	1.97	1.13	1.20	2.21	3.27	4.79	6.29	0.31 - 14.5
m,p-Xylene	38	.	6.92	0.99	5.32	1.13	3.41	5.72	8.44	13.0	16.1	1.05 - 36.6
n-Decane	27	0.62	0.61	0.10	0.36	1.30	0.31	0.47	0.80	1.19	2.17	0.01 - 2.66
n-Octane	35	0.68	0.86	0.09	0.67	1.15	0.44	0.79	1.17	1.73	1.89	0.06 - 2.19
n-Undecane	34	0.50	0.42	0.08	0.25	1.21	0.07	0.32	0.58	0.80	1.44	0.04 - 2.75
n-Nonane	36	0.53	0.78	0.07	0.66	1.12	0.41	0.73	1.07	1.32	1.57	0.07 - 2.12

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-54. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT LIVING AREA CANISTER MS SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	7	0.35	0.35	1.00	0.00	12.5	0.00
Chloroform	5	0.45	0.45	1.00	37.5	37.5	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	8	0.75	0.75	1.00	0.00	0.00	.
Trichloroethylene	5	0.55	0.55	1.00	37.5	37.5	1.00
Toluene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	2	0.70	0.70	1.00	75.0	75.0	1.00
p-Dichlorobenzene	3	0.50	0.50	1.00	50.0	62.5	0.80
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	2	0.80	0.80	1.00	62.5	75.0	0.83
n-Dodecane	6	1.00	1.00	1.00	25.0	25.0	1.00
n-Octane	1	0.40	0.40	1.00	75.0	87.5	0.86
Methylene chloride	0	.	.	.	100.	100.	1.00
Vinyl Chloride	8	0.55	0.55	1.00	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-55. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME LIVING AREA CANISTER MS SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	0.35	0.88	2.51	0.00	0.00	.
Chloroform	3	0.45	1.10	2.44	12.5	62.5	0.20
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	8	0.75	1.90	2.53	0.00	0.00	.
Trichloroethylene	5	0.55	1.30	2.36	12.5	37.5	0.33
Toluene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	3	0.70	1.70	2.43	62.5	62.5	1.00
p-Dichlorobenzene	4	0.50	0.74	1.48	25.0	50.0	0.50
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	1	0.80	0.80	1.00	87.5	87.5	0.00
n-Dodecane	7	1.00	2.20	2.20	12.5	12.5	1.00
n-Octane	3	0.40	1.00	2.50	12.5	62.5	0.20
Methylene chloride	0	.	.	.	100.	100.	1.00
Vinyl Chloride	8	0.55	1.20	2.18	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-56. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT OUTDOOR CANISTER MS SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	7	0.35	0.35	1.00	12.5	12.5	1.00
Chloroform	8	0.45	0.45	1.00	0.00	0.00	.
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	8	0.75	0.75	1.00	0.00	0.00	.
Trichloroethylene	7	0.55	0.55	1.00	12.5	12.5	1.00
Toluene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	4	0.70	0.70	1.00	37.5	50.0	0.75
p-Dichlorobenzene	4	0.50	0.50	1.00	50.0	50.0	1.00
Ethylbenzene	3	0.50	0.50	1.00	62.5	62.5	1.00
o-Xylene	3	0.60	0.60	1.00	62.5	62.5	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	3	0.80	0.80	1.00	62.5	62.5	1.00
n-Dodecane	6	1.00	1.00	1.00	25.0	25.0	1.00
n-Octane	6	0.40	0.40	1.00	25.0	25.0	1.00
Methylene chloride	0	.	.	.	100.	100.	1.00
Vinyl Chloride	8	0.55	0.55	1.00	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-57. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME OUTDOOR CANISTER MS SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	0.35	0.68	1.94	0.00	0.00	.
Chloroform	6	0.45	0.88	1.96	12.5	25.0	0.50
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	8	0.75	1.40	1.87	0.00	0.00	.
Trichloroethylene	8	0.55	1.00	1.82	0.00	0.00	.
Toluene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	3	0.70	1.20	1.71	62.5	62.5	1.00
p-Dichlorobenzene	5	0.50	0.98	1.96	12.5	37.5	0.33
Ethylbenzene	3	0.78	0.98	1.26	37.5	62.5	0.60
o-Xylene	1	1.10	1.10	1.00	37.5	87.5	0.43
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	0	.	.	.	100.	100.	1.00
n-Dodecane	6	1.00	1.90	1.90	12.5	25.0	0.50
n-Octane	4	0.40	0.78	1.95	25.0	50.0	0.50
Methylene chloride	0	.	.	.	100.	100.	1.00
Vinyl Chloride	8	0.55	0.98	1.78	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-58. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT LIVING AREA CANISTER ECD/FID SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	2.36	3.61	1.53	0.00	0.00	.
Chloroform	0	.	.	.	100.	100.	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	0	.	.	.	100.	100.	1.00
Trichloroethylene	4	0.16	0.25	1.53	50.0	50.0	1.00
Tetrachloroethylene	3	0.04	0.07	1.53	62.5	62.5	1.00
Methylene chloride	6	11.2	16.8	1.50	25.0	25.0	1.00
Vinyl Chloride	8	592.	908.	1.53	0.00	0.00	.
Allyl Chloride	8	26.4	40.4	1.53	0.00	0.00	.
trans-1,2-Dichloroethylene	8	14.4	22.0	1.53	0.00	0.00	.
1,1-Dichloroethane	8	45.2	69.2	1.53	0.00	0.00	.
cis-1,2-Dichloroethylene	8	19.2	29.4	1.53	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-59. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME LIVING AREA CANISTER ECD/FID SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	7	2.36	3.93	1.67	0.00	0.00	.
Chloroform	4	0.17	0.26	1.50	50.0	50.0	1.00
1,1,1-Trichloroethane	1	0.05	0.05	1.00	87.5	87.5	1.00
Carbon Tetrachloride	1	0.03	0.03	1.00	87.5	87.5	1.00
Trichloroethylene	3	0.16	0.24	1.50	62.5	62.5	1.00
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
Methylene chloride	8	11.2	18.7	1.67	0.00	0.00	.
Vinyl Chloride	8	592.	988.	1.67	0.00	0.00	.
Allyl Chloride	8	26.4	44.0	1.67	0.00	0.00	.
trans-1,2-Dichloroethylene	7	14.4	24.0	1.67	12.5	12.5	1.00
1,1-Dichloroethane	8	45.2	75.6	1.67	0.00	0.00	.
cis-1,2-Dichloroethylene	8	19.2	32.0	1.67	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-60. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR OVERNIGHT OUTDOOR CANISTER ECD/FID SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	2.36	3.54	1.50	0.00	0.00	.
Chloroform	4	0.17	0.26	1.50	50.0	50.0	1.00
1,1,1-Trichloroethane	1	0.05	0.05	1.00	87.5	87.5	1.00
Carbon Tetrachloride	1	0.03	0.03	1.00	87.5	87.5	1.00
Trichloroethylene	5	0.16	0.24	1.50	37.5	37.5	1.00
Tetrachloroethylene	3	0.04	0.04	1.00	62.5	62.5	1.00
Methylene chloride	8	11.2	16.8	1.50	0.00	0.00	.
Vinyl Chloride	8	592.	888.	1.50	0.00	0.00	.
Allyl Chloride	7	26.4	39.6	1.50	12.5	12.5	1.00
trans-1,2-Dichloroethylene	8	14.4	21.6	1.50	0.00	0.00	.
1,1-Dichloroethane	8	45.2	68.0	1.50	0.00	0.00	.
cis-1,2-Dichloroethylene	8	19.2	28.8	1.50	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-61. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR DAYTIME OUTDOOR CANISTER ECD/FID SAMPLES - SUMMER SEASON

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. Q.L. to Min. Q.L.	Percent Above Max. Q.L.	Percent Measurable	Ratio of % Above Max. Q.L. to % Measurable
Vinylidene Chloride	8	2.36	3.54	1.50	0.00	0.00	.
Chloroform	5	0.17	0.26	1.50	37.5	37.5	1.00
1,1,1-Trichloroethane	1	0.05	0.05	1.00	87.5	87.5	1.00
Carbon Tetrachloride	1	0.03	0.03	1.00	87.5	87.5	1.00
Trichloroethylene	6	0.16	0.24	1.50	25.0	25.0	1.00
Tetrachloroethylene	3	0.05	0.07	1.40	62.5	62.5	1.00
Methylene chlordie	8	11.2	16.8	1.50	0.00	0.00	.
Vinyl Chloride	8	592.	888.	1.50	0.00	0.00	.
Allyl Chloride	7	26.4	39.6	1.50	12.5	12.5	1.00
trans-1,2-Dichloroethylene	8	14.4	21.6	1.50	0.00	0.00	.
1,1-Dichloroethane	8	45.2	68.0	1.50	0.00	0.00	.
cis-1,2-Dichloroethylene	8	19.2	28.8	1.50	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-62. PERCENTS MEASURABLE BY ECD/FID CANISTER MEDIA AND TIME FOR THE SUMMER SEASON

Compound	Overnight Living Area	Daytime Living Area	Overnight Outdoor	Daytime Outdoor
Sample Size Range:	8	7-8	8	8
Vinylidene Chloride	0.00	0.00	0.00	0.00
Chloroform	100.	50.0	50.0	37.5
1,1,1-Trichloroethane	100.	87.5	87.5	87.5
Carbon Tetrachloride	100.	87.5	87.5	87.5
Trichloroethylene	50.0	62.5	37.5	25.0
Tetrachloroethylene	62.5	100.	62.5	62.5
Methylene chloride	25.0	0.00	0.00	0.00
Vinyl Chloride	0.00	0.00	0.00	0.00
Allyl Chloride	0.00	0.00	12.5	12.5
trans-1,1-Dichloroethylene	0.00	12.5	0.00	0.00
1,1-Dichloroethane	0.00	0.00	0.00	0.00
cis-1,2-Dichloroethylene	0.00	0.00	0.00	0.00

TABLE 3-63. PERCENTS MEASURABLE BY MS CANISTER MEDIA AND TIME FOR THE SUMMER SEASON

Compound	Overnight Living Area	Daytime Living Area	Overnight Outdoor	Daytime Outdoor
Sample Size Range:	8	7-8	8	8
Vinylidene Chloride	12.5	0.00	12.5	0.00
Chloroform	37.5	62.5	0.00	25.0
1,1,1-Trichloroethane	100.	100.	100.	100.
Benzene	100.	100.	100.	100.
Carbon Tetrachloride	0.00	0.00	0.00	0.00
Trichloroethylene	37.5	37.5	12.5	0.00
Toluene	100.	100.	100.	100.
Tetrachloroethylene	75.0	62.5	50.0	62.5
p-Dichlorobenzene	62.5	50.0	50.0	37.5
Ethylbenzene	100.	100.	62.5	62.5
o-Xylene	100.	100.	62.5	87.5
m,p-Xylene	100.	100.	100.	100.
n-Decane	75.0	87.5	62.5	100.
n-Dodecane	25.0	12.5	25.0	25.0
n-Octane	87.5	62.5	25.0	50.0
Methylene chloride	100.	100.	100.	100.
Vinyl Chloride	0.00	0.00	0.00	0.00

TABLE 3-64. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT LIVING AREA CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	.[e]	1.47	0.33	1.25	1.24	1.27	0.51 - 3.00
1,1,1-Trichloroethane	8	.	5.17	0.64	4.89	1.13	4.97	3.36 - 7.71
Carbon Tetrachloride	8	.	4.13	1.02	3.21	1.32	3.22	1.19 - 8.19
Trichloroethylene	8	0.19	0.65	0.34	0.31	1.53	0.25	0.10 - 2.96
Tetrachloroethylene	8	0.06	0.83	0.26	0.22	2.41	0.97	0.01 - 1.59
Methylene chloride	8	14.0	13.3	4.12	9.57	1.37	8.75	1.91 - 36.3

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-65. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME LIVING AREA CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	0.19	0.82	0.36	0.33	1.79	0.41	0.02 - 2.98
1,1,1-Trichloroethane	8	0.05	3.47	1.11	1.43	2.25	2.34	0.01 - 9.62
Carbon Tetrachloride	8	0.03	3.85	2.58	0.82	2.48	1.58	0.00 - 21.8
Trichloroethylene	8	0.17	0.54	0.18	0.25	1.81	0.40	0.02 - 1.47
Tetrachloroethylene	8	.[e]	2.00	0.62	1.42	1.39	1.48	0.34 - 5.78
Methylene chloride	8	13.0	7.17	1.37	5.73	1.34	7.25	1.40 - 11.7

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-66. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT OUTDOOR CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	0.17	0.90	0.43	0.33	1.83	0.32	0.02 - 3.54
1,1,1-Trichloroethane	8	0.05	3.79	1.02	1.67	2.27	2.75	0.02 - 8.50
Carbon Tetrachloride	8	0.03	3.72	1.39	1.31	2.47	1.86	0.00 - 12.1
Trichloroethylene	8	0.16	0.29	0.13	0.11	1.74	0.10	0.02 - 1.04
Tetrachloroethylene	8	0.04	0.74	0.23	0.28	1.98	0.75	0.03 - 1.53

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.

TABLE 3-67. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME OUTDOOR CANISTER ECD/FID SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Median	Range
Chloroform	8	0.17	1.44	0.88	0.30	2.00	0.14	0.02 - 6.88
1,1,1-Trichloroethane	8	0.05	4.15	1.07	1.77	2.30	4.34	0.01 - 8.43
Carbon Tetrachloride	8	0.03	4.07	1.99	1.21	2.48	1.84	0.00 - 17.0
Trichloroethylene	8	0.16	0.51	0.32	0.12	1.92	0.10	0.02 - 2.60
Tetrachloroethylene	8	0.07	1.19	0.49	0.24	2.52	0.86	0.01 - 3.84

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.

TABLE 3-68. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT LIVING AREA CANISTER MS SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	Range
Chloroform	8	0.45	0.40	0.09	0.34	1.23	0.22	0.22	0.68	0.23 - 0.78
1,1,1-Trichloroethane	8	.[e]	4.78	0.90	4.21	1.22	2.62	4.43	6.40	1.80 - 9.57
Benzene	8	.	3.28	0.64	2.73	1.29	1.51	3.47	4.74	0.75 - 6.13
Trichloroethylene	8	0.55	0.85	0.35	0.52	1.42	0.27	0.27	1.86	0.28 - 2.59
Toluene	8	.	14.0	2.39	12.6	1.20	7.87	13.0	21.2	5.94 - 23.9
Tetrachloroethylene	8	0.70	1.23	0.28	1.00	1.30	0.46	1.28	1.53	0.35 - 2.80
p-Dichlorobenzene	8	0.50	3.12	1.81	1.09	1.74	0.25	1.23	3.29	0.25 - 15.4
Ethylbenzene	8	.	1.65	0.32	1.44	1.22	0.96	1.51	2.06	0.58 - 3.46
o-Xylene	8	.	2.01	0.49	1.66	1.26	0.85	1.85	2.49	0.73 - 4.87
m,p-Xylene	8	.	5.92	1.44	4.85	1.27	2.49	5.48	7.41	2.01 - 14.4
n-Decane	8	0.80	1.16	0.24	0.98	1.26	0.48	1.05	1.82	0.40 - 2.22
n-Dodecane	8	1.00	1.00	0.34	0.74	1.30	0.50	0.50	1.59	0.50 - 3.00
n-Octane	8	0.40	0.85	0.24	0.65	1.32	0.35	0.66	1.40	0.20 - 2.10
Methylene chloride	8	.	5.79	1.44	4.34	1.37	1.85	5.21	9.42	1.12 - 12.6

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-69. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME LIVING AREA CANISTER MS SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	Range
Chloroform	8	0.70	0.75	0.23	0.59	1.28	0.38	0.53	0.93	0.23 - 2.23
1,1,1-Trichloroethane	8	.[e]	4.12	0.55	3.76	1.20	3.56	3.90	5.29	1.18 - 6.40
Benzene	8	.	4.60	1.17	3.61	1.31	1.73	3.84	6.73	1.43 - 10.8
Trichloroethylene	8	0.55	0.74	0.19	0.59	1.29	0.27	0.62	1.06	0.28 - 1.79
Toluene	8	.	14.8	3.17	12.3	1.27	6.91	13.9	21.9	4.34 - 29.4
Tetrachloroethylene	8	0.70	2.10	0.54	1.47	1.43	0.47	2.25	3.48	0.35 - 4.45
p-Dichlorobenzene	8	0.50	0.78	0.30	0.52	1.37	0.25	0.38	1.37	0.25 - 2.56
Ethylbenzene	8	.	1.72	0.35	1.46	1.25	0.81	1.62	2.61	0.59 - 3.32
o-Xylene	8	.	2.10	0.46	1.76	1.26	0.92	2.07	2.92	0.74 - 4.54
m,p-Xylene	8	.	5.83	1.34	4.82	1.27	2.48	5.25	8.68	2.09 - 12.8
n-Decane	8	0.80	1.94	0.34	1.65	1.27	1.15	1.94	2.88	0.40 - 3.16
n-Dodecane	8	1.00	2.41	1.77	0.91	1.51	0.50	0.55	1.01	0.50 - 14.8
n-Octane	8	0.40	9.75	0.20	0.59	1.32	0.27	0.66	0.93	0.20 - 1.95
Methylene chloride	8	.	5.47	1.36	4.56	1.25	3.15	4.21	7.76	1.81 - 13.6

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-70. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR OVERNIGHT OUTDOOR CANISTER MS SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	Range
1,1,1-Trichloroethane	8	.[e]	2.80	0.94	2.18	1.27	1.24	2.07	2.72	1.05 - 9.24
Benzene	8	.	2.13	0.50	1.75	1.27	0.92	1.59	3.74	0.82 - 4.23
Toluene	8	.	5.01	1.29	3.96	1.29	2.24	3.08	9.44	1.68 - 10.2
Tetrachloroethylene	8	0.70	0.77	0.21	0.62	1.27	0.35	0.48	1.22	0.35 - 1.92
p-Dichlorobenzene	8	0.50	4.59	4.02	0.76	1.81	0.25	0.49	1.35	0.25 - 32.7
Ethylbenzene	8	0.50	1.51	0.70	0.82	1.51	0.25	0.96	1.64	0.25 - 6.20
o-Xylene	8	0.60	2.16	1.08	1.07	1.56	0.30	1.33	2.23	0.30 - 9.40
m,p-Xylene	8	.	4.91	1.75	3.22	1.42	1.34	3.44	6.47	0.95 - 15.8
n-Decane	8	0.80	5.65	4.89	1.14	1.71	0.40	0.99	1.08	0.40 - 39.9
n-Dodecane	8	1.00	23.6	17.8	1.77	2.30	0.50	0.50	31.9	0.50 - 143.
n-Octane	8	0.40	0.26	0.04	0.24	1.14	0.20	0.20	0.35	0.20 - 0.47
Methylene chloride	8	.	1.62	0.50	1.23	1.31	0.69	0.98	2.70	0.51 - 4.51

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-71. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR DAYTIME OUTDOOR CANISTER MS SAMPLES ($\mu g/m^3$) - SUMMER SEASON

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	Range
Chloroform	8	0.61	0.45	0.11	0.39	1.22	0.23	0.35	0.55	0.23 - 1.19
1,1,1-Trichloroethane	8	.[e]	3.67	0.65	3.18	1.25	2.32	3.52	4.63	0.89 - 7.08
Benzene	8	.	2.43	0.75	1.86	1.30	1.01	1.53	3.49	0.88 - 7.09
Toluene	8	.	6.38	1.57	5.33	1.25	2.98	5.30	8.31	2.41 - 16.0
Tetrachloroethylene	8	0.70	1.66	0.38	1.23	1.38	0.41	1.92	2.71	0.35 - 2.78
p-Dichlorobenzene	8	0.78	0.56	0.13	0.49	1.21	0.31	0.46	0.68	0.25 - 1.42
Ethylbenzene	8	0.88	0.96	0.28	0.77	1.27	0.45	0.62	1.26	0.39 - 2.76
o-Xylene	8	1.10	1.30	0.40	1.04	1.26	0.65	0.86	1.53	0.55 - 3.97
m,p-Xylene	8	.	3.43	1.04	2.64	1.30	1.42	2.24	4.97	1.20 - 9.78
n-Decane	8	.	2.03	0.24	1.94	1.11	1.70	1.76	2.54	1.29 - 3.38
n-Dodecane	8	1.50	1.17	0.44	0.90	1.26	0.60	0.77	0.92	0.50 - 4.19
n-Octane	8	0.58	0.54	0.12	0.45	1.24	0.26	0.42	0.92	0.20 - 1.08
Methylene chloride	8	.	3.50	1.53	2.05	1.46	0.76	1.87	4.89	0.58 - 13.4

[a]Median quantifiable limit.
[b]Standard error of arithmetic mean.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-72. FIXED SITE DATA AVAILABLE FOR STATISTICAL ANALYSIS BY METHOD

Method	Number of 12-Hour Periods
Canister	11
Tedlar Bag	20
Tenax	9 - 19

TABLE 3-73. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR FIXED SITE ECD/FID CANISTER SAMPLES

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Vinylidene Chloride	11	2.36	2.53	1.07	0.00	0.00	.
Chloroform	11	0.17	0.18	1.07	0.00	0.00	.
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	0	.	.	.	100.	100.	1.00
Trichloroethylene	11	0.16	0.17	1.07	0.00	0.00	.
Tetrachloroethylene	1	0.04	0.04	1.00	90.9	90.9	1.00
Methylene chloride	11	11.2	12.0	1.07	0.00	0.00	.
Vinyl Chloride	11	592.	636.	1.07	0.00	0.00	.
Allyl Chloride	11	26.4	28.3	1.07	0.00	0.00	.
trans-1,2-Dichloroethylene	11	14.4	15.4	1.07	0.00	0.00	.
1,1-Dichloroethane	11	45.2	48.4	1.07	0.00	0.00	.
cis-1,2-Dichloroethylene	11	19.2	20.6	1.07	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-74. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR FIXED SITE MS CANISTER SAMPLES

Compound	Sample Size	Min.[a] Q.L.	Max.[a] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Vinylidene Chloride	9	0.35	0.35	1.00	9.09	18.2	0.50
Chloroform	11	0.45	0.45	1.00	0.00	0.00	.
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Benzene	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	10	0.75	0.75	1.00	9.09	9.09	1.00
Trichloroethylene	11	0.55	0.55	1.00	0.00	0.00	.
Toluene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	9	0.70	0.70	1.00	18.2	18.2	1.00
p-Dichlorobenzene	10	0.50	0.50	1.00	9.09	9.09	1.00
Ethylbenzene	1	0.50	0.50	1.00	81.8	90.9	0.90
o-Xylene	1	0.60	0.60	1.00	90.9	90.9	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	2	0.80	0.80	1.00	81.8	81.8	1.00
n-Dodecane	11	1.00	1.00	1.00	0.00	0.00	.
n-Octane	9	0.40	0.40	1.00	18.2	18.2	1.00
Methylene chloride	0	.	.	.	100.	100.	1.00
Vinyl Chloride	11	0.55	0.55	1.00	0.00	0.00	.

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-75. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR FIXED SITE TEDLAR BAG SAMPLES

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	0	.	.	.	100.	100.	1.00
1,1,1-Trichloroethane	0	.	.	.	100.	100.	1.00
Carbon Tetrachloride	0	.	.	.	100.	100.	1.00
Trichloroethylene	0	.	.	.	100.	100.	1.00
Tetrachloroethylene	0	.	.	.	100.	100.	1.00
1,2-Dibromoethane	5	0.08	0.08	1.00	5.00	75.0	0.07
Methylene chloride	0	.	.	.	100.	100.	1.00

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-76. SUMMARY OF QUANTIFIABLE LIMITS ($\mu g/m^3$) AND PERCENTS MEASURABLE FOR FIXED SITE TENAX SAMPLES

Compound	Sample Size	Min.[a] Q.L.	Max.[b] Q.L.	Ratio of Max. QL to Min. QL	% Above Max. QL	Percent Measurable	Ratio of % Above Max. QL to % Measurable
Chloroform	17	0.52	0.64	1.23	10.5	10.5	1.00
1,2-Dichloroethane	18	0.10	0.16	1.60	5.26	5.26	1.00
1,1,1-Trichloroethane	2	0.28	0.28	1.00	89.5	89.5	1.00
Benzene	3	0.24	0.30	1.25	73.7	84.2	0.88
Carbon Tetrachloride	9	0.40	0.50	1.25	52.6	52.6	1.00
Trichloroethylene	19	0.40	0.52	1.30	0.00	0.00	.
Tetrachloroethylene	2	0.20	0.20	1.00	81.8	81.8	1.00
Chlorobenzene	19	0.12	0.20	1.67	0.00	0.00	.
Styrene	19	0.18	0.40	2.20	0.00	0.00	.
m-Dichlorobenzene	18	0.76	0.92	1.21	0.00	0.00	.
p-Dichlorobenzene	18	0.25	0.52	2.10	0.00	0.00	.
o-Dichlorobenzene	18	0.64	0.80	1.25	0.00	0.00	.
Ethylbenzene	0	.	.	.	100.	100.	1.00
o-Xylene	0	.	.	.	100.	100.	1.00
m,p-Xylene	0	.	.	.	100.	100.	1.00
n-Decane	1	0.12	0.12	1.00	66.7	88.9	0.75
n-Dodecane	15	0.50	0.60	1.20	5.88	11.8	0.50
1,4-Dioxane	19	0.48	0.64	1.33	0.00	0.00	.
1,2-Dibromoethane	19	0.20	0.24	1.20	0.00	0.00	.
n-Octane	16	0.50	0.70	1.40	5.26	15.8	0.33
n-Undecane	13	0.36	0.44	1.22	13.3	13.3	1.00
1,1,2,2-Tetrachloroethane	19	0.48	0.64	1.33	0.00	0.00	.
α-Pinene	19	0.48	0.60	1.25	0.00	0.00	.
Limonene	18	0.44	0.52	1.18	0.00	0.00	.
n-Nonane	10	0.30	0.40	1.33	33.3	44.4	0.75

[a]Minimum quantifiable limit.
[b]Maximum quantifiable limit.

TABLE 3-77. PERCENT MEASURABLE FOR FIXED SITE SAMPLES

Compound	Canister ECD/FID	Canister MS	Tedlar Bag	Tenax
Sample Size Range:	11	11	20	19
Vinylidene Chloride	0.00	18.2	.	.
Chloroform	0.00	0.00	100.	10.5
1,2-Dichloroethane	.	.	.	5.26
1,1,1-Trichloroethane	100.	100.	100.	89.5
Benzene	.	100.	.	84.2
Carbon Tetrachloride	100.	9.09	100.	52.6
Trichloroethylene	0.00	0.00	100.	0.00
Toluene	.	100.	.	.
Tetrachloroethylene	90.9	18.2	100.	81.8
Chlorobenzene	.	.	.	0.00
Styrene	.	.	.	0.00
m-Dichlorobenzene	.	.	.	0.00
p-Dichlorobenzene	.	9.09	.	0.00
o-Dichlorobenzene	.	.	.	0.00
Ethylbenzene	.	90.9	.	100.
o-Xylene	.	90.9	.	100.
m,p-Xylene	.	100.	.	100.
n-Decane	.	81.8	.	88.9
n-Dodecane	.	0.00	.	11.8
1,4-Dioxane	.	.	.	0.00
1,2-Dibromoethane	.	.	75.0	0.00
n-Octane	.	18.2	.	15.8
n-Undecane	.	.	.	13.3
1,1,2,2-Tetrachlorethane	.	.	.	0.00
α-Pinene	.	.	.	0.00
Limonene	.	.	.	0.00
n-Nonane	.	.	.	44.4
Methylene chloride	0.00	100.	100.	.
Vinyl Chloride	0.00	0.00	.	.
Allyl Chloride	0.00	.	.	.
trans-1,2-Dichloroethylene	0.00	.	.	.
1,1-Dichloroethane	0.00	.	.	.
cis-1,2-Dichloroethylene	0.00	.	.	.

TABLE 3-78. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR FIXED SITE ECD/FID CANISTER SAMPLES ($\mu g/m^3$)

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	Range
1,1,1-Trichloroethane	11	.[e]	4.52	1.93	2.89	1.29	1.52	3.36	3.67	19.7	1.14
Carbon Tetrachloride	11	.	1.68	0.11	1.64	1.07	1.46	1.73	1.87	2.25	1.05
Tetrachloroethylene	11	0.04	0.85	0.20	0.57	1.42	0.36	0.79	0.99	2.31	0.03

[a]Median quantifiable limit.
[b]Arithmetic standard error.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-79. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR FIXED SITE MS CANISTER SAMPLES ($\mu g/m^3$)

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	Range
1,1,1-Trichloroethane	11	.[e]	3.83	2.03	2.15	1.31	1.21	1.54	2.68	19.8	1.05
Benzene	11	.	1.92	0.13	1.88	1.07	1.64	1.84	2.27	2.73	1.41
Toluene	11	.	3.84	0.26	3.76	1.07	3.20	3.84	4.24	5.66	2.77
Ethylbenzene	11	0.50	0.69	0.10	0.63	1.14	0.52	0.64	0.77	1.37	0.25
o-Xylene	11	0.60	0.90	0.10	0.84	1.14	0.72	0.85	1.05	1.55	0.30
m,p-Xylene	11	.	2.87	0.30	2.74	1.10	2.20	2.57	3.19	5.07	1.75
n-Decane	11	0.80	1.13	0.13	1.03	1.16	0.88	1.33	1.47	1.56	0.40
Methylene chloride	11	.	1.06	0.19	0.94	1.16	0.65	0.97	1.20	2.53	0.44

[a]Median quantifiable limit.
[b]Arithmetic standard error.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-80. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR FIXED SITE TEDLAR BAG SAMPLES ($\mu g/m^3$)

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	Range
Chloroform	20	.[e]	0.50	0.07	0.41	1.15	0.26	0.49	0.59	1.06	0.11
1,1,1-Trichloroethane	20	.	8.03	1.18	6.15	1.20	3.03	7.64	13.9	15.2	1.47
Carbon Tetrachloride	20	.	0.64	0.05	0.60	1.09	0.46	0.70	0.87	0.88	0.18
Trichloroethylene	20	.	0.64	0.07	0.56	1.13	0.34	0.56	0.79	1.20	0.20
Tetrachloroethylene	20	.	2.92	0.43	2.21	1.21	1.10	2.87	4.51	5.81	0.47
1,2-Dibromoethane	20	0.08	0.03	0.01	0.03	1.14	0.02	0.02	0.04	0.04	0.01
Methylene chloride	20	.	2.70	0.66	1.70	1.24	0.65	1.60	3.73	7.40	0.45

[a]Median quantifiable limit.
[b]Arithmetic standard error.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-81. SUMMARY STATISTICS FOR SELECTED COMPOUNDS FOR FIXED SITE TENAX SAMPLES ($\mu g/m^3$)

Compound	Sample Size	Mid[a] Q.L.	Arith. Mean	Arith.[b] S.E.	Geo.[c] Mean	Geo.[d] S.E.	Percentiles 25th	Median	75th	90th	Range
1,1,1-Trichloroethane	19	0.28	2.97	0.51	1.70	1.42	1.05	2.86	4.21	7.05	0.03
Benzene	19	0.28	2.22	0.44	1.01	1.47	0.28	2.50	3.31	5.19	0.03
Carbon Tetrachloride	19	0.50	0.65	0.08	0.54	1.15	0.31	0.59	1.05	1.13	0.25
Tetrachloroethylene	11	0.20	0.32	0.04	0.30	1.15	0.28	0.33	0.42	0.54	0.12
Ethylbenzene	19	.[e]	0.87	0.10	0.78	1.11	0.61	0.73	1.04	1.76	0.31
o-Xylene	19	.	0.96	0.10	0.88	1.10	0.64	0.83	1.18	1.83	0.43
m,p-Xylene	19	.	4.07	0.48	3.63	1.21	3.05	3.39	5.20	8.26	1.16
n-Decane	9	0.12	0.17	0.03	0.13	1.34	0.11	0.20	0.24	0.24	0.01
n-Nonane	18	0.40	0.32	0.05	0.24	1.24	0.23	0.25	0.48	0.72	0.04

[a]Median quantifiable limit.
[b]Arithmetic standard error.
[c]Geometric mean.
[d]Standard error of geometric mean.
[e]100 percent measurable.

TABLE 3-82. SUMMARY STATISTICS FOR CVS FOR FIXED SITE SAMPLES

Compound	Sample Size	Average CV	Median CV	Minimum CV	Maximum CV
ECD/FID AND MS CANISTER					
1,1,1-Trichloroethane	11	21.7	21.1	1.49	53.8
Carbon Tetrachloride	1	11.8	11.8	11.8	11.8
Tetrachloroethylene	2	24.1	24.1	20.7	27.4
ECD/FID CANISTER AND TEDLAR BAG					
1,1,1-Trichloroethane	11	59.6	67.3	6.17	110.
Carbon Tetrachloride	11	62.3	55.4	31.7	96.5
Tetrachloroethylene	10	72.9	90.5	14.3	129.
ECD/FID CANISTER AND TENAX					
1,1,1-Trichloroethane	10	45.0	41.5	7.63	111.
Carbon Tetrachloride	6	30.2	22.2	0.00	69.5
Tetrachloroethylene	5	43.1	36.3	10.9	75.1
MS CANISTER AND TEDLAR BAG					
1,1,1-Trichloroethane	11	71.8	80.3	26.2	120.
Carbon Tetrachloride	1	89.8	89.8	89.8	89.8
Tetrachloroethylene	2	87.4	87.4	66.2	109.
Methylene chloride	11	54.7	49.7	3.51	132.
MS CANISTER AND TENAX					
1,1,1-Trichloroethane	10	56.1	58.7	8.33	111.
Benzene	10	51.7	41.2	13.6	96.4
Ethylbenzene	9	18.1	3.33	0.01	73.5
o-Xylene	9	23.6	17.8	6.14	58.0
m,p-Xylene	10	28.1	23.1	1.36	74.3
n-Decane	3	99.4	104.	80.8	113.
TEDLAR BAG AND TENAX					
Chloroform	2	63.6	63.6	4.60	123.
1,1,1-Trichloroethane	17	60.4	72.3	3.59	118.
Carbon Tetrachloride	10	24.0	24.2	2.31	49.0
Tetrachloroethylene	9	79.1	84.3	30.0	121.

TABLE 3-83. SUMMARY STATISTICS FOR RATIO OF FIXED SITE SAMPLES

Compound	Sample Size	Mean Ratio	Median Ratio	Minimum Ratio	Maximum Ratio
ECD/FID TO MS CANISTER					
1,1,1-Trichloroethane	11	1.39	1.35	0.94	2.23
Carbon Tetrachloride	1	1.18	1.18	1.18	1.18
Tetrachloroethylene	2	1.41	1.41	1.34	1.48
ECD/FID CANISTER TO TEDLAR BAG					
1,1,1-Trichloroethane	11	0.58	0.35	0.12	1.66
Carbon Tetrachloride	11	2.90	2.29	1.58	5.30
Tetrachloroethylene	10	0.41	0.22	0.04	1.22
ECD/FID CANISTER TO TENAX					
1,1,1-Trichloroethane	10	1.71	0.69	0.42	8.22
Carbon Tetrachloride	6	1.69	1.37	1.00	2.93
Tetrachloroethylene	5	2.10	1.69	1.17	3.27
MS CANISTER TO TEDLAR BAG					
1,1,1-Trichloroethane	11	0.45	0.28	0.08	1.69
Carbon Tetrachloride	1	4.48	4.48	4.48	4.48
Tetrachloroethylene	2	0.25	0.25	0.13	0.36
Methylene chloride	11	0.89	0.93	0.04	2.36
MS CANISTER TO TENAX					
1,1,1-Trichloroethane	10	1.48	0.57	0.29	8.39
Benzene	10	1.70	0.58	0.50	5.29
Ethylbenzene	9	0.88	0.98	0.32	1.27
o-Xylene	9	1.11	1.18	0.42	1.65
m,p-Xylene	10	0.77	0.72	0.31	1.25
n-Decane	3	6.43	6.55	3.67	9.09
TEDLAR BAG TO TENAX					
Chloroform	2	0.50	0.50	0.07	0.94
1,1,1-Trichloroethane	17	3.19	3.09	0.50	11.4
Carbon Tetrachloride	10	0.83	0.76	0.49	1.49
Tetrachloroethylene	9	5.02	3.95	1.54	12.9

TABLE 3-84. SUMMARY STATISTICS FOR CVS FOR OUTDOOR AND FIXED SITE SAMPLES

Compound	Sample Size	Average CV	Median CV	Minimum CV	Maximum CV
ECD/FID CANISTER					
1,1,1-Trichloroethane	11	50.4	50.8	0.00	108.
Carbon Tetrachloride	11	31.8	12.3	4.31	119.
Tetrachloroethylene	7	33.7	25.7	13.3	82.8
MS CANISTER					
1,1,1-Trichloroethane	13	50.7	42.7	6.26	109.
Benzene	13	37.4	37.7	0.86	83.1
Toluene	13	38.0	34.6	0.79	85.3
Tetrachloroethylene	3	40.9	30.9	26.1	65.8
p-Dichlorobenzene	2	24.6	24.6	21.4	27.7
Ethylbenzene	9	39.9	20.5	4.95	105.
o-Xylene	11	40.0	40.4	0.86	115.
m,p-Xylene	13	42.4	41.8	1.30	86.4
n-Decane	10	37.1	26.1	9.43	132.
n-Octane	2	7.71	7.71	1.55	13.9
Methylene chloride	13	42.9	29.2	1.40	125.
TENAX					
Chloroform	2	37.3	37.3	3.28	71.3
1,1,1-Trichloroethane	57	49.6	40.1	3.49	115.
Benzene	52	50.4	41.9	0.56	120.
Carbon Tetrachloride	30	18.4	17.3	0.78	60.9
Tetrachloroethylene	21	72.8	76.4	8.97	115.
Ethylbenzene	65	48.8	45.6	2.88	104.
o-Xylene	64	59.4	62.0	1.14	117.
m,p-Xylene	65	50.0	46.2	0.01	108.
n-Decane	12	94.2	102.	51.8	129.
n-Octane	5	27.3	22.3	4.04	55.3
n-Undecane	2	20.0	20.0	19.2	20.8
n-Nonane	16	36.3	30.3	2.86	77.7

TABLE 3-85. SUMMARY STATISTICS FOR RATIO OF FIXED SITE TO OUTDOOR SAMPLES

Compound	Sample Size	Mean Ratio	Median Ratio	Minimum Ratio	Maximum Ratio
ECD/FID CANISTER					
1,1,1-Trichloroethane	11	0.73	0.58	0.13	2.12
Carbon Tetrachloride	11	0.91	0.92	0.09	2.06
Tetrachloroethylene	7	0.97	1.21	0.26	1.46
MS CANISTER					
1,1,1-Trichloroethane	13	1.09	0.55	0.13	6.94
Benzene	13	1.12	0.95	0.26	2.90
Toluene	13	0.85	0.75	0.25	1.68
Tetrachloroethylene	3	0.56	0.64	0.36	0.69
p-Dichlorobenzene	2	0.70	0.70	0.67	0.74
Ethylbenzene	9	0.66	0.75	0.15	1.10
o-Xylene	11	0.92	0.85	0.10	2.44
m,p-Xylene	13	1.12	0.81	0.24	4.08
n-Decane	10	0.77	0.75	0.04	1.44
n-Octane	2	0.92	0.92	0.82	1.02
Methylene chloride	13	0.62	0.66	0.06	1.03
TENAX					
Chloroform	2	0.64	0.64	0.33	0.95
1,1,1-Trichloroethane	57	0.90	0.63	0.10	4.86
Benzene	52	0.92	0.67	0.08	4.90
Carbon Tetrachloride	30	1.23	1.17	0.70	2.51
Tetrachloroethylene	21	0.35	0.30	0.10	0.88
Ethylbenzene	65	0.86	0.54	0.15	6.63
o-Xylene	64	0.60	0.40	0.10	4.69
m,p-Xylene	65	0.98	0.61	0.16	7.59
n-Decane	12	0.21	0.16	0.05	0.46
n-Octane	5	0.72	0.73	0.44	1.06
n-Undecane	2	1.33	1.33	1.31	1.34
n-Nonane	16	0.68	0.65	0.29	1.27

TABLE 3-86. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON OVERNIGHT KITCHEN CONCENTRATIONS FOR SELECTED COMPOUNDS - SUMMER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	34	2,740	1,360	-8,560	43,300
Benzene	34	630	369	-3,440	8,280
Carbon Tetrachloride	24	17.3	28.7	-456	382
Tetrachloroethylene	19	253	159	-1,580	1,990
Styrene	12	1,010	839	-147	10,200
p-Dichlorobenzene	9	3,090	1,780	-1,020	14,900
Ethylbenzene	34	449	182	-1,250	5,330
m,p-Xylene	34	1,900	795	-6,440	22,200
n-Octane	23	826	182	-36.9	3,640
n-Undecane	12	6,270	3,590	-17.2	43,400
Limonene	1				
n-Nonane	23	854	233	-183	4,580

TABLE 3-87. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON DAYTIME KITCHEN CONCENTRATIONS FOR SELECTED COMPOUNDS - SUMMER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	36	20,900	17,200	-820	620,000
Benzene	35	988	462	-10,800	6,280
Carbon Tetrachloride	20	123	86.2	-278	1,420
Tetrachloroethylene	28	540	219	-2,020	3,620
Styrene	8	410	197	-336	1,300
p-Dichlorobenzene	8	22,800	20,600	-270	167,000
Ethylbenzene	33	512	439	-10,100	9,120
m,p-Xylene	33	2,080	1,760	-42,800	33,000
n-Octane	19	1,390	201	-112	2,870
n-Undecane	10	2,810	1,540	180	15,700
Limonene	1				
n-Nonane	26	1,600	410	-331	9,070

TABLE 3-88. SUMMARY STATISTICS (μg/hr) FOR WHOLE HOUSE SOURCE STRENGTHS BASED ON DAYTIME LIVING AREA CONCENTRATIONS FOR SELECTED COMPOUNDS - SUMMER SEASON

Compound	Sample Size	Mean	Std. Error	Minimum	Maximum
1,1,1-Trichloroethane	38	4,700	1,410	-821	40,700
Benzene	37	2,210	1,090	-12,700	36,800
Carbon Tetrachloride	25	32.4	53.2	-575	621
Tetrachloroethylene	31	283	197	-3,020	3,560
Styrene	9	1,510	1,150	-688	10,500
p-Dichlorobenzene	10	24,300	16,200	11.0	162,000
Ethylbenzene	37	673	422	-11,500	7,810
m,p-Xylene	37	3,000	1,800	-47,500	32,800
n-Octane	22	2,010	736	-126	17,000
n-Undecane	11	6,760	5,030	-255	56,200
Limonene	1				
n-Nonane	26	1,290	294	-25.0	7,330

TABLE 3-89. MEANS AND STANDARD ERRORS FOR SMOKERS AND NONSMOKERS BY MEDIA FOR SELECTED COMPOUNDS -- SUMMER SEASON

		Smokers			Nonsmokers		
Media	Compound	Sample Size	Mean	Std. Error	Sample Size	Mean	Std. Error
Overnight Personal Air	1,1,1-Trichloroethane	10	10.3	2.27	30	10.3	1.87
	Benzene	10	6.96	1.20	30	7.16	1.18
	Tetrachloroethylene	6	2.72	1.26	24	6.13	3.95
	p-Dichlorobenzene	10	51.7	31.8	29	4.89	1.62
	Ethylbenzene	10	2.39	0.26	30	2.99	0.49
	m,p-Xylene	10	10.4	1.12	30	12.8	2.13
	n-Octane	10	4.52	2.11	27	2.64	0.28
Daytime Personal Air	1,1,1-Trichloroethane	10	10.6	3.20	30	57.6	29.5
	Benzene	10	8.71	2.16	30	15.4	4.01
	Tetrachloroethylene	8	3.63	1.07	19	28.8	24.8
	p-Dichlorobenzene	9	6.64	3.77	30	4.03	1.37
	Ethylbenzene	10	4.19	0.85	30	14.4	6.56
	m,p-Xylene	10	17.2	3.48	30	49.2	19.7
	n-Octane	10	10.5	6.32	28	4.65	1.23

(continued)

TABLE 3-89. (continued)

Media	Compound	Smokers			Nonsmokers		
		Sample Size	Mean	Std. Error	Sample Size	Mean	Std. Error
Daytime Living Area	1,1,1-Trichloroethane	9	25.6	12.5	31	11.5	2.22
	Benzene	9	5.46	1.18	31	6.83	1.05
	Tetrachloroethylene	7	3.09	0.81	30	2.67	0.27
	p-Dichlorobenzene	8	21.4	18.9	31	3.51	1.55
	Ethylbenzene	9	2.58	0.49	31	3.04	0.54
	m,p-Xylene	9	10.7	1.97	31	12.7	2.28
	n-Octane	8	3.44	0.56	31	3.11	0.33
Overnight Kitchen	1,1,1-Trichloroethane	8	10.1	2.05	29	13.9	2.96
	Benzene	8	10.4	4.81	29	5.47	0.89
	Tetrachloroethylene	5	1.96	0.55	28	1.65	0.25
	p-Dichlorobenzene	7	4.46	2.21	27	3.88	1.46
	Ethylbenzene	8	2.88	0.24	29	3.07	0.59
	m,p-Xylene	8	12.6	0.80	29	13.1	2.55
	n-Octane	6	4.85	2.25	29	3.04	0.42
Daytime Kitchen	1,1,1-Trichloroethane	9	13.2	4.62	29	20.1	10.1
	Benzene	9	7.07	2.81	29	5.01	0.53
	Tetrachloroethylene	9	2.85	0.75	26	2.79	0.29
	p-Dichlorobenzene	9	19.3	17.2	27	2.23	0.55
	Ethylbenzene	9	2.79	0.70	27	2.37	0.36
	m,p-Xylene	9	11.8	2.93	27	9.86	1.42
	n-Octane	9	3.58	1.15	26	2.97	0.25

[a]Means significantly different at .05 level.

TABLE 3-90. COMPARISON OF PERCENT MEASURABLE VALUES FOR OVERNIGHT PERSONAL AIR TENAX SAMPLES

Compound	% Measurable				
	Contra Costa (1984)	Los Angeles (1984)		Los Angeles (1987)	
	Summer	Winter	Summer	Winter	Summer
Chloroform	48	99	80	63	25
1,2-Dichloroethane	30	65	11	82	26
1,1,1-Trichloroethane	100	99	-	98	100
Benzene	99	100	99	100	100
Carbon tetrachloride	94	95	99	81	57
Trichloroethylene	62	91	59	51	36
Tetrachloroethylene	97	100	99	98	87
Styrene	89	95	80	95	86
m-Dichlorobenzene	-	-	-	14	0
p-Dichlorobenzene	75	97	87	95	77
Ethylbenzene	100	100	97	98	100
o-Xylene	100	100	97	98	100
m,p-Xylene	100	100	100	98	100
n-Decane	79	90	62	98	85
n-Dodecane	63	96	30	88	78
1,4-Dioxane	22	55	12	19	2
1,2-Dibromoethane	2	4	4	0	0
n-Octane	94	99	92	95	97
n-Undecane	88	99	63	98	78
α-Pinene	85	98	92	98	87
Limonene	-	-	-	95	97
n-Nonane	-	-	-	98	97

TABLE 3-91. COMPARISON OF PERCENT MEASURABLE VALUES FOR DAYTIME PERSONAL AIR TENAX SAMPLES

Compound	% Measurable				
	Contra Costa (1984)	Los Angeles (1984)		Los Angeles (1987)	
	Summer	Winter	Summer	Winter	Summer
Chloroform	34	95	59	42	45
1,2-Dichloroethane	26	67	23	60	21
1,1,1-Trichloroethane	100	100	100	100	100
Benzene	100	100	100	100	100
Carbon tetrachloride	96	98	99	87	73
Trichloroethylene	72	92	66	52	41
Tetrachloroethylene	100	100	99	100	96
Styrene	91	98	85	96	89
m-Dichlorobenzene	-	-	-	0	3
p-Dichlorobenzene	74	96	83	93	77
Ethylbenzene	100	100	97	100	100
o-Xylene	100	99	96	98	100
m,p-Xylene	98	100	100	98	100
n-Decane	82	96	81	91	95
n-Dodecane	77	95	45	96	67
1,4-Dioxane	25	48	19	22	5
1,2-Dibromoethane	1	4	0	2	0
n-Octane	96	98	93	100	95
n-Undecane	87	99	74	98	82
α-Pinene	70	88	86	87	69
Limonene	-	-	-	96	97
n-Nonane	97	-	-	96	100

TABLE 3-92. COMPARISON OF PERCENT MEASURABLE VALUES FOR OVERNIGHT OUTDOOR TENAX SAMPLES

Compound	% Measurable				
	Contra Costa (1984)	Los Angeles (1984)		Los Angeles (1987)	
	Summer	Winter	Summer	Winter	Summer
Chloroform	79	94	31	17	22
1,2-Dichloroethane	0	60	0	52	17
1,1,1-Trichloroethane	100	100	100	100	100
Benzene	100	100	100	98	100
Carbon tetrachloride	95	97	100	91	82
Trichloroethylene	8	97	14	15	2
Tetrachloroethylene	60	97	100	100	80
Styrene	56	100	84	87	37
m-Dichlorobenzene	-	-	-	4	0
p-Dichlorobenzene	37	100	77	84	44
Ethylbenzene	71	96	100	100	100
o-Xylene	89	100	100	100	100
m,p-Xylene	100	100	100	100	100
n-Decane	100	93	44	100	63
n-Dodecane	0	93	31	56	3
1,4-Dioxane	18	69	21	13	0
1,2-Dibromoethane	0	0	13	2	0
n-Octane	30	94	67	96	87
n-Undecane	11	97	48	95	49
α-Pinene	13	93	47	58	18
Limonene	-	-	-	87	10
n-Nonane	-	-	-	98	92

TABLE 3-93. COMPARISON OF PERCENT MEASURABLE VALUES FOR DAYTIME OUTDOOR TENAX SAMPLES

Compound	% Measurable				
	Contra Costa (1984)	Los Angeles (1984)		Los Angeles (1987)	
	Summer	Winter	Summer	Winter	Summer
Chloroform	19	78	31	24	26
1,2-Dichloroethane	0	16	5	37	0
1,1,1-Trichloroethane	96	100	100	100	100
Benzene	100	100	100	100	100
Carbon tetrachloride	96	100	100	83	69
Trichloroethylene	8	87	4	8	0
Tetrachloroethylene	58	100	100	100	85
Styrene	56	92	94	61	24
m-Dichlorobenzene	-	-	-	2	0
p-Dichlorobenzene	0	89	71	54	26
Ethylbenzene	66	100	100	100	97
o-Xylene	70	100	100	100	97
m,p-Xylene	100	100	100	100	100
n-Decane	92	96	46	100	56
n-Dodecane	0	79	38	22	5
1,4-Dioxane	5	28	17	2	0
1,2-Dibromoethane	0	0	0	0	0
n-Octane	32	97	59	100	63
n-Undecane	8	96	51	90	38
α-Pinene	0	62	57	22	8
Limonene	-	-	-	49	3
n-Nonane	-	-	-	100	78

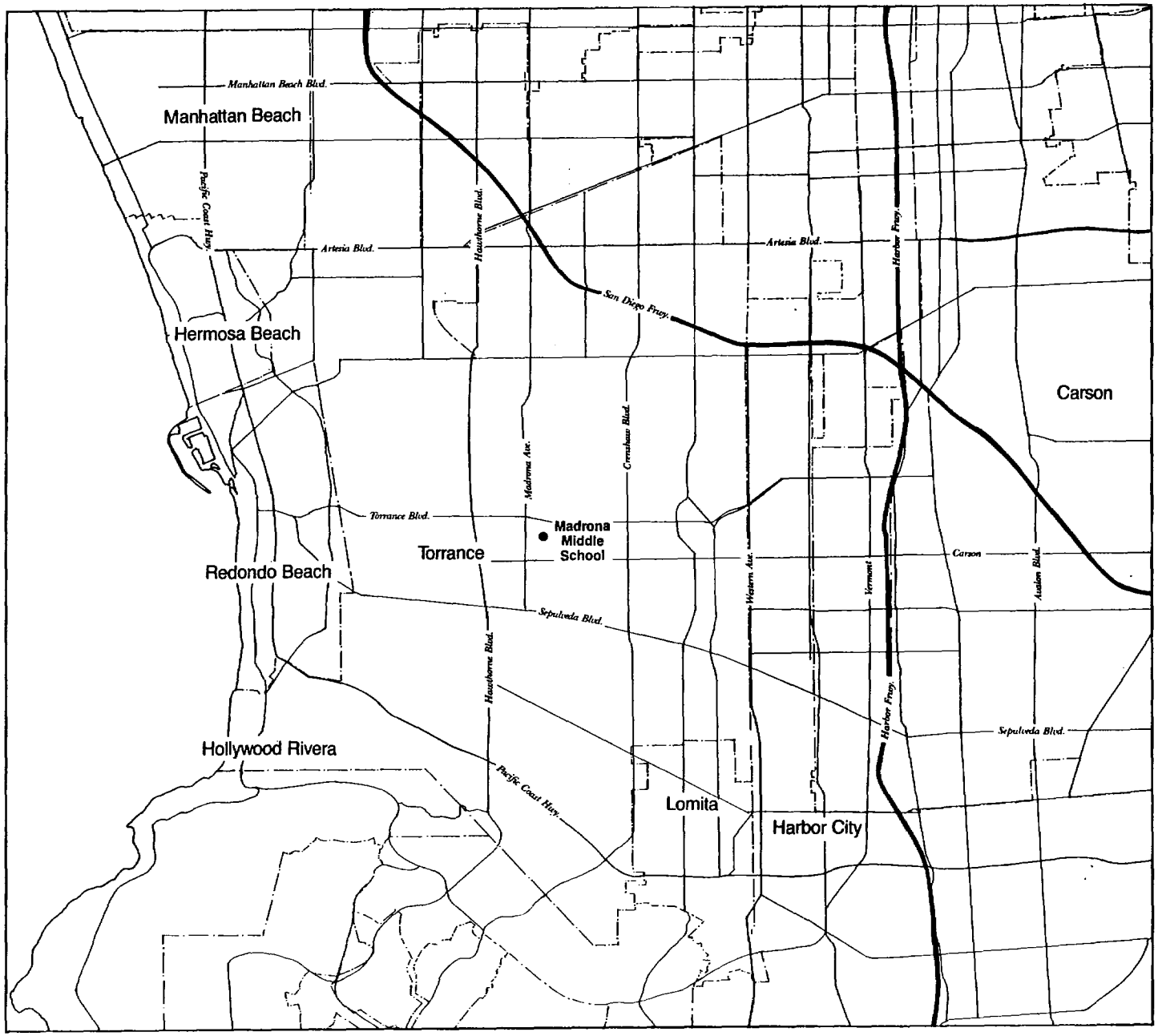

Figure 3-1. Study area in Los Angeles County, CA; Central fixed-site indicated.

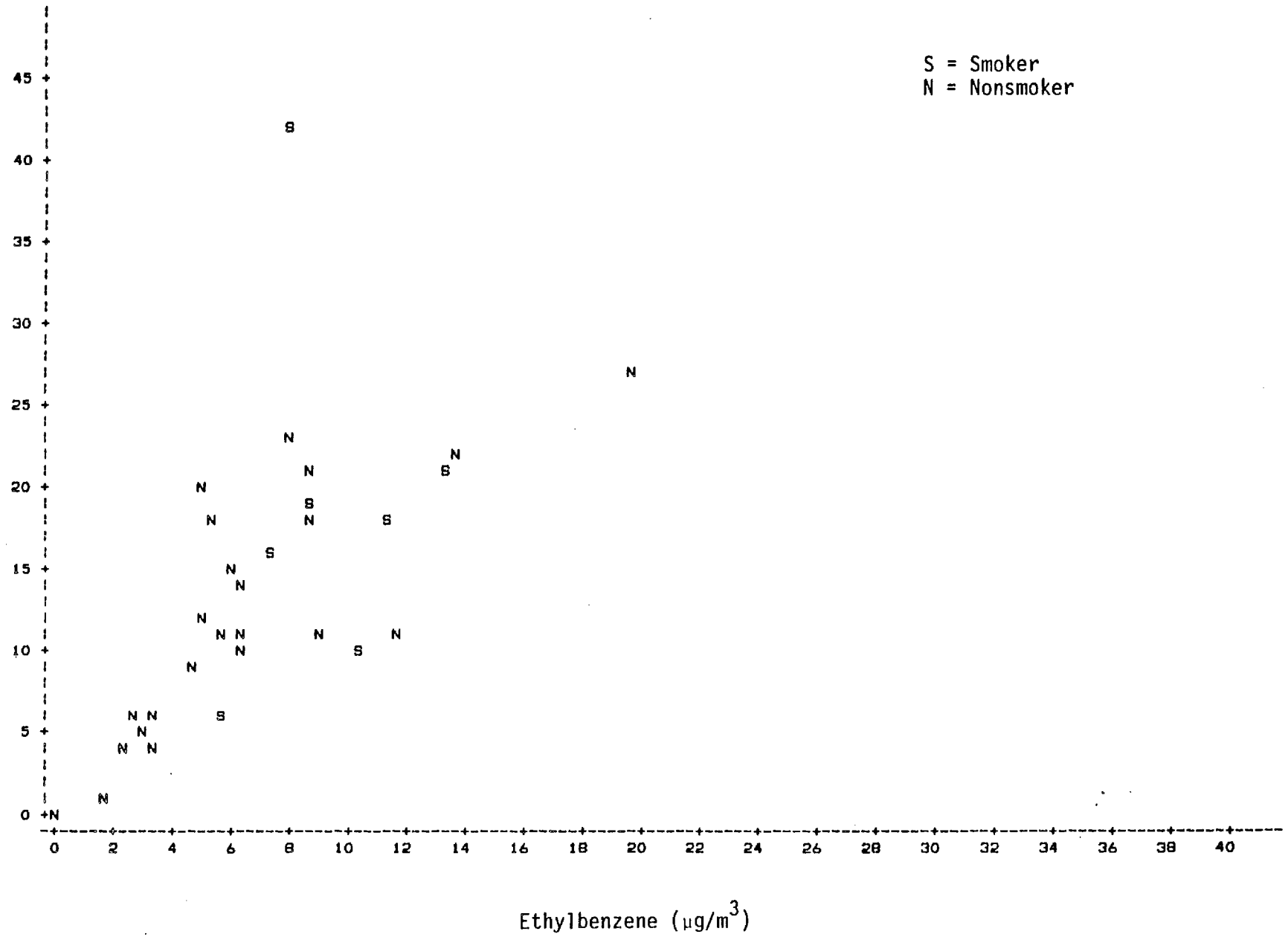

Figure 3-2. Regression of benzene versus ethylbenzene concentrations in overnight air - winter season.

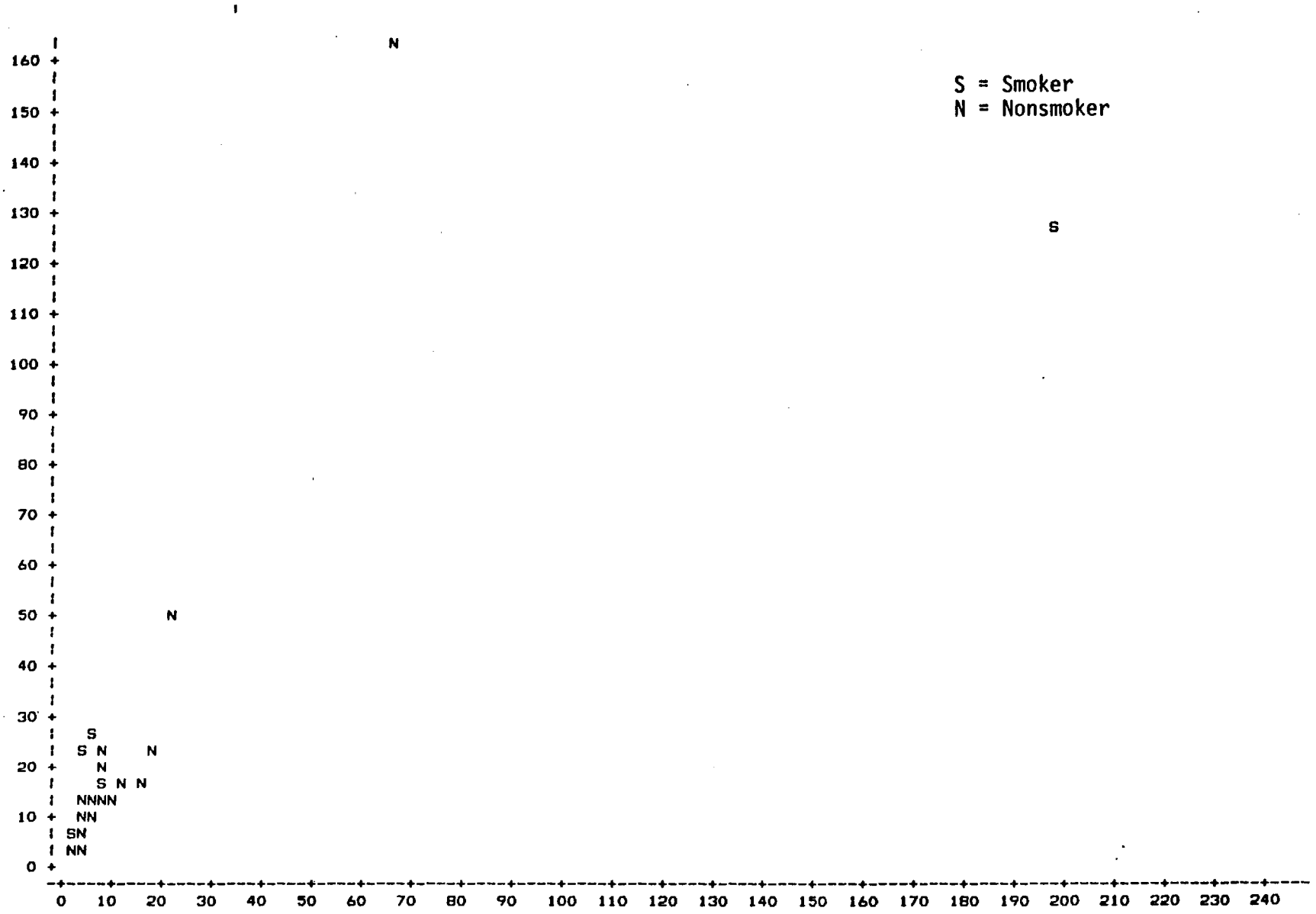

Figure 3-3. Regression of benzene versus ethylbenzene concentrations in daytime personal air - winter season.

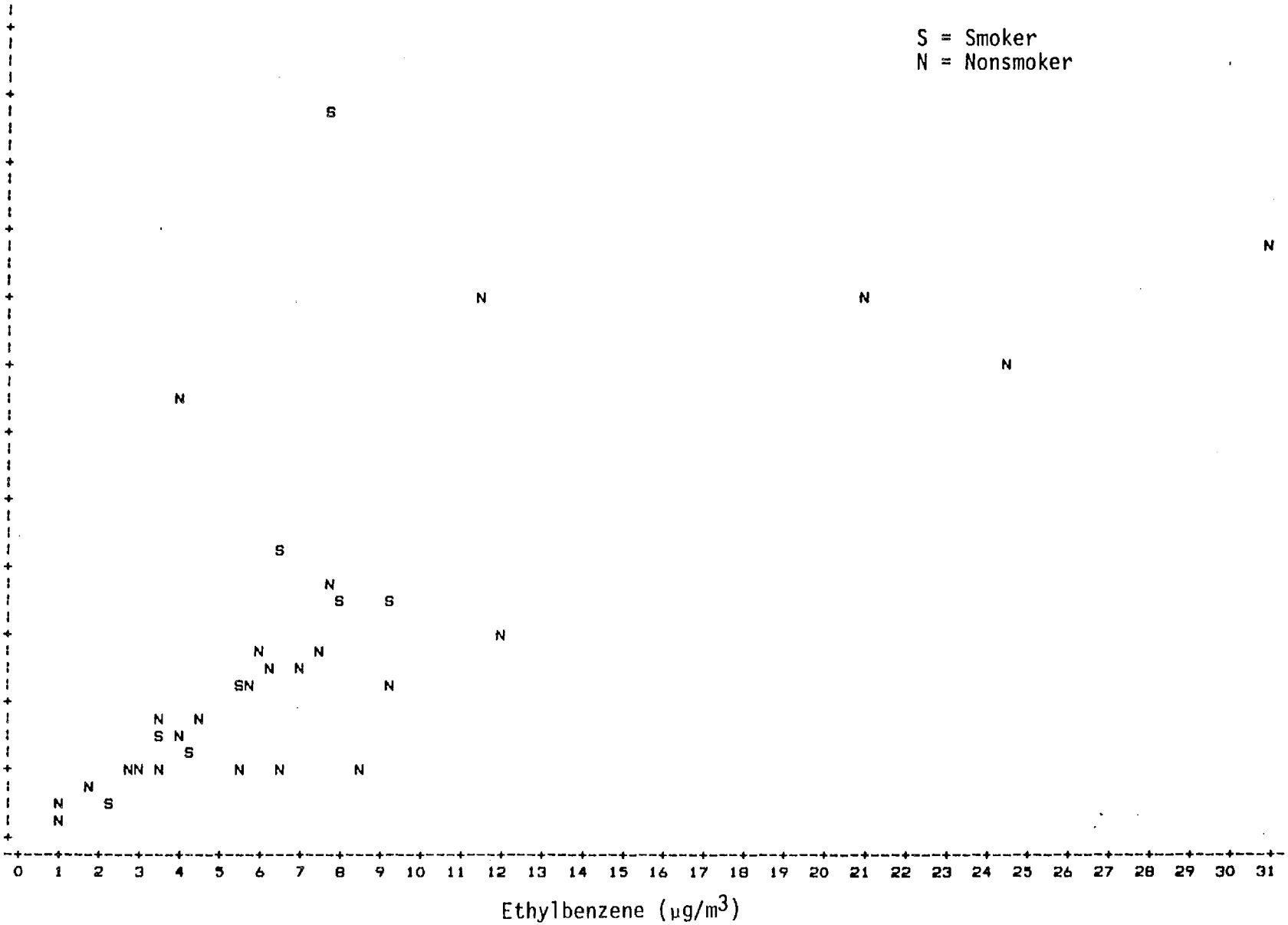

Figure 3-4. Regression of benzene versus ethylbenzene concentrations in overnight kitchen air-winter season

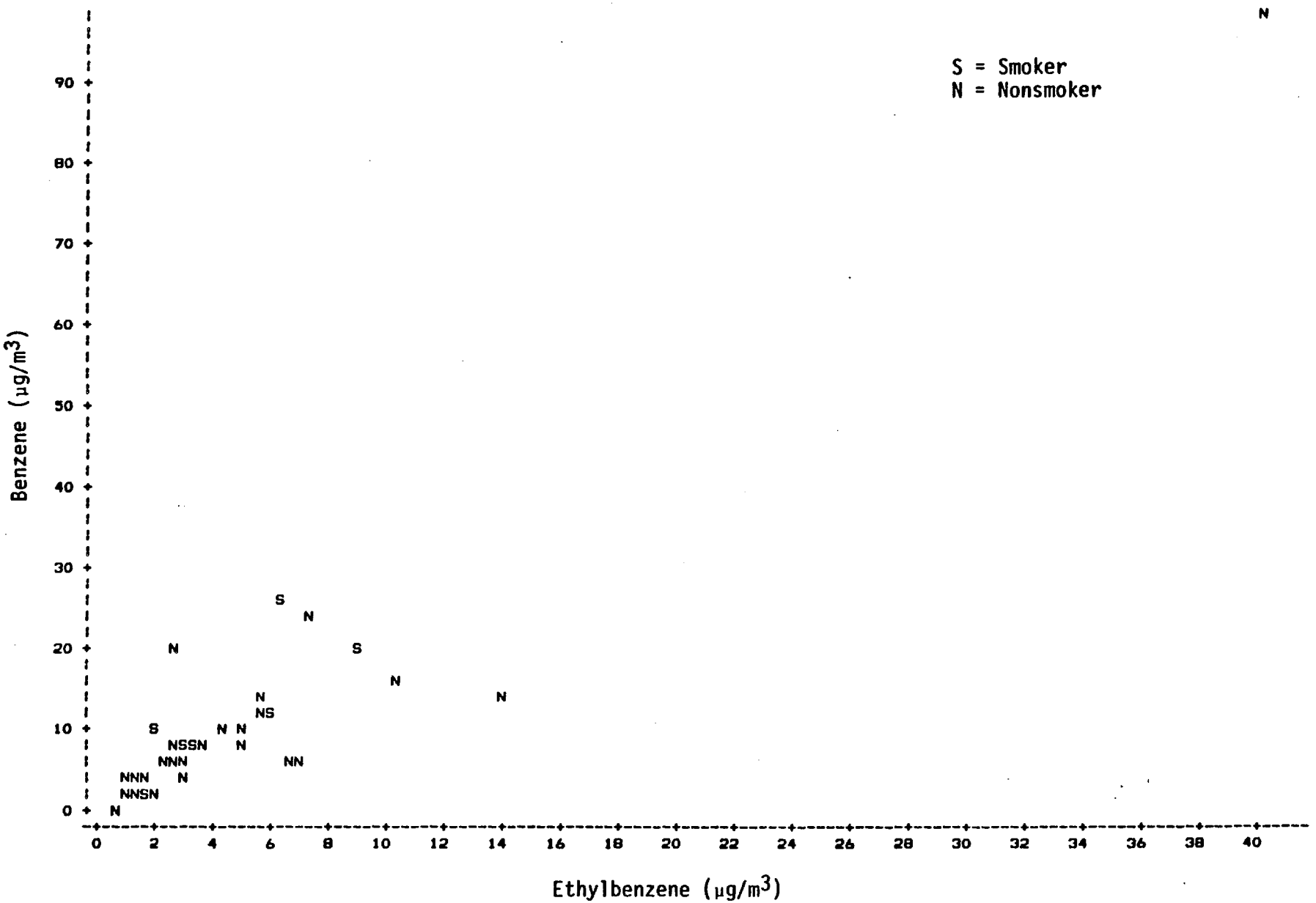

Figure 3-5. Regression of benzene versus ethylbenzene concentrations in daytime kitchen air - winter season.

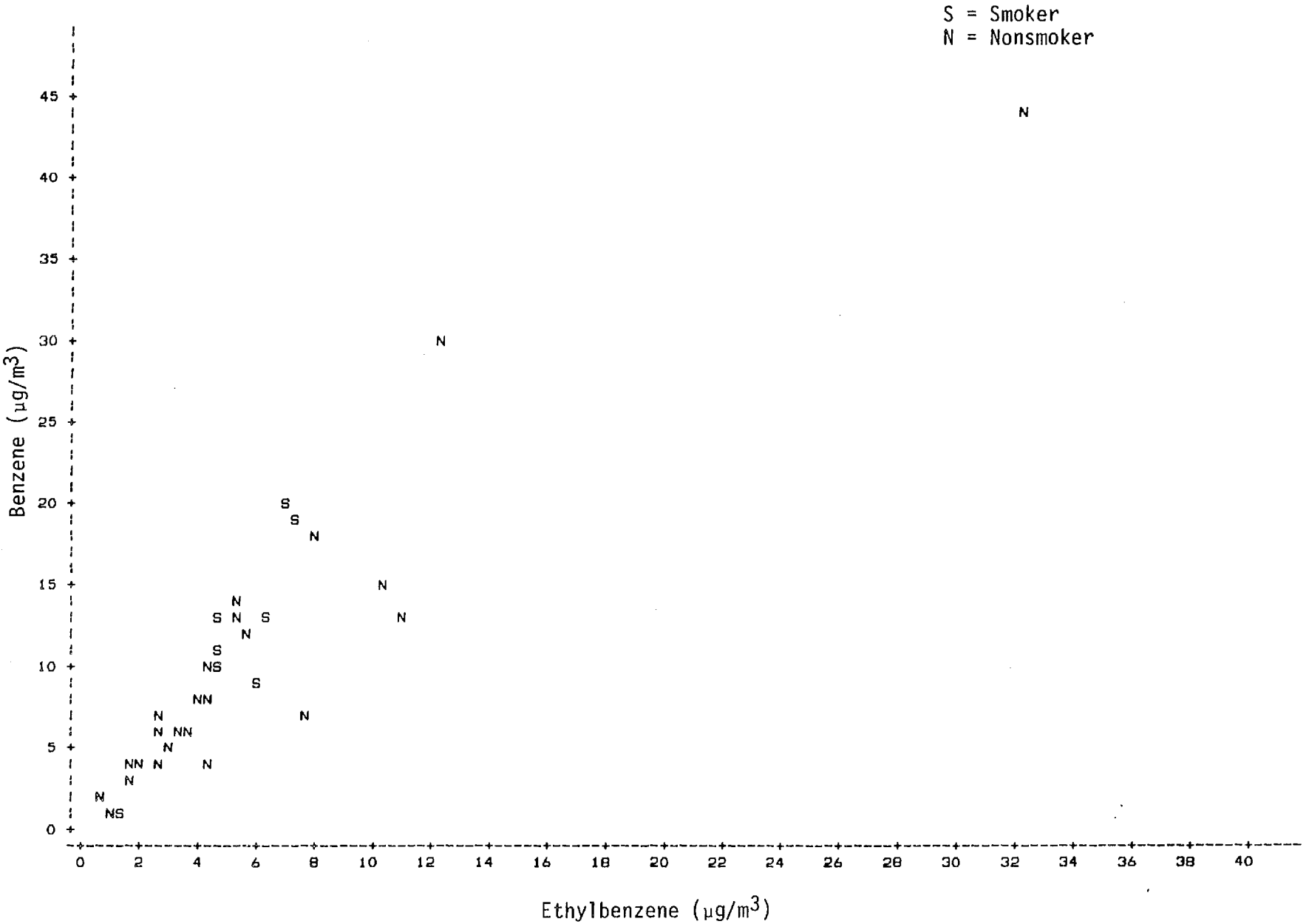

Figure 3-6. Regression of benzene versus ethylbenzene concentrations in daytime living area air-winter season.