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A STUDY OF INDOOR AIR QUALITY

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A STUDY OF INDOOR AIR QUALITY

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ABSTRACT

This report describes the results of a three-phase study to investigate the indoor generation of air pollutants. Both field and laboratory measurements of nitrogen dioxide (NO_2), nitric oxide (NO), and carbon monoxide (CO) were made to evaluate the contribution of gas stoves to indoor pollutant levels. An inventory of significant sources of indoor air contaminants was also made.

In the field program, four private residences with gas stoves were selected for monitoring during the spring and fall of 1973. A two-week measurement period at each residence for each season was utilized. Measurements of the three pollutants were made at three indoor locations, the kitchen, living room and bedroom as well as outdoors.

In order to sample at all four locations simultaneously and yet conserve equipment and manpower, TRC designed and built a measurement system that enabled the use of a single analyzer for NO_2 and NO and a second analyzer for CO. An electronic timer, solenoid valves and continuously purged teflon sampling lines were used to permit the analysis of sample streams from each location in rapid sequence.

The laboratory program was designed to evaluate the mass emissions from both old and new stoves and also a small unvented space heater. The effectiveness of vented and unvented kitchen hoods in removing gaseous pollutants was also evaluated. A variety of stove operating modes were evaluated in order to establish a relationship between operating conditions and pollutant levels.

Two of the homes in the field program were surveyed to determine all significant indoor sources of contaminants. Information from these two in-depth surveys was used in surveying a broad range of TRC employees regarding contaminant generating activities.

The results of this program show the concentrations of NO_2, NO, and CO to which the occupants of residences are exposed, the variation of pollutant concentrations within a structure, the relative magnitude of indoor generated pollutants and outdoor pollutants which penetrate a structure, the influence of stove operations upon the generation of pollutant quantities, and the relative importance of contaminant sources other than gas appliances.

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INTRODUCTION

The Research Corporation of New England (TRC) carried out a study of indoor/outdoor air quality relationships for the forerunner of EPA, The National Air Pollution Control Administration (Contract CPA-22-69-14). The results of this study were published in the technical literature [(1),(2)] and showed that indoor air quality is a complex function of outdoor pollutant concentrations, building permeability, meteorological conditions, ventilation system design and indoor generation of pollutants. While more work is needed in establishing the specific effect of each of these factors on indoor air quality, the one factor of those listed which is least understood and which will assume greater importance as outdoor air quality improves, is indoor generation of air contaminants.

In 1972, a conference was held at South Berwick, Maine on the subject of improving indoor air quality.[(3)] The meeting brought together a wide range of scientists, engineers, and physicians concerned with the subject. The meeting showed the complexity and high degree of interest in the entire subject of indoor air quality. While indoor air quality in general appears to be dominated to a great degree by outdoor air pollution, the indoor/outdoor relationship is also a complex function of building permeability, type of ventilation system, meteorological conditions and internal generation. An especially important outcome of the meeting was the indication that internal

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(1) Yocom, J.E., W.L. Clink, and W.A. Coté, "Indoor/Outdoor Air Quality Relationships", APCA Journal, Vol. 21, 5, pp. 251-59, May 1971

(2) Yocom, J.E., W.A. Coté, W.L. Clink, "Measurement of Air Pollution Penetration into Building Interiors", Presented at 17th Annual ISA Analysis Instrumentation Symposium, April 19-21, Houston, Tex., published In the Proceedings: "Analysis Instrumentation", Vol. 9-ISA, Pittsburg, Pa.

(3) "Improving Indoor Air Quality", Engineering Foundation Conference Berwick Academy, South Berwick, Maine, August 13-18, 1972.

generation of pollutants is a more critical aspect of the problem than was heretofore suspected. Gas stoves were implicated repeatedly as to their potential emissions of CO, hydrocarbons, NO_x, odorous materials and unspecified compounds that one doctor felt were responsible for adverse reactions on some of his highly sensitive patients.

TRC's earlier indoor/outdoor work[(1)] for EPA demonstrated that unvented gas stoves can indeed contribute measurable quantities of CO to the indoor atmosphere and our sampling methods were able to track the travel of CO from this source to other parts of the house. However, the scope of this work did not include the measurement of other pollutants. The objective of the present EPA sponsored program is to investigate further the indoor generation of air pollutants in private residences. This effort has been organized into three major tasks as follows:

Task 1 - Laboratory Investigation

Task 2 - Field Studies

Task 3 - Inventory of Indoor Sources

This report summarizes the entire program. Following this general introduction, we present the Summary, Conclusions and Recommendations for the entire program. Then, in sequence, we present reports of each of the three tasks. Since these tasks represent discrete efforts within the overall program, we present them essentially as self-contained reports but with cross references to other tasks where appropriate.

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(1) See page 1

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

TRC has completed a 15-month research program on indoor air quality. The program was carried out in three tasks which are briefly summarized as follows:

1. Task 1 - Laboratory Study

   The objective of this task was to measure emmissions of NO, NO_2, and CO from normally used and operated gas stoves and unvented space heaters in relation to several stove and heater operating variables. Emissions from the gas appliances as well as emissions as modified by ventilating hoods were determined in a laboratory study. A brief survey of stove and heater designs was made to select representative models for testing. A completely enclosed laboratory structure was constructed for the evaluation of emissions from the appliance on a mass basis. Operating variables evaluated included air-fuel ratios, flame intensity, time and temperature and use of pilot lights.

2. Task 2 - Field Studies

   Measurements for NO_2, NO and CO were made continuously over 2-week periods in 4 homes with gas stoves in the Hartford, Connecticut area. Separate field measurement programs were carried out during the spring-summer of 1973 and fall-winter of 1973-1974.

   Sampling was carried out by means of a TRC-designed system which utilized single instruments to obtain data on a 5-minute sequential basis from four sampling points. Three of the sampling points were located indoors (one or two locations in the kitchen and either the living room or bedroom) while one monitored outdoor concentrations.

Data on stove use was recorded by the homeowner to permit comparisons of indoor air quality with stove use.

3. Task 3 - Inventory of Indoor Sources

A two-phase study to identify indoor sources was carried out. Initially, two of the houses used for the Task 2 effort were used as a basis for cataloging sources of potential indoor emissions. We determined that there are many sources of indoor air contamination which take many forms based on practices within each household.

One of the most widespread source categories within the home is the dispersal of household products in aerosol form. We carried out a survey of TRC employees to develop use patterns of aerosol products and to estimate the effect of such use on indoor air quality.

CONCLUSIONS

From the results of the work performed, we draw the following conclusions:

1. Combustion products from gas stoves degrade indoor air quality -- especially in terms of NO_2, NO, and CO. In several cases, levels of indoor NO_2 and CO could exceed the air quality standards for these pollutants if such outdoor standards were to be applied indoors.

2. Propellant dispersed aerosols also have a significant but widely variable impact on indoor air quality. While concentrations of propellants are estimated to be below the Threshold Limit Values (TLV's) for these materials, special circumstances may cause these levels to be exceeded on occasion.

3. The half-life of indoor concentrations of CO, an unreactive gas, was found to be 2.1 hr. NO is also relatively unreactive in the indoor atmosphere with a half-life of 1.8 hr. NO_2, on the other hand, showed a half-life in the same home of 0.6 hr. We conclude that NO_2 is lost through reaction, absorption and adsorption.

4. The ratios of NO_2 to NO produced by gas stoves varied somewhat, but there was some tendency to produce slightly more NO than NO_2.

5. Pilot lights on gas stoves produce a measureable amount of NO, NO_2, and CO during inactive stove use periods.

6. Outdoor air quality has a significant effect on indoor air quality, particularly in the warmer months when the house is relatively permeable.

7. Highest indoor concentrations of stove-generated pollutants occurred in the winter when the house was tightly closed.

8. Gas stoves and to a lesser extent unvented space heaters generate significant quantities of NO, NO_2, and CO as determined in our laboratory study. Some difference in emission levels were observed for older and newer stoves, but these are not directly attributable to age or design differences. Amounts of pollutants generated are directly related to the number of burners in operation and the amount of gas being consumed.

9. Vented stove hoods are moderately effective in removing gaseous pollutants but recirculating hoods are not effective.

RECOMMENDATIONS

The work performed has shown the need for further work in further defining indoor air quality, sources of indoor contamination, and the impact of indoor air quality on occupants of indoor spaces. We believe further work in the following areas is needed:

1. Further analysis and evaluation is needed of the data developed from this program. Task 2 of this program generated a large body of valuable data on the indoor/outdoor patterns of air quality in several different types of houses with gas stoves. While the data and their evaluation presented show clearly the magnitude of the influence of gas stoves on indoor air quality, further analysis of the data of the type listed below would put these evaluations in more precise perspective.

   a. Extrapolate the data obtained in this program to provide an estimate of total exposure to NO_2 and CO for the occupants of houses tested. This would involve the development of typical occupancy patterns for individuals and patterns of travel, activity and occupation together with outdoor ambient air quality data from this program and the State of Connecticut, and judgments based upon TRC's previous work and literature sources on what regimes of exposure could be expected for different occupations and within different types of enclosures.

   b. Utilize the existing data to develop preliminary models of the indoor concentrations in terms of indoor sources (stove use), design of house, relative permeability of the house, outdoor concentrations, and meteorological factors (temperature, wind direction and speed, etc.).

   c. Make a detailed analysis of indoor NO_2 and CO patterns in Houses 1, 3 and 4 to corroborate the shorter half life of NO_2 as opposed to CO as was determined in the diffusion experiment at House No. 2.

2. Further definition and quantification of indoor sources is needed. More detailed inventories together with well designed field measurement programs should be carried out. Highest priorities should be given to such common household activities as cleaning, smoking, cooking and use of aerosol products.

3. Epidemiological studies should be made of the possible effects on the occupants of homes of the wide range of materials present in the indoor air. These should be carried out simultaneously with programs to identify sources, likely contaminants, and field programs to measure indoor air quality.

4. In the diffusion studies, we determined that NO_2 from gas stoves disappears 3 times as fast as NO. Research should be carried out to determine what happens to NO_2. One possible route which has strong health implications is the formation of nitrate or nitrite aerosol in the highly humid kitchen atmosphere. A study to establish the ultimate disposition of NO_2 in the indoor atmosphere should be carried out.

5. The indoor/outdoor relationships for nitrate and sulfate aerosol and their precursors NO_x and SO_2 should be developed particularly in view of the formation of NO_2 and NO by gas appliances.

6. Air quality standards are based on outdoor concentrations, but epidemiological data supporting these standards undoubtedly include the integrated exposure to both indoor and outdoor air pollutants. Since people spend most of their time indoors, studies should be designed to establish true human exposure (both indoors and outdoors) to air pollutants.

7. Indoor/outdoor air quality studies need to be carried out on a broader base. There is a need for studies in different types of structures located in different types of communities. At the same time there is a need for carrying out such work in sufficient depth to permit statistical evaluation of the data, in order to verify the findings of initial surveys conducted to date.

8. Instrumentation is needed which can reliably operate on a continuous basis over longer periods of time to permit increased data recovery.

TASK 1

LABORATORY INVESTIGATIONS

1.0 INTRODUCTION

As part of The Research Corporation of New England's study of sources of indoor air pollution, Task 1 was planned to investigate emissions characteristics of gas appliances in a laboratory environment. Task 1 was developed in response to the lack of information available for pollutant emissions from gas appliances and their relationship to operating conditions.

TRC evaluated emissions from two gas stoves, an old and a new model, and an unvented space heater. Emission levels from the gas stoves were measured for the following types of operation:

1. pilot lights
2. burners
3. oven and broiler

The effects of flame intensity, air-fuel mixture, number of burners in use, and utensils were determined in this laboratory test program.

The oven and broiler emissions were evaluated under transient and steady-state operating conditions. In addition to these evaluations, we determined the effects of recirculating and vented hoods on the characteristics of pollutant emissions for gas stoves.

We measured nitric oxide (NO), nitrogen dioxide (NO_2), and carbon monoxide (CO) emissions from the gas appliances under the different operating conditions. These measurements were made with sequential sampling equipment in an enclosure built to isolate the appliances during the tests. We found through contact with the local gas utility that the sulfur content of the odorant in the natural gas was very low, 0.21 μg/kcal. Measurement of SO_2 with available monitoring equipment would not have yielded reliable results and therefore was not performed.

2.0 SUMMARY AND CONCLUSIONS

A brief summary of the results from Task 1 is presented in Table 2-1. Emission measurements are presented for an older and newer gas stove and an unvented space heater. For comparison, the emissions from a domestic gas furnace are also included in Table 2-1.

Pilot light NO and NO_2 emissions from the newer stove were less and CO emissions higher than those from the older stove. The newer stove also has a pilot light designed to use less gas than the older stove.

Tests designed to evaluate the effect of air-fuel mixture upon burner operation indicated that the best blue luminous flame was produced at an intermediate air shutter opening for each stove. Variation in the shutter opening had little effect on the pollutant emissions for the older stove but had a greater effect on the newer stove. The intermediate air shutter opening (best flame) also had the highest oxides of nitrogen levels for the newer stove.

Evaluation of the number of burners in use and their flame intensity showed that the emissions are similar for all conditions when adjusted to an equivalent heat input basis. Oven and broiler emissions are somewhat less than those for the burners on the same heat input basis. An exception was the large amount of CO from the oven of the newer stove.

Total pollutant emissions per unit of time from a gas stove are roughly proportional to the number and type of burners used and the period of use.

The unvented space heater had lower emissions than the stoves with the exception of NO at high flame and CO at low flame conditions.

Vented stove hoods could capture and exhaust about 40 to 50 percent of the pollutants generated by the stove depending upon the fan speed used. Our tests could not detect any removal of gaseous pollutants by a recirculating hood with a charcoal filter.

TABLE 2-1

SUMMARY OF POLLUTANT EMISSIONS
OF GAS APPLIANCES FOR SEVERAL TYPICAL
OPERATING CONDITIONS

Appliance	Operation	Heat Input Rate (Kcal/Hr)	Pollutant Emission Factors (μg/Kcal)			Pollutant Emission Rates mg/Hr		
			NO	NO_2	CO	NO	NO_2	CO
Older Gas Stove with cast Iron Burners	Pilot Lights	150	45.3	54.6	419	6.8	8.2	62.9
	1 Burner - High Flame	2700	92.6	51.8	382	250	140	1031
	3 Burners - High Flame	6780	117.0	72.8	475	793	494	3220
	Oven-Steady-state	2200	91.4	73.1	530	201	161	1166
Newer Gas Stove with Pressed steel burners	Pilot Lights	100	4.7	18.6	842	0.5	1.9	84.2
	1 Burner-High Flame	3500	130.0	79.0	510	455	277	1785
	3 Burners-High Flame	10200	138.0	65.6	315	1408	669	3213
	Oven-Steady-state	2200	77.9	50.4	1620	171	111	3564
Unvented Space Heater	Low Flame-Steady-state	2800	76.4	46.4	632	214	130	1770
	High Flame-Steady-state	6200	135.0	43.8	319	837	272	1978
Domestic Gas Furnace*	------	Approx. 30,000	NO_x@NO_2: 90.0		36	Approx. 2700		1080

* Compilation of Air Pollution Emission Factors (Revised), U.S. Environmental Protection Agency, February, 1972.

From the laboratory study, we conclude that:

1. Gas stoves emit significant quantities of oxides of nitrogen and carbon monoxides in the following ranges depending upon stove operation:

   NO = 90 - 130 μg/Kcal, 200-1000 mg/Hr

   NO_2 = 50 - 80 μg/Kcal, 100-500 mg/Hr

   CO = 400 - 1000 μg/Kcal, 1000-4000 mg/Hr

2. In our tests, pollutant emissions from the newer stove were not consistently higher or lower than the older stove for the range of operations evaluated. The oven of the newer stove did emit about three times more CO than the older stove oven.

3. The different designs of the burners for the two stoves did not appear to have consistent and reproducible effects upon pollutant emissions.

4. Pilot lights, although using gas at a small rate, do contribute quantities of pollutants comparable to those generated during cooking operations over a typical 24-hour period because of their continuous nature.

5. Vented stove hoods are moderately effective in removing gaseous pollutants but recirculating hoods are ineffective in removing pollutants.

6. An unvented space heater has pollutant emissions in the following ranges depending upon operation:

   NO = 80 - 130 μg/Kcal, 200-800 mg/Hr

   NO_2 = 40 - 50 μg/Kcal, 100-300 mg/Hr

   CO = 300 - 600 μg/Kcal, 1000-2000 mg/Hr

   These emissions are less than that for a gas stove, however, total emissions could be greater if the heater were used continuously.

3.0 DESCRIPTIONS AND PROCEDURES

3.1 Appliance Selection

A preliminary survey was conducted to determine the different types of stoves, hoods, & space heaters available for residential use. Design features that could possibly affect pollutant emissions fall into two major categories, heat input rate and burner construction. Maximum heat input rates for range top burners are split evenly between 2300 Kcal/hr and 3000 Kcal/Hr. Oven and broiler heat input rates vary from 3000 Kcal/hr to 6300 Kcal/hr. Burner construction is divided into four major categories:

1. Steel tube (venturi) with ports or slots
2. Infrared type
3. Cast iron with drilled ports
4. Pressed steel with formed ports

The latter two are predominant with most modern gas stoves having the pressed steel burners and older stoves the cast iron burners. We chose one stove from each of these latter two categories for the laboratory study.

Space heaters, not in general use in the Northeast, are available in several different configurations. They have single or multi-port cast iron burners and are vented to either the living space or outdoors. The heating medium is either hot air, steam or hot water. The Project Officer supplied us with a multi-ported, unvented, hot air space heater for the task.

Range top hoods are available in many different sizes and either recirculate indoor air or exhaust to the outside. For this study, we selected a representative hood for each category, one recirculating and one vented. Table 3-1 summarizes the characteristics of the applicances selected for this test program.

TABLE 3-1

CHARACTERISTICS OF THE GAS APPLIANCES AND HOODS

Appliance	Age	Description	Nominal Rated Capacity	
New Gas Stove	5 Years	4 pressed steel burners, 3 pilot lights	Burners: Each: 3000 Kcal/Hr	Oven/Broiler 5500 Kcal/Hr
Old Gas Stove	Approx. 20 Years	4 cast iron burners, 3 pilot lights	Burners: Each Small: 2550 Kcal/Hr Large: 3000 Kcal/Hr	Oven/Broiler 3550 Kcal/Hr
Unvented Space Heater	Approx. 15 Years	Cast iron multi-port burner, hot air, manual ignition	6700 Kcal/Hr	
Recirculating Hood	New	2 speed fan 930 CM^2 Inlet Area	Rated Fan Capacity 4.2 M^3/MIN	
Vented Hood	New	3 speed fan 1677 CM^2 Inlet Area	8.4 M^3/MIN	

3.1.1 Newer Gas Stove

This five year old gas stove was purchased used and has four pressed steel burners. Each burner is rated at 3000 Kcal/hr. There are two pilot lights for the burners and broiler. The oven, with a capacity of 5500 Kcal/hr, has its own pilot light and has a volume of approximately 98,300 CM^3. It was chosen as representative of one of the two major types of gas stoves available and in common use. Air-to-fuel ratios are controlled at each of the burners by shutters.

3.1.2 Older Gas Stove

This stove is approximately twenty years old and has four cast iron burners with two pilot lights. Another pilot light is located near the oven and broiler. The broiler and over are separate compartments of 23,600 CM^3 and 65,600 CM^3, respectively. This appliance represents the second major category of gas stove in use in residential structures. There are two small burners and two larger ones having individual rated capacities of 2550 and 3000 Kcal/hr, respectively. The oven has a 3550 Kcal/hr capacity.

3.1.3 Recirculating-Type Range Hood

This hood, which is the most commonly used in modern residences, has a two-speed fan that draws a maximum of 4.2 cu.m/min. Air from above the stove passes through a 930 square centimeter aluminum grease filter and activated charcoal unit. The exhaust from this hood is discharged directly into the kitchen space.

3.1.4 Vented Range Hood

This second type of hood made by the same manufacturer as the recirculating type used in this study has a greater exhaust capacity. The three-speed fan draws a maximum of 8.4 cu.m/min through a 1677 cm^2 aluminum grease filter and exhausts this air through a .15 meter diameter sheet metal duct to the outside.

3.1.5 Space Heater

The space heater which was supplied by the Project Officer, was an unvented hot air system with a multi-port cast iron burner. This fifteen-year old space heater has neither a pilot light nor an air-fuel adjustment device. Combustion air was provided to the 12 finned burners by aspiration. It has a maximum heat input of 6700 Kcal/hr.

3.2 Procedures

3.2.1 Laboratory Test Enclosure

Figure 3-1 shows the laboratory test enclosure and sampling system built specifically for this study. The test enclosure was designed and built to isolate the stoves, hoods and space heater from external influences and to allow us to monitor the generation of pollutants in a convenient manner.

The test room enclosed 8.0 cubic meters, 2.4 meters long and 1.4 meters wide, and was 2.4 meters high. One door and two sealed windows were installed to allow access to and observation of the stoves in the test chamber. The sheet rock walls were covered with a non-adsorbent epoxy base paint and all openings were sealed with silicone weatherstripping. The air intake for the test enclosure was a .2 meter diameter duct. Control of the intake air was achieved by a variable guillotine damper placed in the inlet duct.

Ventilation of the test enclosure was provided with a 8.4 m^3/Min fan placed in the .2 meter room outlet duct in the ceiling.

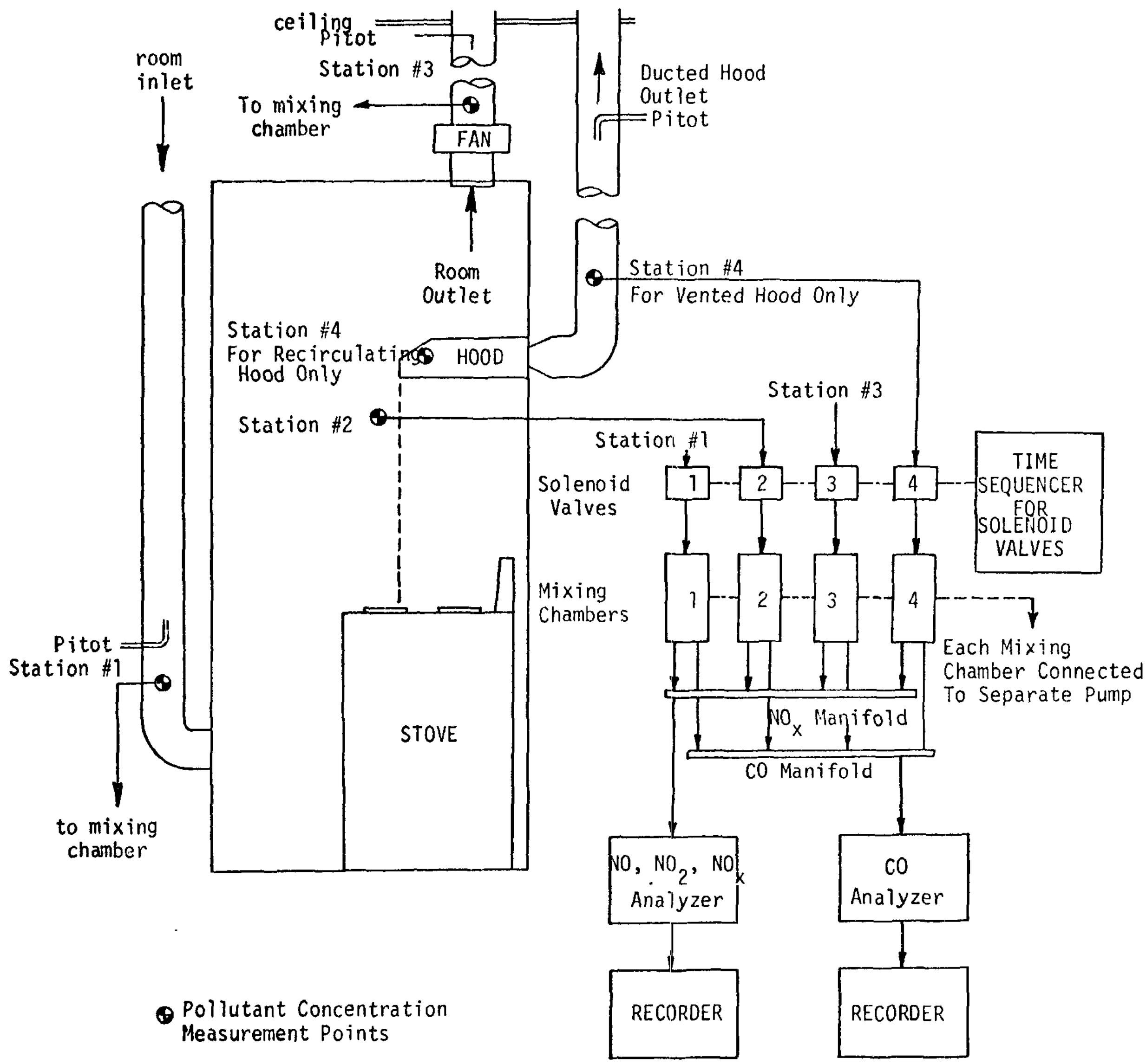

Figure 3-1: Testing Room and Equipment Arrangement

A .15 meter diameter exhaust outlet for the vented hood was placed in the back wall of the test enclosure. Air flow through the inlet and outlet was measured by standard type pitot tubes and inclined manometers.

3.2.2 Measurement System

In order to measure pollutant concentrations at multiple locations and yet conserve the amount of instrumentation and manpower required to obtain this data, TRC designed and built a unique measurement system as shown in Figure 3-2. The major components of the system are four continuously purged sampling lines with an integrating chamber, solenoid valves, Bendix Chemiluminescent NO/NO_x Analyzer, Intertech Non-Dispersive Infrared Carbon Monoxide Analyzer, carbon monoxide and NO/NO_2 Calibration Systems, strip chart recorders and electronic sequencer. The system design acknowledged the need for:

1. Continuous, uninterrupted operation with only periodic service
2. Frequent automatic and manual calibration checks.

As shown schematically in Figure 3-2, the sample stream from each of the four locations is piped to a central location through 15 meters of 4.8 mm I.D. Teflon tubing at a rate of approximately 9.5 LPM. This is equivalent to a retention time of approximately 2 seconds. Each sample stream is then drawn through an individual 500 ml glass integrating chamber, through a diaphram pump and then vented. This arrangement provides continuous purging of the sampling lines.

From the integrating chamber two small streams are drawn, one to the Bendix Chemiluminescent NO/NO_x analyzer and the other to the Intertech NDIR CO analyzer. Solenoid valves (normally closed) on each sample line are energized by the electronic sequencer at five minute intervals with

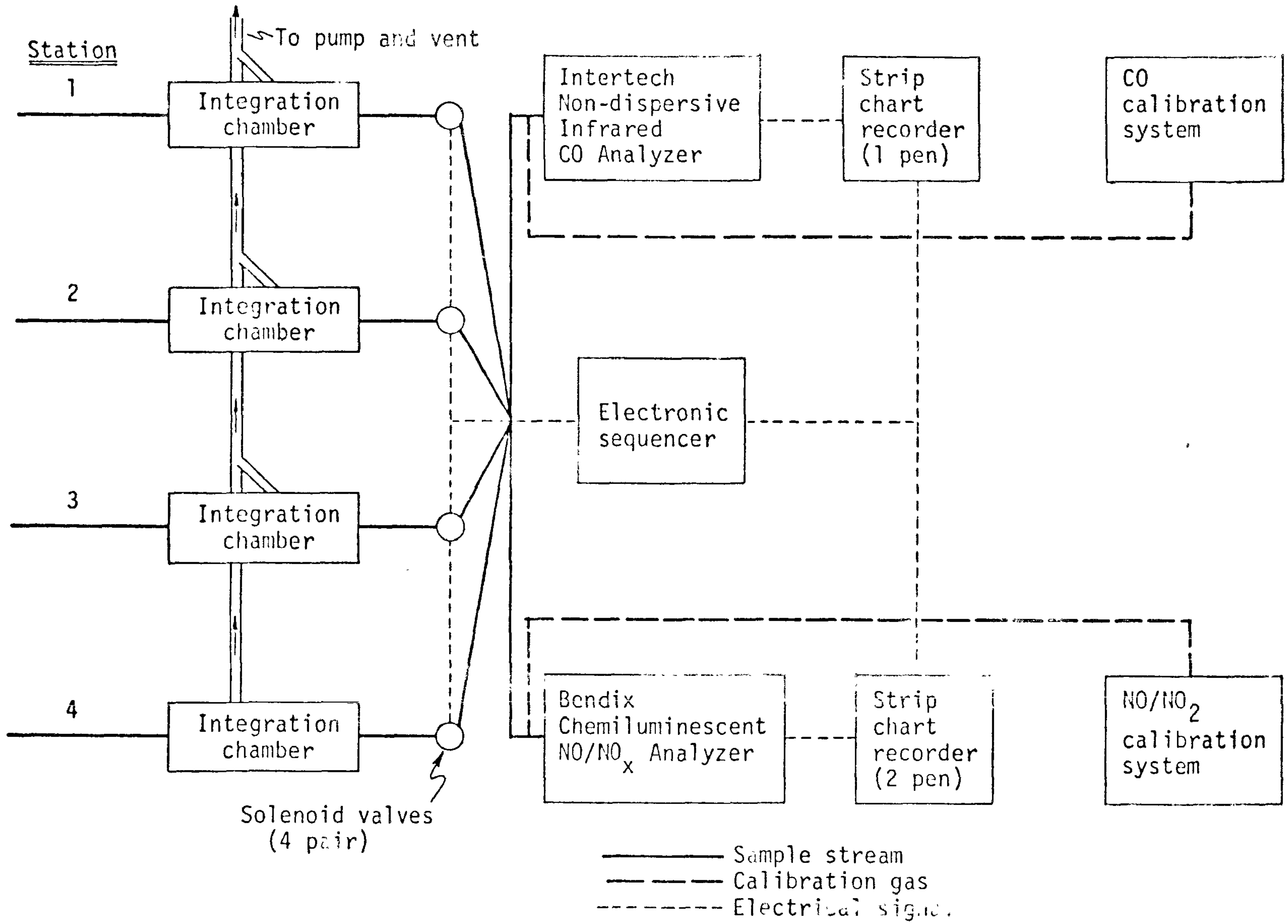

FIGURE 3-2

NO, NO_2, and CO Sampling and Measurement System each station having its sample being drawn to the detectors once every twenty minutes. The two solenoid valves that allow samples to be drawn to the CO analyzer and the NO/NO_2 detector from the integration chamber are kept in phase so that the sample stream from each station is being analyzed simultaneously for CO and NO/NO_2. A two pen recorder was used for the NO and NO_2 output of the chemiluminescent analyzer and a separate single pen unit for recording the CO output.

An additional function of the electronic sequencer was to mark the beginning of each 20-minute sampling cycle. This was accomplished by creating a vertical slash on each strip chart immediately before the analysis of the Station 1 sample stream for the three pollutants of interest. This sampling and measurement system is the same as the one used for the Task 2 field measurements.

3.2.3 Calibration Procedures

Calibration of the Bendix Chemiluminescent NO/NO_2 Analyzer was accomplished with a dynamic dilution module. This module was provided by the Environmental Protection Agency and is described schematically in Figure 3-3. A wide range of concentrations of NO and NO_2 can be generated by this unit for calibrating the NO/NO_2 analyzer. Bottled NO calibration gas with a guaranteed concentration of 95.1 ppm and purified room air were used to produce the various nitric oxide concentrations. Nitrogen dioxide can be produced in different concentrations by the use of the ozone generator that is part of the calibration module.

The procedures used to calibrate the Bendix Chemiluminescent NO/NO_2 Analyzer were provided by the EPA and are identical to those used in Task 2. A copy of the procedures can be found in Appendix A.

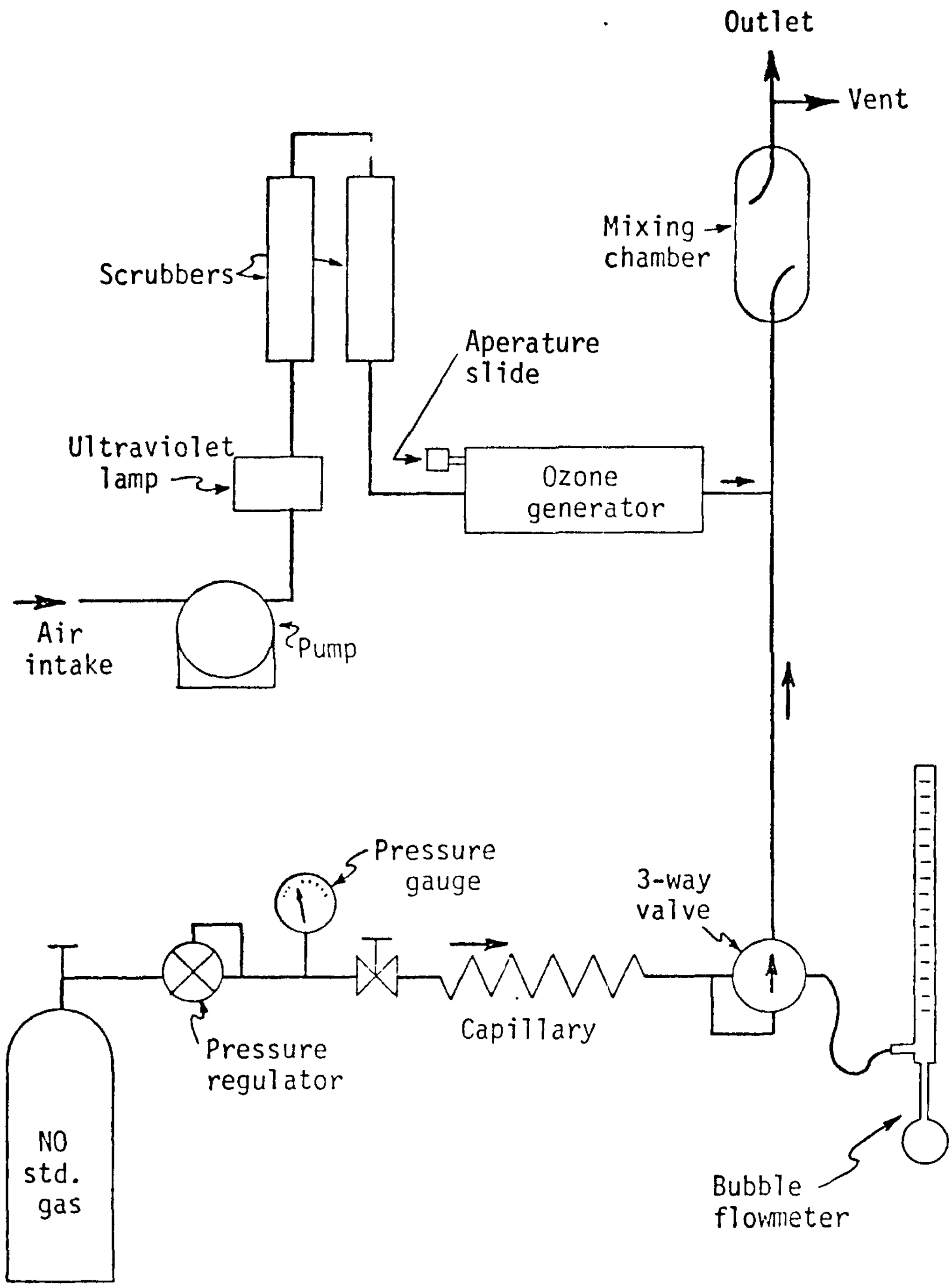

FIGURE 3-3

NO - NO_2 Calibration System

The calibration of the non-dispersive infrared (NDIR) carbon monoxide analyzer was accomplished with zero gas and 13.0 ppm (14,950 $\mu g/m^3$) CO calibration gas. Zero gas was introduced into the detector cell to establish the zero baseline of the device. Calibration gas was then used to determine the span, or chart displacement, of a known concentration of carbon monoxide. Finally, the zero gas was re-introduced to ensure the baseline stability.

3.2.4 Sampling Locations

To determine the generation and behavior of the pollutants from the gas appliances with and without the hoods in operation, we chose the four sampling locations within the test structure as follows:

Station 1: Test enclosure air inlet

Station 2: Above the gas appliance - approximately 1.7 meters above the floor

Station 3: Test enclosure air outlet directly downstream of the sealed fan unit.

Station 4: Recirculating hood outlet or in outlet duct from vented hood.

Station 1 pollutant measurements were used to establish the baseline, or background, levels in the air entering the test structure during the experiments. Initial comparisons of measured inlet and outlet air volumes showed the presence of sufficient leakage, 10% to 50%, to disallow the conversion of the inlet concentrations to a mass basis. The concentration of the air entering the structure through all openings was assumed to have a pollutant concentration as measured in the inlet duct.

Station 2 was placed in the breathing zone directly above the stove. This location was chosen to provide data that would be representative of concentrations encountered by the person using the gas appliance and to monitor the presence of steady-state concentrations within the enclosure.

Room outlet pollutant concentrations were measured at Station 3 in the test enclosure outlet duct. Air flow measurements taken at Station 3 were used with the Station 1 inlet pollutant concentrations to determine the mass input rate of pollutants into the test structure. The pollutant concentrations at this outlet were converted to a mass basis by the use of these air flow data as well.

Station 4, depending upon the individual test, was placed in either the recirculating hood outlet or in the outlet duct from the vented hood. When neither hood was in use, this station remained inoperative.

Test personnel monitored pollutant concentrations at all four locations throughout each test sequence. Our reported results were taken from reproducible, steady-state conditions except when transient conditions were under study. The steady-state condition was achieved when pollutant levels at Station 2, above the gas appliance, stopped fluctuating. In most cases, duplicate tests were run to verify the initial tests.

3.3 Test Plan

A comprehensive test plan was prepared to guide the measurement personnel in performing the laboratory tests in rapid sequence. The plan was designed to assess the emission quantities produced by gas stoves, space heaters and the pollutant removal capability of vented and unvented hoods. The tests designed for these objectives are discussed in the next three sections.

3.3.1 Gas Stoves

The generation and behavior of pollutants from gas stoves is a function of many inter-related variables including burner and oven size and design, pilot lights, air-fuel mixture, flame intensity, etc. To have a test plan of manageable size to give us meaningful results we divided these effects into the following categories:

1. pilot lights
2. air-fuel mixtures
3. burner size
4. flame intensity
5. combinations of burner use
6. broiler
7. oven
8. utensils

Each of these variables was individually isolated for testing with each of the two stoves and determined in the sequence listed above.

Pilot Lights- With most modern stoves having continuous rather than manual pilot lights, we decided that this aspect of the stove's impact on indoor air quality deserved investigation. It was relatively easy to seal each stove in the test enclosure and monitor the pollutant emissions of the pilot lights.

Burner Air-Fuel Mixture- The first series of tests on each stove was designed to give comparative data for each stove showing the effects of different air-fuel mixtures on pollutant emissions. On the older stove with two sizes of burners, we tested the larger one which was comparable to those on the newer stove. A high flame intensity was used for these tests on one burner on each stove.

Changes in the air-fuel mixture were made by adjusting the primary air-shutter under each burner. Three air-shutter adjustments were tested: maximum primary air, intermediate and minimum primary air. The intermediate air-shutter setting was judged as the position which created the best luminous blue flame, considered a[illegible] most efficient operating condition. This setting was used for all the subsequent tests.

<u>Burner Size</u>- Since the newer stove had four equal size burners, this test series was run on the older stove with 2 small and 2 large burners. Separate tests were run with each size burner set at a high flame intensity. The data were used to evaluate what effects of pollutant emissions could be attributed to the different size burners.

<u>Burner Flame Intensity</u>- Two extremes of flame intensity, high and low, were chosen for this test series on the newer stove. Each flame intensity was tested separately to compare the effects of these two operating conditions on pollutant generation.

<u>Combination of Burner Use</u>- This test series was designed to determine the buildup of pollutant emissions with the successive ignition of each burner at 15 minute intervals. Each stove was tested at low flame and at high flame intensity. The newer stove had one burner with a temperature sensor that shuts off the flame when the preset temperature is reached. This burner was the last one ignited in the test sequence so that any possible disturbance in pollutant emissions by the modulating flame could be avoided.

<u>Broiler</u>- The broiler in each stove was tested under two different operating conditions, transient and steady-state. We monitored the pollutant emissions during the transient phase as the broiler heated up to its thermostat setting, 500°F. When the broiler reached this temperature, the steady-state tests were run. These two operating conditions were re-tested with one burner in operation at a high flame.

Oven - Our spring-summer phase of the Task 2 field measurements showed the oven and broiler as significant sources of NO_2, NO and CO. As far as we could tell, these emissions were greatest during the oven warm-up period.

To investigate these findings in a laboratory situation we tested each stove under two conditions, transient and steady-state. The transient condition was represented by the oven's warming up to the thermostat setting, 475°F(245°C). The steady-state tests were run after the oven reached and maintained the preset temperature. This series of tests at the two operation conditions was repeated with the addition of one burner set on high flame.

Utensils- We chose several representative types of utensils for testing on one burner of each stove. Pollutant concentrations were determined separately for aluminum, cast iron, stainless steel, and Pyrex utensils. The flame settings, low and high, remained unchanged until the effect of each utensil had been measured. Another test for comparative purposes was run at the same flame setting with no utensil on the burner. This test with no utensil was used as a baseline to compare the relative effects of each utensil. Water was placed in each utensil and brought to a boil during each test.

3.3.2 Hoods

A comparison of the unvented and vented hoods was made from tests with a combination of burners and the oven in use on the newer stove. These tests were run to determine the respective pollutant removal efficiencies, if any, for each hood. Tests were also run with the fan on the vented hood operating at two different speeds to determine the effect of exhaust rate on removal efficiencies.

3.3.3 Space Heater

The unvented space heater is a fairly uncomplicated appliance and in contrast to the gas stoves there are few operating conditions that could be investigated. Our tests were conducted under two operating conditions, transient and steady-state for a low and high heat input. Pollutant emission levels were measured for each of these four conditions.

3.4 Calculations

The pollutant emissions from the gas appliances were determined from comparisons of the data collected at each of the four sampling locations within the test enclosure. The contribution of the gas appliance was calculated as the difference between the mass emissions at the outlet, Station 3, and the mass rate of pollutants entering the test enclosure. The concentration of pollutants in the room inlet air was measured at Station 1 and the mass inlet rate was then calculated with air flow data from Station 3. Using the Station 3 air flow data took into account any leakage that would not be detected at the Station 1 room inlet.

For the tests with the vented hood in operation, the total air flow and pollutant concentration were determined as the sum of the emissions through the room outlet duct, Station 4 and the hood outlet duct, Station 3. From this sum, the pollutant mass rate entering the test enclosure was subtracted to obtain the mass emission rate of the gas stove.

Pollutant emission levels from the stove on a heat input basis were calculated from the mass emission rates and gas usage data taken from an integrating meter installed in the natural gas supply line.

The effect of various utensils was determined by a simple measurement scheme utilizing the concentration of pollutants measured directly over the stove adjusted for any change in the incoming room air pollutant concentrations. Concentration measurements were judged more sensitive for measurement of small differences which may not have to be uncovered using the above mass emission calculation procedure.

4.0 RESULTS AND DISCUSSION

The pollutant emission levels for the gas appliances were calculated from the concentrations measured at Stations 1 and 3, the room inlet and outlet, respectively. The difference between the inlet and outlet mass rates of pollutant are attributable to the effect of the stove.

The emission results shown in Tables 4-1 to 4-6, with the exception of Table 4-3, are presented on a heat input basis, micrograms per kilocalorie, µg/Kcal and also on a per unit time basis, mg/Hr. Results on both bases are shown to provide an emission factor independent of the amount of fuel used and an emission rate for a particular set of conditions. Table 4-3 shows the pollutant concentrations above the stove as a measure of the effect of utensils on pollutant generation.

4.1 Gas Stoves

The gas stove provided the greatest variety of operating situations that could affect the generation of pollutants. The effects of pilot lights, burners, oven, broiler and utensils were evaluated. For the burners, additional characteristics including air-fuel mixture, size, flame intensity, and number in use were evaluated for their effect on pollutant emissions.

4.1.1 Pilot Lights

The results for the pilot light tests on the two stoves are presented in Table 4-1. Some significant differences in pilot light pollutant emissions levels are apparent in these data. Both of these appliances have three pilot lights yet gas consumption for those in the older stove was 50% higher than for the newer stove. Carbon monoxide emissions for the newer stove were approximately twice as high as from the older one. Oxides of nitrogen emissions were substantially lower from the pilot lights of the newer stove.

The pilot lights on newer gas stoves are designed to consume less gas than those on older stoves. This design change is confirmed by our natural gas input measurements taken during the pilot light tests.

TABLE 4-1

POLLUTANT EMISSION LEVELS FOR THE PILOT LIGHTS AND DIFFERENT BURNER OPERATING CONDITIONS

Test	Operating Condition	Stove	Natural Gas Input Rate (Kcal/Hr)	Pollutant Emission Factors (μg/Kcal)			Pollutant Emission Rates (mg/Hr)		
				NO	NO_2	CO	NO	NO_2	CO
	Pilot Lights:								
1		New	100	4.65	18.6	842	0.5	1.9	84.2
2		Old	150	45.3	54.6	419	6.8	8.2	62.9
	Air-Fuel Mixture:								
3A	Maximum Primary Air	New	3500	78.6	120	461	275	420	1614
3B	Intermediate Primary Air	New	3500	117	71.7	794	410	251	2779
3C	Minimum Primary Air	New	3500	119	112	419	417	392	1467
	Air-Fuel Mixture:								
4A	Maximum Primary Air	Old	2700	98.7	55.9	416	266	151	1123
4B	Intermediate Primary Air	Old	2700	99.7	55.4	413	269	150	1115
4C	Minimum Primary Air	Old	2800	93.8	54.1	354	263	151	991
	Burner Size:	Old							
5	Small		2400	85.9	53.1	376	206	127	902
6	Large		2700	92.6	51.8	382	250	140	1031
	Flame Intensity:	New							
7A	Low		1700	140	76.0	346	238	129	588
7B	High		3500	130	79.0	510	455	277	1785
	Ignition Sequence:								
	Low Flame	New							
8A	1 Burner		1200	42.2	59.2	280	51	71	336
	2 Burners		2400	106	67.7	221	254	162	530
	3 Burners		3600	75.0	66.7	291	270	240	1048
	4 Burners		4800	76.2	93.1	486	366	447	2333
	High Flame	New							
8B	1 Burner		3400	109	55.8	832	371	190	2829
	2 Burners		6800	137	57.3	405	932	390	2754
	3 Burners		10200	138	65.6	315	1408	669	3213
	4 Burners		13600	96.3	55.2	274	1310	751	3726
	Low Flame	Old							
9A	1 Burner		500	36.3	99.8	1540	18	50	770
	2 Burners		1000	40.8	95.4	2130	41	95	2130
	3 Burners		1500	51.5	84.8	1420	77	127	2130
	4 Burners		2000	47.7	84.0	1430	95	168	2860
	High Flame	Old							
9B	1 Burner		2260	102	57.1	554	231	129	1252
	2 Burners		4520	111	77.6	672	502	351	3037
	3 Burners		6780	117	72.8	475	793	494	3230
	4 Burners		9040	100	70.4	461	904	636	4167

Ambient background NO, NO_2, and CO levels in the test enclosure of 26, 50, and 2490$\mu g/m^3$, respectively, were comparable to those encountered in the field sampling program during inactive periods, such as late night and early morning. It is during this time period that measured pollutant levels reflect only the pilot light emissions. The difference in pollutant emissions from the pilot lights is undoubtedly due to a combination of factors including stove age, condition, and design.

4.1.2 Burner Primary Air-to-Fuel Mixture Effects

One of the most fundamental factors of burner operation that can be modified is the air-fuel mixture. Changing the air-fuel mixture by adjusting the air shutter under the burner would expectedly alter the combustion characteristics and subsequently affect pollutant generation. One burner on each stove was used for this test series. The burner was set at high flame and its air shutter was adjusted to three positions; full open, full closed, and intermediate. The intermediate air shutter setting was judged as the position which created the best luminous blue flame, considered as the most efficient operating condition.

At the intermediate air shutter setting the emission levels from the newer stove were noticeably higher than those from the older unit as shown in Table 4-1. Increasing the primary air to a maximum for the newer stove caused a 33% and 42% reduction in NO and CO levels while NO_2 levels increased by 67%. Reducing the primary air in the burner of the older stove caused a slight decrease in the pollutant emissions. The minimum air setting on the newer stove affected NO emissions only slightly while the CO decreased and the NO_2 increased as compared to the intermediate shutter setting values.

Generally, these data show that the emissions from the older stove are less sensitive and more uniformly independent of the air-fuel mixture.

Emissions from the newer stove are noticeably higher at the optimum air shutter setting.

4.1.3 Burner Size Effects

Since the newer stove had four burners of equal size, we ran these tests on the older stove only. The small and large burners were tested separately at high flame intensity. The pollutant emissions data presented in Table 4-1 show the burner size has little effect when compared on a heat input basis.

4.1.4 Burner Flame Intensity Effects

TRC investigated pollutant emissions at two flame intensities, high and low, on one burner of the newer stove. The high flame had a heat input more than twice that used for the lower flame. As shown in the results presented in Table 4-1, emission factors for NO, NO_2, and CO during these two different conditions of burner operation are closely correspondent. The greatest difference in emissions is apparent for the carbon monoxide with the high flame having a 50% higher CO emission factor than the low flame. Total emission rates per unit time increase in proportion to the amount of fuel used.

4.1.5 Burner Ignition Sequence Effects

For this series of tests, each burner was ignited successively at 15-minute intervals. The build up of pollutant emission levels was monitored for a 60-minute period, until 15 minutes after the fourth burner was ignited.

At each flame intensity, nitric oxide and NO_2 emission factors were relatively constant with a few exceptions for each stove, regardless of the number of burners in use, when adjusted to a heat input basis.

Carbon monoxide emission factors seem to be affected the most by increased number of burners in use. The burners of the older stove generated more NO_2 and CO per unit of heat input than those of the newer one, especially during the low flame tests. In these low flame tests, nitric oxide emission factors for the newer stove burners were noticeably higher than those from the older stove. These differences are less apparent for the high flame tests.

Pollutant emission quantities per unit time were less for the older stove than the newer stove except for carbon monoxide, particularly when a low flame was used. The difference in emission quantities between stoves was due to the smaller fuel consumption rate of the older stove at a specified setting. In spite of this smaller fuel consumption rate, the carbon monoxide emissions for the older stove were greater than the newer stove.

4.1.6 Broiler and Oven

For the tests on each stove's broiler and oven, we chose two operating conditions for investigation defined as transient and steady-state. The transient condition included the period from oven or broiler ignition until the temperature reached 475°F (245°C) for the oven and 500°F (260°C) for the broiler. For the steady-state mode, we then operated the oven and broiler at the above settings for a similar time period during which the oven or broiler flame would cycle on and off to maintain the desired temperature. The thermostat for the older stove did not work properly and consequently, the flame remained on even after the desired temperature was reached.

The results for this test series are shown in Table 4-2. For both stoves, pollutants are generated at a generally higher rate per amount of heat input while operating in the transient condition as compared to steady-state. The broilers of both stoves have comparable emission levels except the NO from the newer broiler is 50% higher than the older one during a steady-state operation. The newer oven generates more carbon monoxide but less oxides of nitrogen than the older oven at steady-state.

TABLE 4-2

POLLUTANT EMISSION LEVELS FOR
BROILER AND OVEN OF TWO GAS STOVES

Test	Operating Condition	Stove	Natural Gas Input Rate (Kcal/Hr)	Pollutant Emission Factors (μg/Kcal)			Pollutant Emission Rates, mg/Hr		
				NO	NO_2	CO	NO	NO_2	CO
10A	Broiler:	New							
	Transient		4900	126.	80.6	846	617	395	4145
	Steady-state		3700	136.	57.1	757	503	211	2800
12A	Broiler:	Old							
	Transient		3000	137.	123.	1350	411	369	4050
	Steady-state		3800	88.8	48.5	818	337	184	3108
	Oven:	New							
14A	Transient		4000	331.	79.0	1010	1324	316	4040
14B	Steady-state		2200	77.9	50.4	1620	171	111	3564
	Oven:	Old							
16A	Transient		2300	157.	159.	1790	361	366	4117
16B	Steady-state		2200	91.4	73.1	530	201	161	1166

Comparing the oven and broiler emissions with the burner emissions in Table 4-1 shows that based upon equivalent heat input, the oven and broiler generally produce less oxides of nitrogen and more carbon monoxide than the burners. However, the quantity of pollutants per unit time is greater for the oven and broiler than the burners because of the greater fuel consumption of the former during normal operation.

4.1.7 Utensil Effects

Table 4-3 shows the results of our pollutant concentration measurements with different utensils on one burner of the new stove under two flame intensities, high and low. The cast iron and the stainless steel utensils show the ability to reduce NO_2 to NO in the low flame test condition, although the relative change is not significant. The most substantial utensil effect apparent is the much higher CO concentrations for the aluminum pot test. Each utensil shows the effect of decreasing NO_2 concentrations when compared to the test done without utensils.

Behavior of each utensil in affecting pollutant concentrations during the high flame tests was different from the low flame tests. Nitric oxide and NO_2 concentrations were generally higher with a utensil on the burner than without one. Except for the stainless steel utensil, carbon monoxide levels were lower with the use of each utensil.

The magnitude of the observed effects of utensils upon pollutant concentrations, although measurable, does not appear substantial. No one utensil has a substantial effect upon pollutant measurements.

4.2 Hoods

Table 4-4 shows the results of our tests on the vented hood's efficiency in removing pollutants from the test enclosure. These data show that the vented hood is moderately effective in removing pollutants from the room. The higher

CONCENTRATIONS (1)
VARIOUS UTENSILS

Test	Operation Condition	[illegible]	Stove	Pollutant Concentrations, μg/m³ NO	NO₂	CO
				NO	NO_2	CO
	Low Flame:		New			
18A		Aluminum		27	58	1066
18B		Cast Iron		32	66	545
18C		Stainless Steel		32	72	403
18D		Pyrex		27	76	474
18E		None		27	82	675
	High Flame:		New			
19A		Aluminum		260	204	1910
19B		Cast Iron		221	224	1433
19C		Stainless Steel		207	224	2380
19D		Pyrex		233	224	2030
19E		None		207	183	2030

(1) The effect of utensils on pollutant generation was determined by measurement of pollutant concentrations directly above the stove rather than by calculation of pollutant quantities entering and leaving the laboratory enclosure.

TABLE 4-4

POLLUTANT REMOVAL EFFICIENCIES
FOR NEWER GAS STOVE WITH VENTED HOOD

Test	Operation	Hood Fan Speed	Natural Gas Heat Input Rate Kcal/ hr	Pollutant	Pollutant Emission Rate, mg/hr.		Hood Removal Efficienc %
					Without Vented Hood	With Vented Hood	
21A	Oven and 4 Burners	Medium	14,200	NO NO_2 CO	1,968 1,377 12,354	1,161 826 7,536	41 40 39
21B	Oven and 4 Burners	High	14,200	NO NO_2 CO	1,785 1,332 11,076	910 719 5,649	49 46 49
22	Oven and 4 Burners	Off	14,400	NO NO_2 CO	2,193 1,221 10,140	2,105 1,160 9,430	4 5 7

fan speed, with its greater induced draft above the stove, will capture and exhaust about 50% of the pollutants generated by the stove. With the fan shut off, there is enough draft to allow measurable amounts of pollutants to escape through the hood outlet duct.

Table 4-5 presents the resul'. ^f tests to determine the ability of the charcoal filter in the recirculating hood to remove gaseous pollutants. Two separate tests were run, one with the ducted hood without a filter and one with the recirculating hood with the charcoal filters. In both cases, the newer stove was used. Comparison of the data from both tests shows in our judgment no collection efficiency for the charcoal. While these is a difference of about 10% in the NO_2 and CO measurements between tests, we estimate this to be measurement error. From comparison of other data taken during the test program, the mass balance approach we have used to determine emissions has an accuracy of $\pm$10% which is reasonable for the objectives of this task. A more precise evaluation of a charcoal filter would have to be determined by a different laboratory method which was beyond the scope of this task.

4.3 Unvented Space Heater

Table 4-6 shows the results of our tests on the unvented space heater. The uncomplicated nature of this appliance left us with relatively few operating conditions to evaluate. We chose two operating conditions, transient and steady-state for the emission measurement tests.

Our measurements show that the pollutant emissions are relatively higher during steady-state operation of the space heater at the preset temperature. This is opposite to our findings for the gas stove oven and broiler tests.

TABLE 4-5

POLLUTANT REMOVAL EFFICIENCIES FOR
NEWER GAS STOVE WITH RECIRCULATING HOOD

Tests	Operation	Hood Fan Speed	Natural Gas Heat Input Rate Kcal/Hr	Room Outlet Emissions, mg/hr		Recirculating Hood Removal Efficiencies, %
				without charcoal filter	with charcoal filter	
8B and 20B	High Flame Four Burners	Medium	13,600	NO: 1290 NO_2: 671 CO: 4060	1310 751 3726	0 (-10) 10

<u>TABLE 4-6</u>

POLLUTANT EMISSION LEVELS
OF THE UNVENTED SPACE HEATER

Test	Operating Condition	Natural Gas Input Kcal/Hr	Pollutant Emission Factors, µg/Kcal			Pollutant Emission Rates, mg/Hr		
			NO	NO_2	CO	NO	NO_2	CO
	Low Flame:							
25	Transient	1280	6.6	14.1	414	8	18	530
26	Steady-state	2800	76.4	46.4	632	214	130	1770
	High Flame:							
27	Transient	6600	84.2	19.0	133	556	125	878
28	Steady-state	6200	135.	43.8	319	8[illegible]7	272	1978

We also see that the high flame operating condition as having greater emissions than the low flame condition. In general, our tests show pollutant emissions as somewhat lower than those from the gas stoves when adjusted to a heat input basis. However, using the space heater continuously would add a considerable amount of pollutants to the indoor atmosphere when compared to the intermittent operation of gas stoves.

TASK 2

FIELD STUDIES

1.0 INTRODUCTION

The purpose of this task is to determine the impact of gas stove emissions and outdoor air quality on indoor air quality. The work performed in this task consisted of a field measurement program at four private homes with gas stoves in the Hartford, Connecticut area. The homes selected represented a spectrum of conditions related to:

- Home age, size, and configuration
- Stove age and condition
- Stove use
- Home location in relation to outdoor sources.

The field sampling program was divided into two sampling periods, spring-summer and fall-winter and carried out at three separate homes during each period.

Because of sparsity of stove use at one of the houses sampled in the spring-summer sampling period, another house was selected and used as a replacement for this house during the fall-winter sampling period. Thus, in all, four different houses were investigated during this task. Nitric oxide (NO), nitrogen dioxide (NO_2), and carbon monoxide (CO) were monitored continuously at three locations within and at one location outside each house for about two weeks in each sampling period.

The data were compiled as 2-hour and daily averages. Stove use data recorded by the residents provided the basis for our evaluation of the impact of gas stoves on indoor air quality.

2.0 SUMMARY AND CONCLUSIONS

2.1 Summary

During the spring and early summer of 1973, and again in the following fall and winter, TRC conducted a measurement program in three private residences to determine the effect of internal generation of pollutants from gas appliances upon indoor air quality. A modern suburban home, an older urban home, and a suburban two-story apartment each with a gas stove were selected for the program. After the spring-summer sampling period, we decided to replace the older urban home because of little stove use. Thus, for the fall-winter period, a replacement home was selected. It was a 14-year old suburban, single-family home in a development of similar homes.

Approximately two weeks of monitoring for nitrogen dioxide (NO_2), nitric oxide (NO) and carbon monoxide (CO) were conducted at each structure. Three sampling sites inside each structure and one outside were used as data collection points.

In order to sample at all four locations simultaneously and yet conserve equipment and manpower, TRC designed and built a measurement system that enabled the use of a single analyzer for NO_2 and NO and a second analyzer for CO. An electronic timer, solenoid valves and continuously purged sampling lines were used to permit the analysis of sample streams from each location in rapid sequence.

During the spring-summer sampling period the four sampling locations for each house were: kitchen (over the stove, except as noted below), living room, bedroom and outside. At the request of the Project Officer, sampling during the fall-winter period was modified somewhat. A second sampling position was located in the kitchen but displaced somewhat from the stove. The purpose of this sampling point was to provide data which would be more representative of the generalized kitchen atmopshere than the sampling point immediately adjacent to the stove. The third sampling point was placed in the living room during the first week and in the bedroom during the second week of the 2-week sampling period.

At House No. 1, during the spring-summer sampling period, we initially encountered a number of off-scale readings and subsequently moved the kitchen sampling location about 1 meter from the stove, over the sink for the rest of this period.

All monitoring equipment was placed inside the structure sampled and serviced usually every other day by a TRC staff member.

All field data were recorded on strip charts which were examined and verified before reduction to five-minute average values using a semi-automatic chart reading instrument. The five-minute data were then keypunched and entered into TRC's computer to facilitate data analysis.

A summary of the data for this task is presented in Table 2-1. The data show that there are significant differences in the indoor patterns of pollutants within each of the houses which are undoubtedly a function of house design, stove use patterns, outdoor concentrations and other factors. However, two points are clear: (1) Except for CO in House No. 2, the concentrations of the pollutants measured are higher inside than outside and (2) kitchen concentrations are always higher than those in other parts of the house.

Indoor concentrations of NO_2 in the kitchen at most of the houses are at levels which would exceed the annual average air quality standard of 100 $\mu g/m^3$ if projected over one year. In several instances, a concentration of 100 $\mu g/m^3$ is approached or exceeded throughout the house. Indoor CO concentrations during the winter at House No. 3 and No. 4 approached the 8-hour average air quality standard of 10,000 $\mu g/m^3$.

TABLE 2-1

SUMMARY OF INDOOR/OUTDOOR AIR QUALITY DATA
IN EACH HOME FOR BOTH SEASONS
(Spring-Summer 1973 and Fall-Winter 1973-74)

House No.	Sampling Period	Pollutant	Average Concentration at Each Location, $\mu g/m^3$					Total Stove (Oven Plus Burners) Min/Day	Number of Days of Valid Data (1)
			1-Kitchen Over Stove	1A-Kitchen 1M from Stove	2-Living Room	3-Bedroom	4-Outside		
1	Spring-Summer	NO_2	----	100	61	52	44	220	6
		NO	----	102	64	65	26	220	6
		CO	----	4490	4070	4170	3480	198	9
	Fall-Winter 1st Half	NO_2	67	60	55	----	50	134	7
		NO	136	134	94	----	63	134	7
		CO	4190	3520	3230	----	1670	106	4
	Fall-Winter 2nd Half	NO_2	110	67	----	49	46	(2)	6
		NO	134	131	----	102	65	(2)	6
		CO	4790	4210	----	3830	2310	(2)	6
2	Spring-Summer	NO_2	113	----	103	103	101	43	5
		NO	41	----	30	28	24	43	5
		CO	3000	----	3080	2900	2940	43	3
3	Spring-Summer	NO_2	114	----	75	58	51	11	2
		NO	53	----	42	34	21	11	2
		CO	4310	----	3210	2680	2230	37	13
	Fall-Winter 1st Half	NO_2	53	47	28	----	35	20	1
		NO	111	95	42	----	40	20	1
		CO	7820	6420	5070	----	3380	66	6
	Fall-Winter 2nd Half	NO_2	180	140	----	70	32	74	3
		NO	111	101	----	64	20	74	3
		CO	7130	6620	----	5500	2500	115	8
4	Fall-Winter	NO_2	213	120	71	----	39	139	7
		NO	305	229	156	----	19	139	7
		CO	9070	9000	8190	----	2410	201	6

(1) Data are based on all valid daily averages for each house during the season sampled, i.e., days for which 12 two hour average values were available.

(2) Stove use data not available for second half of fall-winter period for this house.

Using a study of brief records from the continuous analyzers together with stove use data showed clearly the response of indoor air quality throughout the house to stove use. A statistical analysis of the 5-minute air quality data showed the frequency of occurrence of various values for each sampling location. In most cases, the relative positions of the cummulative frequency distribution curves could be explained in terms of season, stove operation, and the behavior of the pollutant in question.

A diffusion experiment conducted at House No.2 showed the decay patterns of NO_2, NO and CO. NO_2 was found to decay much more rapidly than the other pollutants, and several possible theories were postulated.

The study showed that the impact of continuously burning pilot lights on several of the stoves contributed air contaminants to the indoor atmosphere.

2.2 Conclusions

Based upon the findings of this task effort we draw the following conclusions:

1. Stove use and outdoor air quality both influence indoor air quality. This joint influence is a function of house permeability as determined by season. No evidence could be found that stove and house age *per se* influenced indoor air quality.
2. The patterns of indoor air quality are influenced by interior design features.
3. The half life of CO, an extremely unreactive gas, was found to be 2.1 hours in House No.2 during an unoccupied period. The half life for NO was 1.8 hours indicating its relatively high stability in the indoor atmosphere. On the other hand, NO_2 had a half life of 0.6 hours

indicating that in addition to dispersion and dilution, NO_2 disappears through reaction, absorption, and/or adsorption. This effect was noted in a qualitative way in several of the other houses, especially House No. 4 in the winter.

4. Stove pilot lights were found to be a significant source of NO_2, especially at House No. 3.
5. If one can assume that an outdoor air quality standard can be applied indoors, the data show that the air quality standard for CO (8-hour average) can be exceeded.
6. Average kitchen NO_2 concentrations for most sampling periods were two to four times the outdoor NO_2 concentrations.

3.0 PROCEDURES

3.1 Structure Selection

The field measurement program was designed specifically to evaluate the effect of gas cooking appliances on indoor pollutant levels. While gas stoves are certainly not the only source of indoor pollutants, they are a readily identifiable source about which little is known. The major pollutants of interest that are emitted from gas appliances are nitrogen dioxide (NO_2), nitric oxide (NO), and carbon monoxide (CO). Four structures, a modern suburban house, a suburban 2-story apartment, an older, urban single-family house and a medium size and age, suburban, single-family house were selected for the measurement program. Table 3-1 lists the characteristics of the four structures.

These residences represent the wide differences in land use, house type and layout, gas applicance age and life styles which are desirable in an exploratory study such as this.

We chose House No. 1 as representative of a large, modern split-level house with approximately 2000 ft^2 of floor area. Figure 3-1 is a schematic diagram of this house and Figure 3-2 is a photograph of the house. House No. 1 is in a residential development of similar homes in Rocky Hill, Connecticut, and is located about 2400 feet west of Interstate 91 which is a major north-south highway that follows the Connecticut River Valley. This eight-year old house consists of four half-levels each spaced approximately 3 or 4 steps above the other in a split-level arrangement. The kitchen is large and open and directly connected to the dining, living and family rooms. The stove, which is the same age as the house, is located on an exterior wall near a window and has a recirculating type exhaust hood above the surface burners. A family of four occupies the house. The children are teenagers and the housewife does not have an outside job.

TABLE 3-1

CHARACTERISTICS OF FIELD PROGRAM RESIDENCES

Characteristics	House No. 1	House No. 2	House No. 3	House No. 4
Type	Split-level, large, centrally located and well ventilated kitchen	Two-story, medium size, centrally located and well ventilated kitchen	Two-story apartment with small, unventilated kitchen	Single story, small ranch-style, kitchen open to other areas of house.
Size	2000 Ft^2	1500 Ft^2	1000 Ft^2	1500 Ft^2
Age*	8 Years	40 Years	2 Years	14 Years
Location	Suburban development 1/2 mile from inter-state highway	Urban residential area on local artery	Suburban community	Suburban development near local main road
Gas Appliances	Stove and heating system	Stove	Stove	Stove and heating system
Occupants	Two adults and two teenage children	Single adult	Two adults and two preschool children	Two adults and two children

* For both residence and gas appliances.

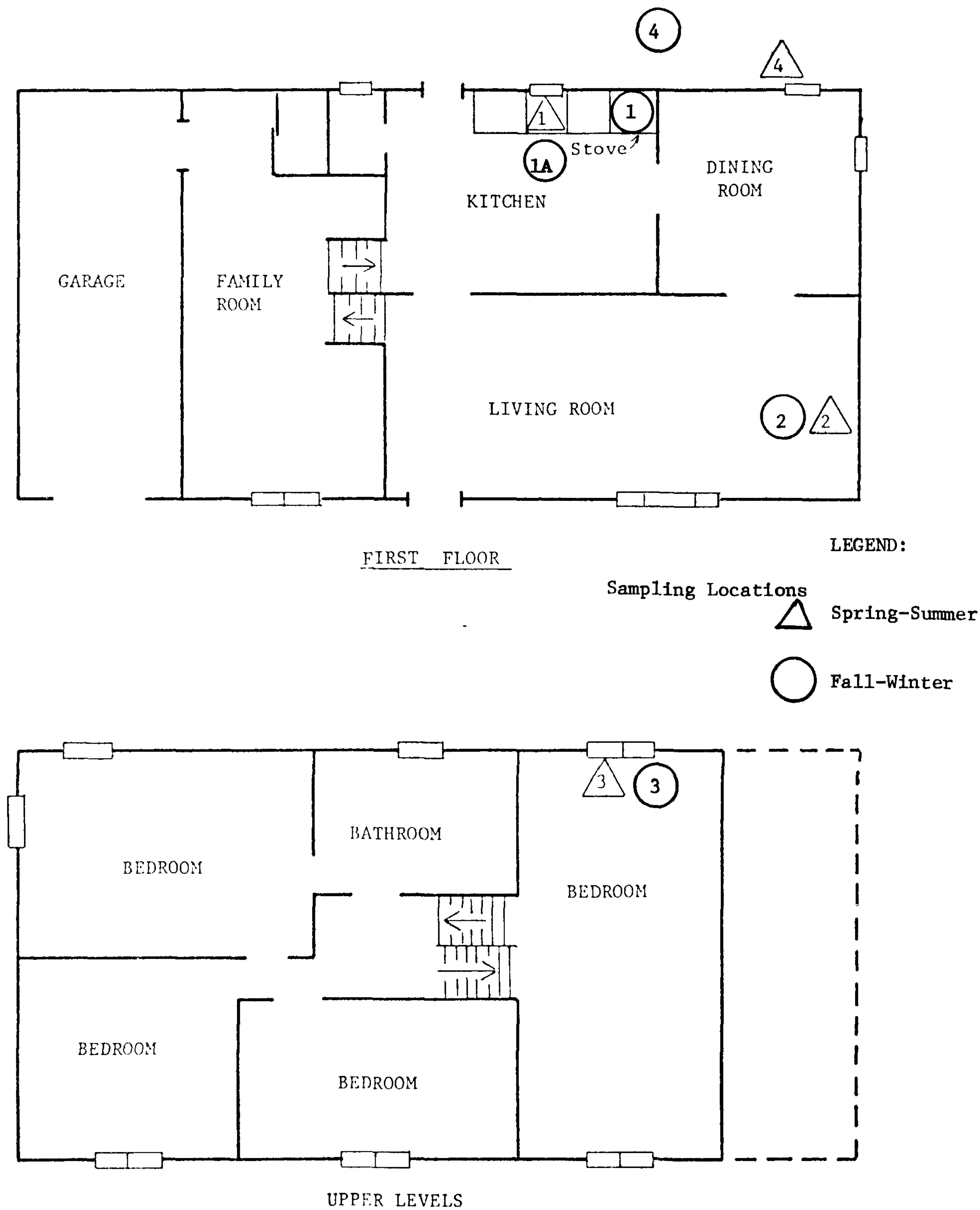

FIGURE 3-1

Plan Layout of House No. 1

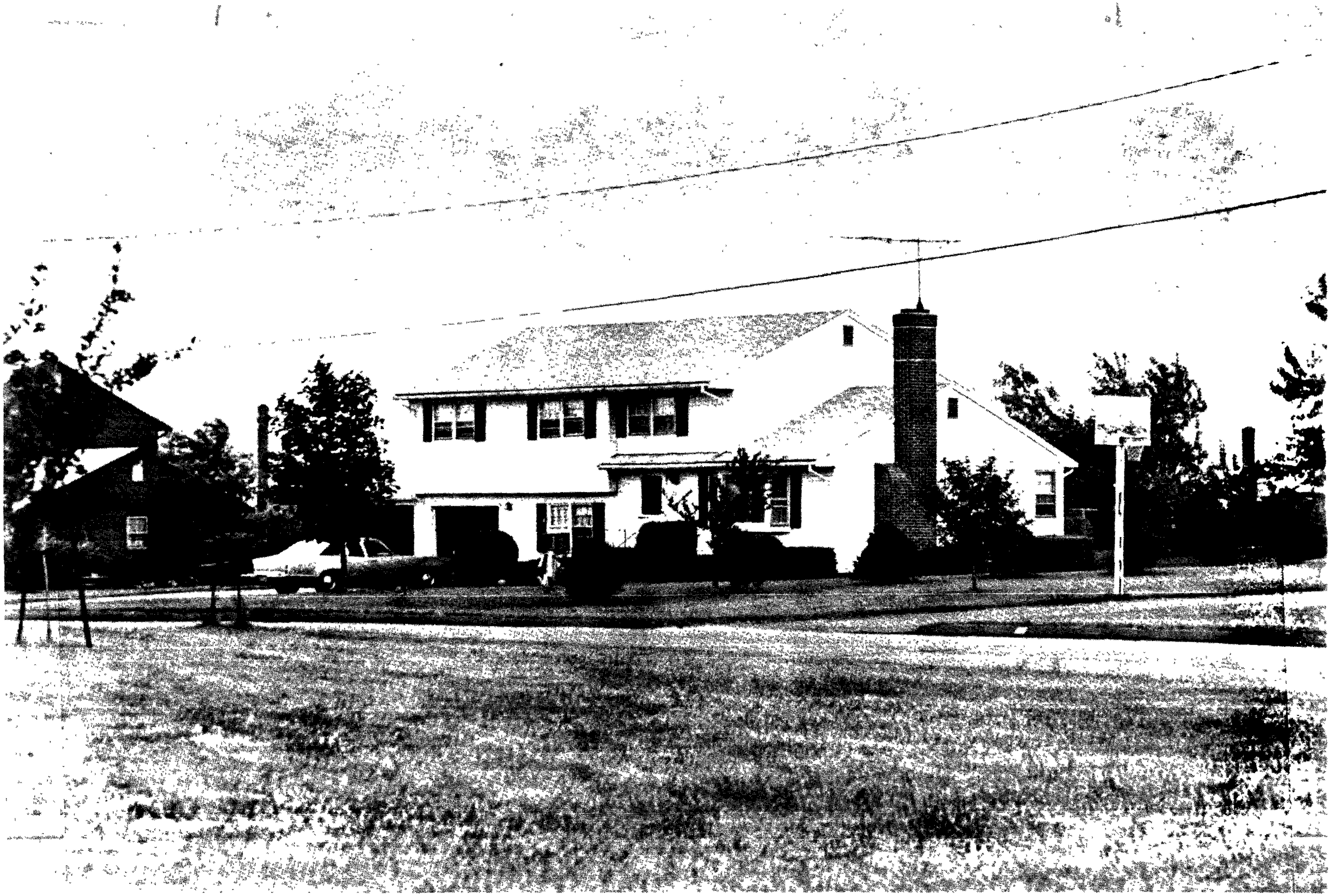

FIGURE 3-2 Front view of House No. 1

House No. 2, shown as a schematic in Figure 3-3 is an older home with an equally old stove. This house, a photograph of which is shown in Figure 3-4, is a seven-room, 2-story single family dwelling of about 1500 ft^2 of floor area. The neighborhood is an area of similar aged houses located in the south-end of Hartford. Campfield Avenue, an artery for local traffic in that area, runs in front of the house. Living areas of the house are located on the first floor and bedrooms upstairs. The stove is located next to an interior wall and there is no exhaust hood. The oven exhaust is vented to the outside. The only occupant is a young bachelor. This house was not used for the fall sampling period because of the sparse stove use during the spring-summer period.

The third dwelling used for the Task 2 field measurement program, is shown schematically in Figure 3-5. House No. 3 is a two-floor, 4-room apartment with the kitchen and living area on the first floor and 2 bedrooms on the second floor. A photograph of this home is shown as Figure 3-6. This dwelling is part of a garden apartment complex in the town of Newington, Connecticut. This complex is located approximately 500 feet north and west of local main roads. Although the area surrounding the complex is commercial and residential, large tracts of undeveloped land lie to the north and to the west of this apartment.

On the first floor there are no openings to the outside except the front door and a glass sliding door at the opposite end of the living area.

Typical of many modern apartments, the kitchen is only a small workspace with no windows or other outside ventilation. There is a recirculating type hood over the stove. The housewife and two small children are normally home during the day.

The fourth dwelling used for the Task 2 field measurement program, House No. 4, replaced House No. 2 for the fall sampling period. A plan

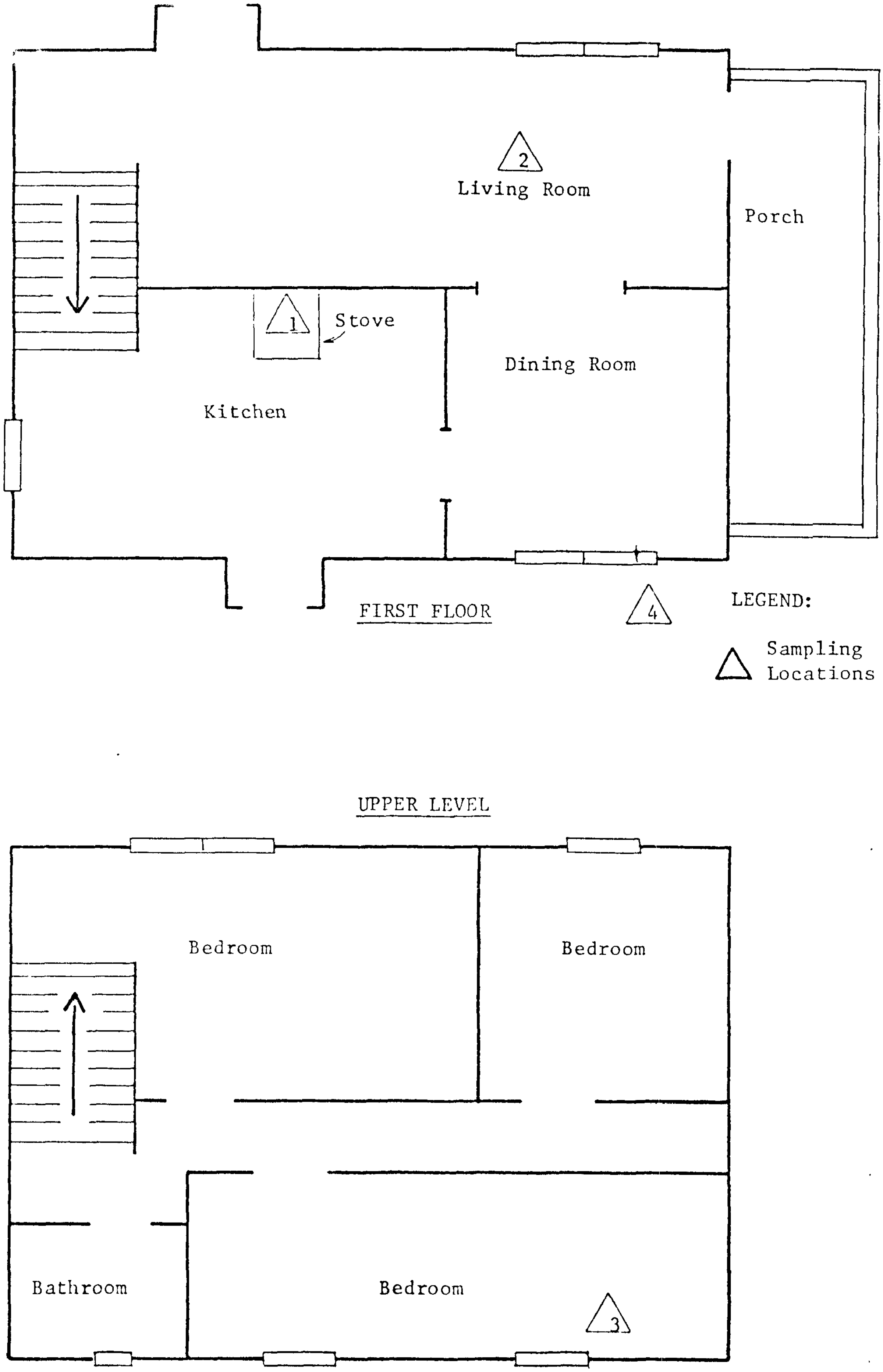

FIGURE 3-3

Plan Layout of House No. 2

FIGURE 3-4 Front view of House No.2

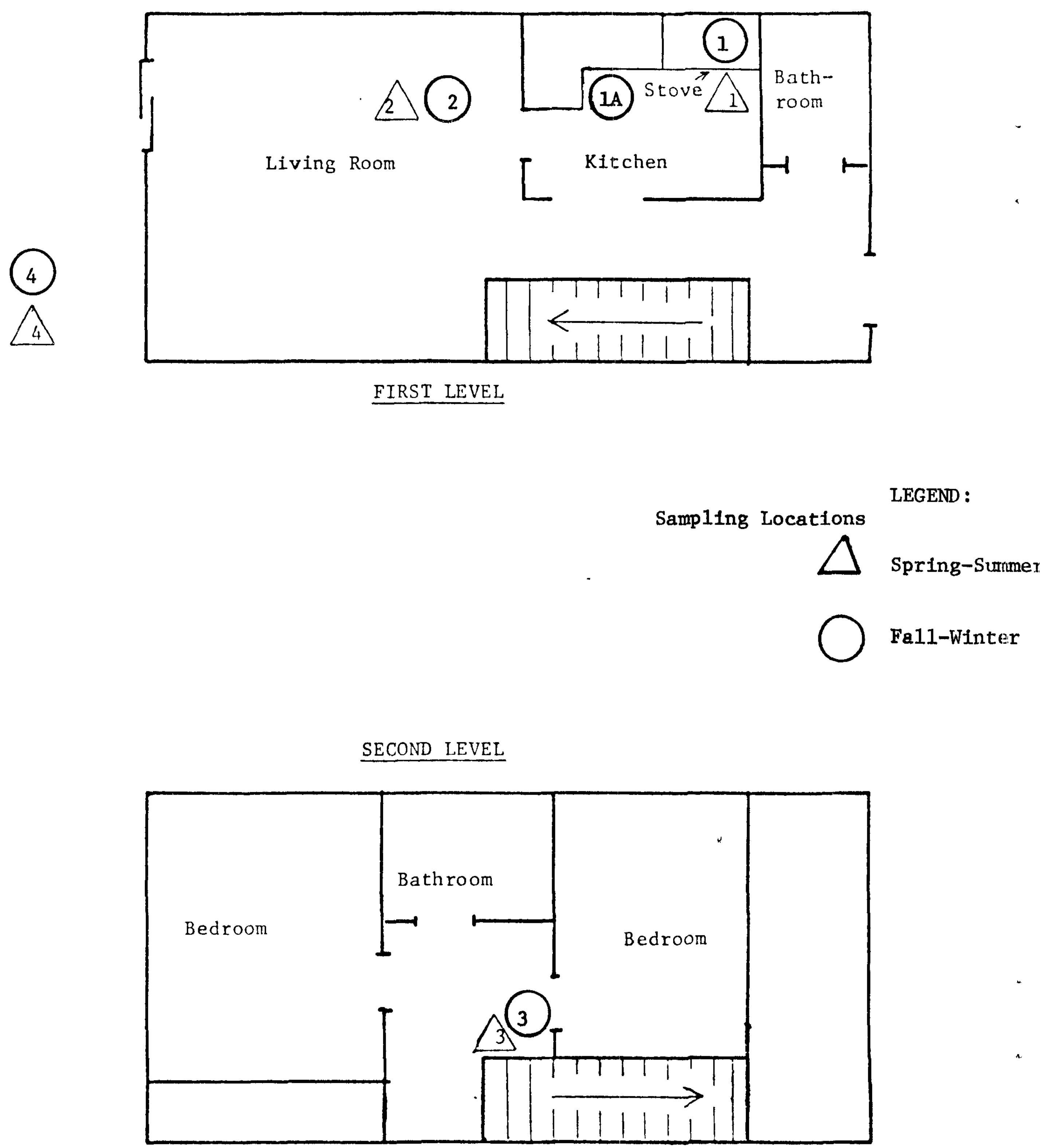

FIGURE 3-5
Plan Layout of House No. 3

FIGURE 3-6 Front view of House No. 3

layout of this house is presented in Figure 3-7. This house is a single floor ranch-style home enclosing approximately 1500 square feet. A photograph of this home is shown as Figure 3-8. Located in Enfield, Connecticut, this house is part of a large development of similar dwellings built in 1959. It is located approximately 1000 feet from a local main thoroughfare, Elm Street. The area surrounding this house is zoned residential and commercial. Several large shopping centers lie to the south of this house, on the opposite side of Elm Street.

The kitchen in this house opens directly into the dining area and living room and the stove is not vented to the outside. The occupants of this dwelling are two adults, one teenager and one young adult.

3.2 Measurement System

The objective of the field measurement program dictated that pollutant concentrations be determined at several points within the structure being sampled. A simultaneous measurement of the ambient outdoor concentration of each pollutant measured is also desirable to act as a reference and to gauge the possible influence of outdoor concentration on the levels measured indoors. Locating individual monitors at each sampling point would represent a substantial equipment investment and would result in multiple servicing and space requirements,not to mention data reduction problems, and lack of confidence in the comparability of data from point to point.

In order to measure pollutant concentrations at multiple locations and yet conserve the amount of instrumentation and manpower required to obtain this data, TRC designed and built a unique measurement system as shown in Figure 3-9. Four sampling locations as described in Section 3.4 were chosen

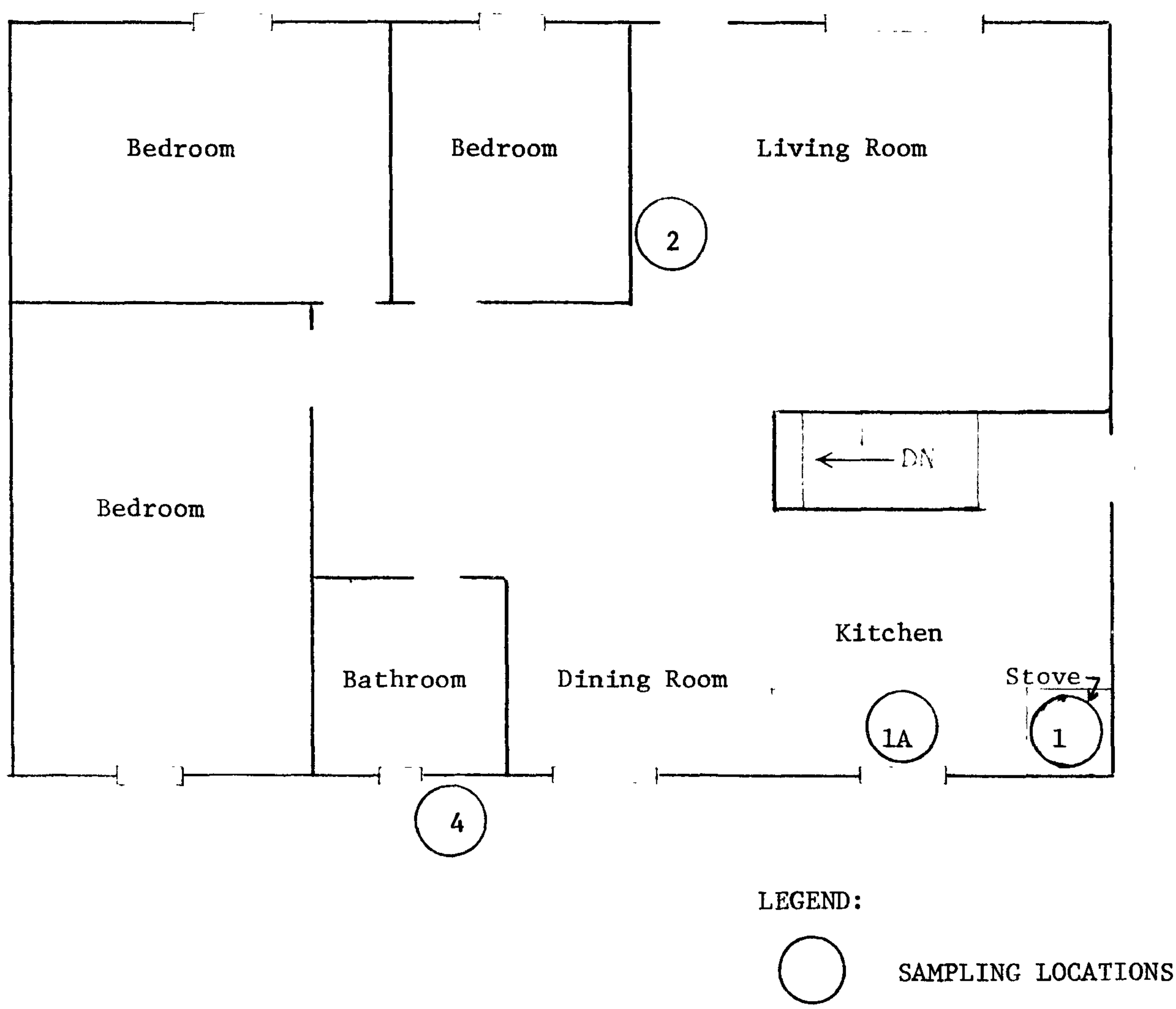

FIGURE 3-7

Plan Layout of House No. 4

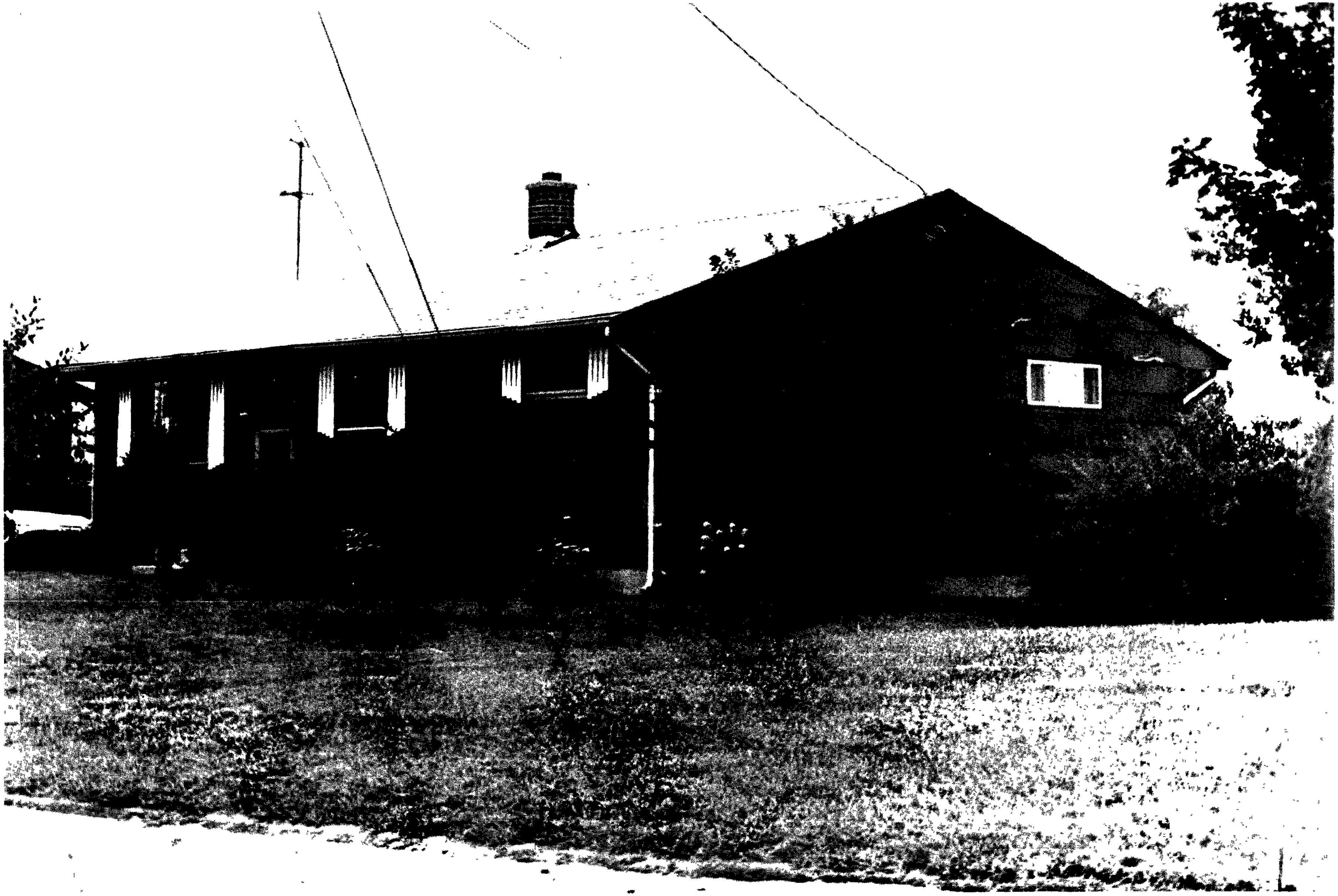

FIGURE 3-8 Oblique front view of House No. 4

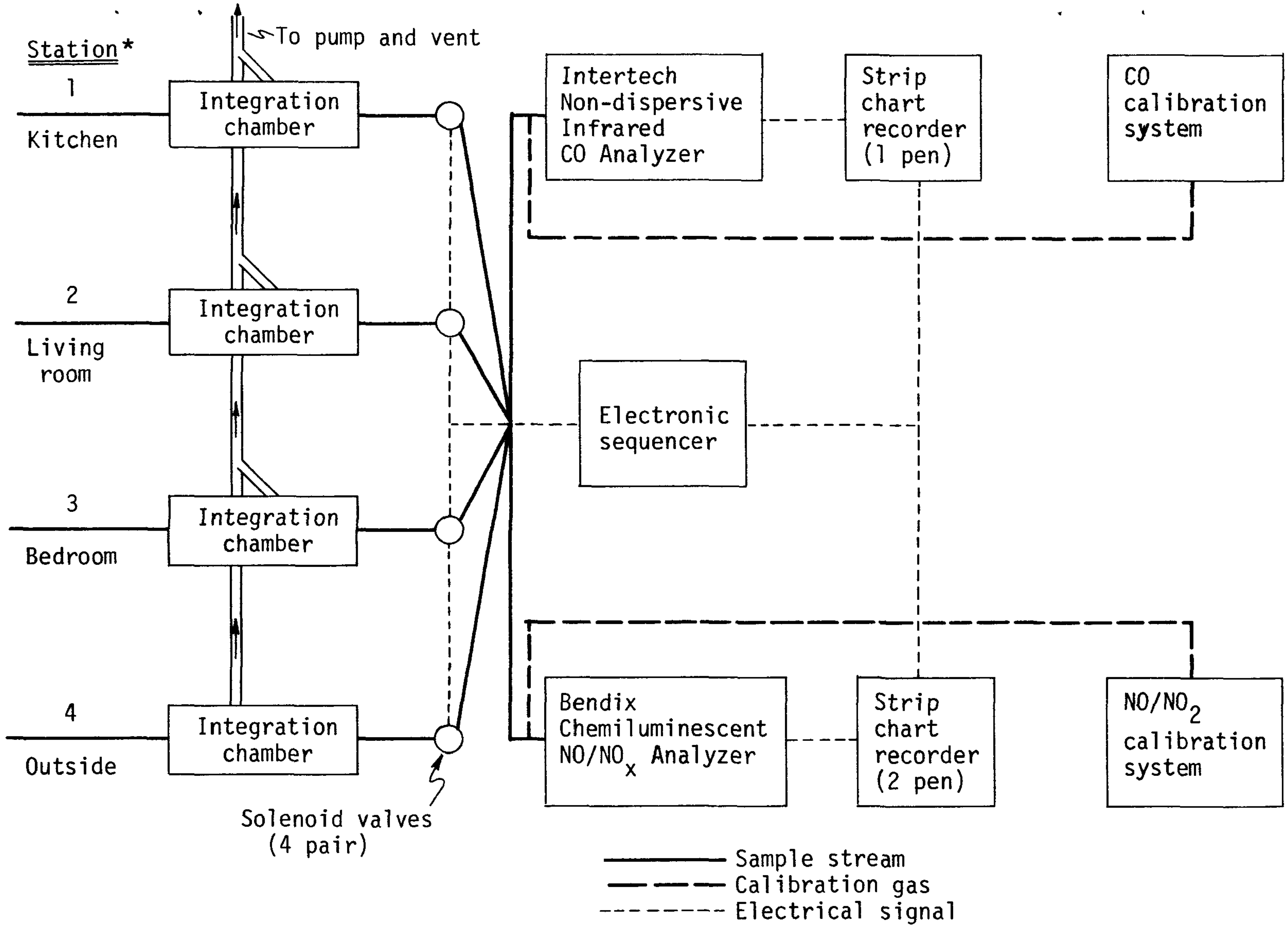

FIGURE 3-9

NO, NO_2, and CO Sampling and Measurement System

*Configuration used during Spring-Summer period.

for sampling, three indoors and one outside. The major components of the system are four continuously purged sampling lines with an integrating chamber, solenoid valves, Bendix chemiluminescent NO/NO_x analyzer, Intertech Non-Dispersive Infrared Carbon Monoxide Analyzer, carbon monoxide and NO/NO_2 Calibration Systems, strip chart recorders and electronic sequencer. The system design acknowledged the need for:

(1) Continuous, uninterrupted operation with only periodic service

(2) Frequent automatic and manual calibration checks

(3) Ability to be readily moved from one location to another

(4) Small space requirement within the sampled structure.

As shown schematically in Figure 3-9 the sample stream from each of the four locations is piped to a central location through 15 meters of 4.8 millimeter I.D. Teflon tubing at a rate of approximately 9.5 LPM. This is equivalent to a retention time of approximately 2 seconds. Each sample stream is then drawn through an individual 500 ml glass integrating chamber, through a diaphram pump and then vented. This arrangement provides continuous purging of the sampling lines.

From the integrating chamber two small streams are drawn, one to the Bendix Chemiluminescent NO/NO_x analyzer and the other to the Intertech NDIR CO analyzer. Solenoid valves (normally closed) on each sample line are energized by the electronic sequencer at five-minute intervals with each station having its sample being drawn to the detectors once every twenty minutes. The two solenoid valves that allow samples to be drawn to the CO analyzer and the NO/NO_2 detector from the integration chamber are kept in phase so that the sample stream from each station is being analyzed simultaneously for CO and NO/NO_2. A two-pen recorder was used for the NO and NO_2 output of the chemiluminescent analyzer and a separate single pen unit for recording the CO output.

An additional function of the electronic sequencer was to mark the beginning of each 20-minute sampling cycle. This was accomplished by creating a vertical slash on each strip chart immediately before the analysis of the Station 1 sample stream for the three pollutants of interest. A sample of an NO/NO_2 trace is shown in Figure 3-10.

3.3 Calibration Procedures

Calibration of the Bendix Chemiluminescent NO/NO_2 analyzer was accomplished with a dynamic dilution module. This module was provided by the Environmental Protection Agency and is described schematically in Figure 3-11. A wide range of concentrations of NO and NO_2 can be generated by this unit for calibrating the NO/NO_2 analyzer. Bottled NO calibration gas with a guaranteed and EPA verified concentration of 95.1 ppm and purified room air are used to produce the various nitric oxide concentrations. Nitrogen dioxide can be produced in different concentrations by the use of the ozone generator that is part of the dilution module.

The procedures used to calibrate the Bendix Chemiluminescent NO/NO_2 Analyzer were provided by the EPA. A copy of the procedures can be found in Appendix A.

The calibration of the non-dispersive infrared (NDIR) carbon monoxide analyzer was accomplished with zero gas and 13.0 ppm CO calibration gas. Zero gas was introduced into the detector cell to establish the zero baseline of the device. Calibration gas was then used to determine the span, or chart displacement, of the known concentration of carbon monoxide. Finally, the zero gas was re-introduced to ensure the baseline stability. The electronic sequencer automatically charged zero gas to the NDIR CO analyzer once every twenty-four hours as another check for baseline stability between manual calibrations.

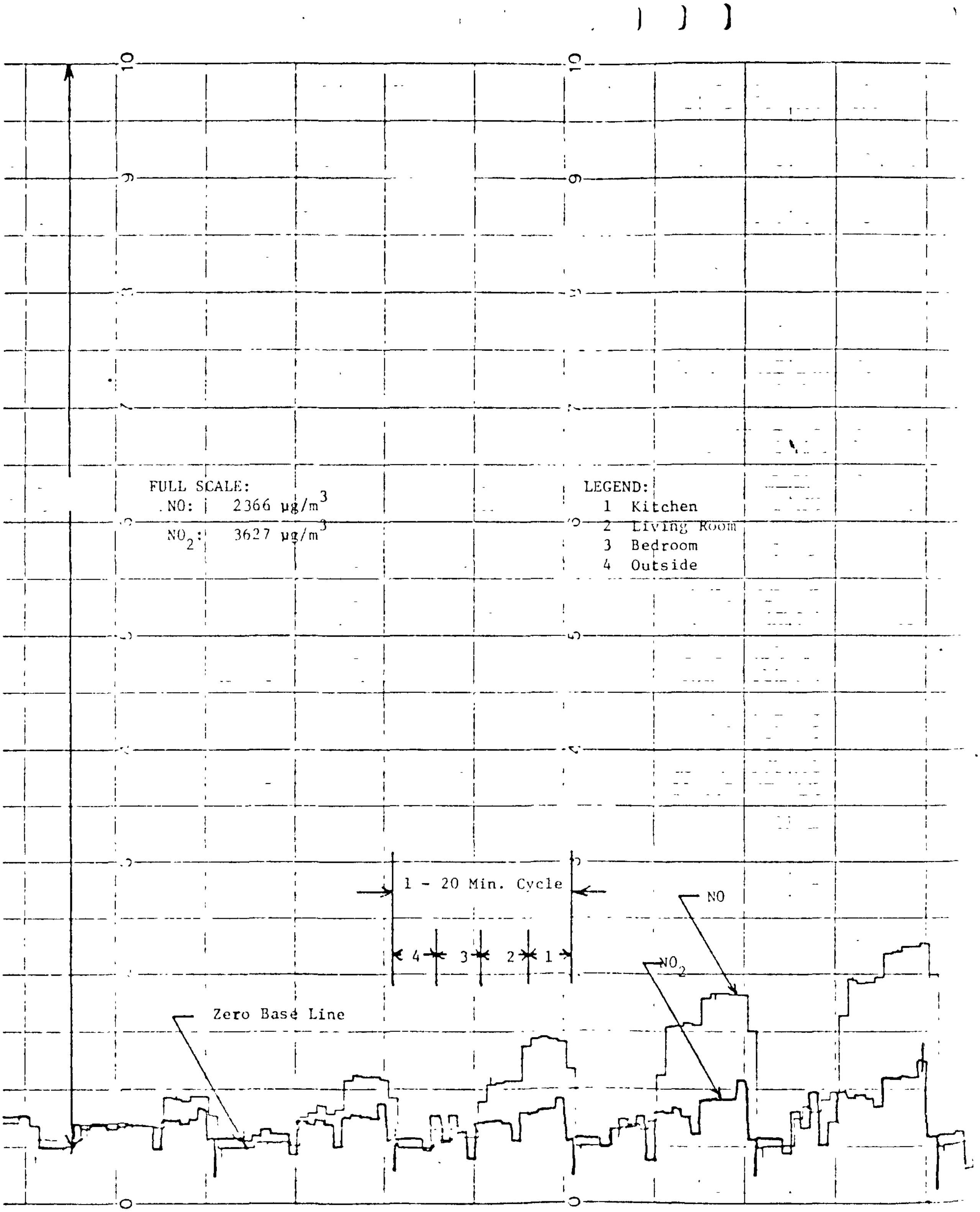

FIGURE 3-10

Sample NO/NO_2 Trace

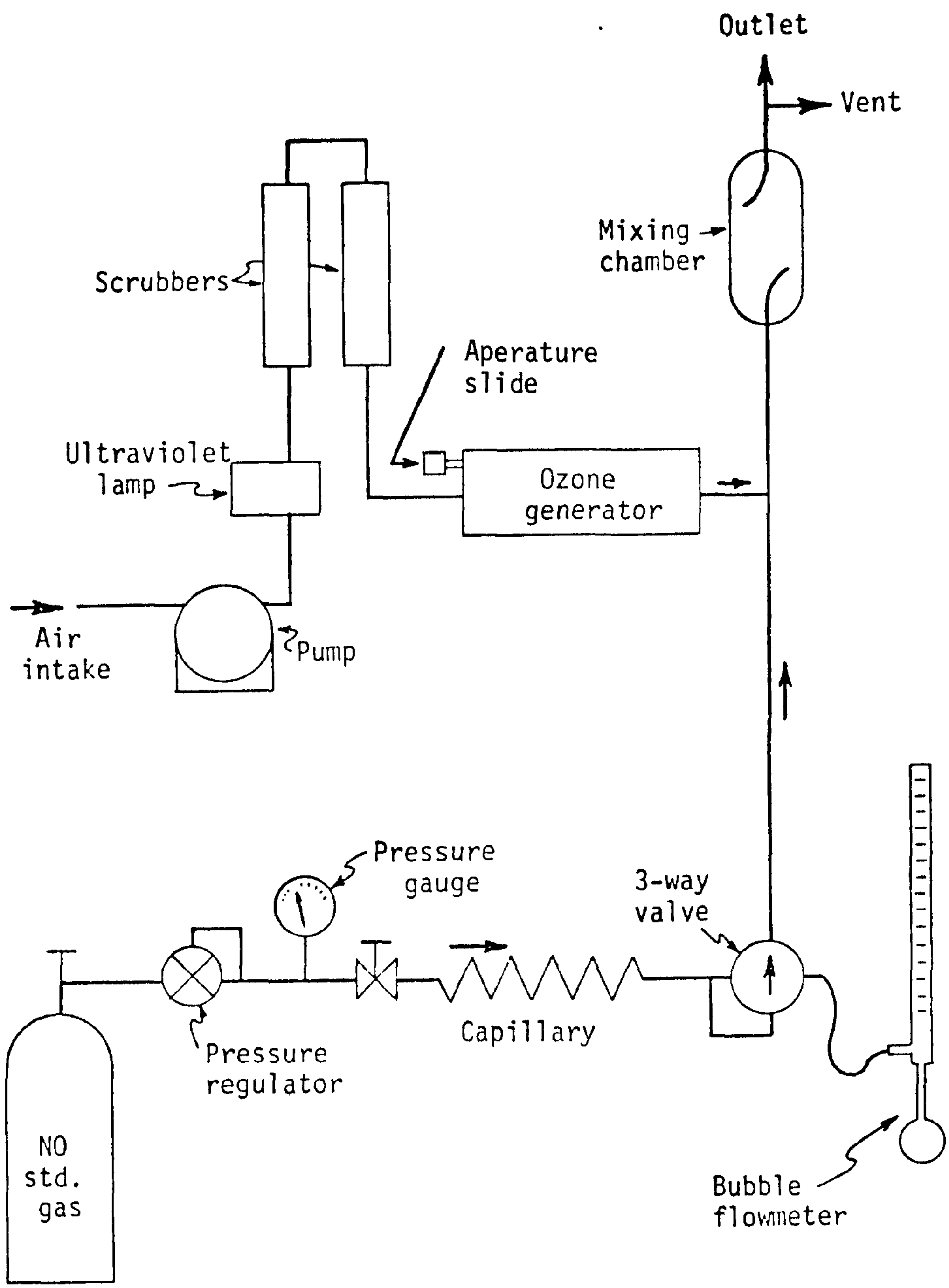

FIGURE 3-11

NO - NO_2 Calibration System

3.4 Field Operations

The sampling equipment and auxiliary calibration devices were installed in an unobtrusive location in each house that would not result in interference with the residents' activities. Teflon sample lines were run from the equipment to four sampling locations:

Designation	Spring-Summer	Fall-Winter
Station #1	Kitchen-Over Stove (except Home No. 1)	Kitchen-Over Stove
Station #1A		Kitchen-Approx. 1 meter from Stove
Station #2	Living Room	Living Room
Station #3	Bedroom	Bedroom
Station #4	Outside of Structure	Outside of Structure

The sample intake for each station was placed in the breathing zone, between 1.4 and 1.8 meters above the floor. The sample intake for Station #1, in the kithcen, was placed directly over the stove except at House No. 1 during the spring-summer sampling period. For this sampling period at House No. 1, the sample intake was placed approximately 1 meter from the stove. This location corresponds to Station 1A for the fall-winter sampling period when it was possible to locate Station 1 directly above the stove. The data from Station 1 was used to determine the concentrations of NO_2, NO and CO at the source, the stove. Comparison of these data with those obtained from the other stations shows the behavior of the pollutants as they diffuse through the structure and the effect of the source on the indoor air quality within the structure.

Station 1A (placed approximately 1 meter from the stove) was used in the fall-winter sampling period to determine NO_2, NO and CO concentrations within the kitchen, other than directly above the stove. These data were intended to show the behavior of the pollutants in the vicinity of the stove as they diffuse from the source throughout the structure.

Station 2 was placed in the living room away from windows, doors and air conditioners. Station 2 was used (alternately with Station 3) for about half of the fall-winter sampling period at each house. Comparison of the data obtained from Stations 1, 1A and 2 was intended to show the characteristic changes in indoor air quality in an area on the same level as the source, at Station 1.

Station 3 was placed in an upper level bedroom to provide data to determine the relationship between concentrations in the kitchen and more remote areas within the structure, particularly where people spend 8 hours sleeping. As noted earlier, this sampling location was alternated with Station 2 during the fall-winter sampling period at each house with the exception of House No. 4. At this house, it was not possible to sample at Station 3 because of the inconvenience it would have caused the residents.

Station 4 was placed outside the structure to provide reference measurements for the pollutants measured indoors. Measurement of the outdoor pollutant concentrations was necessary to determine if they control the indoor concentration by infiltration. The net contribution of the stove to indoor air quality was determined by comparing the outdoor with the indoor concentrations.

After installation of the equipment and deployment of the sampling lines, TRC personnel verified their correct function in the operating mode. Calibration procedures as mentioned in Section 3.3 were used after a warm-up period of several hours and sampling of the four stations was started.

A form was developed for use by the housewife or other person using the kitchen to record pertinent data on stove use. The total number of minutes of oven and burner use were tabulated for each day of sampling. These forms provided a record of the level of use and the respective time of use of the stove that was useful for interpretation of the sampling data. A copy of this form is shown as Figure 3-12.

TRC personnel serviced the equipment at least every other day. The service included calibration and functional checks of the sampling equipment. Adjustments were made as necessary. The residents assisted by frequently recording time and events directly on the strip charts and alerting TRC to any possible malfunction that occurred.

In general, the instrumentation in the measurement system performed well and dependably for the duration of both portions of Task 2, except for several problems at House No. 3. The Bendix Chemiluminescent NO/NO_x Analyzer held its calibration and baseline very well and in retrospect we probably could have reduced the frequency of calibration checks.

Substantial data were lost at House No. 3 during the spring-summer sampling period by a combination of sticking solenoid valves for Stations 1 and 2.

Shortly after this problem was rectified, a solenoid valve in the Bendix Chemiluminescent NO/NO_x Analyzer malfunctioned, thus preventing separate determinations for NO and NO_2. We replaced this instrument with a back-up one and the amount of lost data was minimized.

STOVE USAGE FORM

PROJECT 32247 - A STUDY OF INDOOR AIR QUALITY

HOME OF ______________________________

DATE ______________ MEAL: B _____ L _____ S _____ OTHER _____

LR
(1) TIME ON __________
(2) TIME OFF __________
(3) SETTING __________
(4) TYPE OF FOOD PREPARED
____
____

(5) DESCRIBE COOKING UTENSIL USED ____
____

RR
(1) TIME ON __________
(2) TIME OFF __________
(3) SETTING __________
(4) TYPE OF FOOD PREPARED
____
____

(5) DESCRIBE COOKING UTENSIL USED ___
____

LF
(1) TIME ON __________
(2) TIME OFF __________
(3) SETTING __________
(4) TYPE OF FOOD PREPARED
____
____

(5) DESCRIBE COOKING UTENSIL USED ____
____

RF
(1) TIME ON __________
(2) TIME OFF __________
(3) SETTING __________
(4) TYPE OF FOOD PREPARED _____
____
____

(5) DESCRIBE COOKING UTENSIL USED ___
____

	TIME ON	TIME OFF	TEMP., °F	TYPE OF FOOD PREPARED	DESCRIBE COOKING UTENSIL USED
OVEN					
BROIL			--		

TEST CONDITIONS

(1) EXHAUST FAN: ON ____ OFF ____

(2) KITCHEN WINDOW: OPEN ____ CLOSED ____

(3) AIR CONDITIONING: ON____OFF____

(4) WHAT DOORS OPEN? __________
____

COMMENTS:

Zero drift in the CO detector was a recurring problem during the spring-summer sampling period. In most cases, we were able to interpret the data adequately but in a few cases the baseline drift was so extreme that some data were lost. TRC personnel performed an extensive overhaul of the CO analyzer prior to the outset of the fall-winter sampling period and the CO zero drift problem was solved.

The schedule of monitoring periods was as shown below:

	Spring-Summer	Fall-Winter
House No. 1	May 9, 1973 to May 25, 1973	Nov. 6, 1973 to Nov. 21, 1973
House No. 2	May 29, 1973 to June 10, 1973	-----
House No. 3	June 11, 1973 to July 13, 1973	Nov. 28, 1973 to Dec. 28, 1973
House No. 4	----	Jan. 29, 1974 to Feb. 15, 1974

3.5 Data Summarization

The considerable amount of data accumulated from the field effort in Task 2 precluded manual examination of the data in its entirety. Semi-automatic analog to digital conversion equipment and computer programs were used to reduce the labor in the data evaluation process.

Each strip chart was examined and valid data periods were identified for further reduction. Those sections of the charts that showed questionable data were eliminated from evaluation. The data from the NO/NO_2 charts were converted to digital form and thence to punch cards using a Gerber analog-to-digital converter. The data from the CO charts were hand reduced, then transferred to coding forms for subsequent keypunching. Random samples of the punch cards were cross-checked with the original charts. Care was taken to insure that the data matched and keypunch errors were eliminated. Initial computer printouts included both concentration values and net chart division displacement to facilitate further checking of the results. The results were then put on punch cards or magnetic tape for additional analysis.

To develop diurnal trends in air quality at the three indoor and one outdoor sampling locations, we accumulated five-minute bits into two-hour averages. Occasionally, less than 6 (the maximum possible number) five-minute bits of data were available for each two-hour period since some data were lost during instrument servicing periods and during periods of instrument malfunctions. In a few isolated cases, there were as few as one or two five-minute bits for a given two-hour period. Nevertheless, we defined the two-hour average as the average of all five-minute bits in that period even though less than 6 bits might be available The data in Appendix B show the two-hour averages for each location and the number of five-minute bits used for calculation of the averages.

In calculating the daily averages, we gave equal weight to all two-hour averages even though some were based on less than 6 bits of data. However, a daily average was not computed for any day which had one or more two-hour average values missing for all four stations. Note in Appendix B that daily averages are shown only for those days in which a full compliment of two-hour averages were available.

In addition to the above summaries, we developed a number of summaries of the diurnal pattern of NO_2 for several of the house-pollutant-season combinations in terms of a "composite day". Here we determined the average concentration for each two-hour time interval for all those days for which 12 valid two-hour average values were available.

Frequency distributions for NO, NO_2 and CO data were compiled from all the five-minute data at each location for each house in order to assess the frequency of exposure to the range of concentrations measured during the field program. In constructing these distribution curves, we used all five-minute data and assumed that any loss of data during a sampling period was more or less randomly distributed by time of day. While these frequency distributions may not be statistically valid because of the loss of a certain amount of data, we believe they provide useful information. However, we did not include NO_2 and NO data from House No. 3 because we judged the loss of data for these pollutants at this house to be excessive.

In addition to the above data presentations, we plotted graphs showing the time history of NO_2, NO and CO for brief episodes in order to show the direct dependence of indoor concentrations on stove usage.

4.0 RESULTS AND DISCUSSION

The sampling data were organized and evaluated in terms of several different time averaging periods. The shortest time averaging period is the five-minute average concentration of each pollutant at each of the four sampling locations. For each sampling location there are three five-minute average readings in each hour. We chose to compile these five-minute readings into two-hour and daily averages in order to view the diurnal variation of pollutant concentrations as well as to compare the measured values on a daily basis.

The procedure for summarizing data was presented in Section 3.5. The air quality data for each house are presented in Appendix B and are organized as follows:

Appendix	House No.	Season
B-1	1	Spring-Summer
B-2	1	Fall-Winter
B-3	2	Spring-Summer
B-4	3	Spring-Summer
B-5	3	Fall-Winter
B-6	4	Fall-Winter

In each Appendix, the tables are organized for each of the pollutant gases in the order of NO_2, NO, and CO.

In some instances, we have prepared graphs of the five-minute data which illustrate short term episodes of interest. Finally, to provide a more meaningful indication of the pollutant concentrations to which the home occupants are exposed than would be shown by a hourly or daily average concentrations, a frequency distribution of all the five-minute average data for each pollutant was constructed.

4.1 House No. 1 - Suburban Split Level Home

During the spring-summer sampling period, the four sampling points were located as follows:

1. Kitchen (approximately 1 Meter from stove)
2. Living Room

3. Upstairs Bedroom
4. Outside

This was the first house we sampled in this program and early indications were that a kitchen sampling location directly above the stove would produce peak values which would exceed the capability of the nitrogen oxides sensing instrument. Thus, the sampling point was moved approximately 1 meter away from the stove for the two-week spring-summer sampling period. At the other three houses we found we were able to use a sampling point above the stove.

Between the spring-summer and fall-winter sampling period, the EPA Project Officer requested that data be collected at somewhat different locations during the fall period to provide additional data on diffusion of stove contaminants through the house. Thus, the sampling in the fall-winter period was somewhat different for each half of the two-week period as shown below:

FIRST HALF		SECOND HALF	
1.	Kitchen - above stove	1.	Kitchen - above stove
1A.	Kitchen - approximately 1 meter from stove	1A.	Kitchen - approximately 1 meter from stove
2.	Living Room	3.	Bedroom
4.	Outside	4.	Outside

4.1.1 Nitrogen Dioxide (NO_2)

Tables 4-1 and 4-2 present data for House No. 1 during the spring-summer and the fall-winter sampling periods respectively. Even though stove use data for the second half of the fall sampling period were lost, the indoor/outdoor air quality data for this portion of the sampling period are reported. It is apparent in a general way from Tables 4-1 and 4-2 that NO_2 concentrations in this house are strongly influenced by stove use. During the spring-summer sampling the periods when daily average NO_2 concentrations in the kitchen were near or exceeded 100 $\mu g/m^3$ coincided with days of significant stove use.

TABLE 4-1

SPRING (1973) SAMPLING AT HOUSE NO. 1
DAILY AVERAGE NO_2 CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)				Total Stove Use (min)	
	1-Kitchen (1 Meter from Stove)	2-Living Room	3-Upper Bedroom	4-Outside	Oven	Burner[1]
5/12/73	125	74	62	44	195	335
5/13/73	65	38	35	25	0	50
5/15/73	154	95	78	73	220	195
5/22/73	70	40	31	25	20	75
5/23/73	94	60	54	56	45	80
5/24/73	87	56	49	42	40	60
OVERALL DAILY AVERAGE	100	61	52	44		

[1] In this table and all subsequent tables of this type the burner use times are computed from the sum of all minutes of individual burner use during the day shown, e.g., if during a day three burners were on for 10 minutes, two burners on for 20 minutes, and one burner was on for 30 minutes, the total burner time would be (3 x 10) + (2 x 20) + 30 = 100 minutes.

TABLE 4-2

FALL (1973) SAMPLING AT HOUSE NO. 1
DAILY AVERAGE NO_2 CONCENTRATIONS AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, $\mu g/m^3$					Total Stove Use, Min*	
	1-Kitchen Above Stove	1A-Kitchen 1 meter from stove	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/07/73	67	56	59	--	35	55	76
11/08/73	98	77	97	--	57	130	62
11/10/73	28	28	16	--	20	0	21
11/11/73	62	50	34	--	32	165	113
11/12/73	71	64	51	--	64	70	59
11/13/73	84	95	78	--	86	70	98
11/14/75	62	53	51	--	58	0	20
OVERALL DAILY AVERAGE	67	60	55	--	50		
11/15/73	84	65	--	60	69	--	--
11/16/73	63	58	--	43	62	--	--
11/17/73	85	65	--	32	18	--	--
11/18/73	67	61	--	37	29	--	--
11/19/73	219	119	--	53	44	--	--
11/20/73	139	34	--	71	53	--	--
OVERALL DAILY AVERAGE	110	67	--	49	46		

* Stove use data not available during second half of period.

The same conclusion can be drawn for the fall-winter period, but it is not nearly as clear cut as for the spring-summer period. Relatively less stove use during the fall-winter period and higher outdoor NO_2 levels as compared to the spring-summer period contribute to a reduced indication of a direct cause and effect relationship between indoor NO_2 and stove use. During both sampling periods, there is an indication that the oven is more influential than the burners in contributing to levels of NO_2 indoors.

Outdoor concentrations appear to influence indoor concentrations to the extent that they penetrate the structure and produce indoor "background" levels to which indoor-generated NO_2 is added. This is shown in comparing the patterns of indoor/outdoor NO_2 for May 12 and 15, 1973, in Table 4-1. These were both days of relatively high and similar stove use, but outdoor NO_2 concentrations were quite different: 44 $\mu g/m^3$ on May 12 and 73 $\mu g/m^3$ on May 15th. Kitchen concentrations were higher on May 15 by about the same amount as outdoor concentrations as compared to May 12th. Furthermore, the relatively high outdoor concentrations on May 12 prevented the bedroom concentrations from getting below 78 $\mu g/m^3$ on a daily basis.

If a similar analysis is attempted on data for the fall-winter period (Table 4-2) it is not possible to show a clear-cut influence of outdoor NO_2 levels on indoor concentrations. This can be attributed largely to the house being closed up to a greater extent in November as compared with May.

Table 4-3 is presented to compare further the two sampling periods in House No. 1 in terms of average values over the entire sampling periods. In addition, we have computed non-kitchen values as a percent of the kitchen value (either directly over the stove in the fall-winter or 1 meter from the stove

TABLE 4-3

SUMMARY OF AVERAGE NO_2 VALUES AND STOVE USE

House No. 1 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day)(1)		
	Kitchen above stove	Kitchen 1 Meter from stove	Living Room	Bedroom	Outside	Oven	Burner	Total(2)
Spring, 1973								
NO_2 Concentration, $\mu g/m^3$	--	100	61	52	44	87	133	220
% of remote kitchen value	--	100	61	52	--			
Indoor/Outdoor ratio	--	2.27	1.39	1.18	1.00			
Fall, 1973 (first half)								
NO_2 Concentration, $\mu g/m^3$	67	60	55	--	50	70	64	134
% max. kitchen value	100	90	82	--	--			
% remote kitchen value	--	100	91					
Indoor/Outdoor ratio	1.34	1.20	1.10	--	1.00			
Fall 1973 (second half)								
NO_2 Concentration, $\mu g/m^3$	110	67		49	46			
% max. kitchen values	100	61		45	--			
% remote kitchen value	---	100		69	--			
Indoor/Outdoor ratio	2.39	1.46		1.07	1.00			

(1) Stove use data not available for second half of fall period.

(2) The sum of oven and burner use. The two are not strictly additive but the sum is a useful reference in comparing sampling periods.

in the spring-summer); indoor/outdoor ratios; and relative stove use during the period.

Average stove use in the first half of the fall period was only 0.6 of the use in the spring. The ratio of fall to spring values for the comparable kitchen locations (1 meter from stove) was 0.6 and for the living room, 0.9. Although several interpretations of these values are possible because of the complex interplay of a number of effects, the most logical is that the more closed-up attitude of the house in the fall lessens dilution of NO_2 as it diffuses through the house. Furthermore, the relatively low concentrations inside the house during the fall relative to outside concentrations tend to obscure any dilution effects. Also, note in the data for the fall period (Table 4-2) that there are two instances where average living room concentrations exceeded those at the remote kitchen location 1 meter from the stove (See data for 11/7 and 11/8). On both days, outdoor NO_2 levels were considerably below those indoors. We attribute this to a lack of dilution of indoor air by outdoor air because the house is sealed relatively tightly.

Figures 4-1 and 4-2 are graphs showing the diurnal patterns of NO_2 in House No. 1 for the spring and first half of the fall periods respectively. These graphs are based on a "composite day" which was developed from the averages of all two-hour average values for a given time period for each of the complete sampling days (no two-hour average values missing).

These graphs show clearly the rapid drop off of NO_2 concentrations between the kitchen and the living room during the spring and the more gradual drop off between these two rooms in the fall. This presumably is the result of the house being more tightly closed during the colder weather. Note also the lack of a morning and noon kitchen peak during the fall period.

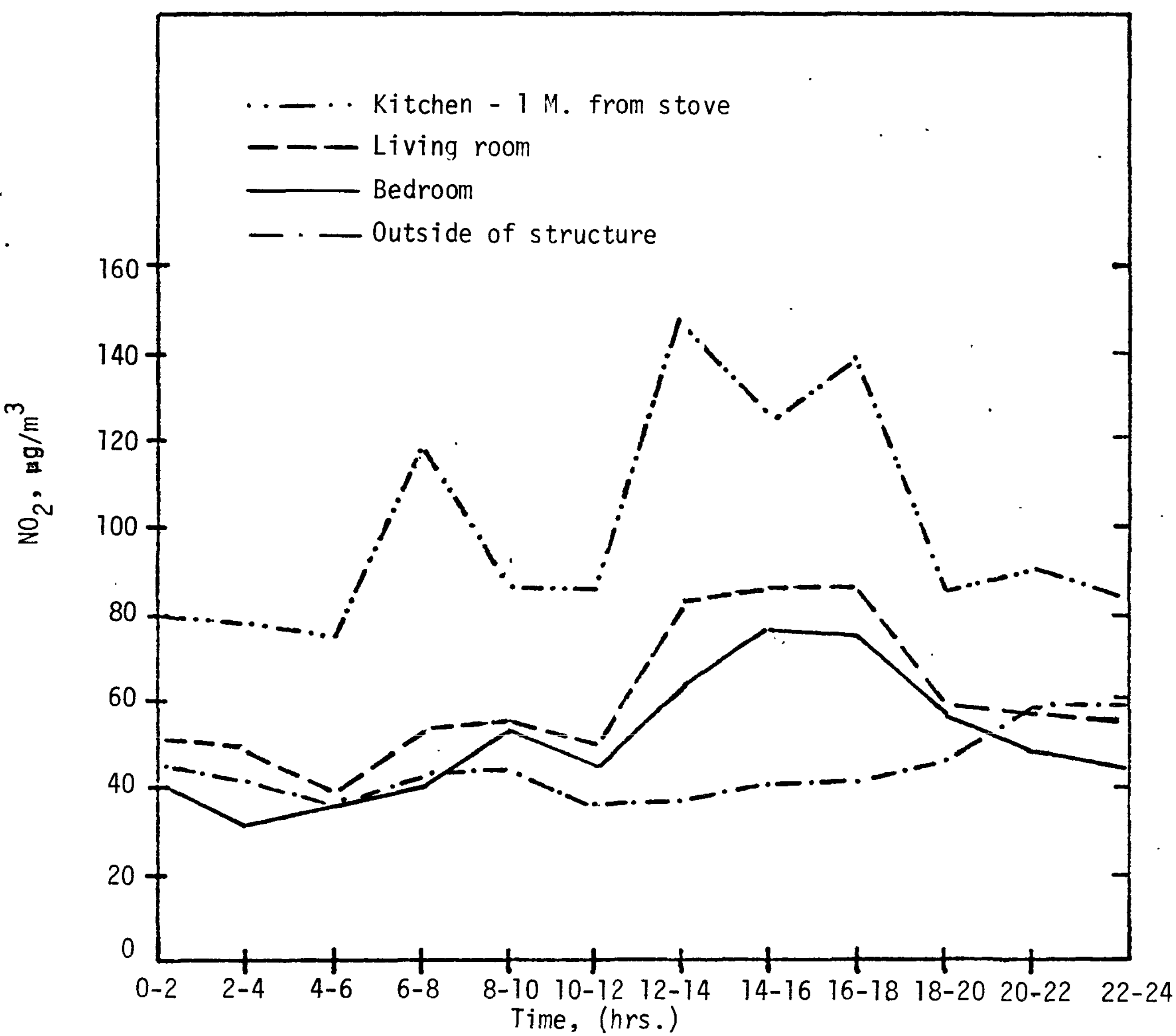

FIGURE 4-1
Diurnal Indoor/Outdoor Pattern for NO_2 - House No. 1, Spring-Summer 1973
(Composite day based on 6 days of data)

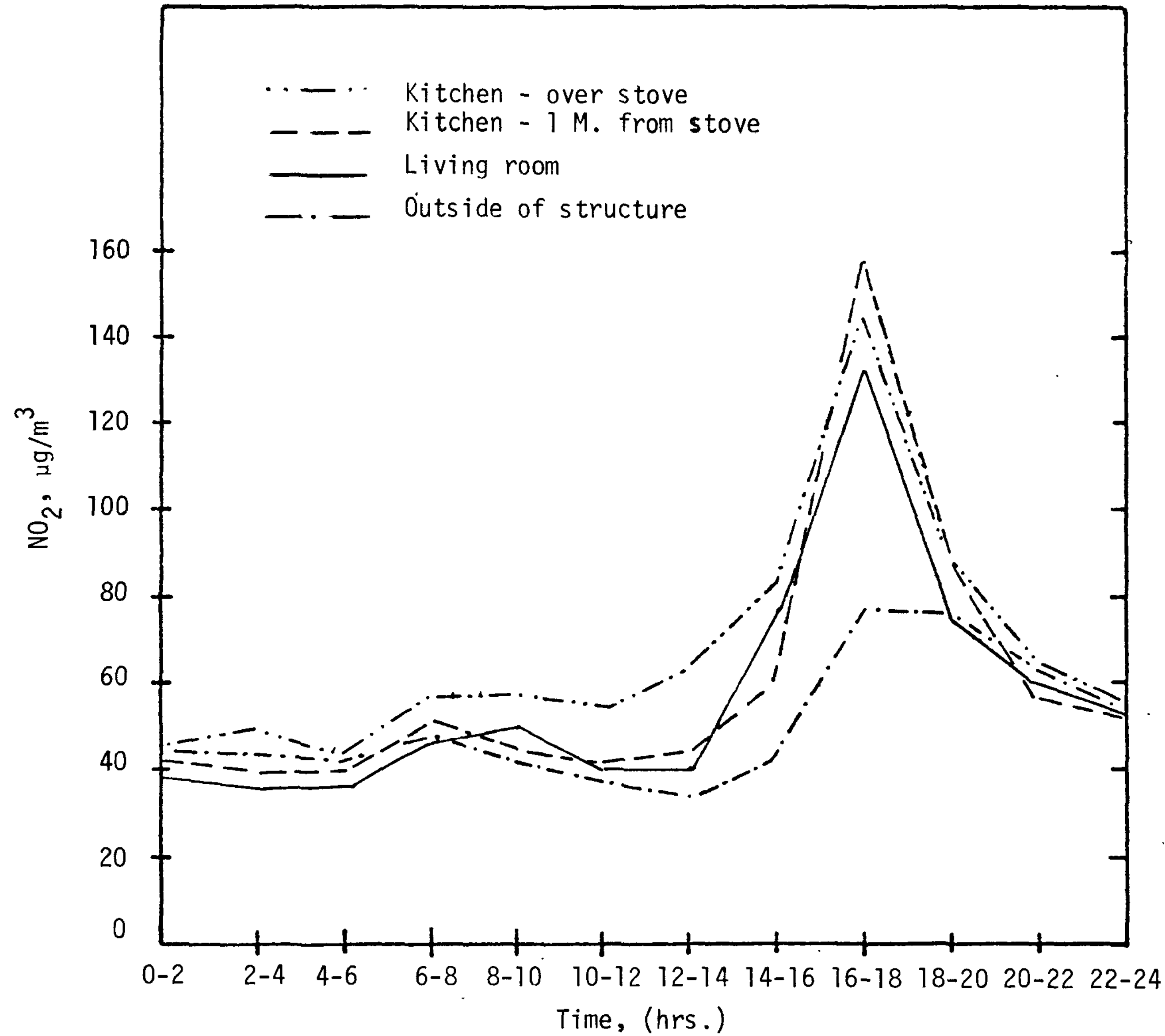

FIGURE 4-2
Diurnal Indoor/Outdoor Pattern for NO_2 - House No. 1, Fall 1973 (first half)
(Composite day based on 7 days of data)

Figure 4-3 is a time history of a 4-day period during the spring sampling at House No. 1, showing NO_2 concentrations based on two-hour average values together with data on stove use. This graph shows the immediate response of the kitchen NO_2 levels to stove use. NO_2 levels elsewhere indoors also respond quickly to stove use. Analysis of the two-hour average NO_2 data shows that the greatest effect on indoor NO_2 concentrations is caused by the oven.

Figure 4-4, a graph of the two-hour average NO_2 concentrations during a two-day period in the fall, further illustrates the effect of stove use on the indoor air quality. As with the spring sampling period, the oven creates the highest two-hour average NO_2 levels. When only the burners on the stove were used, the average NO_2 concentrations were noticeably less.

Note that on two occasions the 2-hour average NO_2 level at Station 2 (living room) exceeded one or both of the kitchen values. While part of this is doubtless the effect of entrapment of NO_2 within a relatively tightly closed house, this apparent anomaly may have been caused in part by the sequential nature of our sampling method. If the stove is turned on just before Station 2 (living room) is sampled, this station will respond rapidly to stove contributions. If the stove is turned off within the 10-minute period before Station 1 (kitchen over stove) is sampled, the level of NO_2 in the kitchen could drop below the earlier level in the living room.

A cursory examination of Figure 4-4 might give the impression that outdoor concentrations are influenced by indoor generation. This is not

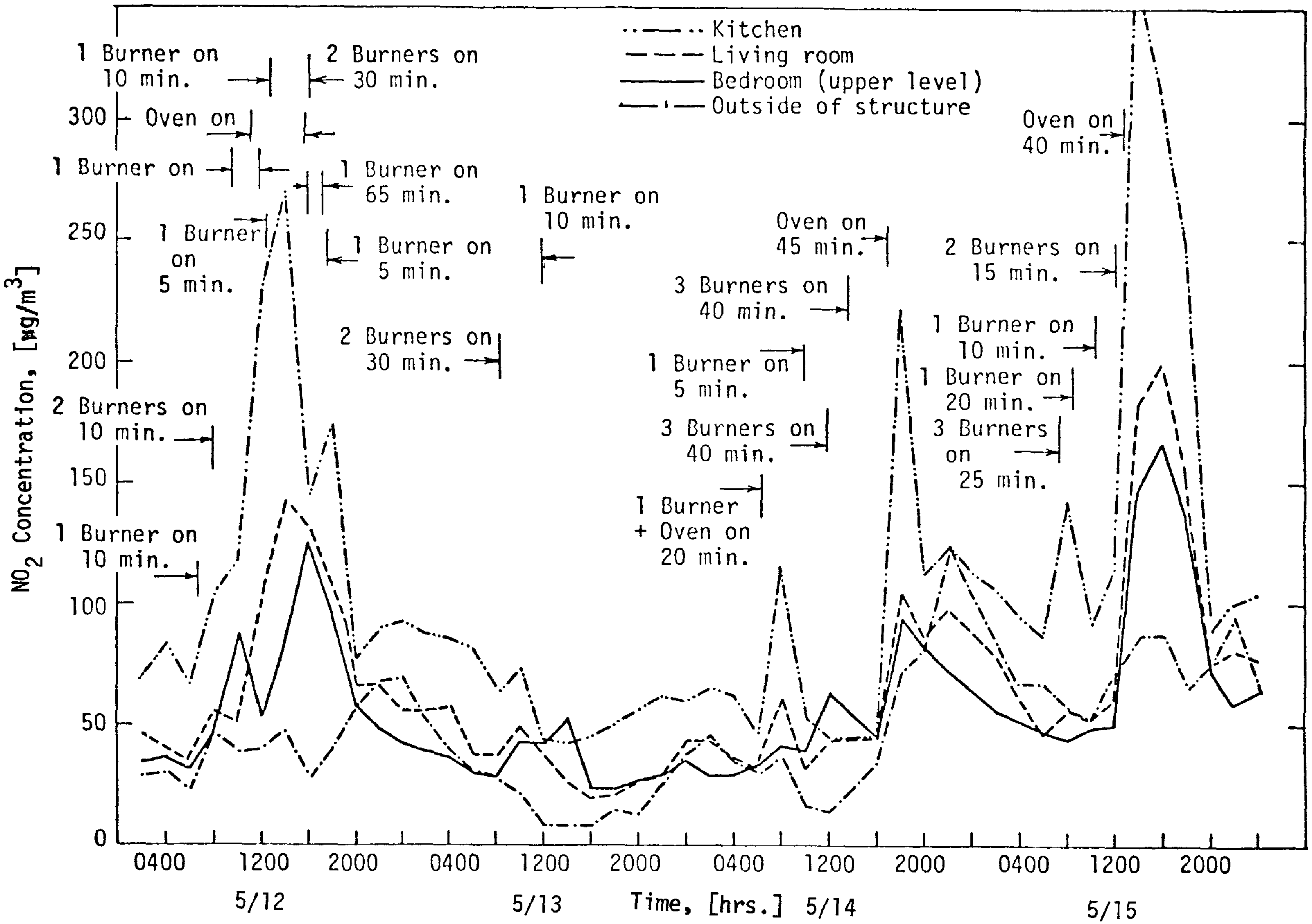

FIGURE 4-3

House No. 1 - A Time History of NO_2 Concentrations, 2-Hour Averages

Spring, 1973

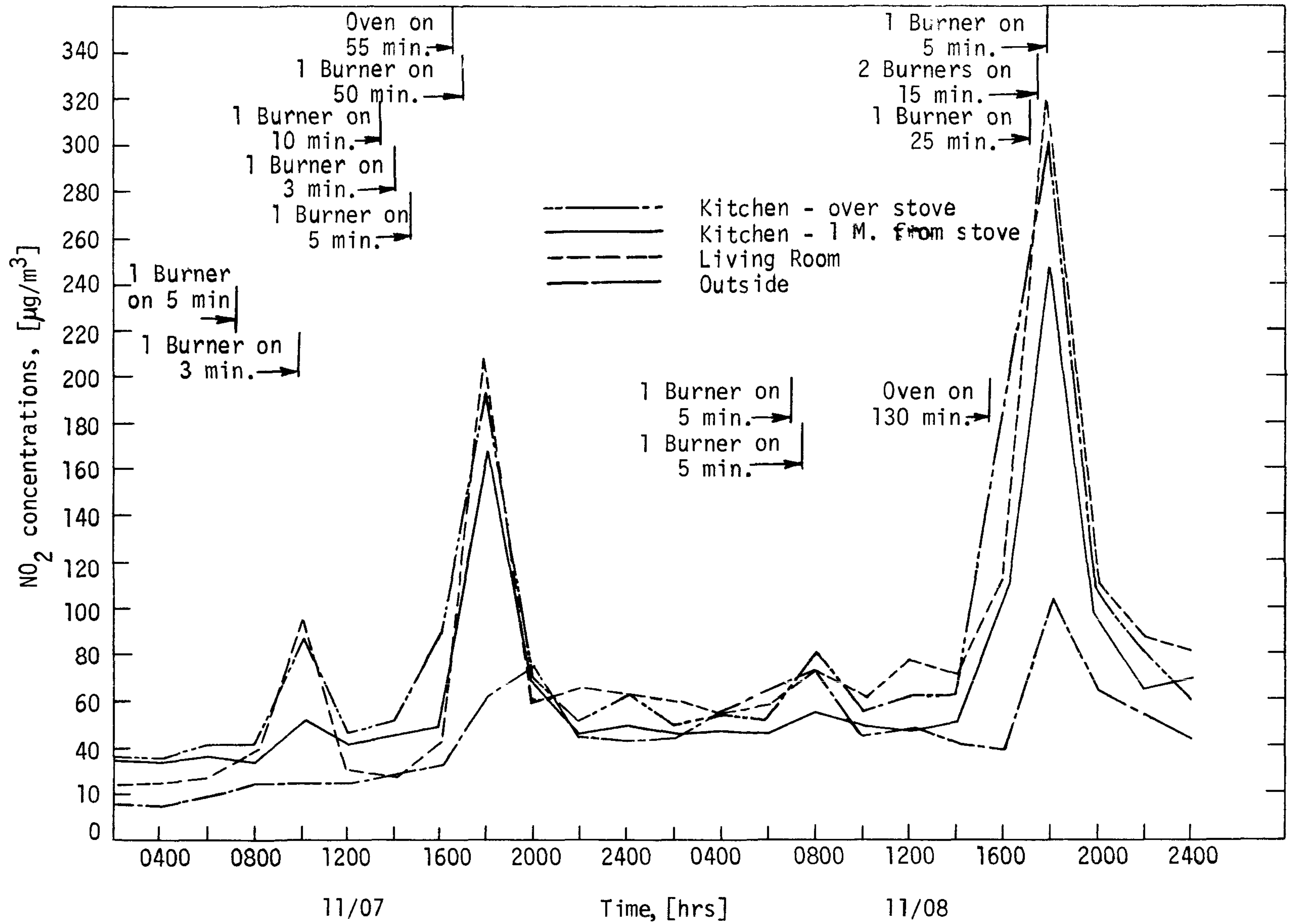

FIGURE 4-4

House No. 1 - A Time History of NO_2 Concentrations, 2-Hour Averages
Fall, 1973

the case, but the converse is true. Outdoor NO_2 levels reached peak values at approximately the same times of day during both the summer and the fall sampling periods. These peaks are associated with the time periods of greatest traffic activity on nearby roads and are frequently coincident with times of meal preparation at this house.

During inactive periods, NO_2 concentrations were close to but slightly greater than the outdoor NO_2 levels. This difference is attributable to the pilot lights. Our laboratory study (Task 1) showed that the pilot lights consume approximately 0.5 cubic feet(.014 cu M) of natural gas per hour.

A frequency distribution of all the five-minute NO_2 data acquired from House No. 1 was prepared to show the relative occurrence of various NO_2 levels within this structure. Figure 4-5 is a log-probability graph of the NO_2 frequency distribution for all five-minute data at each of the four sampling locations for the spring sampling period.

The graph shows that for any chosen percent of data less than a given value, the sampling locations were arranged high to low in the same order: kitchen, living room, bedroom, and outside, the expected pattern. Although displaced in terms of concentration in the aforementioned order, the three indoor locations have essentially parallel distributions up to the 90% level. The living room and upper bedroom data are parallel through their entire length but the kitchen has a noticeably divergence from this general trend at the 90% level. This noticeable effect of indoor generation on the distribution of NO_2 concentrations measured in the kitchen was not as evident in the data for the other indoor locations.

Figure 4-5 clearly shows that the NO_2 concentrations measured indoors have a distribution quite distinct from the outdoor data. The kitchen particularly reflects the influence of internal generation of NO_2 by the stove with a significant number of observations above 100 $\mu g/m^3$.

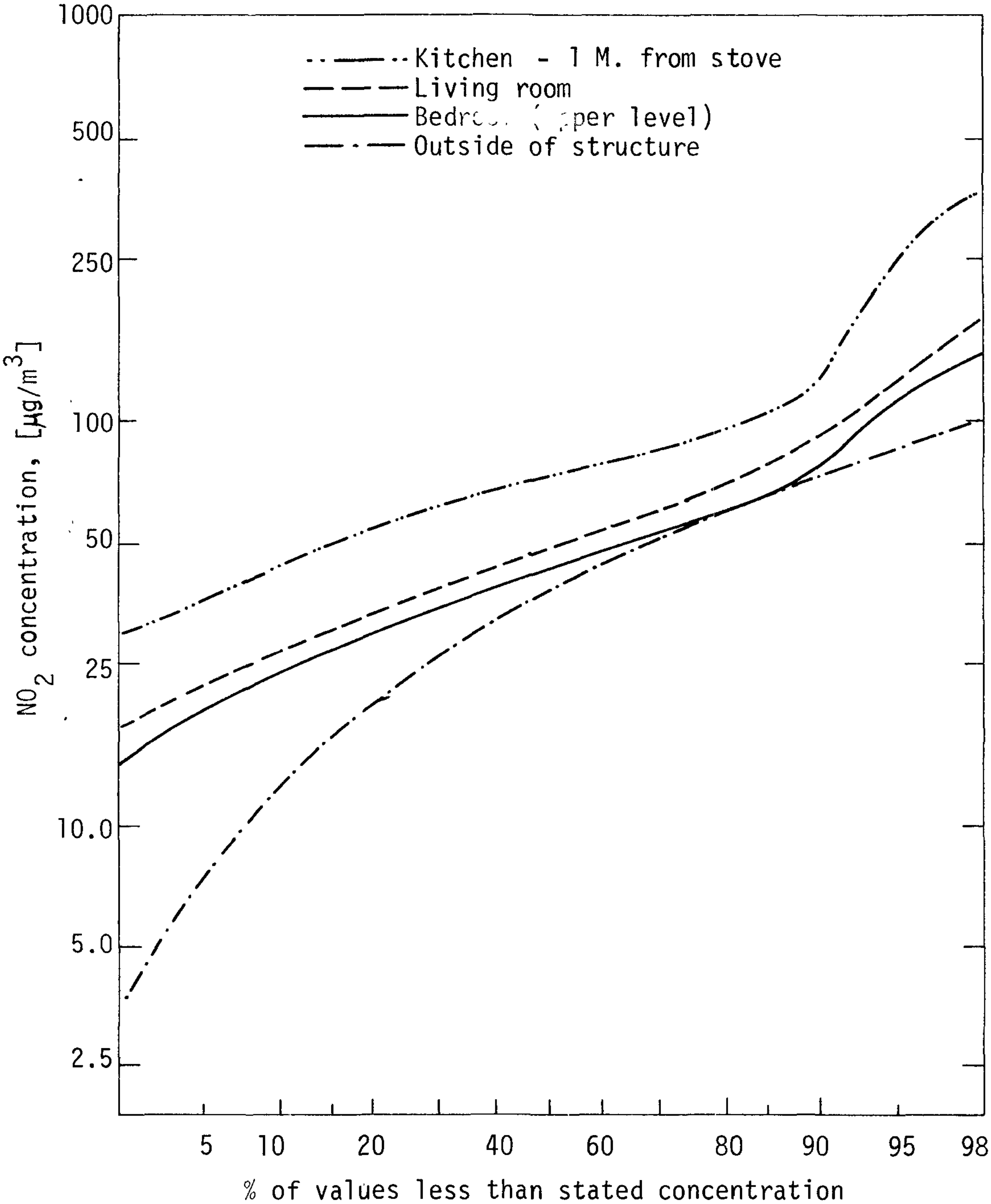

FIGURE 4-5

House No. 1 - Frequency Distribution of NO_2 Concentrations, Five-minute Data

Spring, 1973

We use 100 $\mu g/m^3$ as a basis for comparing the frequency distribution of NO_2 concentrations at various points in the house since this is the outdoor air quality standard. While we are dealing with the indoor inhabited atmosphere for which there is as yet no air quality standard, it is still part of the total human exposure and use of an adopted outdoor standard based on human health effects as a guideline for exposure seems appropriate at this time. If greater than 50% of the values at a given sampling point are above 100 $\mu g/m^3$, it is conceivable that the arithmetic average of the 5-minute data would exceed 100 $\mu g/m^3$. If these data are typical of long term occurrences, they would then be considered to be reasonably representative of long term (annual) exposures.

NO_2 levels in excess of 100 $\mu g/m^3$ occurred in 16% of the data from the kitchen, 9% of the data from the living room and 6% of the data from the upper-level bedroom. Except for a few isolated instances, no data in excess of 100 $\mu g/m^3$ were collected from Station 4, outside House No. 1

The frequency distribution of the NO_2 data for the fall sampling period at House No. 1 was separated into two sub-periods, one for the time when Station 2 was located in the living room (first half of sampling period), and the other for Station 3 in the bedroom (second half of sampling period). The results for the two sub-periods are shown in Figures 4-6 and 4-7 respectively. With Station 2 in the living room (Figure 4-6), the NO_2 distribution curves for each of the locations are quite similar and in fact intertwine with each other in many instances. These distributed data do not shown the clear cut separation as appeared in the spring sampling period.

Approximately 10 percent of the indoor data from all three locations was in excess of 100 $\mu g/m^3$, which is less for Station 1 and slightly more for Stations 1A & 2 than was shown in the summer. As mentioned earlier, this is primarily due to the lower level of stove activity during the fall as compared with the spring. The relatively larger quantity of concentration readings greater than 100 $\mu g/m^3$ at the other indoor locations and the close relationship of the indoor concentration distributions, again, appear to show

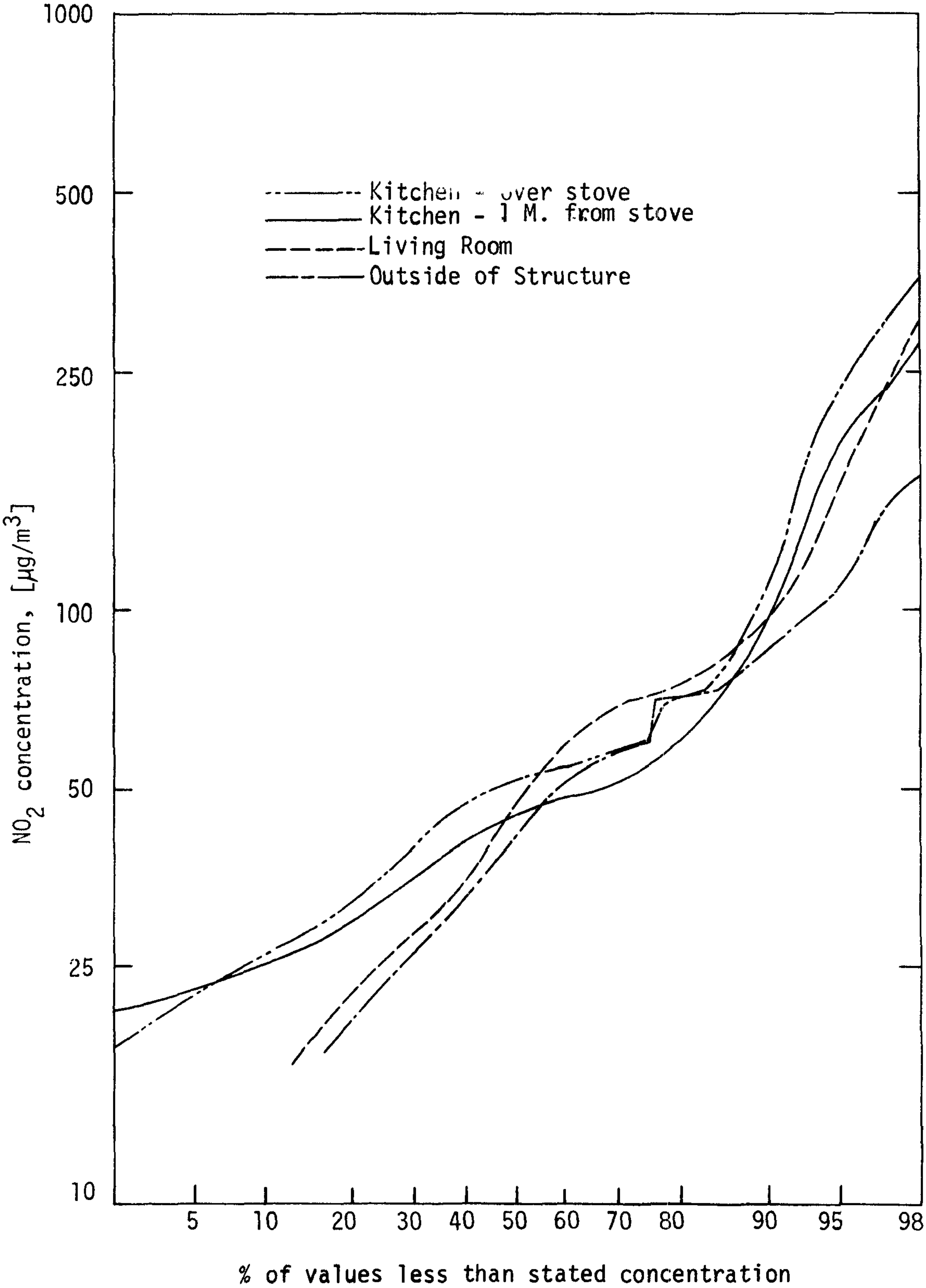

FIGURE 4-6

House No. 1 - Frequency Distribution of NO_2 Concentrations, Five-minute Data Fall, 1973, 1st half of period.

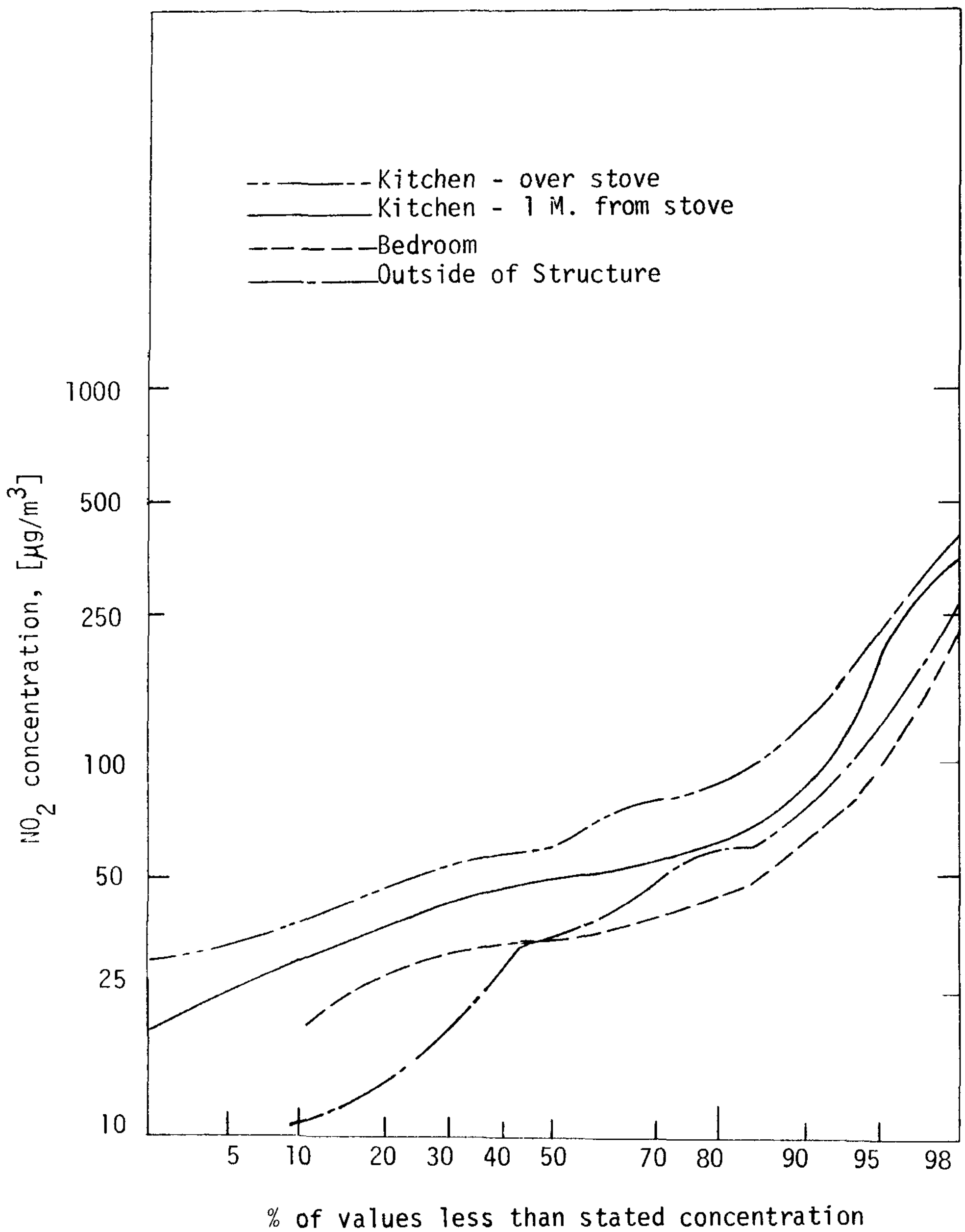

FIGURE 4-7

House No. 1 – Frequency Distribution of NO_2 Concentrations, Five-minute Data Fall, 1973, 2nd half of period.

the effect of the house being in more of a closed-up attitude in the colder weather.

The frequency distribution of NO_2 data with Station 3 in the bedroom, (Figure 4-7) shows a more distinct separation of the NO_2 levels in the kitchen from the bedroom and outdoors. Fifteen percent of the station #1 concentrations were greater than 100 $\mu g/m^3$, and eight, six, and five percent of the data from Stations 2,3, and 4 respectively, were in excess of 100 $\mu g/m^3$. The upper level bedroom, the farthest possible location from the stove within this house, shows relatively high independence from the outdoor ambient NO_2 levels through the top 50% of the data.

4.1.2 Nitric Oxide (NO)

Table 4-4 presents a summary of the daily average NO concentrations for the six full days of spring sampling at House No. 1. Over this sampling period, the NO concentration in the kitchen was approximately four times the average NO level outside the structure. In comparing Table 4-4 with 4-1, the overall indoor concentrations of NO and NO_2 are about equal for this sampling period. However, the overall outdoor NO_2 concentration is almost twice the outdoor NO concentration. While most sources of nitrogen oxides generate much more NO than NO_2 with eventual conversion of NO to NO_2 in the atmosphere, TRC's laboratory investigations of stove operations (Task 1) indicate that the NO and NO_2 are formed in nearly equal amounts over a wide range of stove operating conditions.

Comparison of stove use and daily NO concentrations yeilds about the same correlations as was earlier noted with respect to NO_2. In general, the highest daily NO concentrations were associated with days of high stove usage.

Table 4-5 shows a summary of the daily average NO concentrations for the fall sampling period at House No. 1. Overall, the NO concentrations during the fall were substantially greater both indoors and outside during the fall than they were in the spring. The outside NO concentration was more than twice as high as that measured in the spring. Conservation of NO within the kitchen was more apparent than for NO_2.

TABLE 4-4

Spring (1973) Sampling at House No. 1

DAILY AVERAGE NO CONCENTRATIONS AND STOVE USAGE DATA

Date	Daily Average NO Concentration, (μg/m^3)				Total Stove Use (min)	
	1-Kitchen 1 Meter from stove	2-Living Room	3-Upper Bedroom	4-Outside	Oven	Burner
5/12/73	112	65	57	18	195	335
5/13/73	47	22	28	12	0	50
5/15/73	175	132	145	37	220	195
5/22/73	66	30	20	16	20	75
5/23/73	142	101	106	66	45	80
5/24/73	72	34	31	9	40	60
OVERALL DAILY AVERAGE	102	64	65	26		

TABLE 4-5

Fall (1973) Sampling at House No. 1

DAILY AVERAGE NO CONCENTRATIONS AND STOVE USAGE DATA

Date	Daily Average N[illegible]ntration, µg/m^3					Total Stove Use Min. *	
	1-Kitchen Above Stove	1A-Kitchen 1M from Stove	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/07/73	91	75	73		22	55	76
11/08/73	207	191	160		90	130	62
11/10/73	21	20	12		14	0	21
11/11/73	126	130	60		46	165	113
11/12/73	184	190	128		112	70	59
11/13/73	215	219	140		100	70	98
11/14/73	109	113	88		59	0	20
OVERALL DAILY AVERAGE	136	134	94		63		
11/15/73	141	138		112	99		
11/16/73	66	73		55	22		
11/17/73	71	76		43	15		
11/18/73	65	65		46	21		
11/19/73	228	195		147	60		
11/20/73	235	241		209	171		
OVERALL DAILY AVERAGE	134	131		102	65		

* Stove use data not available during second half of period.

The effect of ambient outdoor NO levels on the indoor NO concentration is somewhat different than appeared with the NO_2. In Table 4-5 we see that two days of similar stove activity, 7 November and 12 November, had substantially different NO levels outdoors and subsequently, indoors as well. Outdoor NO levels on 12 November averaged 5 times those recorded on 7 November. On each of these days, NO levels at Station 1 were approximately 70 $\mu g/m^3$ higher than ambient levels outdoors on the same day. The direct influence is dampened somewhat by the relatively isolated indoor environment caused by closed doors and windows during the colder season.

Table 4-6 is organized similarly to Table 4-3 for NO_2 and is based on averages for entire sampling periods. In comparing Table 4-6 with Table 4-3, one is struck with the extreme complexity of the indoor/outdoor patterns of NO and NO_2. Thus, interpretations must be made largely on the basis of experienced judgment together with data which appear to show some trends. The principal variables which affect indoor patterns of NO and NO_2 are:

1. Stove use
2. Permeability of the house (higher in spring than in fall)
3. Indoor/outdoor ratio
4. Loss of pollutant through reaction, adsorption, and other mechanisms

In Table 4-3, note that outdoor concentrations of NO_2 are about the same for spring and fall, but fall concentrations of NO as shown in Table 4-6 are more than twice the average for the spring. While an analysis of the meteorology and the details of outdoor air quality are outside the scope of this program, we presume that the warmer weather, higher incidence of sunlight

TABLE 4-6

SUMMARY OF AVERAGE NO VALUES AND STOVE USE

House No. 1 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day) *		
	Kitchen above stove	Kitchen 1 Meter from stove	Living Room	Bedroom	Outside	Oven	Burner	Total
Spring, 1973								
NO Concentration, $\mu g/m^3$	--	102	64	65	26			
% of remote kitchen value	--	100	63	60	--	87	133	220
Indoor/Outdoor ratio	--	3.92	2.46	2.50	1.00			
Fall, 1973(first half)								
NO Concentration, $\mu g/m^3$	136	134	94	--	63			
% of max. kitchen value	100	99	69	--	--	70	64	134
% of remote kitchen value		100	70	--	--			
Indoor/Outdoor ratio	2.16	2.13	1.49	--	1.00			
Fall, 1973(second half)								
NO Concentration, $\mu g/m^3$	134	131		102	65			
% of Max Kitchen Value	100	98		76	--			
% of Remote Kitchen Value		100		78				
Indoor/Outdoor Ratio	2.06	2.02		1.57	1.00			

* Stove use data not available during second half of Fall period.

and photochemical processes contributed to the more complete conversion of NO to NO_2 in the spring as compared with the fall.

In comparing the "percent" of remote kitchen value" for NO in the spring and fall in Table 4-6, there is a drop to 63% in the spring and 70% in the fall. This is presumed to be the joint effect of higher house permeability in the spring and higher outdoor NO levels in the fall.

A graph of the two-hour average NO concentrations versus time for the same time period in the spring as shown earlier for NO_2 (Figure 4-3) is presented in Figure 4-8. Comparison of the two figures (4-3 and 4-8) shows them to be basically similar with common peaks and analogous traces. Stove use readily affected the indoor NO levels and the behaviour of the NO with time and distance from the source was the same during both periods.

We do not present a typical time history for NO during the fall since such a graph would not add significantly to our basic knowledge.

Comparison of NO and NO_2 two-hour averaged data in addition to the graphical data also shows that the total oxides of nitrogen (NO and NO_2) did not remain constant during and after stove operation but increased and declined with stove use. This observation is evidence that the generation and diffusion of NO_2 rather than conversion of NO to NO_2 is the predominant source of indoor NO_2. The conversion of NO to NO_2 by reaction with atmospheric oxygen is inhibited by the lack of sunlight available inside the house to promote that reaction.

A frequency distribution of the five-minute average NO data obtained during the spring sampling period at House No. 1 is shown in Figure 4-9. The NO concentrations measured in the kitchen ranged from 4 $\mu g/m^3$ to 500 $\mu g/m^3$. Although the distribtuions of NO and NO_2 concentrations in the spring are somewhat similar, one notable difference between the two sets of data is the uniform

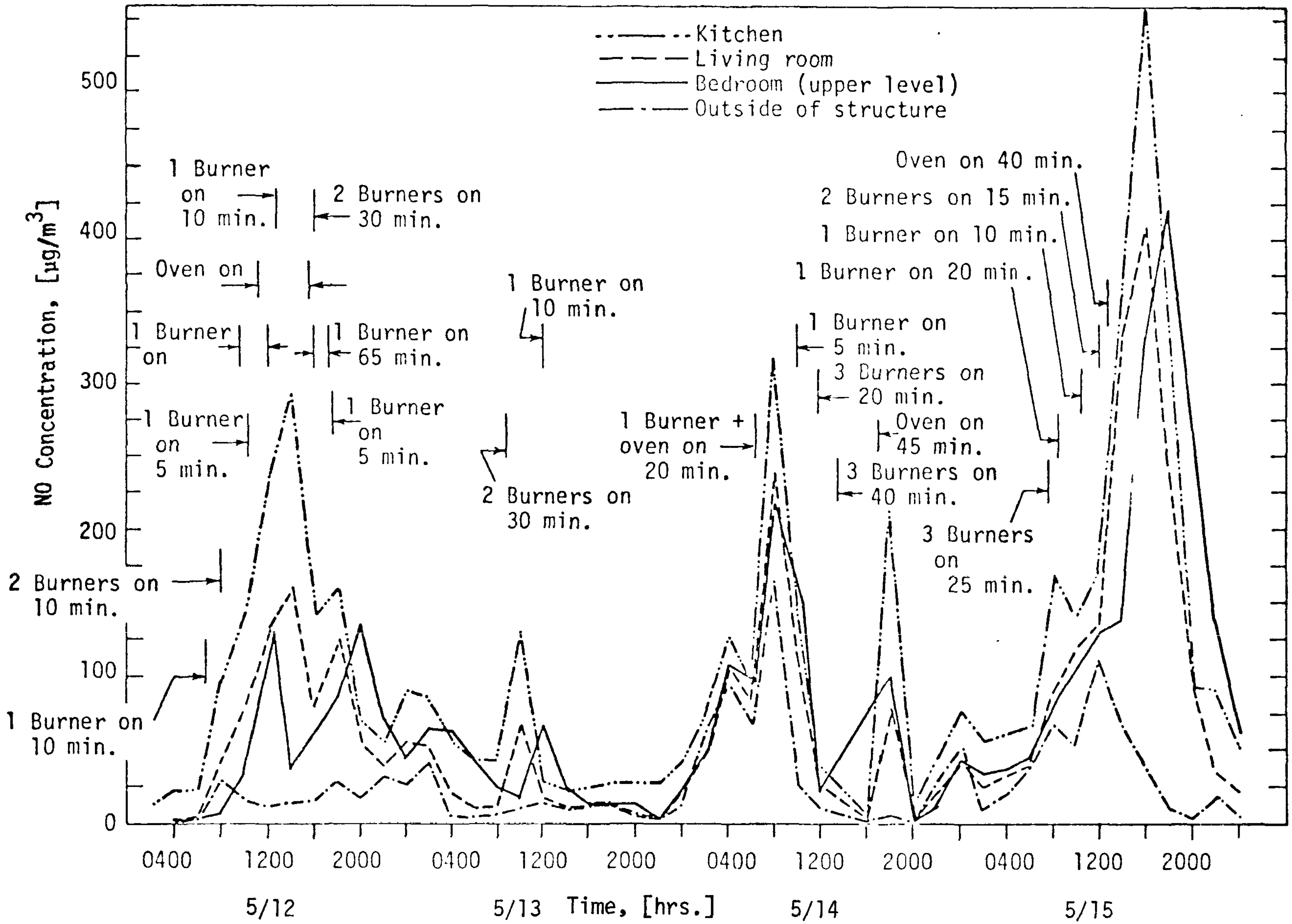

FIGURE 4-8

House No. 1 - A Time History of NO Concentrations, 2-Hour Averages

Spring, 1973

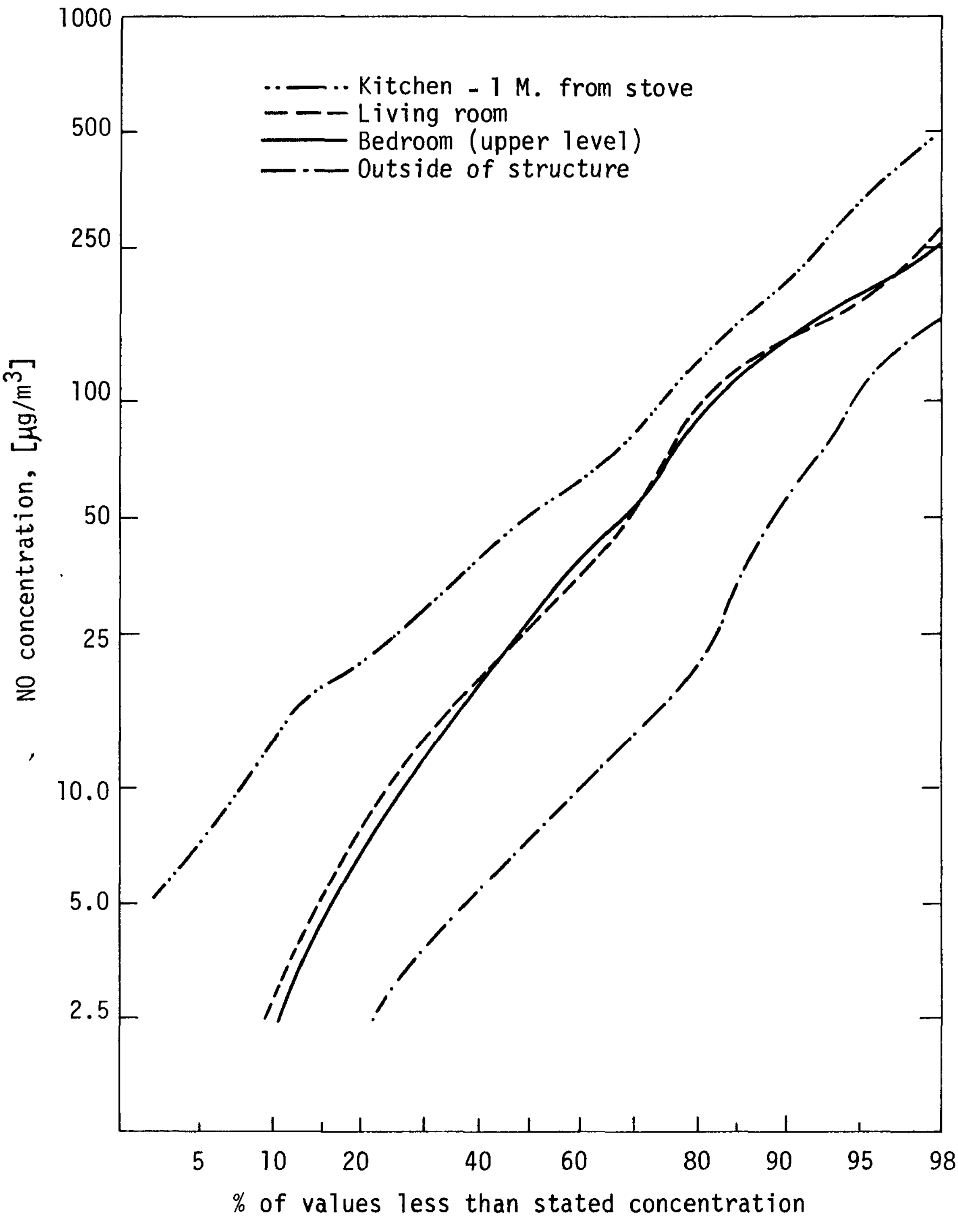

FIGURE 4-9

House No. 1 - Frequency Distribution of NO Concentrations, Five-minute Data
Spring, 1973

distribution of the kitchen NO data compared to the abrupt increase in NO_2 levels at high concentrations. This observation may be explained by our results from laboratory study of stove operations which indicate that some stove operating conditions generate more NO_2 than NO.

The frequency distribution of the five-minute NO data from the fall sampling period with Station 2 in the living room is presented in Figure 4-10. Figure 4-11 is a graph of the frequency distribution of five-minute NO data with Station 3 located in the bedroom of House No. 1. Figure 4-10 shows the very close relationship between Stations 1 and 1A. Nitric oxide is shown as relatively inert and is conserved well in its diffusion into the kitchen from the stove. The living room has a distinctly lower occurrence of a specific NO concentration than the kitchen. All of the indoor locations in both sampling periods showed higher NO concentrations than occurred outdoors. The frequency distribution presenting NO data when Station 3 was located in the bedroom (Figure 4-11) shows the three indoor locations as more closely related than during the earlier sampling. Approximately 60% of the indoor NO concentrations were less than 100 $\mu g/m^3$ during this week of sampling.* The earlier week's sampling, with Station 2 in the living room (Figure 4-10) showed NO concentrations less than 100 $\mu g/m^3$ only 40% to 60% of the time. During the spring sampling period, the indoor NO levels were less than 100 $\mu g/m^3$ for 70-80% of the time. Generally, the occurrence of higher NO concentrations indoors during the fall is caused by the higher background NO levels present outdoors and the more tightly closed attitude of the house in the fall.

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*The 100 $\mu g/m^3$ is not significant for NO since there is no ambient air quality standard for this pollutant. However, it is convenient to use this concentration as a basis for comparison since it is the ambient air quality standard for NO_2 (annual average) and NO and NO_2 and generated together in gas flames.

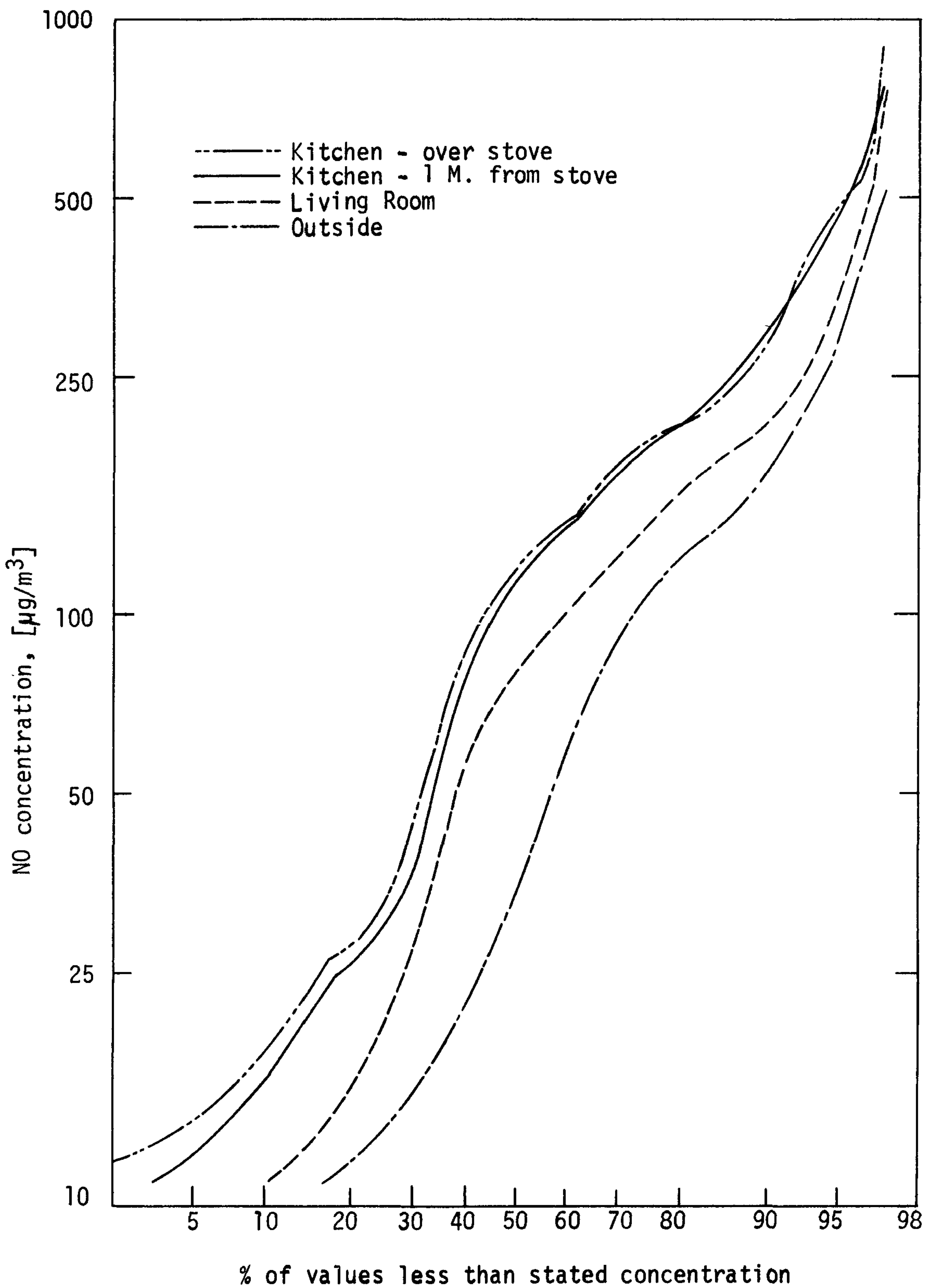

FIGURE 4-10

House No. 1 - Frequency Distribution of NO Concentrations, Five-minute Data
Fall, 1973, 1st half of period

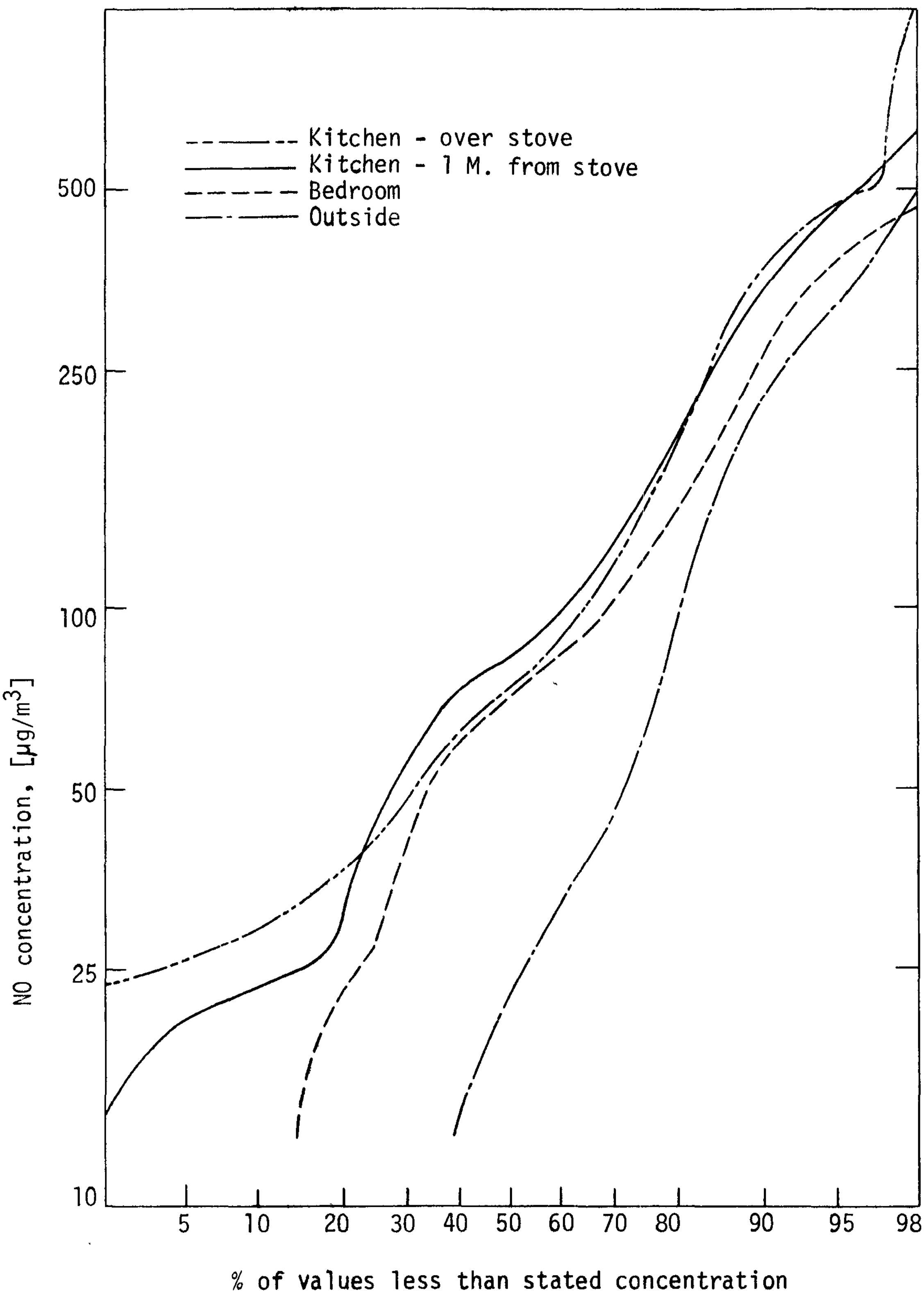

FIGURE 4-11

House No. 1 - Frequency Distribution of NO Concentrations, Five-minute Data
Fall, 1973, 2nd half of period

4.1.3 Carbon Monoxide (CO)

The daily average carbon monoxide levels for the spring sampling period at House No. 1 are compiled in Table 4-7. Over the entire spring sampling period at House No. 1, the daily average carbon monoxide concentration in the kitchen was approximately 1.3 times greater than the daily average CO concentration outside the structure. This is considerably less than the ratio between kitchen and outdoor concentrations for NO_2 and NO. (2.3 and 3.9 respectively for the same period)

An examination of the two-hour time averaged data contained in Appendix B-1 also shows that the CO generated within the house was not as widespread as were the two oxides of nitrogen. The carbon monoxide levels generally did not increase at rates similar to NO and NO_2 and in some cases did not reach peak levels until after the stove was shut off. The rates of increase of CO concentrations in the living room and bedroom were similar to the rate of increase in the kitchen.

Table 4-8 is a summary of the daily average CO concentrations at House No. 1 during the fall sampling period. In spite of a considerably lower level of stove activity during the first half of this sampling period, carbon monoxide levels were about the same indoors but lower outdoors when compared to the spring data. During the second half of the fall sampling period when stove use data were not available, the indoor CO levels again were similar to those in the spring but the outdoor levels were lower. CO levels in the kitchen average 2.5 times greater than outdoors during the first part of the fall sampling period. Stations 1 and 1A showed a similarity in average CO levels that were comparable to those measured for NO, with Station 1A averaging concentrations that were 84% and 88% of those measured directly over the stove for the first and second halves of the fall period. As demonstrated with NO_2 and NO, the indoor CO levels at various indoor locations were much

TABLE 4-7

Spring (1973) Sampling at House No. 1

DAILY AVERAGE CO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average CO Concentration, ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen(1M From Stove)	2-Living Room	3-Upper Bedroom	4-Outside	Oven	Burner
5/12/73	6430	5800	5920	5080	195	335
5/13/73	8980	8680	8980	8230	0	50
5/14/73	5650	5430	5610	5070	130	85
5/15/73	5660	5150	5430	4060	220	195
5/16/73	3280	2720	2840	2240	15	165
5/21/73	3070	2630	2600	2100	20	50
5/22/73	1400	1120	1020	970	20	75
5/23/73	3190	2750	2840	1930	45	80
5/24/73	2770	2360	2330	1660	40	60
OVERALL DAILY AVERAGE	4490	4070	4170	3480		

TABLE 4-8

Fall (1973) Sampling at House No. 1

DAILY AVERAGE CO CONCENTRATIONS AND STOVE USAGE DATA

Date	Daily Average CO Concentration, $\mu g/m^3$					Total Stove Use, Min *	
	1-Kitchen Above Stove	1A-Kitchen 1 M from Stove	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/07/73	4670	3800	3570		1800	55	76
11/08/73	6130	5330	4800		2530	130	62
11/09/73	3240	2870	2580		1200	0	82
11/10/73	2730	2080	1960		1140	0	21
OVERALL DAILY AVERAGE	4190	3520	3230		1670		
11/15/73	5270	4730		4430	2790		
11/16/73	3920	3480		2850	1560		
11/17/73	3750	3140		2800	1550		
11/18/73	4140	3550		3217	1834		
11/19/73	5082	4360		4090	2370		
11/20/73	6550	6010		5600	3760		
OVERALL DAILY AVERAGE	4790	4210		3830	2310		

*Stove use data not available for second half of period.

..loser to each other during the fall than in the summer. This shows the effect of a more sealed up attitude of the house in the fall as compared with the spring.

As noted earlier, CO concentrations at House No. 1 during the fall do not appear to peak as fast as NO_2 and NO. In several cases, CO levels did not reach peak values until after the stove was shut off. The rate of increase of CO levels indoors was similar for all locations.

Table 4-9 summarizes CO concentrations and stove use data for House No. 1 for both the spring and fall sampling periods. Because of less stove use in the fall (first half of period), indoor concentrations of CO are slightly lower in the fall as compared to the spring. However, the indoor/outdoor ratio is much higher for the fall data which reflects the more tightly closed aspect of the house in the fall. Also it appears that there are other sources of indoor CO besides the stove. This house was used in the first indoor/outdoor air quality study conducted by TRC* and we found that the attached garage in this house could contribute significantly to indoor CO concentrations under certain circumstances. It is conceivable that auto exhausts entrapped in the garage, in diffusing through the house, add to the levels of indoor CO. Such an effect will be enhanced by cold weather when the warm house acts like a "stack" and can induce air from the garage at the lower level and spread it through the house.

We do not present any typical CO time histories for House No. 1 but the two-hour average data for the spring and fall are presented in Appendices B-1 and B-2 respectively.

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*See Reference (1) on page 1.

TABLE 4-9

SUMMARY OF AVERAGE CO VALUES AND STOVE USE

House No. 1 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day)		
	Kitchen above stove	Kitchen 1 Meter from stove	Living Room	Bedroom	Outside	Oven	Burner	Total
Spring, 1973								
CO Concentration, $\mu g/m^3$	--	4490	4070	4170	3480			
% of remote kitchen value		100	91	93	--	76	122	198
Indoor/Outdoor ratio		1.29	1.17	1.20	1.00			
Fall, 1973 (first half)								
CO Concentration, $\mu g/m^3$	4190	3520	3230	--	1670			
% of max. kitchen value	100	84	77	--	--	46	60	106
% of remote kitchen value	--	100	92	--	--			
Indoor/Outdoor ratio	2.51	2.11	1.93	--	1.00			
Fall, 1973 (second half)								
CO Concentration, $\mu g/m^3$	4790	4210		3830	2310			
% of max. kitchen value	100	88		80	--			
% of remote kitchen value	--	100		91	--			
Indoor/Outdoor ratio	2.07	1.82		1.66	1.00			

* Stove use data not available for second half of fall period.

Figures 4-12, 4-13, and 4-14 are cumulative frequency distributions of the five-minute averaged CO data from House No. 1 during the spring, the fall with Station 2 in the living room, and the fall with Station 3 in the bedroom, respectively. The two distributions from the two fall periods have similar shapes, but the curves for spring measurements drop off sharply for low values. For each sampling period, the three indoor locations had very similar frequency of occurrences of specific concentrations. This illustrates the relative independence of CO concentrations from the sampling location as compared to NO_2 and NO for five-minute periods. For the fall distributions, the curves for the three indoor locations are closely grouped and there is a greater difference between the grouped indoor curves and the outdoor curve than was shown in the spring data.

4.2 House No. 2 Urban Two Story Home

4.2.1 Nitrogen Dioxide (NO_2)

Fall sampling was not carried out at this house since the amount of stove use by the single occupant was not sufficient to make an adequate evaluation.

Table 4-10 presents the daily averages of NO_2 at House No. 2. It is readily apparent that there is little difference in the concentrations measured at the four locations when averaged over a day. Outdoor NO_2 concentrations were about twice as high at House No. 2 compared to the other structures. This reflects the urban location and proximity of House No. 2 to local traffic arteries. The frequency of stove use was considerably less than for House No. 1 and this appeared to be the reason for the uniformity until we examined the two-hour averaged data.

Figure 4-15 is a graph of a portion of the two-hour averaged data included in Appendix B-3. It shows the specific influence of stove

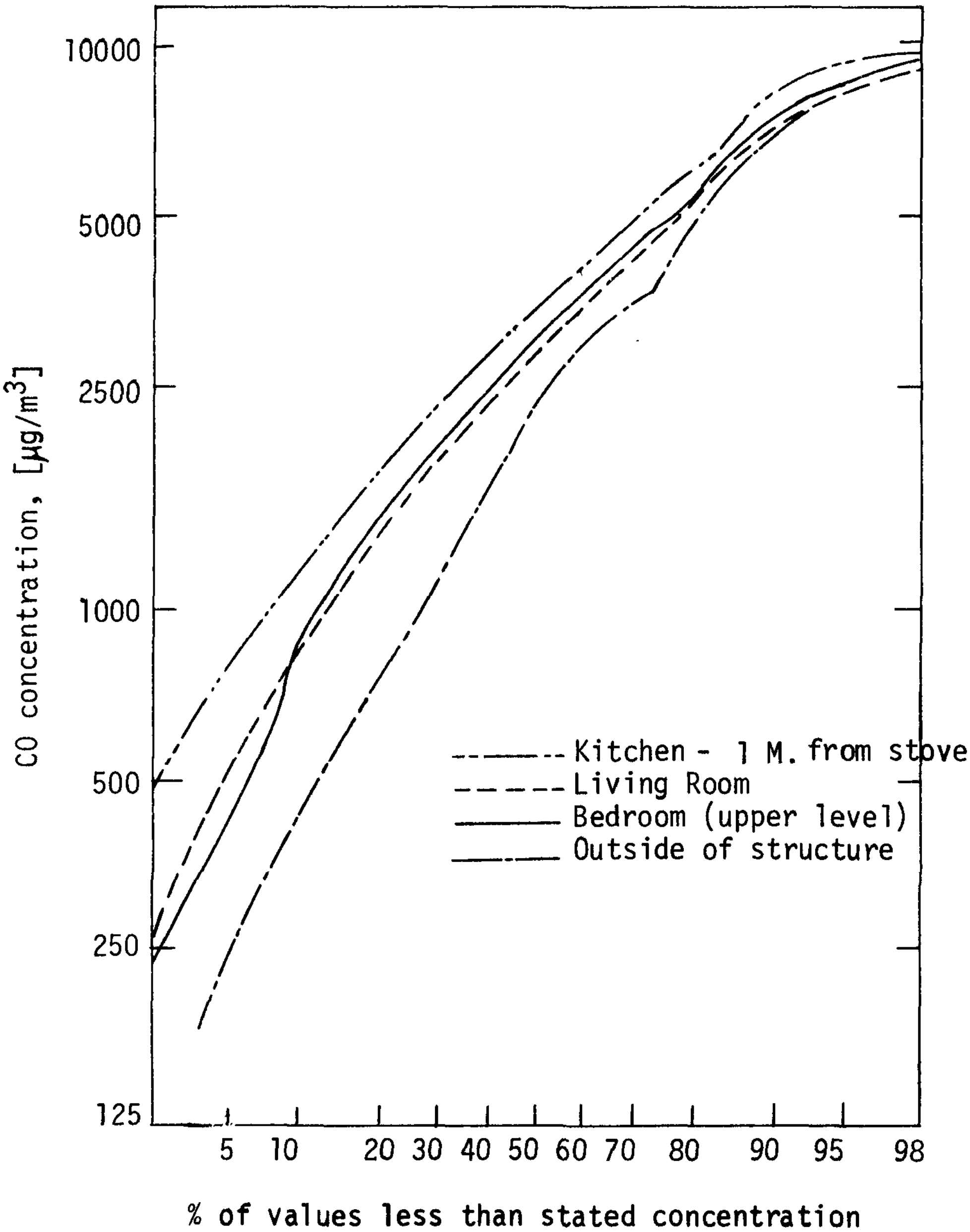

FIGURE 4-12

House No. 1 - Frequency Distribution of CO Concentrations, Five-minute Data

Spring, 1973

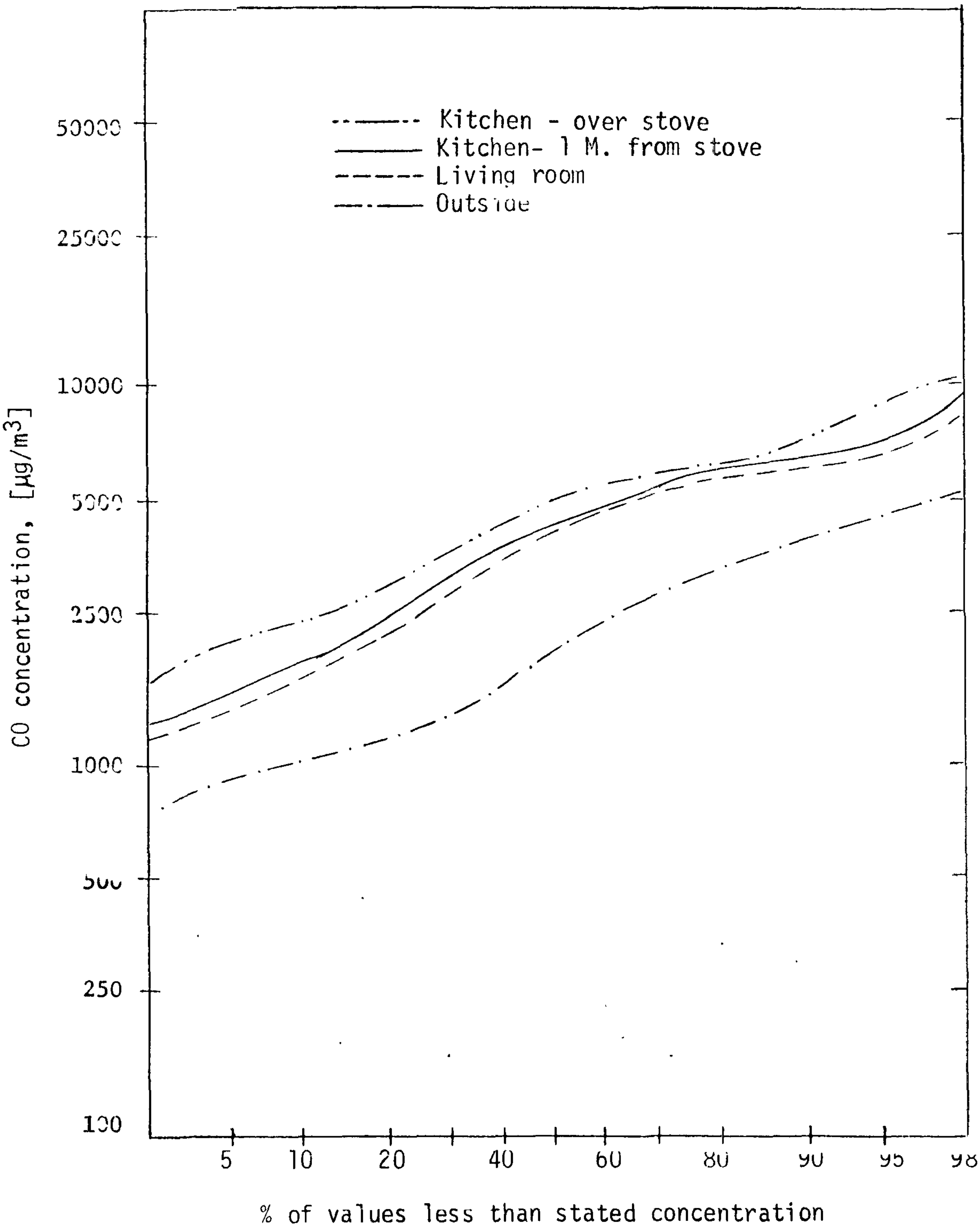

FIGURE 4-13

House No. 1 - Frequency Distribution of CO Concentrations, Five-minute Data Fall, 1973, 1st half of period

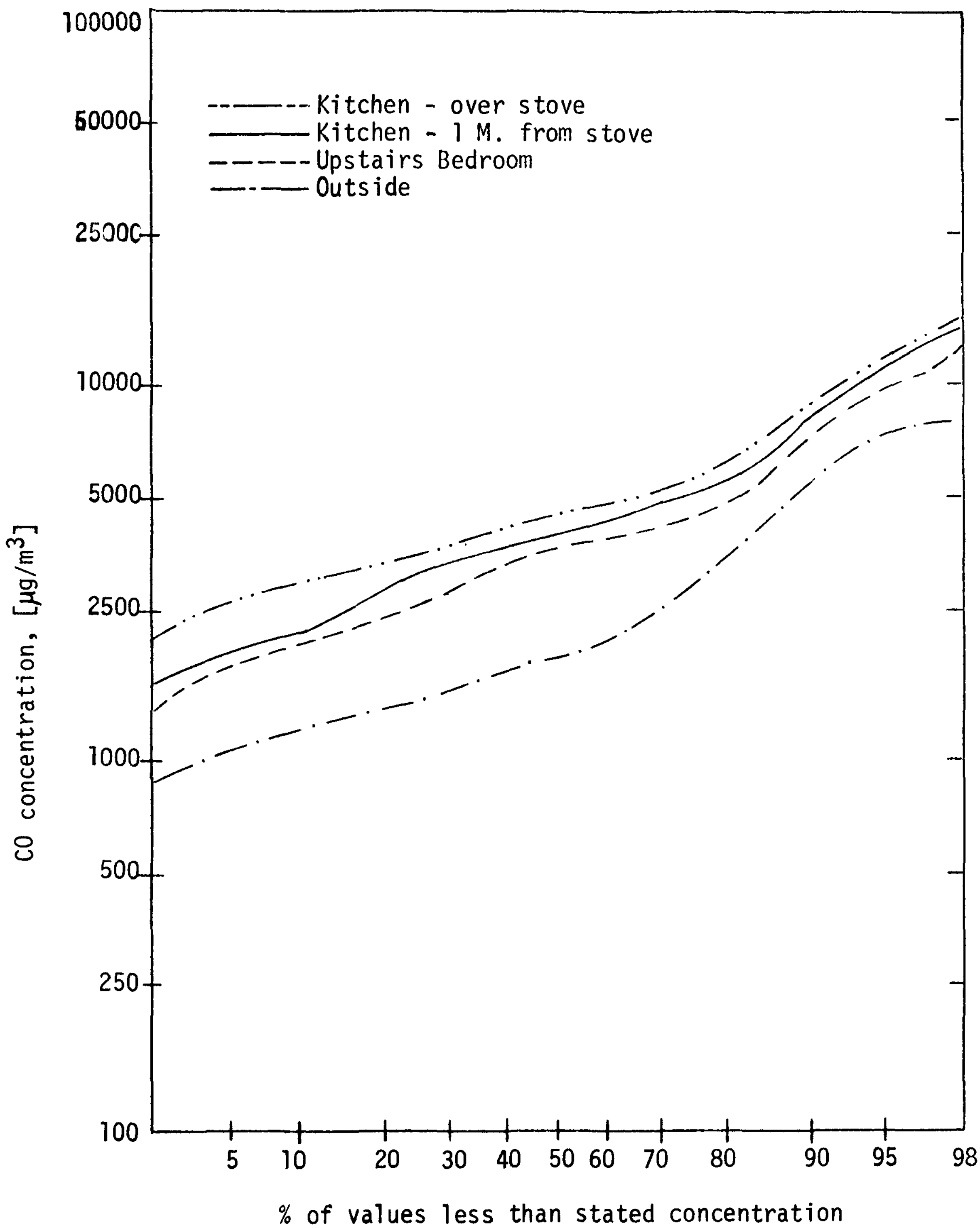

FIGURE 4-14

House No. 1 - Frequency Distribution of CO Concentrations, Five-minute Data

Fall, 1973, 2nd half of period

TABLE 4-10

Spring (1973) Sampling at House No. 2

DAILY AVERAGE NO_2 CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
5/30/73	80	63	62	55	0	86
5/31/73	71	60	58	57	0	22
6/02/73	133	125	123	119	0	49
6/03/73	127	125	124	123	0	26
6/04/73	153	144	147	152	0	30
OVERALL DAILY AVERAGE	113	103	103	101		

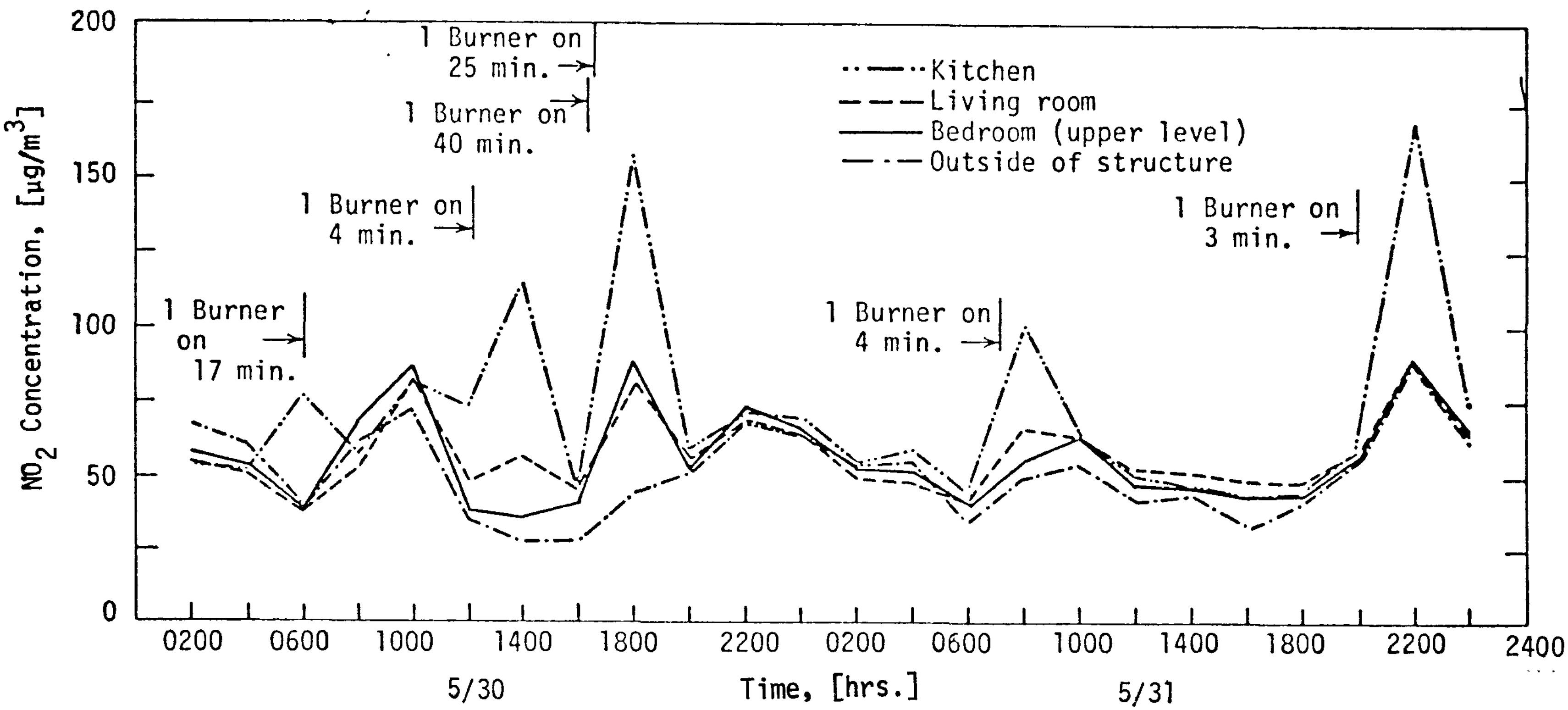

FIGURE 4-15

House No. 2 - A Time History of NO_2 Concentrations, 2-Hour Averages

Spring, 1973

operating periods on the kitchen locations and to a lesser extent on the other indoor locations. This figure also shows the uniformity of concentrations for all four sampling locations when the stove is not being used. By contrast, our results from the other two structures show a consistent difference between kitchen and outdoor NO_2 concentrations during inactive stove use periods. The explanation for the different observations was developed after evaluating stove operation in each house. Houses No. 1,3, and 4 have relatively new stoves, each with three continuous automatic pilot lights, one for each pair of burners and one for the oven/broiler. The much older stove in House No. 2, however, has only a single manual pilot which must be activated first before igniting a burner. This type of pilot uses very little gas and therefore generates only a small amount of NO_2 compared to the multiple continuous pilots of the newer stoves which generate enough NO_2 to maintain a kitchen concentration higher than outside levels.

A frequency distribution of the five-minute averaged NO_2 data for the spring data at House No. 2 is presented in Figure 4-16. The distribution of concentrations is identical for all four locations for about 90% of the observations. Approximately 50% of the NO_2 levels measured at all four locations were greater than 100 $\mu g/m^3$. Similar to House No. 1, the kitchen had a greater frequency of NO_2 concentration above 100 $\mu g/m^3$ than the other sampling locations. We attribute the uniformity of the distributions for all four locations to both lack of stove use as well as the absence of multiple, continuous pilot lights on the stove.

4.2.2 Nitric Oxide (NO)

Table 4-11 presents the daily average nitric oxide (NO) concentrations at House No. 2. The overall average NO concentration within

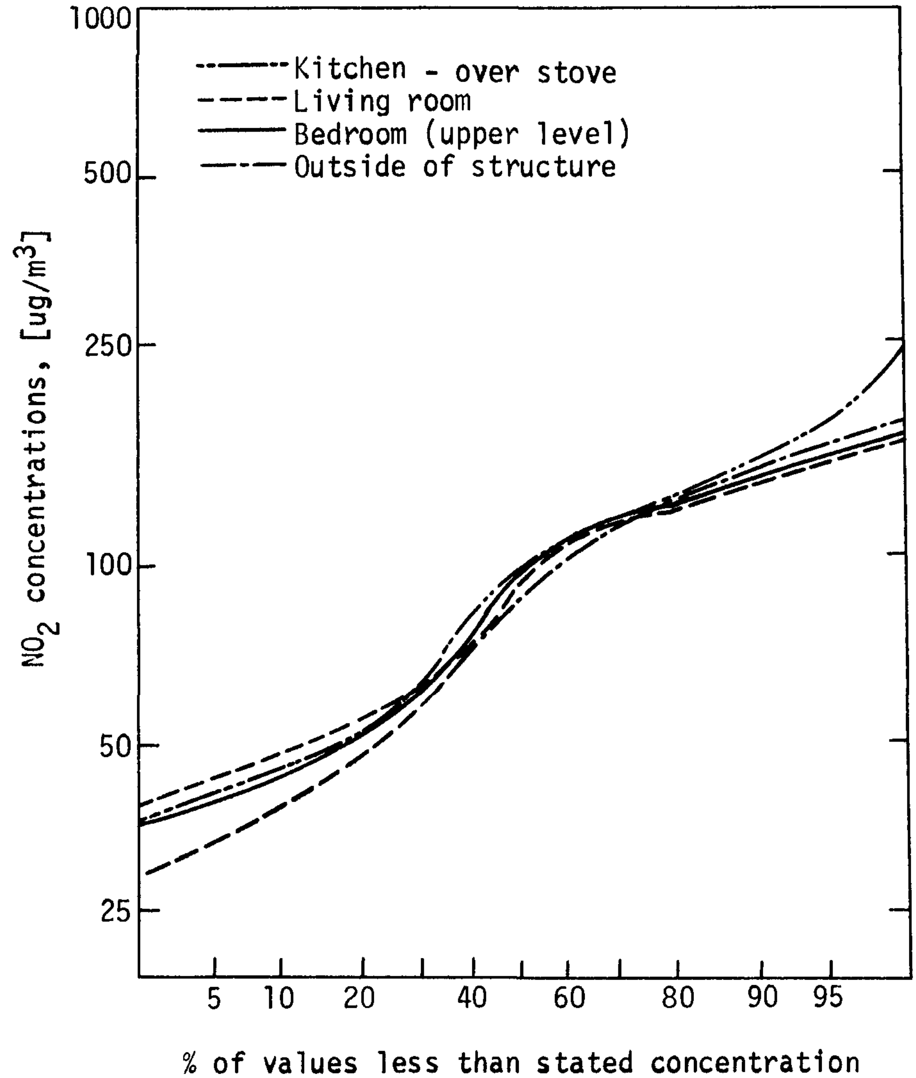

FIGURE 4-16

House No. 2 - Frequency Distribution of NO_2 Concentrations, Five-minute Data
Spring, 1973

TABLE 4-11

Spring (1973) Sampling at House No. 2

DAILY AVERAGE NO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
5/30/73	65	46	43	36	0	86
5/31/73	31	19	15	14	0	22
6/02/73	34	27	27	25	0	49
6/03/73	35	28	29	24	0	26
6/04/73	42	31	27	22	0	30
OVERALL DAILY AVERAGE	41	30	28	24		

the kitchen during the sampling period was greater than the overall outside NO concentration by 70%. The contribution of the stove to NO concentrations in the kitchen is more apparent than for NO_2. Outdoor NO concentrations were much lower than the corresponding NO_2 values during the sampling period and therefore ambient NO penetration did not influence the kitchen NO concentrations as greatly as ambient NO_2 influenced the kitchen NO_2 measurements.

A graph of the two-hour average NO concentration for a two-day period at House No. 2 is presented in Figure 4-17. A tabulation of the two-hour averages for the entire sampling period at House No. 2 is in Appendix B-3. The graph shows that the generation and diffusion of NO followed a pattern similar In comparing Figure 4-17 with Figure 4-15, the higher ambient NO_2 causes the indoor NO_2 levels to be much higher than NO indoor concentrations during periods of stove inactivity.

Figure 4-18 is a graph of the frequency distribution of the five-minute NO data from House No. 2. The distributions of the four sampling locations are not identical but certainly very similar. The kitchen has slightly greater frequency for higher NO concentrations than the other three sampling locations particularly above 200 $\mu g/m^3$.

4.2.3 Carbon Monoxide (CO)

A summary of the carbon monoxide daily averages at House No. 2 is given in Table 4-12. There is little difference in the concentrations measured at the three indoor and one outdoor locations. In fact, on the day of highest stove usage, (5/30), the daily average in the kitchen is somewhat lower than the outside concentration. Outdoor CO concentrations greatly influenced the indoor concentrations.

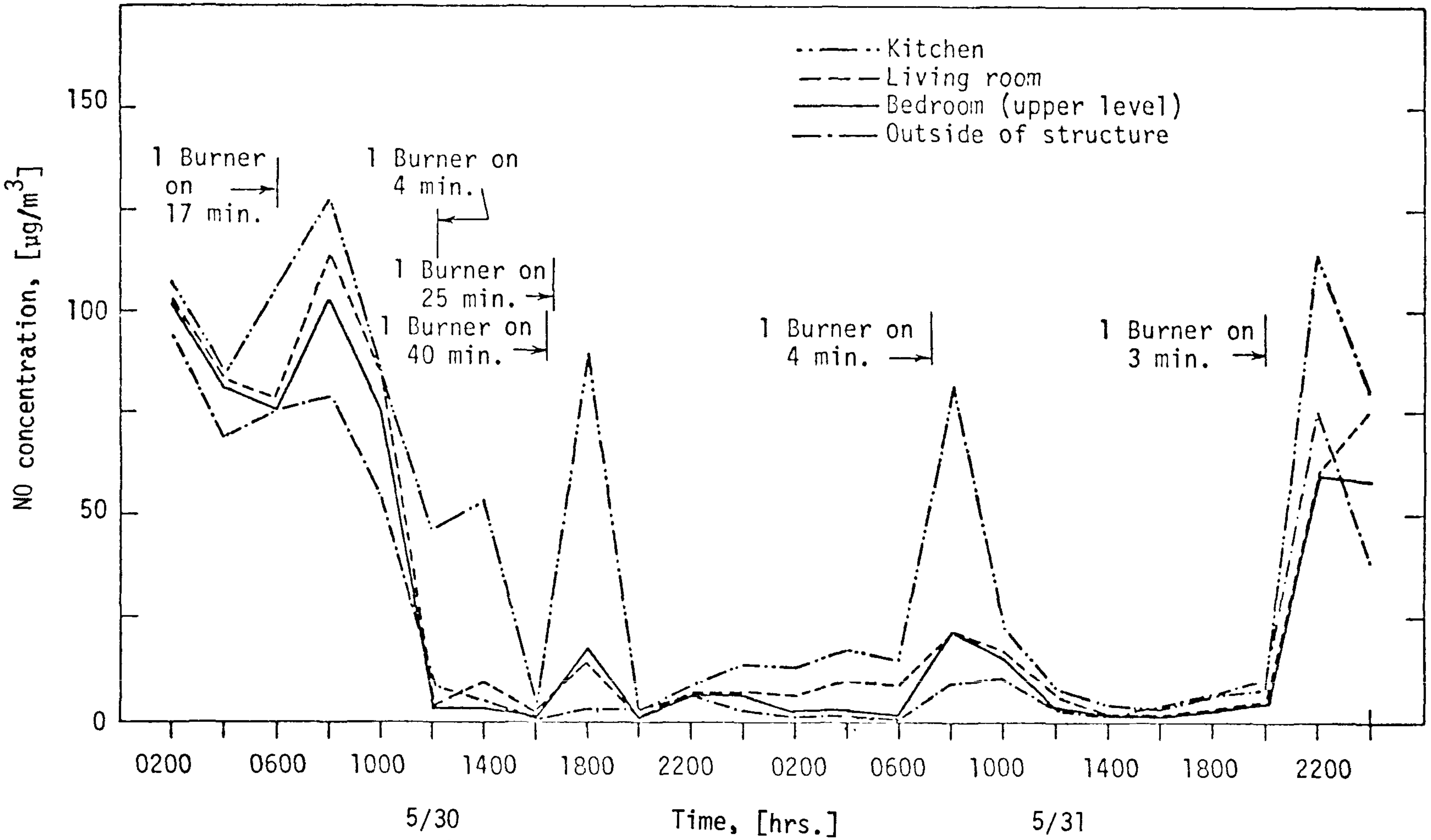

FIGURE 4-17

House No. 2 - A Time History of NO Concentrations, 2-Hour Averages

Spring, 1973

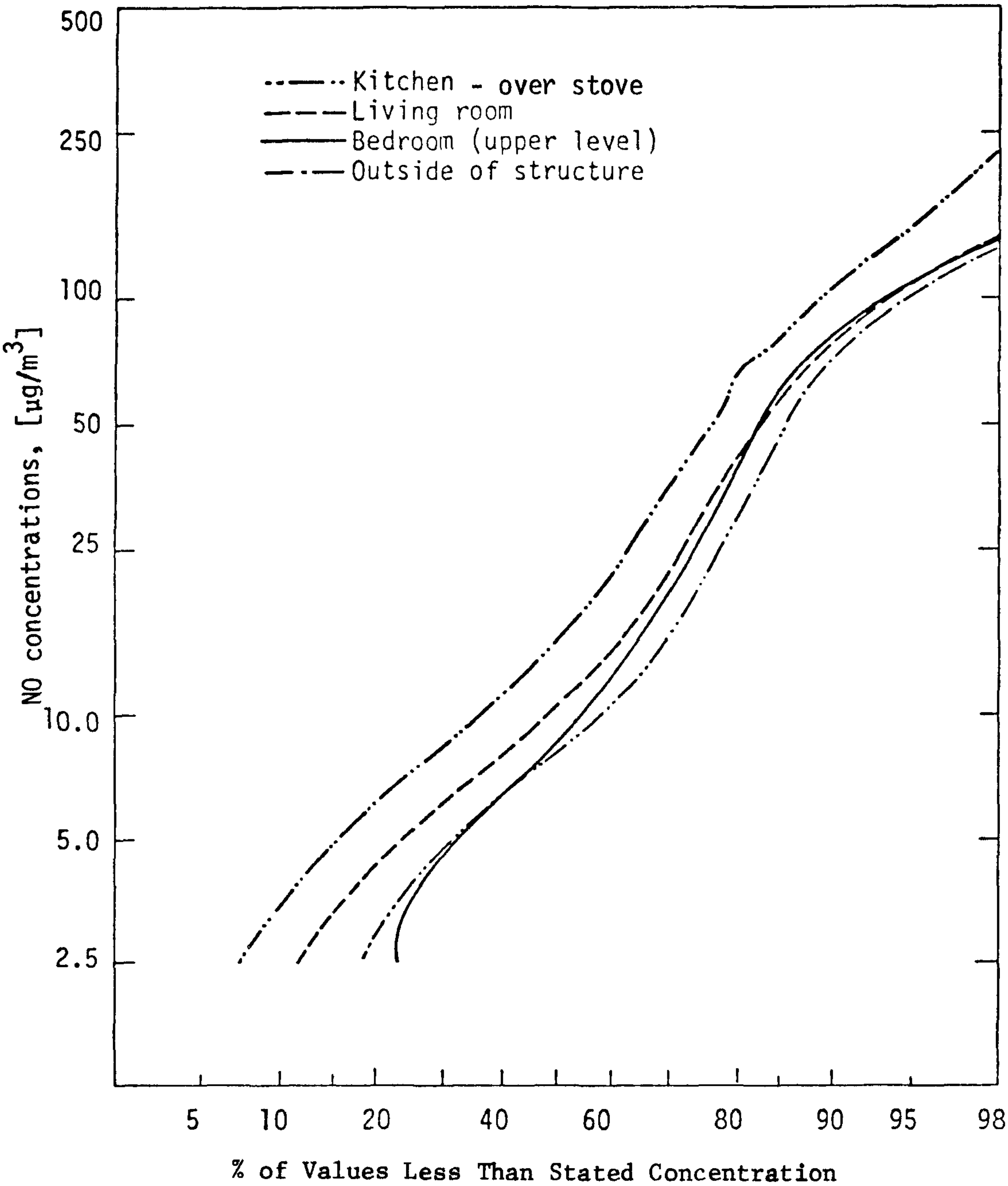

FIGURE 4-18

House No. 2 - Frequency Distribution of NO Concentrations, Five-minute Data
Spring, 1973

TABLE 4-12

Spring (1973) Sampling at House No. 2

DAILY AVERAGE CO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
5/30/73	2950	3440	2920	3170	0	86
5/31/73	2650	2510	2520	2550	0	22
6/06/73	3460	3300	3260	3100	0	10
OVERALL DAILY AVERAGE	3000	3080	2900	2940		

Figure 4-19 is a graph of the two-hour average CO concentrations for a two-day period at House No. 2. Appendix B-3 contains all of the two-hour averaged data for the sampling period. The time variation of CO is very similar to that of NO. The outdoor concentrations fluctuate considerably and the indoor concentrations at the three locations generally follow the outdoor pattern. The influence of the stove on indoor CO concentrations is shown briefly during operating periods and afterwards the indoor concentration rapidly declines to the outdoor CO concentration.

Figure 4-20 is a frequency distribution of all the five-minute CO data recorded at House No. 2. The four curves for the four sampling locations are closely spaced and frequently cross each other. The occurrence of any specific concentration was fairly uniform irregardless of sampling location. Overall stove inactivity was responsible for the close proximity of the indoor concentration to the outdoor CO levels.

4.2.4 NO_2, NO, CO Diffusion Experiment

Although the small amount of stove usage at House No. 2 produced a disappointingly small amount of interesting data, the relative inactivity gave us an excellent opportunity to conduct a diffusion experiment. The purpose of this experiment was to study the behavior of the 3 pollutants as they diffused through the house and became diluted with outdoor air.

We operated all five burners of the stove for a period of 71 minutes until pollutant concentrations in the kitchen approached a maximum. The burners were then shut off and the sampling for NO_2, NO and CO continued until the indoor concentrations returned to their former levels.

Table 4-13 shows the peak values measured at each indoor sampling location before the burners were shut off. The living room and bedroom

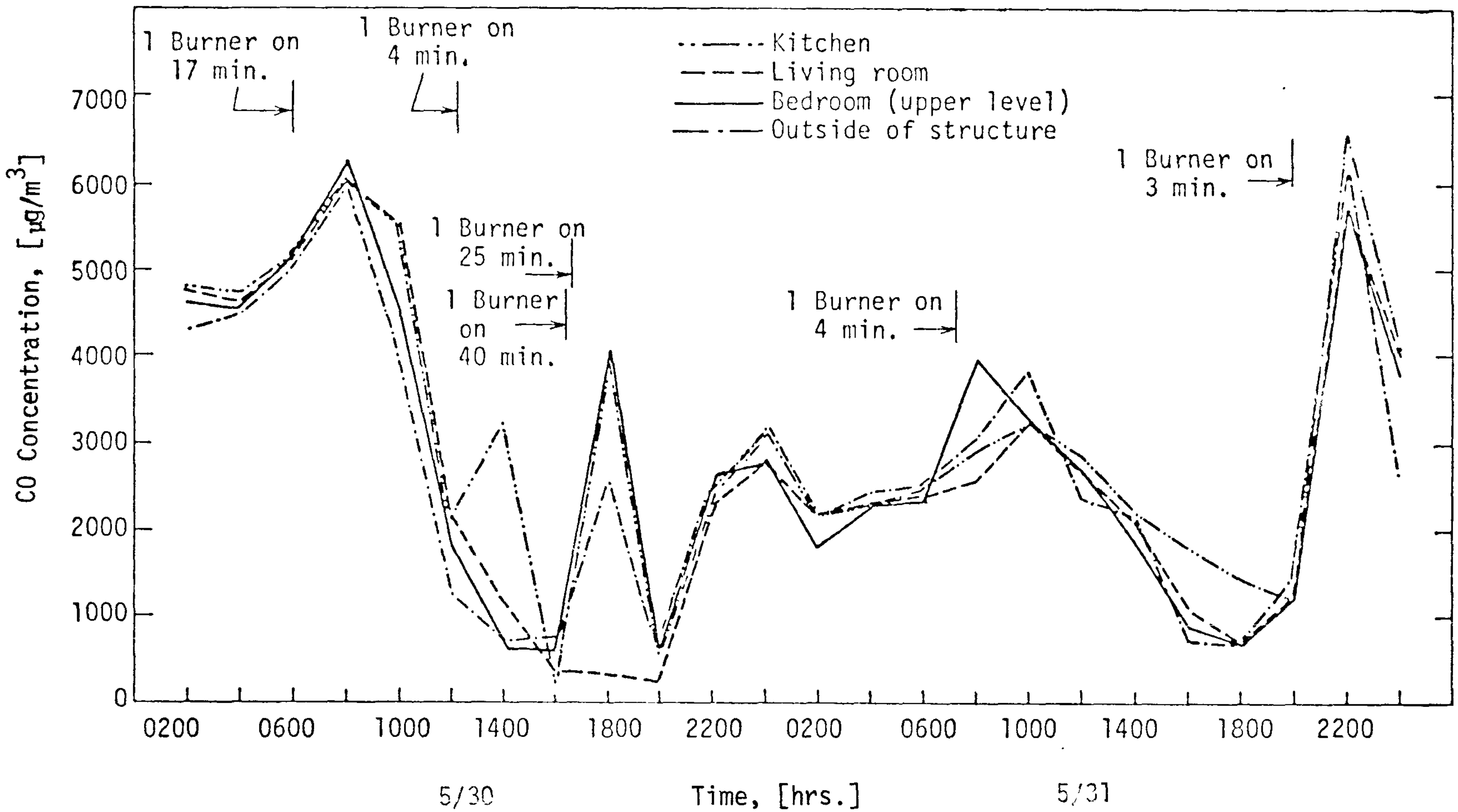

FIGURE 4-19

House No. 2 - A Time History of CO Concentrations, 2-Hour Averages
Spring, 1973

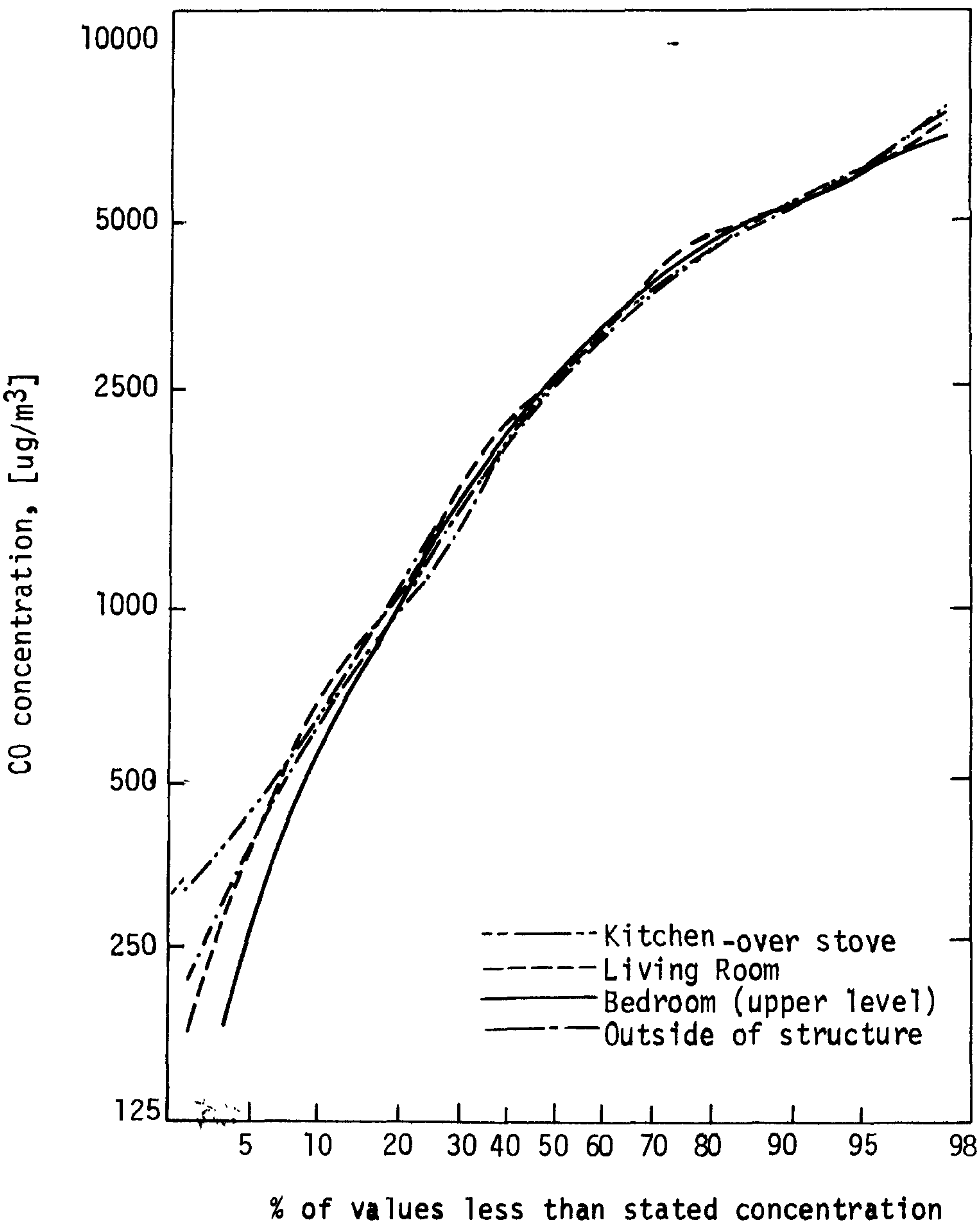

FIGURE 4-20

House No. 2 - Frequency Distribution of CO Concentrations, Five-minute Data
Spring, 1973

TABLE 4-13

PEAK FIVE-MINUTE CONCENTRATIONS OF OXIDES OF NITROGEN AND CARBON MONOXIDE DURING DIFFUSION EXPERIMENTS, $\mu g/m^3$

Parameter	Kitchen	Living Room	Bedroom
NO_2	1,450	900 (62%)*	790 (55%)*
NO	2,030	1,560 (77%)*	1,400 (69%)*
CO	12,800	10,400 (81%)*	9,300 (73%)*

* Percent of five-minute peak value measured in kitchen.

concentrations are also expressed as percentages of the peak kitchen concentration for each pollutant. The living room and bedroom peak values showed that both CO and NO were conserved to a considerably greater extent than NO_2 as they diffused through the house. NO_2 disappears either through reaction or surface adsorption as it diffuses through the house.

Figures 4-21, 4-22 and 4-23 show graphically the time history of the NO_2, NO and CO concentrations respectively during the diffusion experiment at House No. 2. All of the indoor sampling locations showed sharply increased pollutant concentrations within the first five-minute sampling period at each location and all locations had a similar decay rate for the same pollutant when the burners were shut off.

The NO_2 exhibited the most rapid decay; it reached pre-experiment levels about 2 1/2 hours from the time the stove was turned off. The CO required about 7 hours to return to previous levels and the NO about 8 hours. From the shapes of the three curves, we computed that the half life of CO in the house was 2.1 hours. Since CO is unreactive, this half life represents loss solely through diffusion and dilution. The half lives for NO and NO_2 were 1.8 and 0.6 hours respectively. The behavior of NO is quite similar to that of CO. Thus, the oxidation of NO to NO_2 or loss through other mechanisms is not significant. NO_2, on the other hand, is lost relatively rapidly. Among the possible mechanisms for the depletion of NO_2 is the formation of nitrate and/or nitrite aerosol. Such a mechanism might be enhanced by the high moisture content of kitchens with gas stoves -- water vapor production associated with cooking, and that produced as a by product in the combustion of natural gas. Some of our data from the other structures show more NO_2 than NO present during inactive stove use periods which perhaps can only be explained by the generation of more NO_2 than NO from the pilot lights since NO_2 should disappear more rapidly than NO when neither are being generated.

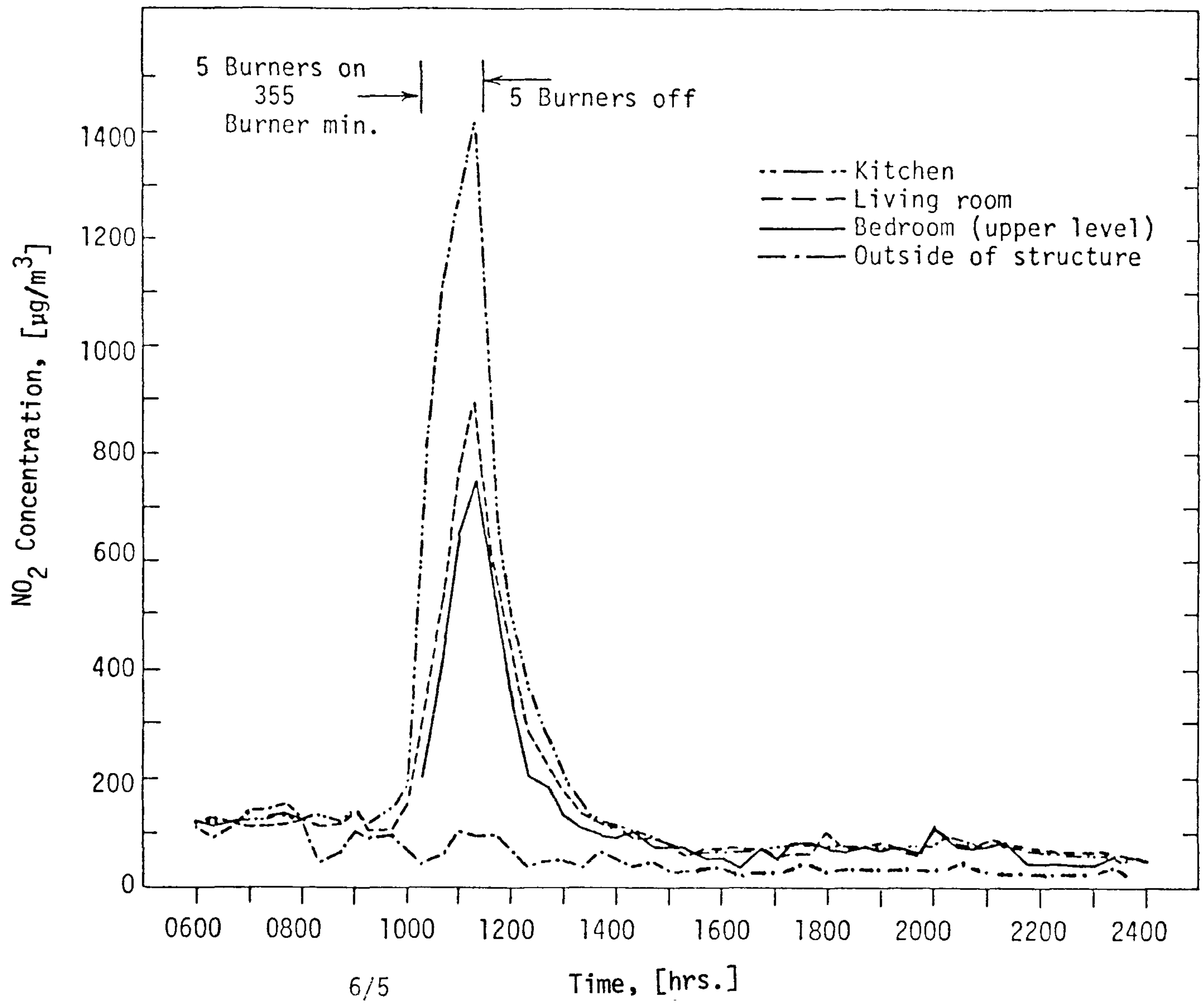

FIGURE 4-21

House No. 2 - Decay of NO_2 Concentrations, Five-minute Data vs. Time

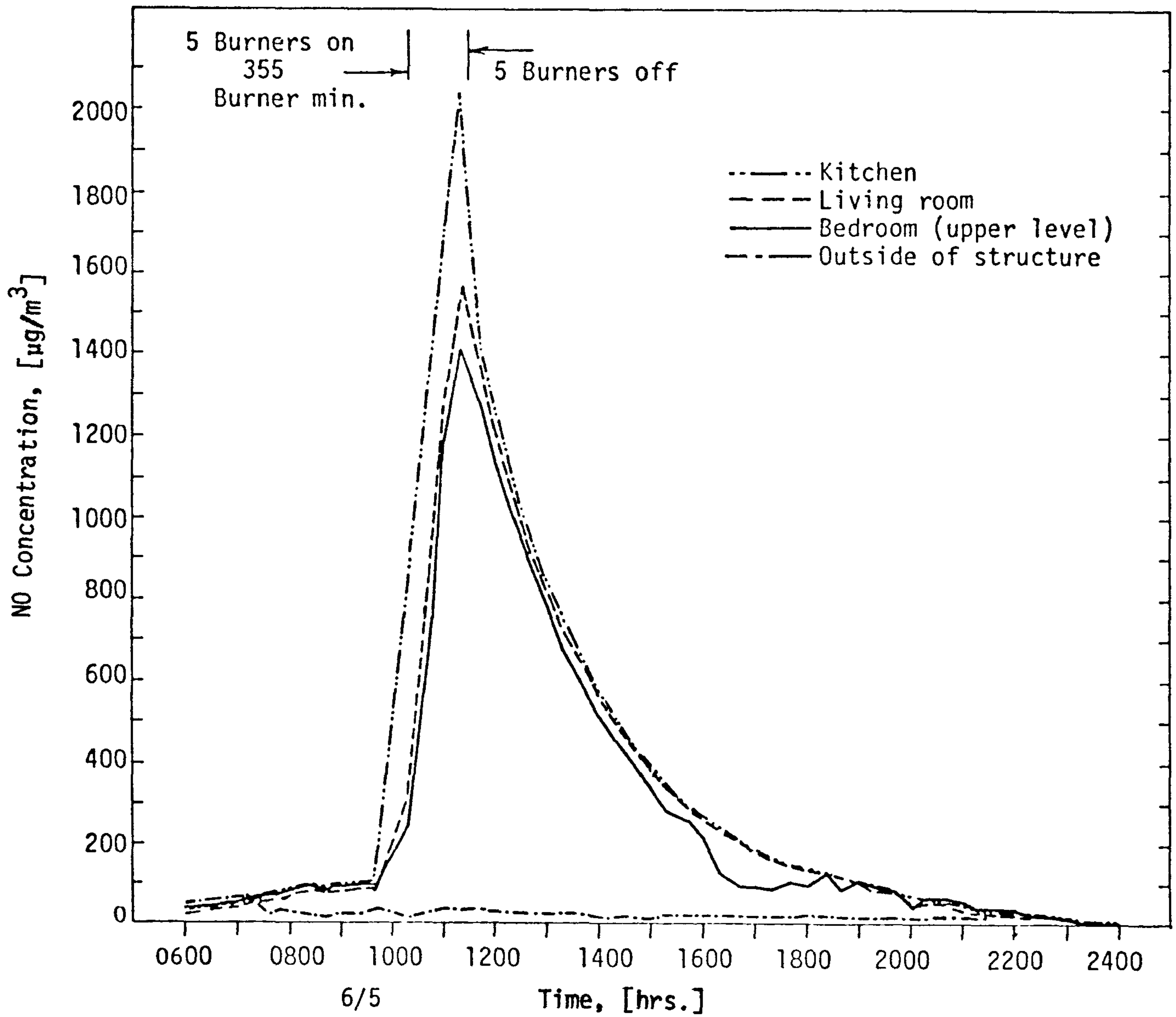

FIGURE 4-22

House No. 2 - Decay of NO Concentrations, Five-minute Data vs. Time

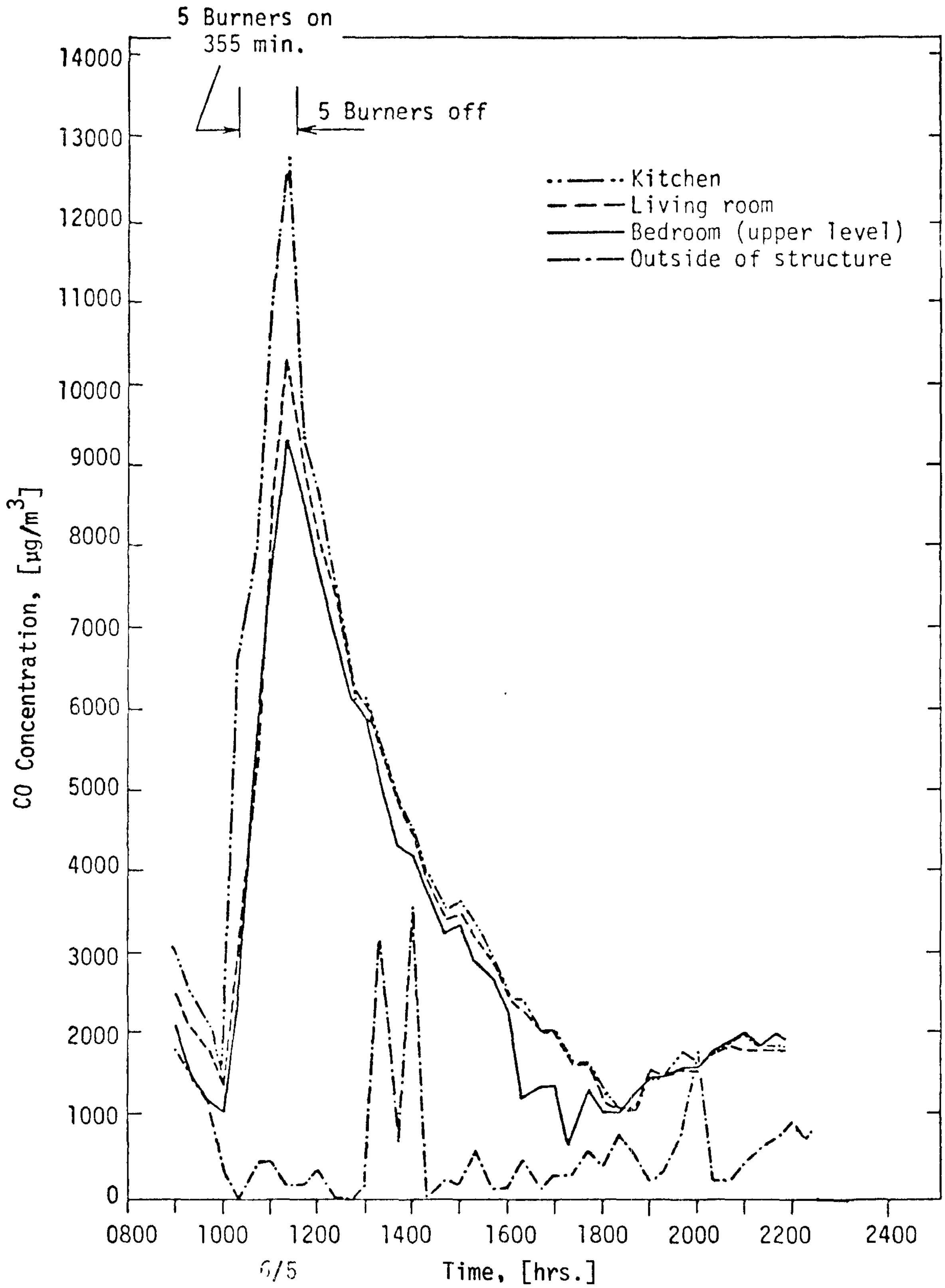

FIGURE 4-23

House No. 2 - Decay of CO Concentrations, Five-minute Data vs. Time

4.3 House No. 3 Suburban Two-Story Apartment

4.3.1 Nitrogen Dioxide (NO_2)

Tables 4-14 and 4-15 show respectively the summer and fall daily average data for NO_2 at House No. 3. In addition we present Table 4-16 which summarizes the data for both seasons to facilitate their comparison. Because of severe instrument malfunction problems in this house we had available only two complete days of sampling during the spring-summer period and one and three days respectively during each of the two fall periods. Nevertheless, we believe it is still possible to draw conclusions from the available data on the effect of stove use and outdoor air quality on the concentrations of pollutants found inside this house.

Concentrations of NO_2 in the kitchen of this home exceeded 100 $\mu g/m^3$ even when the stove is little used. Note that on 6/22 the daily average kitchen concentrations exceed 100 $\mu g/m^3$ with only 5 minutes of stove use. However, at this time outdoor concentrations were relatively high (60 $\mu g/m^3$). In this connection, we point out that outdoor concentrations were higher in the spring-summer period than the fall-winter period. These conditions are the reverse of those encountered while sampling at House No. 1.

One reason for the elevated NO_2 readings in the kitchen of this house in spite of a low level of stove use is undoubtedly the stove pilot lights. Another reason for this effect is the configuration of the kitchen. This kitchen is a small, unventilated workspace that is relatively isolated from the rest of the living quarters. This configuration appears to inhibit the diffusion of NO_2 into the other rooms. The sharp drop in measured NO_2 concentration from the kitchen to the other indoor sampling locations is further evidence of the slow diffusion of kitchen air to the rest of the apartment.

TABLE 4-14

Spring - Summer (1973) Sampling at House No. 3

DAILY AVERAGE NO_2 CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)				Total Stove Use (min)	
	1-Kitchen (above stove)	2-Living Room	3-Upper Bedroom	4-Outside	Oven	Burner
6/21/73	116	75	53	42	0	17
6/22/73	111	75	62	60	0	5
OVERALL DAILY AVERAGE	114	75	58	51		

TABLE 4-15

Fall-Winter (1973) Sampling at House No. 3

DAILY AVERAGE NO_2 CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration, ($\mu g/m^3$)					Total Stove use (min)	
	1-Kitchen (above stove)	1A-Kitchen (1 meter from stove)	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/30/73	53	47	28		35	0	20
OVERALL DAILY AVERAGE	53	47	28		35		
12/15/73	161	87		63	30	0	37
12/16/73	160	93		58	30	0	63
12/23/73	220	241		89	37	75	48
OVERALL DAILY AVERAGE	180	140		70	32		

Indoor sampling locations, outside of the kitchen, had overall average NO_2 levels during both sampling periods that were noticeably lower than the other three structures despite the high concentration in the kitchen.

In Table 4-16 we see that the overall average NO_2 concentration in the living room during the summer was 66% of the corresponding NO_2 concentration directly over the stove. In the first part of the fall sampling period, at the same location, the NO_2 level was only 53% of that measured directly over the stove. This could be the result of the occupant sealing off direct access to the living room from the kitchen with a plywood section between the spring and fall sampling periods. However, such a conclusion is somewhat conjectural in view of the limited number of complete sampling days available.

A comparison of indoor/outdoor ratios in the spring and fall (2nd half) shows the joint effect of stove use and permeability of the apartment. Note that in the spring the indoor/outdoor ratio for the kitchen is about 2 but drops to almost 1 in the bedroom. In the second half of the fall the ratio exceeds 5 in the kitchen corresponding to a 7 times higher stove use than in the spring, but the indoor/outdoor ratio in the bedroom remains above 2 in the fall presumably because of the decreased permeability.

Figure 4-24 is a graph of some of the typical two hour average NO_2 data from the spring sampling period at House No. 3. The graph shows how short burner operating times result in considerable increases in NO_2 concentrations in the kitchen which decay very slowly and consistantly remain higher than outside and other indoor NO_2 concentrations. We suspect that the limited kitchen ventilation and the pilot lights are responsible for the increased concentrations of NO_2 in the kitchen of this house.

TABLE 4-16

SUMMARY OF AVERAGE NO_2 VALUES AND STOVE USE

House No. 3 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day)		
	Kitchen (above stove)	Kitchen (1 meter from stove)	Living Room	Bedroom	Outside	Oven	Burner	Total
Spring-Summer, 1973								
NO_2 Concentration, µg/m^3	114	--	75	58	51	0	11	11
% of max. kitchen value	100	--	66	51				
Indoor/Outdoor ratio	2.23	--	1.47	1.14	1.00			
Fall, 1973 (first half)*								
NO_2 Concentration, µg/m^3	53	47	28	--	35			
% of max. kitchen value	100	88	53	--	--	0	20	20
% of remote kitchen value		100	60					
Indoor/Outdoor ratio	1.51	1.34	0.80	--	1.00			
Fall-Winter, 1973 (second half)								
NO_2 Concentration, µg/m^3	180	140	--	70	32			
% of max. kitchen value	100	78	--	39	--	25	49	74
% of remote kitchen value	--	100	--	50	--			
Indoor/Outdoor ratio	5.62	4.38	--	2.19	1.00			

*Based on data for only one day.

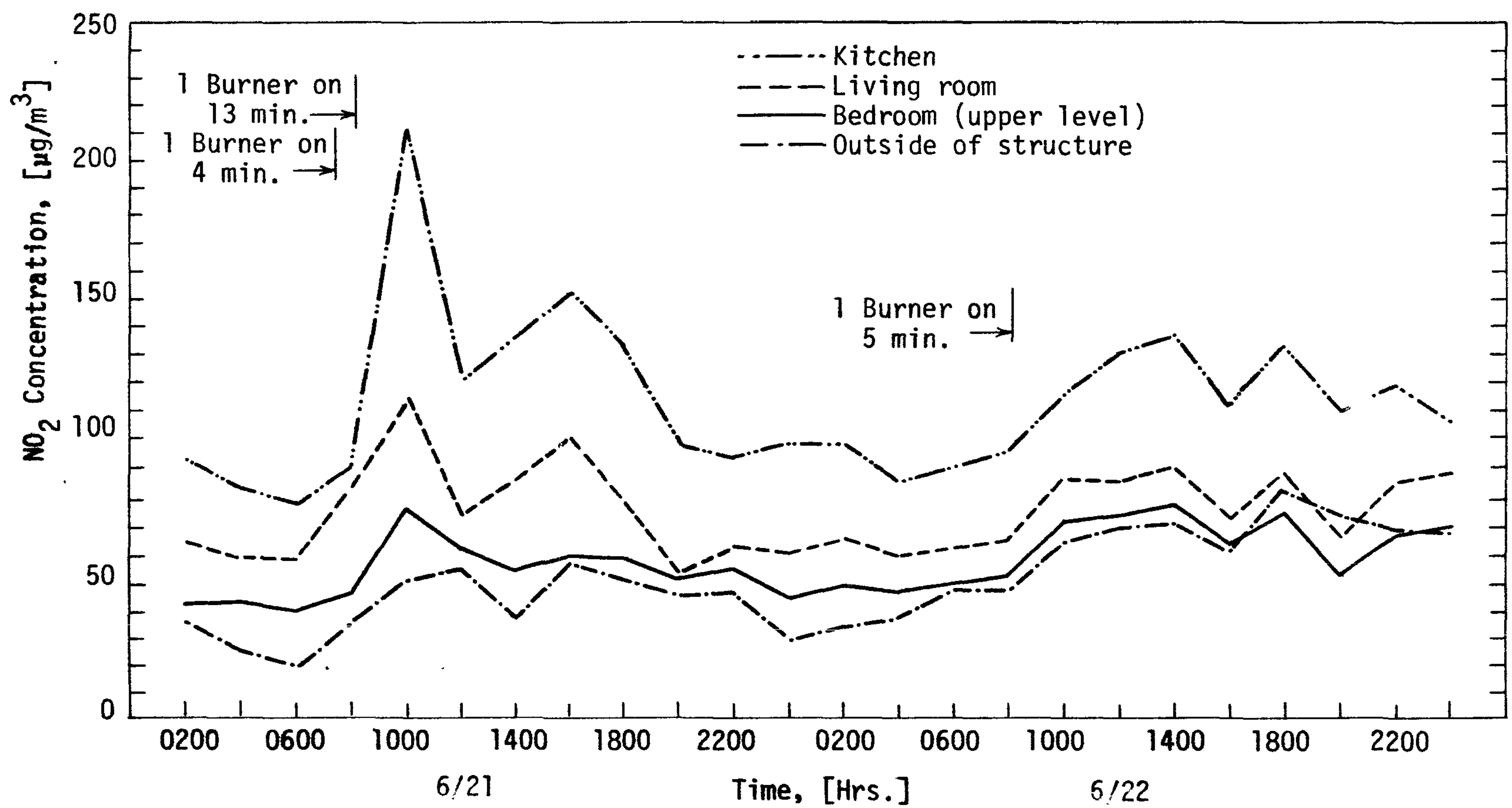

FIGURE 4-24

House No. 3 - A Time History of NO_2 Concentrations, 2-hour Averages

Spring, 1973

Figure 4-25 presents a more detailed look at a portion of the data contained in Figure 4-24 by utilizing the five-minute data obtained directly from the strip charts. The immediate response to stove operation is quite evident by observing the kitchen trace at approximately 0815. Notice that approximately one hour earlier the living room NO_2 concentration shows a sharp peak. Examination of the stove use log kept by the occupants and the original strip chart showed that one burner was turned on for 4 minutes at the same time the living room sampling location was in its 5 minute active mode. No effect of this brief stove use is recorded by the kitchen since the kitchen location was not actively sampling until 15 minutes later. During periods when the stove is inactive the indoor and outdoor concentrations generally rise and fall together which shows the influence of outdoor NO_2 penetrating the structure. At all times, however, a sharp differential existed between the kitchen and outdoor concentrations.

In view of the considerable loss of NO_2 data at this house at non-random times, we do not present frequency distributions for NO_2 at House No. 3.

4.3.2 Nitric oxide (NO)

Tables 4-17 and 4-18 present the daily average data for NO at House No. 3 during the spring-summer and fall-winter periods respectively. Table 4-19 summarizes the average data from both periods to facilitate comparisons. As in the case of NO_2, there are relatively few complete days during each sampling period on which to base our evaluations.

While outdoor NO_2 levels were 1/3 greater in the summer than in the winter, outdoor NO was about the same during the spring and second half of the fall period and about twice as high in the first part of the fall period as compared to either of the other two periods. These relatively higher outdoor concentrations account for some of the higher indoor levels of NO found in the winter

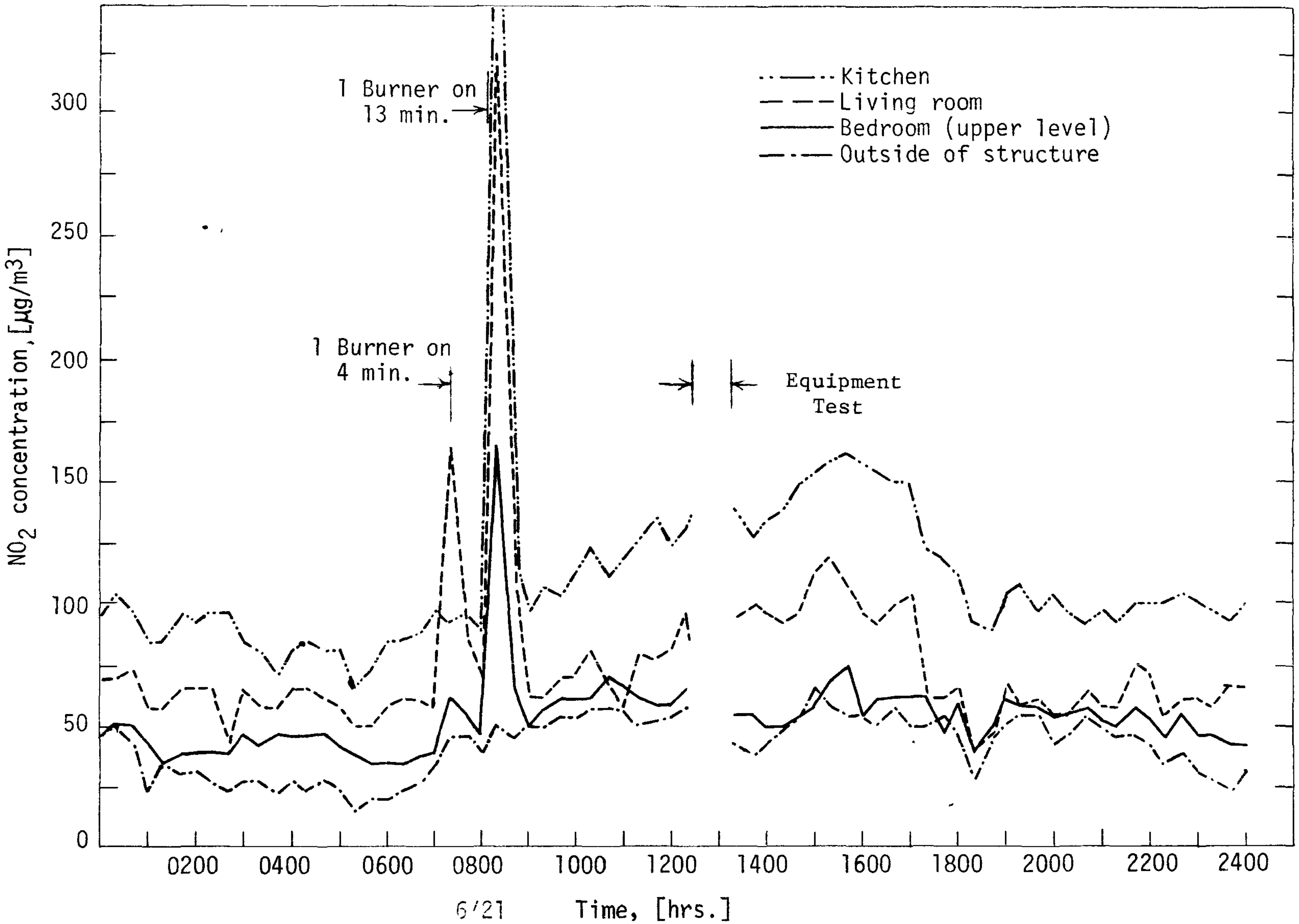

FIGURE 4-25

House No. 3 - A Time History of NO_2 Concentrations, Five-minute Data
Spring, 1973

TABLE 4-17

Spring - Summer (1973) Sampling at House No. 3

DAILY AVERAGE NO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO Concentration, ($\mu g/m^3$)				Total Stove Use (min)	
	1-Kitchen (above stove)	2-Living Room	3-Upper Bedroom	4-Outside	Oven	Burner
6/21/73	45	33	23	13	0	17
6/22/73	60	50	45	29	0	5
OVERALL DAILY AVERAGE	53	42	34	21		

TABLE 4-18

Fall-Winter (1973) Sampling at House No. 3

DAILY AVERAGE NO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO Concentration, (μg/m^3)					Total Stove use (min)	
	1-Kitchen (above stove)	1A-Kitchen (1 meter from stove)	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/30/73	111	95	42		40*	0	20
OVERALL DAILY AVERAGE	111	95	42		40		
12/15/73	92	67		57	19	0	37
12/16/73	97	77		58	21	0	63
12/23/73	144	158		78	20	75	48
OVERALL DAILY AVERAGE	111	101		64	20		

*Based on 11 out of 12 valid 2-hour values.

TABLE 4-19

SUMMARY OF AVERAGE NO VALUES AND STOVE USE

House No. 3 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day)		
	Kitchen (above stove)	Kitchen (1 meter from stove)	Living Room	Bedroom	Outside	Oven	Burner	Total
Spring-Summer, 1973								
NO Concentration, $\mu g/m^3$	53	--	42	34	21			
% of remote kitchen value	100	--	79	64	--	0	11	11
Indoor/Outdoor ratio	2.52	--	2.00	1.62	1.00			
Fall, 1973 (first half)*								
NO Concentration, $\mu g/m^3$	111	95	42		40			
% of max. kitchen value	100	86	38		--	0	20	20
% of remote kitchen value		100	44					
Indoor/Outdoor ratio	2.78	2.38	1.05		1.00			
Fall-Winter, 1973 (second half)								
NO Concentration, $\mu g/m^3$	111	101		64	20	25	49	74
% of max. kitchen value	100	91		58	--			
% of remote kitchen value		100		63				
Indoor/Outdoor ratio	5.55	5.05		3.20	1.00			

* Based on data for only one day.

but in addition the apartment being less permeable in the winter also allows build up of NO indoors. To illustrate this point, note the pattern of indoor/outdoor ratios for the spring and second half of the fall in Table 4-19. As in the case of NO_2 (see Table 4-16) this comparison shows the joint influence of stove use and house permeability. In addition in comparing these two tables we can see clearly the difference in behavior of NO and NO_2. Recall that in the spring the indoor/outdoor ratio for NO_2 dropped to almost 1 in the bedroom. While there is a significant drop in this ratio between the kitchen and bedroom for NO during this period, the bedroom ratio is 40 percent higher for NO than NO_2. This difference is shown even more clearly in comparing indoor/outdoor ratios for NO and NO_2 in the second half of the fall period. The ratio for NO drops from 5.5 to 3.2 between the kitchen and the bedroom while that for NO_2 drops from 5.6 to 2.2. These observations substantiate the results of the diffusion experiment carried out in House No. 2 where we noted the reduced half life of NO_2 as compared with that of NO.

A graph of the two-hour average data from the spring shown in Figure 4-26 is essentially similar in shape to Figure 4-24 for NO_2. The only significant difference is that there is not as sharp a drop in concentrations between the kitchen and the other rooms of the house. This phenomenon, we believe, illustrates the difference in decay characteristics of NO and NO_2 as discussed elsewhere in the report.

As in the case of NO_2 we do not present frequency distributions for NO because of the limited data here.

4.3.3 Carbon Monoxide (CO)

Tables 4-20 and 4-21 present the daily average CO concentrations at House No. 3 during the summer and fall-winter sampling periods respectively.

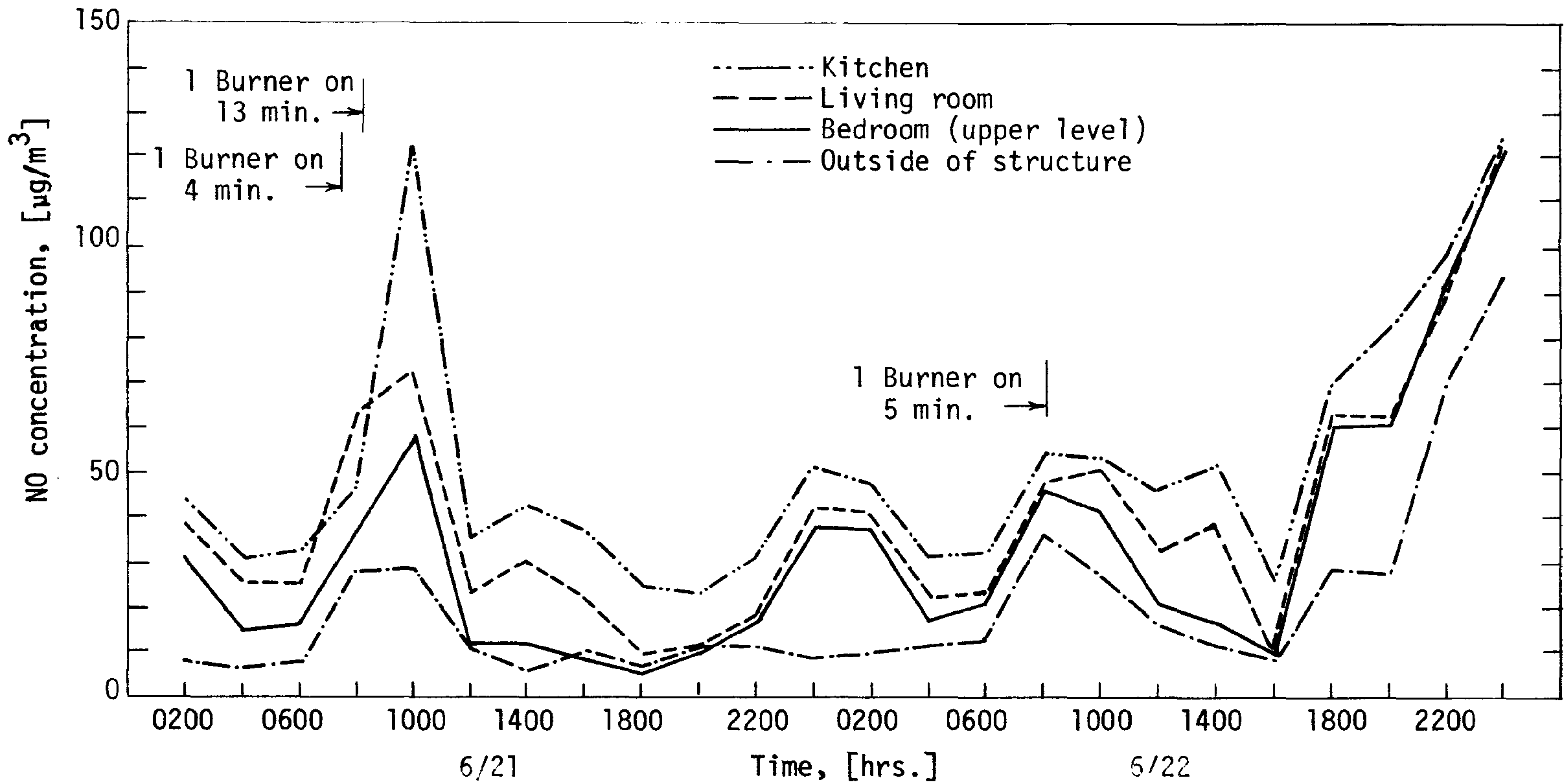

FIGURE 4-26

House No. 3 - A Time History of NO Concentrations, 2-hour Averages
Spring, 1973

TABLE 4-20

Summer (1973) Sampling at House No. 3

DAILY AVERAGE CO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average CO Concentration, ($\mu g/m^3$)				Total Stove Use (min)	
	1-Kitchen (above stove)	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
6/22/73	3440	2720	2460	1810	0	5
6/23/73	3910	3210	3210	2950	34	28
6/24/73	3910	2720	2370	1790	0	77
6/25/73	4320	3010	3050	2600	0	55
6/26/73	3260	2190	2080	1820	65	25
6/27/73	3780	2040	2090	1650	0	21
7/06/73	4090	2820	2870	2470	0	0
7/07/73	5900	5010	4240	3920	0	14
7/08/73	4570	3590	2410	2000	0	24
7/09/73	4340	3270	1860	1470	30	0
7/10/73	5370	4490	2370	1780	0	14
7/11/73	5150	3920	2920	2220	0	0
7/12/73	4010	2730	2870	2540	52	38
OVERALL DAILY AVERAGE	4310	3210	2680	2230		

TABLE 4-21

Fall-Winter (1973) Sampling at House No. 3

DAILY AVERAGE CO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average CO Concentration, (μg/m^3)					Total Stove use (min)	
	1-Kitchen (above stove)	1A-Kitchen (1 meter from stove)	2-Living Room	3-Bedroom	4-Outside	Oven	Burner
11/29/73	6870	5360	3970		1860	0	73
12/07/73	7150	5830	4750		4100	0	25
12/08/73	7130	6010	4570		2660	51	50
12/09/73	8340	6990	5340		3290	15	91
12/10/73	9190	7530	6160		4920	0	84
12/11/73	8220	6800	5650		3440	0	5
OVERALL DAILY AVERAGE	7820	6420	5070		3380		
12/14/73	8860	7310		6820	2530	343	29
12/15/73	6150	4590		4230	1810	0	37
12/16/73	6450	5370		4770	2330	0	63
12/21/73	7680	7390		6560	3160	0	36
12/22/73	6520	6500		4850	2110	70	103
12/23/73	6740	6850		5530	2880	75	48
12/24/73	6980	7230		5400	2390	72	14
12/25/73	7650	7730		5810	2740	0	28
OVERALL DAILY AVERAGE	7130	6620		5500	2500		

Table 4-22 summarizes the data from all sampling periods.

Indoor CO concentrations are more strongly influenced by outdoor concentrations than by stove use. This experience is similar to that from the other houses. In contrast to H [illegible] No. 1, the fall-winter CO levels outside were somewhat higher than those measured in the spring. We attribute this to differences in the meteorological conditions in the two separate sampling periods.

The indoor kitchen concentrations for the fall sampling period approached the air quality standard of 10,000 $\mu g/m^3$ for an 8-hour averaging period. This was due primarily to the high level of carbon monoxide measured outdoors. A secondary reason is the isolation of the kitchen from the rest of the living space. This results in less diffusion and dilution of the stove effluent. Overall, the contribution of carbon monoxide by the stove is of the same order as originally measured by TRC in 1969 and 1970 in our earlier study.*

Frequency distributions of the CO data at House No. 3 for the summer and first and the second week of the fall sampling periods, are presented in Figures 4-27, 4-28, and 4-29 respectively. We did not experience the same loss of CO data that we had for NO_2 and NO at this house. Tabulations of all two-hour average CO data for House No. 3 for the summer and fall sampling periods are presented in Appendices B-4 and B-5 respectively.

All three of these distributions are basically similar in shape except that the fall frequency distributions, Figures 4-28 and 4-29, show significantly higher concentrations, furthermore, there is greater separation of the

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*See Reference 1, Page 1

TABLE 4-22

SUMMARY OF AVERAGE CO VALUES AND STOVE USE

House No. 3 - Spring and Fall Sampling, 1973

Season and Data Category	Sampling Location					Average Stove Use (min/day)		
	Kitchen (above stove)	Kitchen (1 meter from stove)	Living Room	Bedroom	Outside	Oven	Burner	Total
Spring-Summer, 1973								
CO Concentration, $\mu g/m^3$	4310	--	3210	2680	2230			
% of max. kitchen value	100	--	74	62	--	14	23	37
Indoor/Outdoor ratio	1.93	--	1.44	1.20	1.00			
Fall, 1973 (first half)								
CO Concentration, $\mu g/m^3$	7820	6420	5070	--	3380			
% of max. kitchen value	100	82	65	--	--	11	55	66
% of remote kitchen value		100	79	--	--			
Indoor/Outdoor ratio	2.31	1.90	1.50	--	1.00			
Fall-Winter, 1973 (second half)								
CO Concentration, $\mu g/m^3$	7130	6620	--	5500	2500			
% of max. kitchen value	100	93	--	77	--	70	45	115
% of remote kitchen value		100	--	83	--			
Indoor/Outdoor ratio	2.85	2.65	--	2.20	1.00			

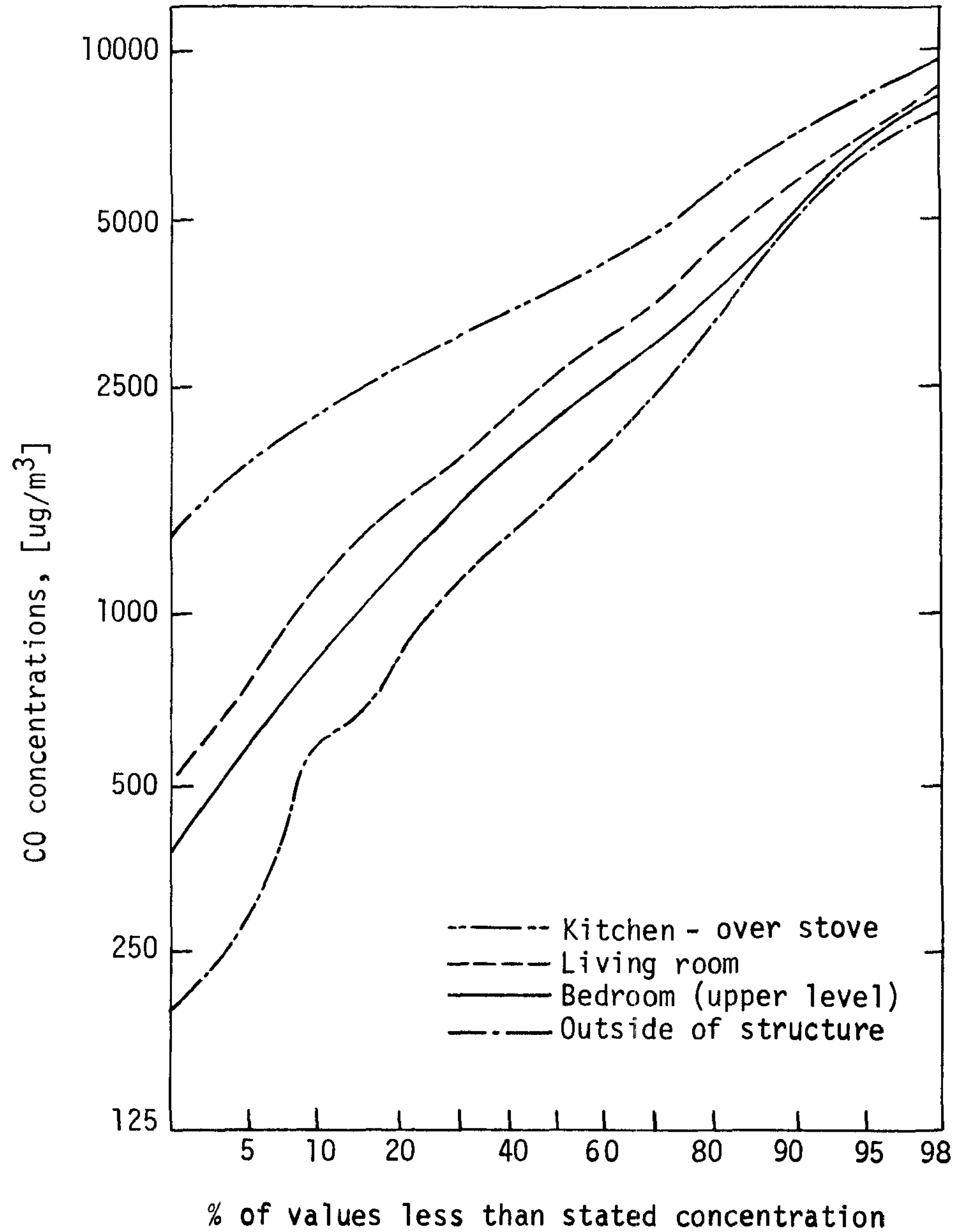

FIGURE 4-27

House No. 3 - Frequency Distribution of CO Concentrations, Five-minute Data
Spring, 1973

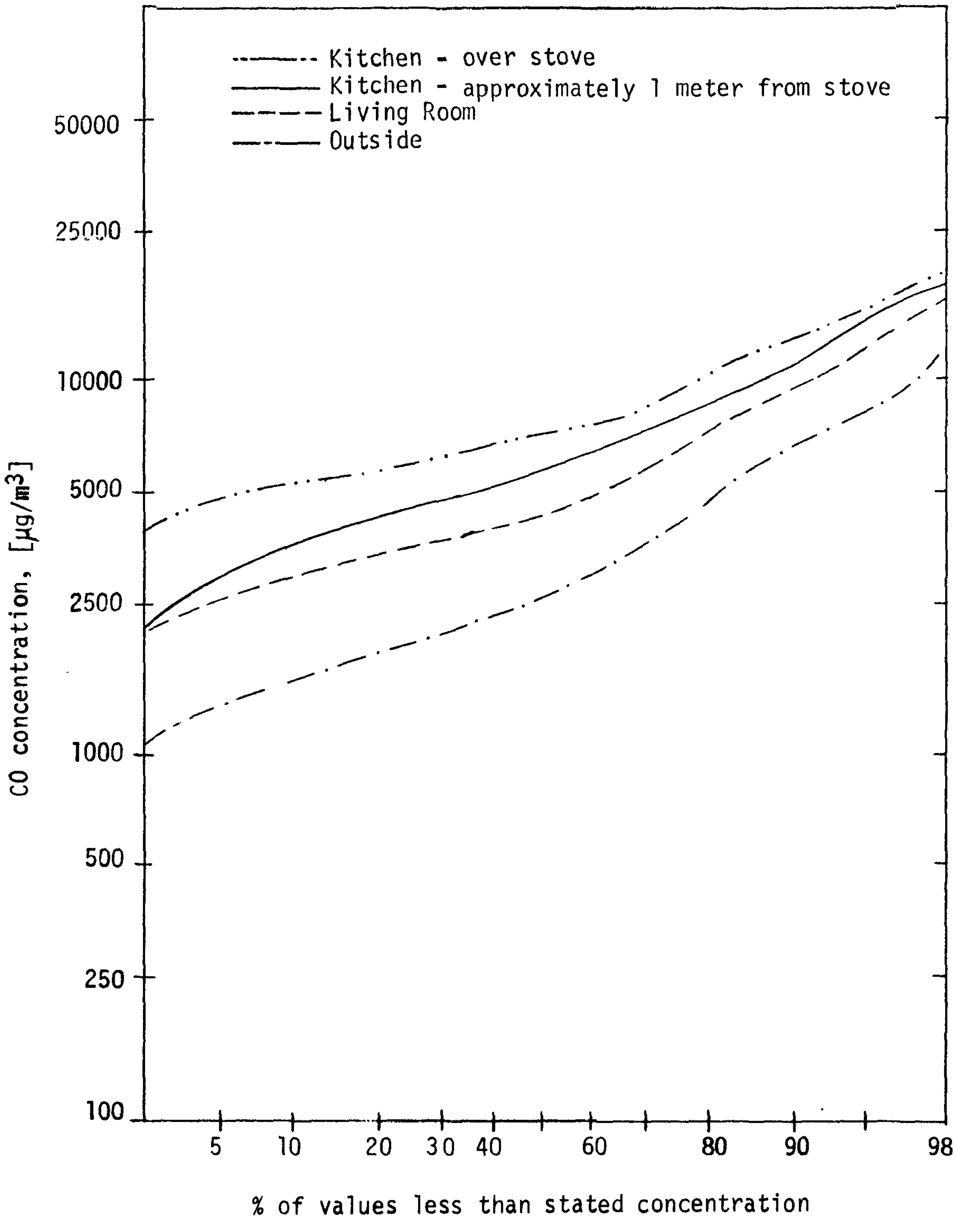

FIGURE 4-28

House No. 3 - Frequency Distribution of CO Concentrations, Five-minute Data Fall, 1973, 1st half of period

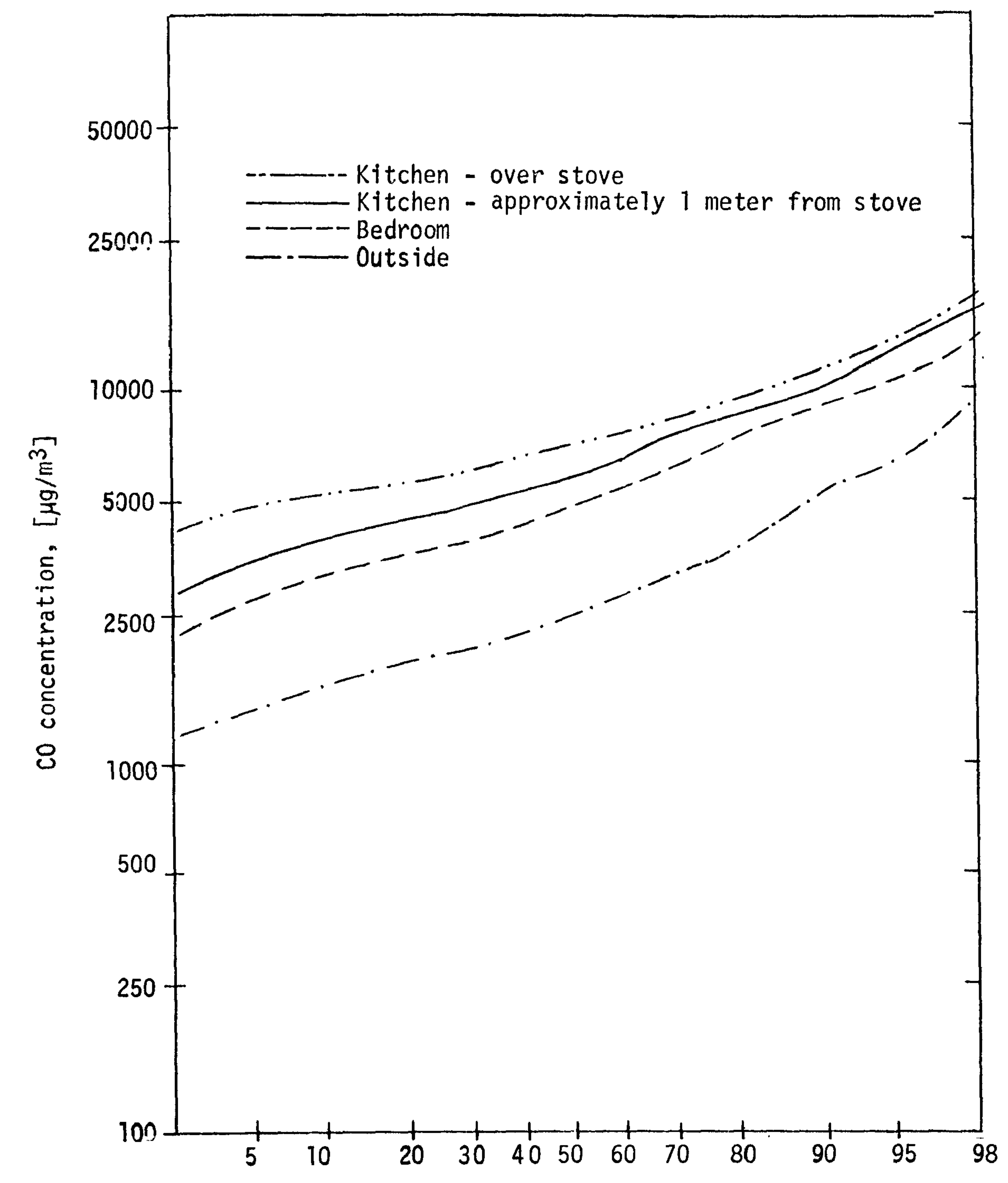

FIGURE 4-29

House No. 3 - Frequency Distribution of CO Concentrations, Five-minute Data
Fall, 1973, 2nd half of period

grouped indoor distribution curves as related to the outdoor curves in the fall than in the spring. This result is probably the result of the more closed up attitude of the house in the fall as compared to the spring.

4.4 House No. 4 - Suburban Ranch Home

We chose this house to replace House No. 2 for the fall-winter 1974 sampling period. The following locations were selected for the entire two week sampling period at this house:

- Station 1. Kitchen-above the stove
- Station 1A. Kitchen-1 meter from the stove, over the sink
- Station 2. Living Room
- Station 4. Outside

Sampling in one of the two bedrooms for half the test period was not possible because of the inconvenience it would have caused the residents.

4.4.1 Nitrogen Dioxide (NO_2)

Table 4-23 is a summary of the daily average NO_2 and stove use data for seven complete days during the winter sampling period. The overall average NO_2 concentration in the kitchen, 213 $\mu g/m^3$, was the highest for all the houses tested in this task. This overall average was approximately 5.5 times greater than the outdoor NO_2 level of 39 $\mu g/m^3$. As we found from sampling at the other three houses, the NO_2 levels indoors are increased by stove usage. Stove age and condition are also factors contributing to the high NO_2 levels at House No. 4. The level of stove activity, an average of 66 oven minutes and 73 burner minutes per day, was one of the highest that we encountered in the field sampling program. Stove use in

Winter (1974) Sampling at House No. 4

DAILY AVERAGE NO_2 CONCENTRATION

AND STOVE USAGE DATA

Date	Daily Average NO_2 Concentration ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen Over Stove	1A-Kitchen 1 M. From Stove	2-Living Room	4-Outside	Oven	Burners
1/31/74	177	103	83	70	65	38
2/01/74	187	106	53	23	91	104
2/02/74	197	78	54	25	30	64
2/07/74	246	173	135	42	131	73
2/09/74	194	136	90	38*	10	57
2/10/74	189	123	84	44	0	68
2/14/74	304	200	136	32	135	110
OVERALL DAILY AVERAGE	213	120	71	39	66	73
Overall NO_2 Average:						
1. As % of Maximum Kitchen Level	100	56	33			
2. As % of Remote Kitchen Level	—	100	59			
3. Indoor/ Outdoor Ratio	5.46	3.08	1.82	1.00		

* Based on 11 out of 12 valid 2-hour values.

in House No. 1 was about the same as the winter use level in House No. 4.

The daily average NO_2 concentrations were generally highest on days of high stove activity. Another factor affecting the indoor average NO_2 levels was the corresponding concentration outside, but such an effect could not be established with precision based on the available data.

Comparison of the twenty-four hour averages for each of the four sampling locations shows a sharp decline in NO_2 levels within a short distance from the stove. Station 1A was 1 meter from the stove and the average NO_2 concentration decreased 44% from the levels measured directly above the stove. We did not observe this sharp drop in NO_2 within the kitchen (comparing concentrations at Station 1 with Station 1A) at either House No. 1 or No. 3 and initially believed that the outside door located close to the stove was diluting stove effluents since neither of the other houses had this configuration. However, as we shall see later this apparent dilution effect did not show up with either NO or CO. Therefore, the outside kitchen door cannot be considered as an important factor in affecting the pattern of indoor concentrations in House No. 4. We believe that the rapid disappearance of NO_2 generated by the stove in this house is enhanced by mechanisms such as adsorption, absorption and reactions which are not present in the other houses. One possible explanation might be the effect of high humidity within the kitchen of this house. Sampling was done during cold weather when the house was tightly closed, and with the considerable amount of cooking done in this house, the relative humidity in the kitchen could have been quite high which in turn might have enhanced the disappearance of NO_2 by one of several mechanisms. The relative higher temperature in the kitchen should not be discounted as a contributory factor.

Figure 4-30 shows the diurnal pattern of NO_2 concentrations in House No. 4 in winter. This graph like the others of this type presented earlier

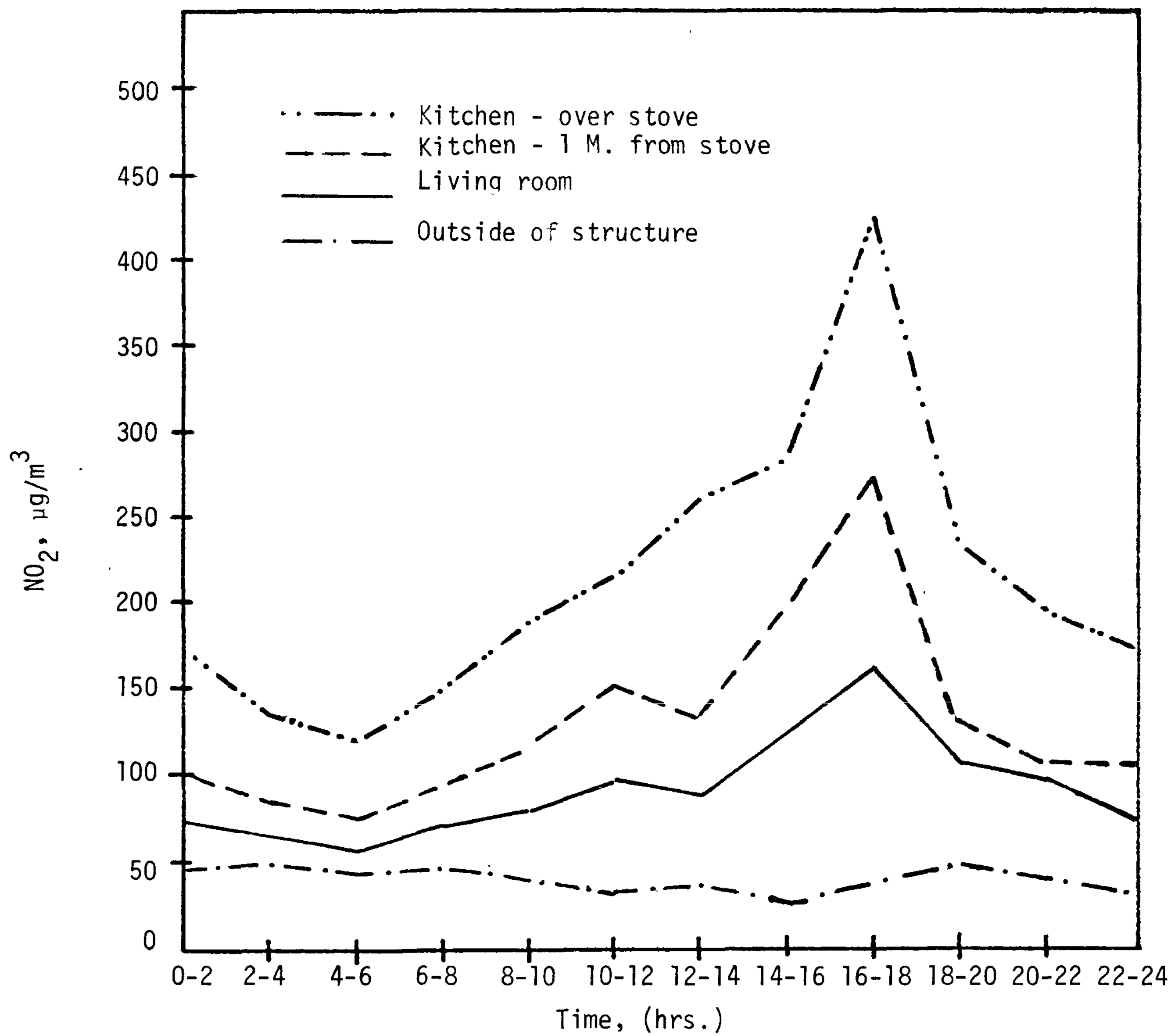

FIGURE 4-30

Diurnal Indoor/Outdoor Pattern for NO_2 - House No. 4, Winter, 1973
(Composite day based on 7 days of data)

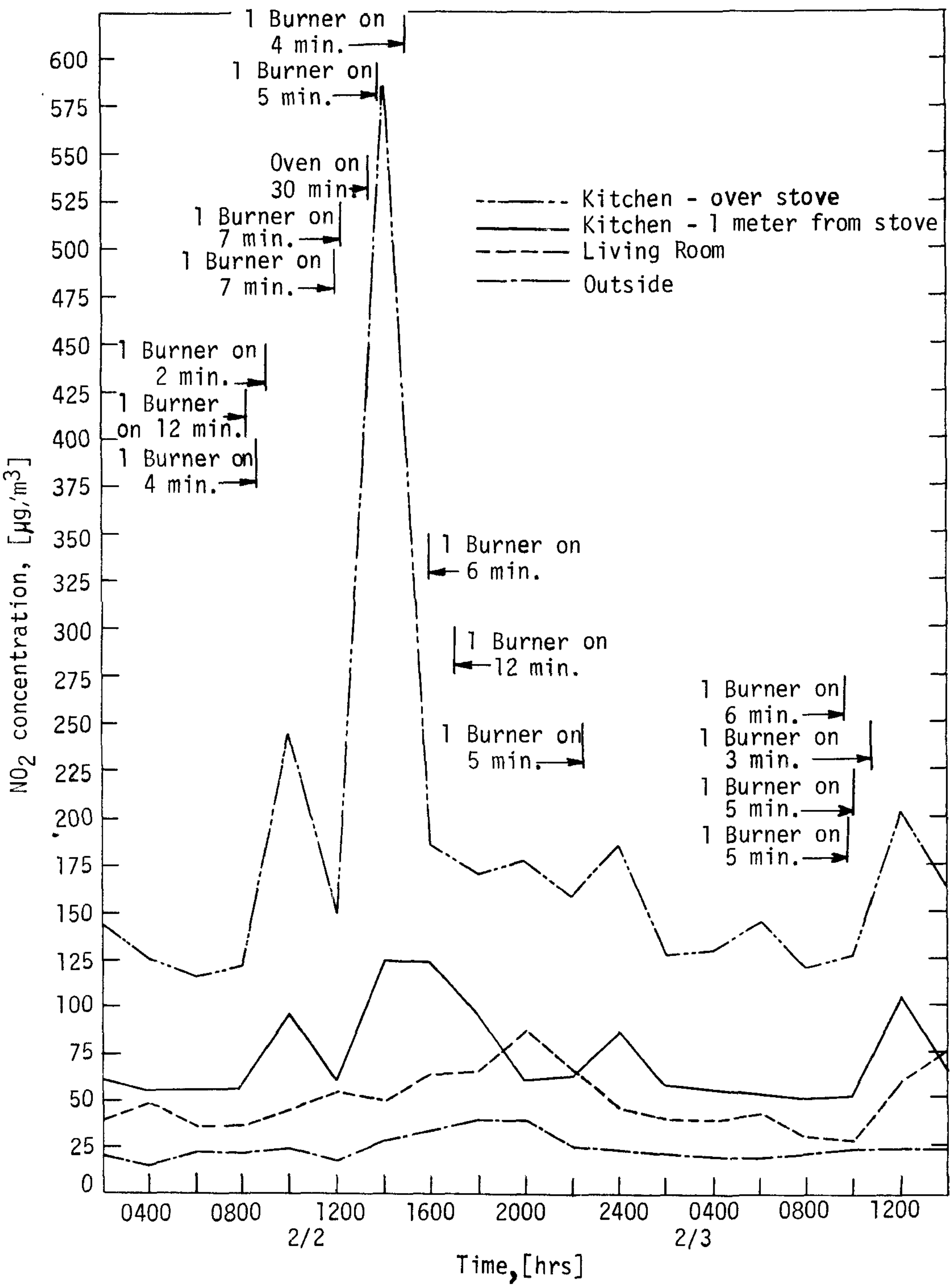

FIGURE 4-31

House No. 4 - A Time History of NO_2 Concentrations, 2-Hour Averages

Winter, 1974

for House No. 1 (Figures 4-1 and 4-2) are based on a "composite day" developed from 7 days of data. This graph shows the dominant influence of the peak associated with preparation of the evening meal. We are not able to explain the dip in the NO_2 value in the kitchen 1 meter from the stove (and to a lesser degree in the living room) which occurs in the early afternoon.

Figure 4-31 is a graph of 2-hour average NO_2 concentrations for a typical period at House No. 4. As we found at the other houses, NO_2 levels immediately respond to stove activity. This stove use also becomes readily apparent as NO_2 concentrations increase throughout the house. Periods of intense activity generally create higher concentrations. But these peak levels did not persist after the stove was turned off. The graph also shows the distinctly higher concentration found at Station 1, and the more closely related NO_2 levels elsewhere indoors. A complete list of the 2-hour NO_2 averages can be found in Appendix B-6.

Figure 4-32 is a frequency distribution of all of the five-minute averaged NO_2 data. This distribution shows that 70% of all the five-minute NO_2 data in the kitchen above the stove was in excess of 100 $\mu g/m^3$. Note that there is a logical separation of curves for the kitchen (over the stove) and the living room. However, the curve for the kitchen location near the door does not have a logical relationship to the others. As we mentioned before, the rapid loss of NO_2 between Stations 1 and 1A for unexplained reasons causes this apparent anomaly.

4.4.2 Nitric Oxide (NO)

Table 4-24 summarizes the daily average NO levels and the stove use data at House No. 4. As we found with NO_2, the NO levels at this house were the highest we encountered in the field sampling program. NO levels at Station 1 averaged 14 times greater than those outside. As with NO_2 these high average NO concentrations are caused primarily by the high levels of stove activity with stove age as a contributing factor also. A complete listing of the 2-hour average NO concentrations can be found in Appendix B-6.

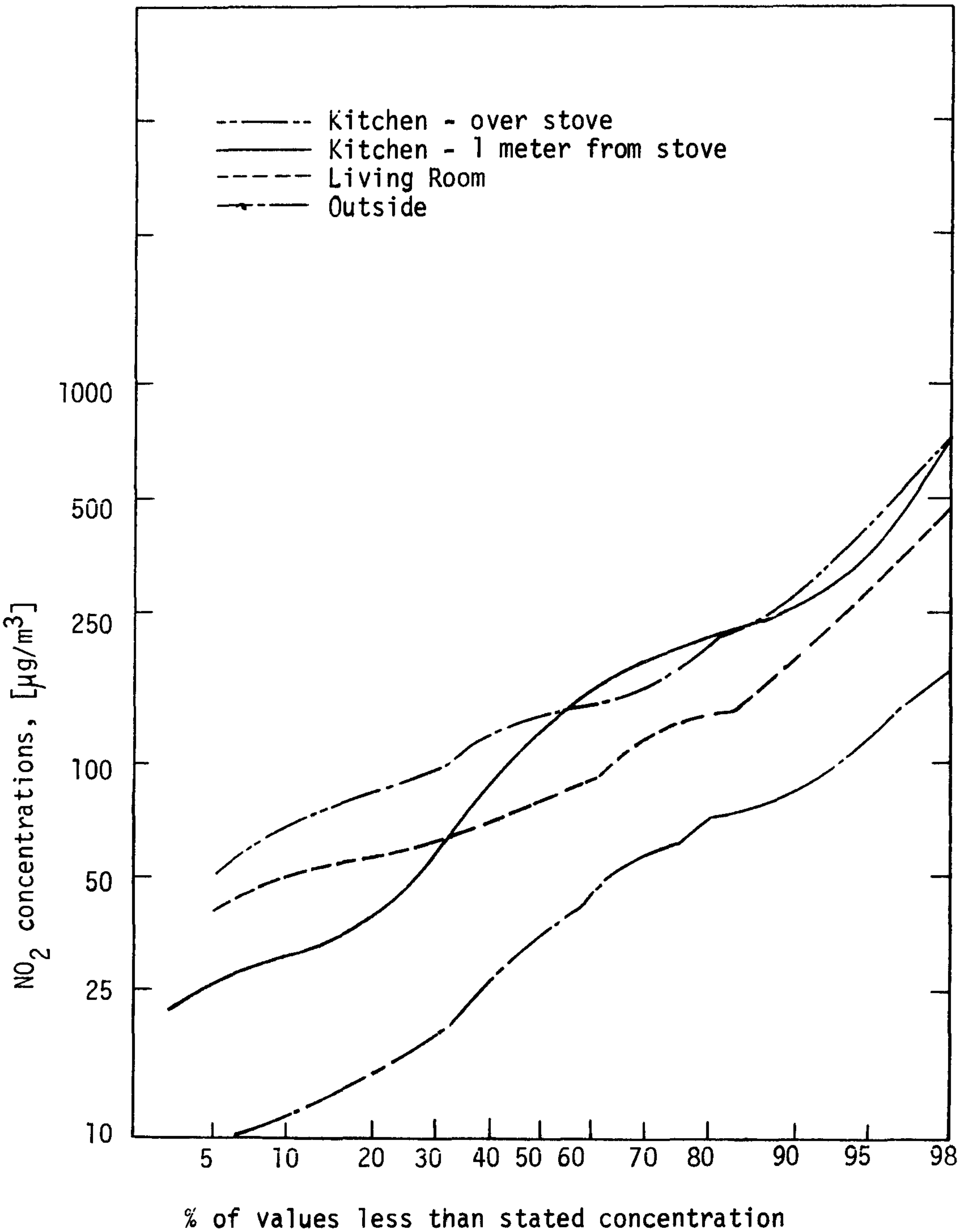

FIGURE 4-32

House No. 4 - Frequency Distribution of NO_2 Concentrations, Five-minute Data
Winter, 1974

TABLE 4-24

Winter (1974) Sampling at House No. 4

DAILY AVERAGE NO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average NO Concentration ($\mu g/m^3$)				Total Stove Use (Min)	
	1-Kitchen Over Stove	1A-Kitchen 1 M. From Stove	2-Living Room	4-Outside	Oven	Burners
1/31/74	322	272	150	33	65	38
2/01/74	264	212	95	12	91	104
2/02/74	281	222	127	8	30	64
2/07/74	410	386	352	19	131	73
2/09/74	224	185	160	24	10	57
2/10/74	236	198	177	16	0	68
2/14/74	400	352	323	21	135	110
OVERALL DAILY AVERAGE	305	229	156	19	66	73
Overall NO Average:						
1. As % of Maximum Kitchen Level	100	75	51	6		
2. As % of Remote Kitchen Level	—	100	68	8		
3. Indoor/Outdoor Ratio	16.1	12.1	8.2	1.00		

The conservative behavior of NO as compared with NO_2 is demonstrated by comparing the relationships of living room to kitchen (over the stove) for NO with NO_2 as shown in Tables 4-24 and 4-23. The living room value for NO is 51 per cent of the kitchen value, and for NO_2 the living room value is only 33 per cent of the kitchen value.

Figure 4-33 is a graph of the two-hour average NO concentrations for the same time period as shown for NO_2 in Figure 4-30. Comparing these two graphs shows peaks occurring in the same time periods of stove use. However, NO obviously does not decay as rapidly as NO_2 as stove effluents diffuse through the house. This confirms our previous findings in the diffusion experiment we conducted at House No. 2 in which the NO half-life was about three times greater than the half-life of NO_2. The two-hour NO averages indoors are much more closely related than shown for NO_2. They are also much higher than the outdoor NO levels during this time period.

A frequency distribution of all five-minute averaged NO data is shown in Figure 4-34. The most striking characteristic shown in this graph is the wide separation between indoor and outdoor concentrations. With all three indoor locations having basically similar occurrences of any given NO concentration, our earlier observations are further substantiated.

4.4.3 Carbon Monoxide

The daily average carbon monoxide concentrations at House No. 4 are presented in Table 4-25. As we found in the case of NO, carbon monoxide levels were exceedingly high indoors. The overall average CO concentration above the stove was approximately 3.8 times the overall average measured outdoors. This is substantially higher than we found at the other three houses. Carbon monoxide levels at House No. 4 appear closely related to stove use. The stove as the primary cause of high indoor CO levels can be seen by comparing the daily average concentration for February 1 and February 2. On February 1 the outdoor CO concentration was somewhat lower than that on February 2, yet kitchen concentrations

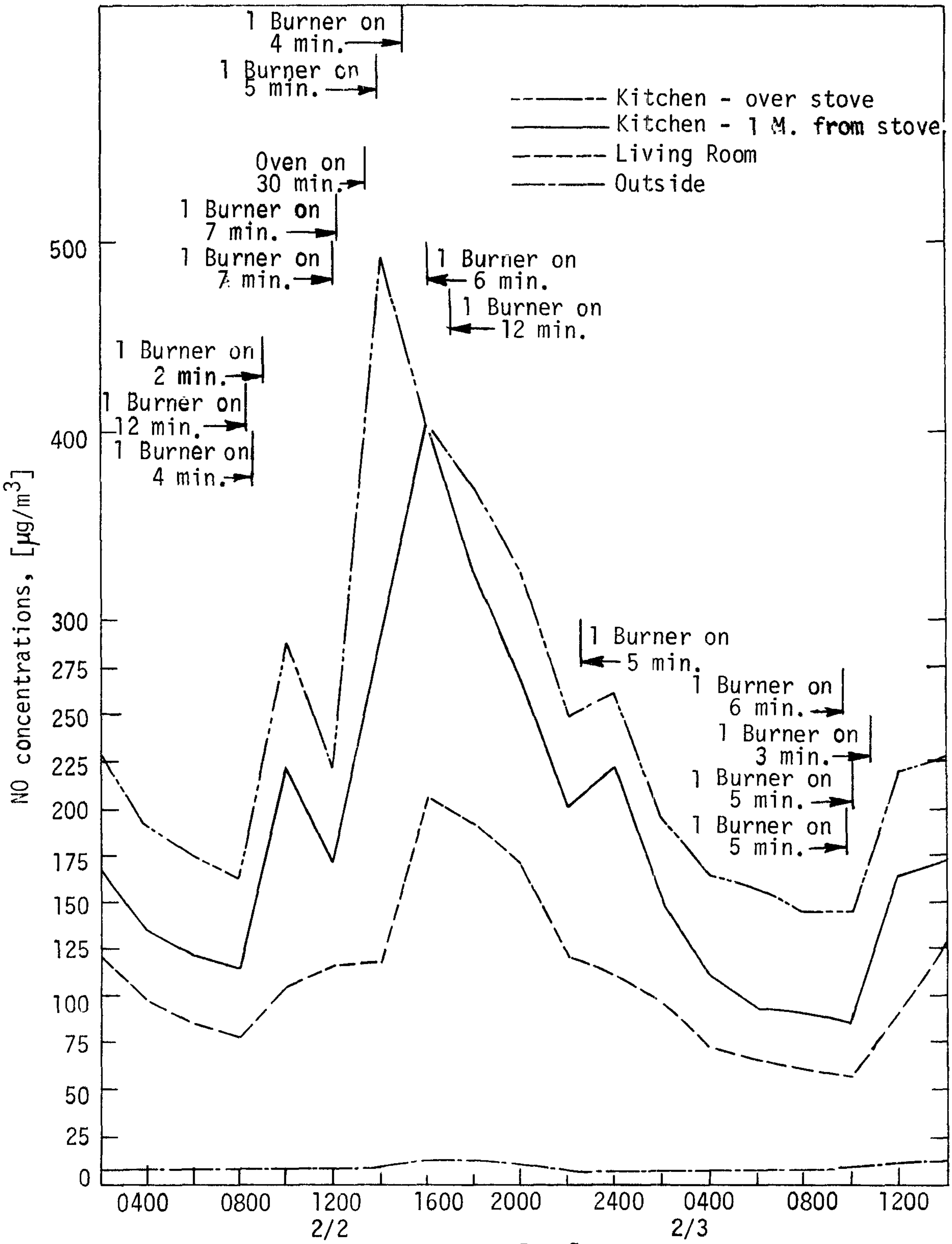

FIGURE 4-33

House No. 4 - A Time History of NO Concentrations, 2-hour Averages

Winter, 1974

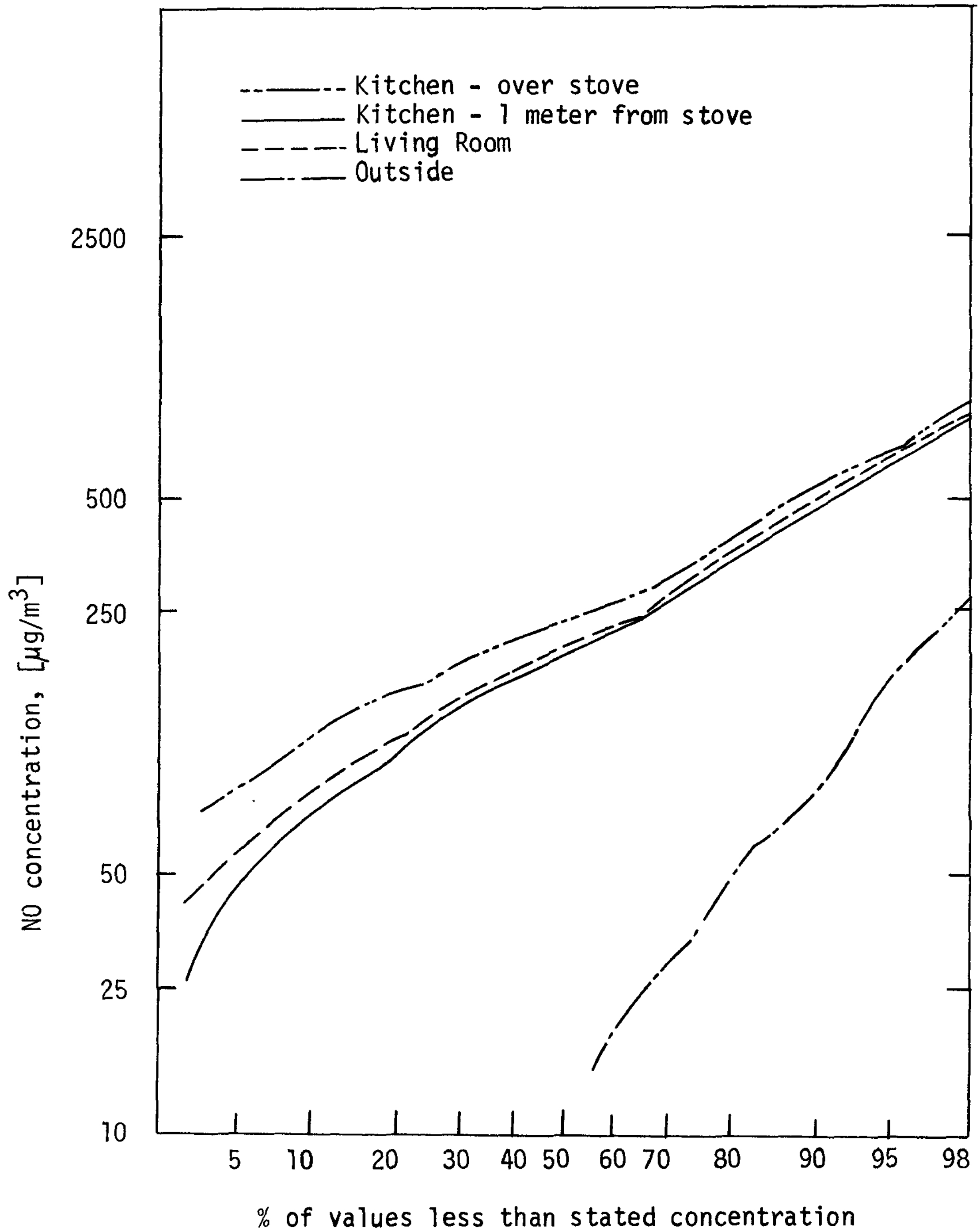

FIGURE 4-34

House No. 4 - Frequency Distribution of NO Concentrations, Five-minute Data

Winter, 1974

(over the stove) were higher on the 1st as compared to the 2nd because of the higher stove use. The interplay between indoor and outdoor CO concentration is probably minimized during the colder season when the house is closed up. At this time, the indoor CO levels are more responsive to stove activity.

The behavior of carbon monoxide shows it to be even more persistant than NO. As shown in Table 4-25 indoor CO levels averaged within 90% of the concentration directly above the stove. On several days the average CO concentration was higher at the remote kitchen location than directly above the stove. The reasons for this are not clear and some characteristics of the specific situation are unknown.

Figure 4-35 shows a time history of 2-hour average CO concentrations for a typical sampling period at House No. 4. This graph shows clearly the conservative nature of CO especially when compared to the time histories for NO_2 and NO for the same period (Figures 4-31 and 4-33). In fact, the CO time histories for the three indoor locations are almost identical and distinctly separate from the outside values. Figure 4-35 also shows the increases in CO levels with stove use. Carbon monoxide levels decrease after stove use more slowly than NO_2 but similar to NO. The CO concentrations at the indoor sampling locations appear to increase and decrease in unison with incidents of stove use. The compilation of all the two-hour CO averages is in Appendix B-6.

Frequency distributions of all the five-minute averaged CO data are shown in Figure 4-36. In this format of data evaluation, we see again the similarities between CO and NO (compare with Figure 4-34). All three indoor CO levels correspond closely and are distinctly higher than the outside values. Approximately 40% of the indoor concentrations are in excess of 10,000 $\mu g/m^3$.

TABLE 4-25

Winter (1974) Sampling at House No. 4

DAILY AVERAGE CO CONCENTRATION AND STOVE USAGE DATA

Date	Daily Average CO Concentration ($\mu g/m^3$)				Total Stove Use (min)	
	1-Kitchen Over Stove	1A-Kitchen 1 M. From Stove	3-Living Room	4-Outside	Oven	Burners
1/31/74	8650	8530	7730	2390	65	38
2/01/74	9150	8890	8020	2010	91	104
2/02/74	8860	9210	8450	2500	30	64
2/04/74	8870	9470	8430	2300	0	233
2/05/74	10840	10910	9790	4070	140	188
2/14/74	8710	7690	7180	1190	135	110
OVERALL DAILY AVERAGE	9070	9000	8190	2410	85	116
Overall CO Average:						
1. As % of Maximum Kitchen Level	100	99	90	27		
2. As % of Remote Kitchen Level	---	100	91	27		
3. Indoor/ Outdoor Ratio	3.76	3.73	3.40	1.00		

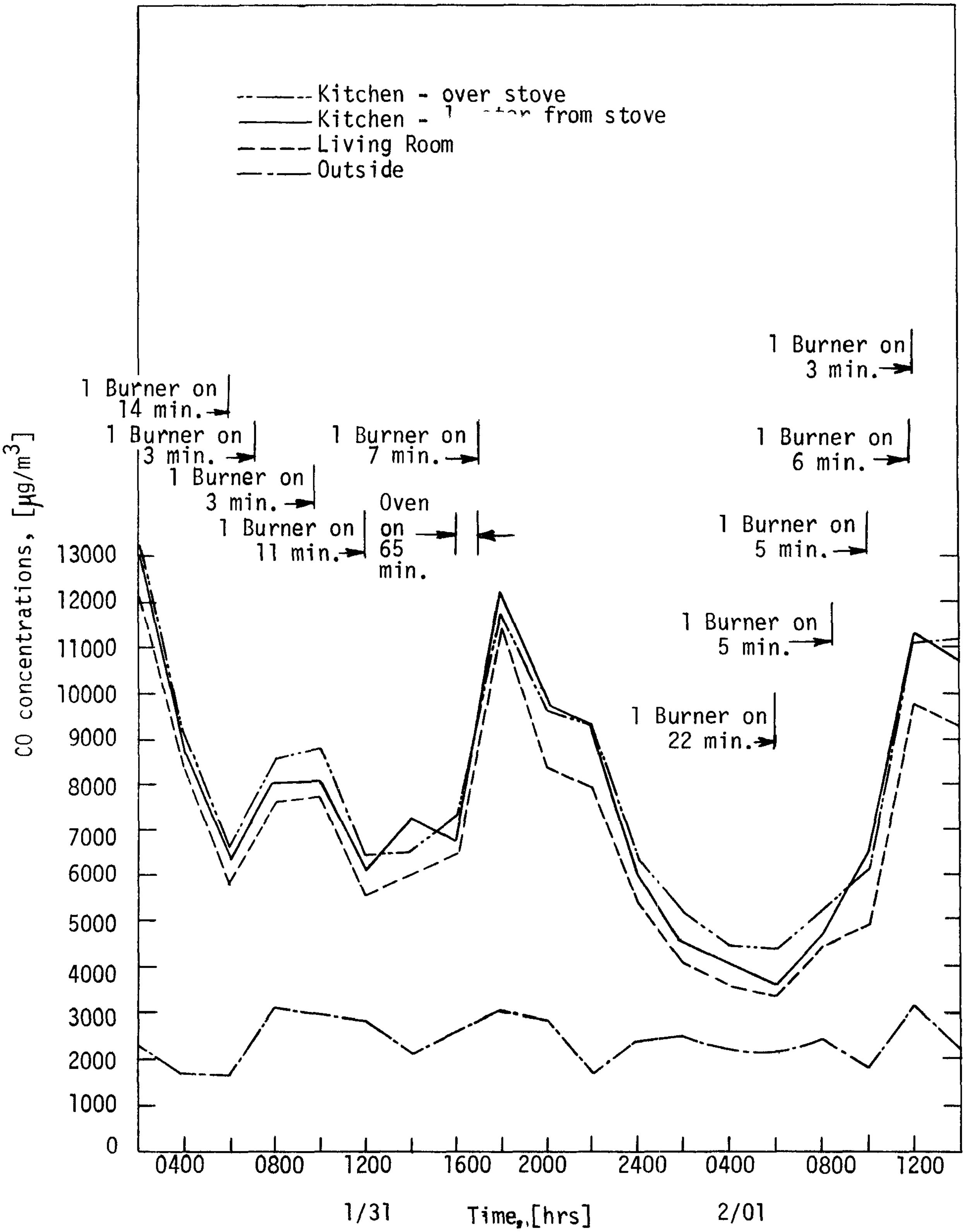

FIGURE 4-35

House No. 4 - A Time History of CO Concentrations, 2-hour Averages

Winter, 1974

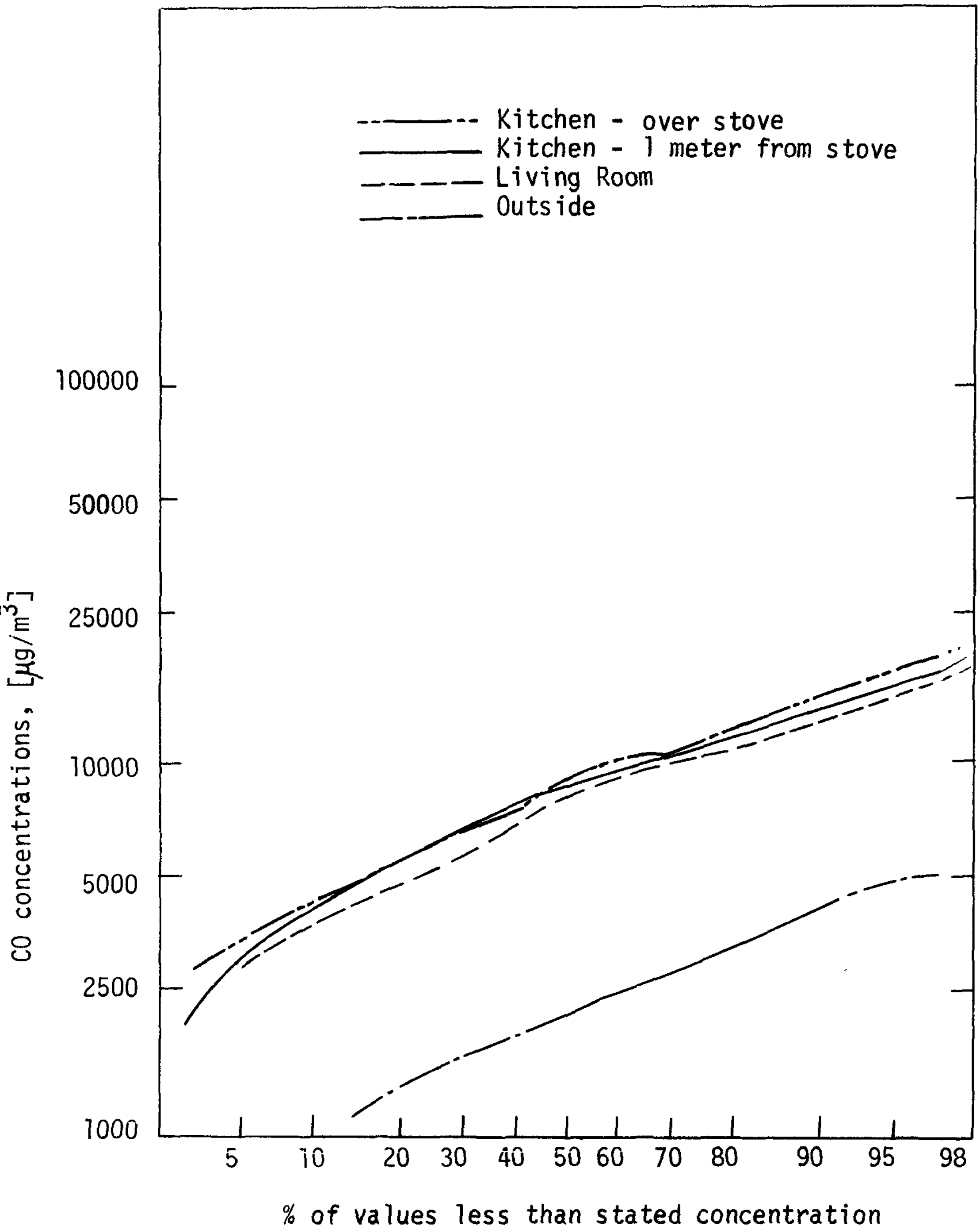

FIGURE 4-36

House No. 4 - Frequency Distribution of CO Concentrations, Five-minute Data

Winter, 1974

TASK 3

INVENTORY OF INDOOR SOURCES

TASK 3 - INVENTORY OF INDOOR SOURCES

1.0 INTRODUCTION

The purpose of this task is to identify actual and potential sources of indoor air contamination other than gas stove emissions. These sources were to be identified in two of the homes where indoor/outdoor sampling was carried out. Then, based on the results of this general and preliminary survey, those source categories judged to be important in determining indoor air quality and which could be quantified were to be studied in greater detail by an analysis of their activities in the homes of TRC employees.

In the course of the study we determined that the indoor source other than gas stoves which appeared to be most significant and was amenable to quantification was the use of aerosol products. Therefore, the bulk of this task was devoted to this indoor source category.

2.0 SUMMARY AND CONCLUSIONS

We have carried out a two-phase study to identify and, to the extent possible, quantify sources of indoor air contamination. We found that potential indoor sources take many forms. The emissions characteristics are highly variable and are related to a wide range of household operations. The one category of source found to be common to the households surveyed and which promised to be reasonably quantifiable was the use of products dispensed as aerosols by propellants.

Estimates were made for emissions of propellants into indoor atmospheres based on a survey of aerosol use patterns among TRC employees.

From the results of this work we draw the following conclusions:

1. Indoor sources of air contamination take many forms and are highly variable as to location in the home, intensity and frequency.
2. Quantification of indoor emissions of air contaminants is not straightforward and much more work is needed in developing appropriate emission factors.
3. The most common and important sources of indoor air contamination were identified as:
    a. Smoking
    b. House cleaning activities
    c. Cooking
    d. Use of aerosol products
4. Of the important source categories identified, the only one whose quantification could be attempted within the scope of this study was use of aerosol products.

5. A wide range of "active" ingredients and to a lesser extent propellants are used in aerosol form. We were able to determine typical active ingredients for many aerosol products but not specific quantities of each ingredient. For this reason no quantitative estimates of emissions were made for the active ingredients.
6. Fluorocarbon propellants are used in an estimated 75 percent or more of the aerosol products. Other propellants are used but in much smaller quantities.
7. Based on aerosol use data in a survey of TRC employees, we conclude that propellant concentrations in the home are usually well below the TLV's for these materials. However, combinations of circumstances could produce concentrations approaching or exceeding these levels.
8. The co-existence of aerosol product active ingredients, propellants, and contaminants from other sources in the home could produce an environment capable of producing adverse health effects. This whole area needs further study.

3.0 SURVEY RESULTS

3.1 Preliminary Interviews and Inspections

The two houses chosen for a generalized survey in indoor sources were House Nos. 1 and 3. A general description of their lay-out and other physical aspects is included in the Task 2 report.

In surveying the two houses, we used a list of possible sources of indoor air contamination as a basis for our interviews with the homeowners. This list is shown as Table 3-1.

Table 3-2 presents the results of interviews with the householders in Houses 1 and 3 based upon the format presented in Table 3-1. As one might expect, there is considerable variability in the habits and practices in these two homes which are capable of creating indoor air contamination. We discussed this survey with many TRC employees and determined that the variability (in character, time, degree and location) in practices which can cause indoor air contamination is typical.

Many of the sources were deemed to be extremely intermittent (e.g., interior painting) or so variable in nature (e.g, hobby and home repair activities),at least among TRC employees, that further detailed considerations within this task would have yielded little useful information. We also found that the incidence of smokers among the TRC staff and their families was extremely low (less than 10%) and pursuing this potential source in detail within the population under study would have yielded little information.

We identified cooking, cleaning and the widespread use of products dispensed with propellants as important and common sources of indoor air contamination. The first two source categories can take many forms.

TABLE 3-1

CHECK LIST FOR IDENTIFICATION OF INDOOR SOURCES OF AIR CONTAMINATION

1. Personal habits of individuals
   a. Smoking
   b. Use of spray products such as hair sprays, deodorants, shaving foam, etc.
2. House cleaning
   a. Vacuuming, sweeping and dusting
   b. Use of liquid (solvent) waxes and cleaning agents.
   c. Use of spray products such as air fresheners, disinfectants, oven cleaners, etc.
3. Cooking
   a. Stove use (included in Task 2)
   b. Types and quantities of foods cooked and methods used.
4. Household maintenance
   a. Painting of house interior with solvent, water-based and aerosol spray paints.
   b. Home workshop projects (sawdust, glue solvents, soldering and brazing, etc.).
   c. Automobile repair in attached or in basement garage.
5. Hobbies
   a. Model airplane (glue and dope)
   b. Photographic dark room (So_2 from Hypo, etc.)
   c. Woodworking (particulates, solvents, etc.)
6. General
   a. Attached or basement garage
   b. Use of electric motors (NO_x, 0_3)

TABLE 3-2

SUMMARY OF INDOOR SOURCES AT TWO TEST HOMES

Source Category	House No. 1	House No. 3
	(Surburban Split Level with basement-8 yea[illegible]-attached garage-4 occupants)	(town-house with basement-2 years old-apartment-no attached or basement garage-4 occupants)
Smoking	Wife smokes, 1 pack/day	No smokers in family
Personal Products	Men use spray deodorants. Women use creams, used in morning.	Spray deodorants used - no hair spray or shaving foams.
Cleaning	Vacuum rugs every other day-kitchen floor swept every day-House dusted 2 to 3 times a week, aerosol dust spray and rug cleaners used.	Vacuuming, sweeping and dusting on erratic schedule-usually 1 to 2 times a week. Household spray products limited to disinfectants, oven cleaners, and furniture polish.
Cooking	Gas stove-mostly roasting and baking. Most meals prepared and eaten at home.	Gas stove - mostly roasting and baking, very little frying done.
Household Maintenance	Interior painting done as needed (roughly yearly) Usually spring or fall.	Painting done yearly by apartment owner.
Hobbies	Very limited indoor hobbies.	Wife paints using a variety of media.
Basement and/or Garage Activities	Auto repair and lawn mower maintenance in attached garage. Lawn mower and auto started in garage.	Extensive use of basement for spray finishing of pictures (art), refinishing of furniture and woodworking.
Use of Electrical Appliances	Toaster used daily, blender seldom used, can opener, hair dryer and stylers electric razors, electric frying pan, television and radios.	Can opener and blender (seldom used) hair dryer, sewing machine used frequently, electric dryer, television and stereo.

Quantification of these indoor emissions could only be determined by means of laboratory and field measurement programs and developing adequate data on these relative importance in influencing indoor air quality would be outside of the scope of this project. Therefore, we identified the use of aerosol products in the home as the category to be studied further.

3.2 Aerosol Product Survey

The use of aerosol products was shown to be prevalent among the TRC employees interviewed. The variety of products dispensed from pressurized containers has grown remarkably in the past ten years or so and are associated with many household and personal care uses. Since the average family employs a significant number of aerosol products which directly dispense material into the home air environment, TRC decided to investigate further their emissions.

A checklist of common spray products was distributed among the employees at TRC and the responses from nearly 40 households were evaluated. Information was gathered on the usage habits (rate of use, time of use, and the frequency of use) from which estimates of the quantity of contaminants emitted to the indoor environment were obtained. We believe that this inventory represents a cross-section of middle-class Southern New England homes.

3.2.1 Design of the Survey

A check list was prepared and distributed among the employees at TRC. Information on the usage habits of each household with respect to aerosol products was recorded. The following product areas appeared on the check list:

- Hair Sprays
- Breath Sprays
- Deodorant Sprays
- Hair Removers
- Perfumes & Cologne Sprays
- Mouth Wash Sprays
- Feminine Deodorant Sprays
- Medicinal & First Air Sprays
- Foot Sprays
- Shoe Polish Sprays
- Shaving Foams
- Hair Coloring Foams
- Air Fresheners
- Window Cleaners
- Dust Sprays
- Fabric Finish Sprays
- Anti-Static Sprays
- Stain Repellents
- Non-Stick Cooking Sprays
- Oven Cleaners
- Furniture Polish & Dust Spray
- Spot Remover Sprays
- Spray Starch
- Rug Shampoo Sprays
- Disinfectants
- Tile Cleaners
- Spray Waxes
- Veterinary Products
- Spray Paints
- Craft Adhesives
- Car Starters
- Insect Repellents
- Anti-Rust Sprays
- Degreasers
- Whipped Cream
- Cheese
- Cake Frostings

We noted the usage rates, location of use, and the frequency and time of use for each product used by the households interviewed. Information regarding the makeup of the households was also recorded.

3.2.2 Results and Discussions

General Characteristics

The inventory consisted of responses from approximately 40 households which represent essentially half of TRC's employees. Statistics on the households appear in Table 3-3.

Usage habits of aerosol products among the households surveyed showed that essentially all families use some aerosol spray product of one kind or another. The data showed that an average of 10 product categories are used by each household. Table 3-4 presents the most frequently reported aerosol products. Six of the nine categories appearing come under the heading of household cleaning aids. This is of particular consequence since this would necessarily subject the housewife to a good number of potential air contaminants during the course of the day. Another major class of spray products is the Personal Care Category with contributions from deodorant sprays, hair sprays, and shaving foams.

TABLE 3-3

DATA ON HOUSEHOLDS FOR AEROSOL USE SURVEY

Type of Residence:

Apartment	55%
House	45%

Number of Persons in Household:

1	18%
2	40%
3	8%
4	24%
5	5%
>5	5%

Size of Residence (No. of Rooms):

3	10%
4	16%
5	26%
6	13%
7	16%
8	11%
>8	8%

TABLE 3-4

AEROSOL PRODUCT CATEGORY USE FOR TRC HOUSEHOLDS

Product Category	Percentage of Households using this Product
Furniture Polish	84%
Deodorant Spray	74%
Hair Spray	71%
Disinfectant Sprays	63%
Window Cleaners	47%
Shaving Foams	45%
Oven Cleaners	42%
Air Fresheners	26%
Dust Sprays	18%

Emission Characteristics

Some aerosol products are limited or confined to specific locations of use in the house. Others are used throughout the residence. The time, frequency, and rate of use are also shown to vary among spray products. For the most part, deodorants and shaving foams are most heavily used in the bathroom in the early morning before work or school and possibly at night before bed. Most members of the family will be present at their time of use. Hair sprays are applied on a less frequent schedule. Housecleaning is generally performed a few times per week, in the morning or afternoon. Chores such as cleaning the oven are done at greater intervals. In any case, the housewife and any pre-school children would be exposed to aerosol contaminants from household spray products.

Usage patterns and rates for the aerosol products appearing in Table 3-4 are presented in Table 3-5. The quantities of materials used are based on the numbers of various sizes of cans of a product which the householder reported using. Window cleaners were not listed and were not considered further since we found that a significant portion of their use is likely to be out-of-doors.

Propellant Emission Estimates

Most spray systems consist of two components: Functional or "active" ingredients and the propellant. The functional ingredients comprise the cleaning agents, perfumes, solvents, polishing waxes, disinfectants, etc. Propellants are used to dispense the functional portion from the container. Although the exact proportions and ingredients used in aerosol products are proprietary information, TRC was able to determine the majority of ingredients for the most frequently used

TABLE 3-5

AEROSOL USAGE PATTERNS

Product Category	Frequency of Use	Time of Use	Location of Use	Average Usage Rate for Household g/mo.	Weight Fractions of Propellant %
Deodorant Spray	Once or Twice a Day	Early Morning Late Evening	Bathroom	112-140	40
Hair Spray	3 times per week	Morning or Evening	Bathroom	84-112	70
Shaving Foam	Once a day	Morning or Evening	Bathroom	84-112	10
Air Fresheners	Once a Week	Morning-Afternoon	Throughout House	28-56	80
Disinfectant Sprays	3 times per week	Morning-Afternoon	Kitchen, Bathroom	112	80
Furniture Polish Sprays	Once a week	Morning-Afternoon	Living Room, Bedrooms, Dining Room	56	60
Dust Sprays	Once a week	Morning-Afternoon	Living Room, Bedrooms, Dining Room	28-56	60
Oven Cleaners	4 times per Year	Afternoon	Kitchen	84	10

products in Table 3-4 with the exception of dust sprays. Table 3-6 shows the wide variety of active ingredients that can be packaged in aerosol form. Because of the diversity of compounds used as ingredients, the lack of any information about the quantity of each ingredient in a single product and the amounts of active ingredients actually used versus the amount emitted to the atmosphere, we did not attempt to quantify the emission of active ingredients to the indoor atmosphere. It is our judgement the impact of the active ingredients can only be determined from a well-designed measurement program, which was beyond the scope of the present study.

There are a number of propellants used as well as shown in Table 3-6. Of those listed, however, the Freons appear to predominate in use. Isobutane is used in some window cleaners, propane, methylene chloride and vinyl chloride are used in a few hair sprays and nitrous oxide is used in some shave creams and food products. Although we did not develop any conclusive propellant usage data, we estimate that Freon propellants are used in at least 75 percent of the aerosol products. For this reason in estimating propellant emissions we have assumed that the propellants are fluorocarbons.

By focussing on fluorocarbon propellants we are not suggesting this is the only class of compounds worth examining. Until we can more accurately determine the amount of active ingredients emitted to the indoor atmosphere and the usage of propellants other than fluorocarbons, quantitative assessments of their impact would be speculative.

Emission estimates are a function of the rate of use, frequency of use, and the proportion of propellant in the spray container. Taking for an example the information appearing in Table 3-5 for deodorant sprays, and making certain assumptions, it is possible to compute the approximate quantity of propellant

TABLE 3-6

TYPICAL ACTIVE INGREDIENTS AND PROPELLANTS FOR FREQUENTLY USED AEROSOL PRODUCTS

Product Category	Active Ingredients
Furniture Polish	Silicone, wax, morpholine
Deodorant Spray	Hydrated aluminum chloride, isopropyl myristate, talc, triglycerides
Hair Spray	Vinyl acetate copolymer resins, polyvinyl-pyrrolide resins, ethanol, lanolin
Disinfectant Sprays	Triisopropanolamine, morpholine
Window Cleaners	Sodium nitrite, isopropyl alcohol, ethylene glycol, ammonium hydroxide
Shaving Foams	Stearic acid, triethanolamine, menthol, glycerine
Oven Cleaners	Potassium hydroxide, hydroxyethyl cellulose polyoxyethylene fatty ethers
Air Fresheners	Proplylene glycol, morpholine, ethanol

Propellants

Freon - 11)
Freon - 12) Chlorinated fluorocarbons
Freon - 114)

Isobutane, propane, nitrous oxide, methylene chloride, vinyl chloride emitted into the indoor atmosphere during each individual use. If we assume that the deodorant is used in a household with three occupants, and that each occupant uses a deodorant product every other day (this is generally consistant with the inventory data shown in Table 3-5) the number of individual uses each month will be 45. At 40% propellant, the amount of propellant emitted during each individual use can be computed as follows:

$$\frac{(112 - 140 \text{ g/mo}) \times .40 \text{ (fraction propellant)}}{45 \text{ uses/mo}} = 1.0 \text{ to } 1.2 \text{ g/use}$$

Application of this estimating technique to the other aerosol products resulted in the emission quantities appearing in Table 3-7.

An experiment conducted at TRC was performed to validate data from the inventory. Several brands of deodorant were tested to determine the dispensing rate of aerosol. Analytical measurements gave a range of .3-.9 g/sec. If we assume an average rate of .6 g/sec, 40% propellants and a typical use of 4 seconds, the amount of propellant emitted per use would be:

$$.6 \frac{\text{g}}{\text{sec}} \times .40 \times 4 \simeq 1.0 \text{ g propellant/use}$$

This result is in excellent agreement with our inventory findings. We expect that information assembled on less frequently used products would be somewhat less reliable especially with respect to estimates of usage rate. Those spray products that are used regularly are likely to be more closely estimated.

Referring once again to Table 3-7, we note a wide range of propellant emission rates per household use for the aerosol products listed. Shaving foams are estimated to emit less than .5 grams of propellant per use, while a maximum emission of 25 grams/use was determined for oven cleaners. We have less confidence in the emission estimate for each use of oven cleaners than

TABLE 3-7

EMISSION ESTIMATES OF PROPELLANTS FOR AEROSOL PRODUCTS

Product Category	Propellant Emission Estimates (g/use)
Deodorant Sprays	1.0 - 1.2
Hair Spray	4.9 - 6.5
Shaving Foam	0.3 - 0.4
Air Fresheners Spray	5.6 - 11.2
Disinfectant Spray	7.5
Furniture Polish Spray	8.4
Dust Spray	4.2 - 8.4
Oven Cleaners	20 - 25

for some of the other products, because this material is used only infrequently. While the contamination of the indoor air relates to these emissions, the level of contamination will also be influenced by factors such as location of use, volume space of room, air circulation rate, contaminant half-life, and the specific design of the residence. Those products which are dispensed in small, poorly ventilated areas are not likely to disperse readily throughout the house yet they would be expected to contribute to relatively high initial concentrations within the room where they are dispensed. Aerosols which are employed throughout the residence under condition of adequate air circulation would result in somewhat lower initial room concentrations and decay more rapidly with time.

The nature and extent of indoor air contamination, as was indicated, is a function of many independent variables. Some limits and the scale of the problem may be obtained, however, by using the propellant emission data collected in our inventory and several appropriate assumptions. For the purpose of comparison, we will investigate three situations as described below:

(1) Case 1: Deodorant Spray Propellant, 1-2 g/use, dispensed in bathroom.

(2) Case 2: Air Freshener Spray Propellant, 8.4 g/use, dispensed throughout house

(3) Case 3: Oven Cleaner Propellant, 25 g/use, dispensed in kitchen.

If we assume that a deodorant spray is used in a tightly closed bathroom of $10m^3$ volume, we would expect that the initial concentration of propellant would be:

$$\frac{1.2}{10} = .12 \ g/m^3 = 120,000 \ \mu g/m^3$$

Since fluorocarbons are extremely unreactive under ambient conditions, we would expect the half life of the material based on dispersion and dilution would be similar to that measured for CO in House No. 2 in Task 2, or roughly 2 hours. Thus, as long as someone remained in the closed bathroom, they would be exposed to concentrations at approximately this level.

If we assume that the amount of propellant from two sequential uses of aerosol deodorant is dispersed completely throughout a small house of 255 m^3 volume, the initial concentration would be:

$$\frac{1.2 \times 2}{255\ m^3} \times 10^6 \simeq 9400\ \mu g/m^3$$

Using a half life of two hours, concentrations after 8 hours would be about 600 $\mu g/m^3$.

Air freshener sprays are considered to be applied in most rooms of the house so that an initial concentration of propellant for the indoor environment is established quickly and for the most part uniformly.

$$\frac{8.4\ g}{255\ m^3} = .033\ g/m^3 \simeq 33{,}000\ \mu g/m^3$$

With a 2-hour half-life, the average indoor concentration would be 2000 $\mu g/m^3$ after 8 hours.

Application of spray oven cleaners in the confines of the kitchen (assume a 22m^3 volume) would possibly produce an initial room concentration of propellant as follows, assuming the kitchen is closed off from the rest of the house:

$$\frac{25\ g}{22\ m^3} = 1.14\ g/m^3 \simeq 1{,}140{,}000\ \mu g/m^3$$

Assuming that contaminants from a single use would be rapidly dispersed throughout the whole house, the average propellant concentration would be:

$$\frac{25\ g}{255\ m^3} = 0.10\ g/m^3 \simeq 100{,}000\ \mu g/m^3$$

After eight hours, the indoor concentrations in the house would be about 6,300 $\mu g/m^3$.

The Threshold Limit Values (TLV's) set by the American Conference of Governmental Industrial Hygienists for propellants of the types commonly used are in the approximate range of 5000 to 7000 mg/m^3. Thus, with the possible exception of oven cleaner use, none of the individual aerosol product use in the house appears to approach the TLV for propellant. However, depending on use patterns and in a given house, (e.g., simultaneous or sequential use of several products) indoor concentrations of propellants could exceed these limits on occasion. Furthermore, the active materials dispensed could add an unknown but probably significant component to indoor air contamination from these products.

Further research on the specific impact on indoor air quality of aerosol products and other activities identified above is clearly needed.

IV APPENDICES

APPENDIX A

CALIBRATION PROCEDURES FOR BENDIX

NO/NO_x ANALYZER

CALIBRATION PROCEDURES
FOR THE BENDIX CHEMILUMINESCENT
NO & NO_2 ANALYZER

I. GENERAL

1. Allow instrument to warm up as long as possible, but at least 4 hours. Use the [illegible] mode at all times.

2. Set up calibration apparatus: Connect in order: 1) pump, 2) UV lamp, 3) scrubber, 4) ozone generator, 5) mixing chamber, and 6) output manifold. Connect the NO supply in the following order: 1) NO Cylinder, 2) pressure regulator, 3) capillary, and 4) valve for bubble flowmeter. The NO and air should join ahead of the mixing chamber.

3. Set the instrument's three range scales to the 0 to 0.5 ppm range.

4. Switch the instrument to zero, turn on zero ozone lamp on the zero air scrubber, and allow at least 10 minutes for stabilization.

5. Adjust the "NO_2 ZERO" knob until the NO_2 pen reads 5% of scale, then lock the knob.

6. Adjust the "NO ZERO" knob until the NO pen reads 5% of chart. Lock.

7. Turn the meter switch to "NO_x" position and adjust the "NO_x ZERO" knob until the meter reads 5% of scale. Lock.

8. Recheck the zero on the two pen chart recorder and allow 5-10 minutes to check the chart trace on zero.

9. Connect the instrument inlet to the output manifold of the calibration apparatus. Keep the ozone and NO off, so that zero air is being provided.

10. Switch the instrument to "AMBIENT" and sample the calibration zero air. There should be no change in the zero readings. If there is a change, check the following:

    a. If calibration zero air reads higher than instrument zero, check UV lamp and zero scrubber on calibration apparatus and replace scrubber material.

    b. If calibration zero air reads lower than instrument zero, check zero scrubber and UV lamp on instrument zero module and change scrubber material.

II. NO CALIBRATION

1. Turn the 3-way valve to the bubble flowmeter position and turn on the NO cylinder valve.

2. Adjust air flow and NO pressure to get approximately 0.4 ppm NO.

   (A) $$\text{NO ppm} = \frac{\text{NO flow rate (cc/min)}}{\text{NO flow (cc/min)} + \text{air flow (cc/min)}} \times \text{NO Cylinder ppm}$$

3. Measure the NO flow at least twice with the bubble flowmeter.

4. Switch the 3-way valve back to regular flow and allow the instrument to sample the concentration for at least 10 minutes.

5. Calculate the exact concentration, using (A) above. Extrapolate desired chart reading using (B) below:

   (B) Chart reading (%) = (NO concentration x 200) + 5.

6. Adjust the "NO SPAN" knob until the NO recorder reads correctly, as determined in step 5 above. Lock the knob.

7. Adjust the "NO_x SPAN" knob until the instrument <u>meter</u> reads the same percent of scale as determined in step 5. Lock the knob.

8. Repeat steps I-4 to I-8 to recheck the NO and NO_x zero baseline. If adjustment is necessary, repeat steps II-2 to II-8.

9. Reduce the NO concentration by changing the NO flow. Measure the NO flow with bubble flowmeter and calculate the concentration as in II-2(A). Sample and measure at least three other NO concentrations. Do not change "NO ZERO" or "NO SPAN" settings.

10. Plot the 5 or more chart readings versus the NO concentration in ppm. Draw calibration curve or obtain computer printout of net chart divisions versus the NO concentration in ppm.

III. NO_2 CALIBRATION

1. Adjust the NO concentration to about 0.45 ppm. Measure the NO flow rate and calculate the exact NO concentration, using formula (A) from II-2 above.

2. Allow the instrument to sample the concentration. Switch the meter to NO_x and observe and record the meter reading. Turn on the ozone generator and adjust the slide such that the O_3 output is sufficient to oxidize about 90% of the NO present to NO_2. If the NO_x value drops more than .015 ppm (3% chart) the analyzer converter needs to be replaced.

3. Wait 10 minutes until the NO recorder reading is stable, then calculate the NO_2 concentration as follows:

(C) NO_2 (ppm) = NO_x (ppm) - NO (ppm)

where: NO_x is the original NO concentration from III-1.
NO concentration is the reading on the NO recorder, converted to ppm by the calibration curve prepared in II-9.

4. Now calculate the desired NO_2 chart reading:

NO_2 chart reading (%) - (NO_2 concentration x 200) + 5.

5. Adjust the "NO_2 SPAN" knob until the NO_2 recorder reads correctly as determined in III-4. Lock the knob.

6. Turn off the ozone lamp on the zero air scrubber and reconnect analyzer to sampling system.

APPENDIX B

Indoor/Outdoor Air Quality Data (NO_2, NO, and CO)

2-hour and daily averages

Appendix No.	House No.	Season
B-1	1	Spring-Summer
B-2	1	Fall-Winter
B-3	2	Spring-Summer
B-4	3	Spring-Summer
B-5	3	Fall-Winter
B-6	4	Fall-Winter

Appendix B-1

NO_2, NO and CO data for House No. 1 - Spring/Summer

HOUSE 1 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/ 9/73	0000-0200				
5/ 9/73	0200-0400	******	******	******	******
5/ 9/73	0400-0600	******	******	******	******
5/ 9/73	0600-0800	******	******	******	******
5/ 9/73	0800-1000	******	******	******	******
5/ 9/73	1000-1200	******	******	******	******
5/ 9/73	1200-1400	******	******	******	******
5/ 9/73	1400-1600	81.5 (3)	78.9 (3)	71.3 (3)	66.2 (3)
5/ 9/73	1600-1800	454.7 (6)	150.2 (6)	129.8 (6)	67.5 (6)
5/ 9/73	1800-2000	83.4 (6)	72.5 (6)	73.2 (6)	63.0 (6)
5/ 9/73	2000-2200	89.1 (6)	56.6 (6)	63.6 (6)	61.1 (6)
5/ 9/73	2200-2400	88.5 (6)	65.5 (6)	59.8 (6)	62.4 (6)
5/10/73	0000-0200	75.1 (6)	52.2 (6)	50.9 (6)	47.7 (6)
5/10/73	0200-0400	84.6 (6)	42.0 (6)	48.4 (6)	48.4 (6)
5/10/73	0400-0600	99.9 (6)	55.4 (6)	57.9 (6)	47.7 (6)
5/10/73	0600-0800	125.4 (6)	66.8 (6)	59.8 (6)	52.8 (6)
5/10/73	0800-1000	******	******	******	******
5/10/73	1000-1200	******	******	******	******
5/10/73	1200-1400	******	******	******	******
5/10/73	1400-1600	208.7 (3)	89.1 (3)	78.9 (3)	54.7 (3)
5/10/73	1600-1800	199.2 (6)	140.6 (6)	117.1 (6)	63.6 (6)
5/10/73	1800-2000	90.4 (6)	73.8 (6)	70.0 (6)	56.6 (6)
5/10/73	2000-2200	93.5 (6)	75.1 (6)	68.1 (6)	58.5 (6)
5/10/73	2200-2400	84.6 (6)	57.9 (6)	52.8 (6)	38.2 (6)
5/11/73	0000-0200	67.2 (5)	40.1 (6)	36.9 (6)	28.0 (6)
5/11/73	0200-0400	57.3 (6)	35.6 (6)	30.5 (6)	26.7 (6)
5/11/73	0400-0600	56.6 (6)	39.5 (6)	35.6 (6)	28.0 (6)
5/11/73	0600-0800	82.1 (6)	47.7 (6)	41.4 (6)	41.4 (6)
5/11/73	0800-1000	79.5 (6)	69.4 (6)	73.2 (6)	66.2 (6)
5/11/73	1000-1200	******	******	******	******
5/11/73	1200-1400	26.7 (3)	33.1 (3)	34.4 (3)	28.0 (3)
5/11/73	1400-1600	29.3 (6)	31.2 (6)	35.0 (6)	34.4 (6)
5/11/73	1600-1800	51.2 (5)	55.0 (5)	74.8 (5)	64.1 (5)
5/11/73	1800-2000	******	******	******	******
5/11/73	2000-2200	100.5 (6)	78.3 (6)	73.2 (6)	49.6 (6)
5/11/73	2200-2400	76.4 (6)	58.5 (6)	51.5 (6)	32.5 (6)

Note: **** indicates no valid data collected

HOUSE 1 [illegible] G-SUMMER NO2 AVERAGE CONCENTRATIONS, UG/M3
VALUES ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/12/73	0000-0200	71.9 (6)	49.0 (6)	38.2 (6)	31.8 (6)
[illegible]	0200-0400	80.8 (6)	45.8 (6)	37.5 (6)	33.7 (6)
5/12/73	0400-0600	70.0 (6)	30.5 (6)	31.2 (6)	21.6 (6)
5/12/73	0600-0800	102.4 (6)	56.6 (6)	44.5 (6)	44.5 (6)
5/12/73	0800-1000	98.0 (6)	52.2 (6)	84.6 (6)	45.8 (6)
5/12/73	1000-1200	187.1 (4)	81.1 (4)	55.4 (4)	34.4 (4)
5/12/73	1200-1400	302.9 (6)	143.2 (6)	66.8 (6)	45.2 (6)
5/12/73	1400-1600	152.7 (6)	146.4 (6)	136.2 (6)	37.5 (6)
5/12/73	1600-1800	174.4 (6)	91.6 (6)	96.7 (6)	33.1 (6)
5/12/73	1800-2000	80.8 (6)	70.0 (6)	62.4 (6)	55.4 (6)
5/12/73	2000-2200	87.8 (6)	69.4 (6)	50.3 (6)	71.3 (6)
5/12/73	2200-2400	89.1 (6)	57.3 (6)	42.6 (6)	70.6 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		124.8	74.4	62.2	43.7
5/13/73	0000-0200	91.6 (6)	55.4 (6)	41.4 (6)	57.9 (6)
5/13/73	0200-0400	83.4 (6)	59.2 (6)	37.5 (6)	40.7 (6)
5/13/73	0400-0600	85.9 (6)	41.4 (6)	33.1 (6)	33.7 (6)
5/13/73	0600-0800	64.9 (6)	36.9 (6)	29.3 (6)	28.0 (6)
5/13/73	0800-1000	92.3 (6)	52.2 (6)	44.5 (6)	22.9 (6)
5/13/73	1000-1200	41.4 (6)	38.8 (6)	43.9 (6)	12.7 (6)
5/13/73	1200-1400	49.0 (6)	30.5 (6)	54.7 (6)	8.3 (6)
5/13/73	1400-1600	47.7 (6)	22.3 (6)	25.5 (6)	9.9 (5)
5/13/73	1600-1800	47.1 (6)	21.6 (6)	24.2 (6)	13.4 (6)
5/13/73	1800-2000	54.7 (6)	26.7 (6)	25.5 (6)	12.1 (6)
5/13/73	2000-2200	61.7 (6)	28.0 (6)	29.3 (6)	22.9 (6)
5/13/73	2200-2400	62.4 (6)	42.6 (6)	34.4 (6)	40.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		65.2	38.0	35.3	25.3
5/14/73	0000-0200	69.4 (6)	43.4 (6)	32.5 (6)	42.6 (6)
5/14/73	0200-0400	57.9 (6)	38.8 (6)	29.3 (6)	37.5 (6)
5/14/73	0400-0600	51.5 (6)	36.9 (6)	32.5 (6)	30.5 (6)
5/14/73	0600-0800	108.2 (6)	59.2 (6)	38.2 (6)	36.9 (6)
5/14/73	0800-1000	60.5 (6)	38.8 (6)	42.6 (6)	22.9 (6)
5/14/73	1000-1200	45.8 (6)	42.6 (6)	58.5 (6)	12.7 (6)
5/14/73	1200-1400	******	******	******	******
5/14/73	1400-1600	******	******	******	******
5/14/73	1600-1800	207.1 (6)	94.8 (6)	84.0 (6)	62.4 (6)
5/14/73	1800-2000	114.5 (6)	92.3 (6)	88.5 (6)	80.8 (6)
5/14/73	2000-2200	120.9 (6)	96.7 (6)	75.1 (6)	117.7 (6)
5/14/73	2200-2400	116.4 (6)	91.0 (6)	67.5 (6)	110.1 (6)

HOUSE 1 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

		STATION			
DATE	TIME	1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/15/73	0000-0200	109.4 (6)	79.5 (6)	57.3 (6)	87.8 (6)
5/15/73	0200-0400	95.4 (6)	66.2 (6)	53.5 (6)	70.6 (6)
5/15/73	0400-0600	87.2 (6)	43.4 (6)	49.0 (6)	66.8 (6)
5/15/73	0600-0800	138.1 (6)	56.0 (6)	45.8 (6)	59.2 (6)
5/15/73	0800-1000	99.3 (6)	56.6 (6)	49.0 (6)	51.5 (6)
5/15/73	1000-1200	113.9 (6)	60.5 (6)	49.6 (6)	63.0 (6)
5/15/73	1200-1400	321.3 (6)	159.7 (6)	125.4 (6)	85.9 (6)
5/15/73	1400-1600	318.8 (6)	201.1 (6)	168.6 (6)	89.1 (6)
5/15/73	1600-1800	229.1 (4)	169.9 (4)	146.0 (4)	64.9 (4)
5/15/73	1800-2000	129.2 (6)	78.3 (6)	77.0 (6)	70.0 (6)
5/15/73	2000-2200	99.9 (6)	79.5 (6)	57.9 (6)	96.7 (6)
5/15/73	2200-2400	107.5 (6)	82.7 (6)	64.9 (6)	74.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		154.1	94.9	78.7	73.3
5/16/73	0000-0200	99.9 (6)	59.2 (6)	61.1 (6)	31.8 (6)
5/16/73	0200-0400	78.3 (6)	42.6 (6)	40.7 (6)	22.3 (6)
5/16/73	0400-0600	74.5 (6)	40.1 (6)	37.5 (6)	26.1 (6)
5/16/73	0600-0800	129.8 (6)	71.3 (6)	54.1 (6)	28.0 (6)
5/16/73	0800-1000	77.0 (6)	62.4 (6)	69.4 (6)	31.2 (6)
5/16/73	1000-1200	50.3 (6)	29.3 (6)	29.9 (6)	18.5 (6)
5/16/73	1200-1400	45.8 (6)	37.5 (6)	34.4 (6)	24.2 (6)
5/16/73	1400-1600	65.9 (4)	52.5 (4)	46.8 (4)	24.8 (4)
5/16/73	1600-1800	******	******	******	******
5/16/73	1800-2000	******	******	******	******
5/16/73	2000-2200	******	******	******	******
5/16/73	2200-2400	******	******	******	******
5/21/73	0000-0200	******	******	******	******
5/21/73	0200-0400	******	******	******	******
5/21/73	0400-0600	******	******	******	******
5/21/73	0600-0800	******	******	******	******
5/21/73	0800-1000	******	******	******	******
5/21/73	1000-1200	******	******	******	******
5/21/73	1200-1400	45.8 (6)	28.6 (6)	26.7 (6)	23.5 (6)
5/21/73	1400-1600	54.7 (6)	36.3 (6)	30.5 (6)	16.5 (6)
5/21/73	1600-1800	49.0 (6)	36.9 (6)	25.5 (6)	19.1 (6)
5/21/73	1800-2000	62.4 (6)	36.3 (6)	30.5 (6)	21.6 (6)
5/21/73	2000-2200	134.9 (6)	57.9 (6)	104.4 (6)	32.5 (6)
5/21/73	2200-2400	52.8 (6)	33.1 (6)	33.1 (6)	13.4 (6)

HOUSE 1 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

		STATION			
DATE	TIME	1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/22/73	0000-0200	43.3 (6)	26.1 (6)	23.5 (6)	6.9 (5)
5/22/73	0200-0400	47.1 (6)	26.7 (6)	22.9 (6)	9.2 (5)
5/22/73	0400-0600	50.3 (6)	27.4 (6)	19.1 (6)	13.4 (6)
5/22/73	0600-0800	155.9 (6)	37.5 (6)	22.3 (6)	22.3 (6)
5/22/73	0800-1000	55.4 (6)	46.5 (6)	35.0 (6)	14.0 (6)
5/22/73	1000-1200	36.9 (6)	24.8 (6)	17.8 (6)	9.5 (6)
5/22/73	1200-1400	39.5 (6)	27.4 (6)	19.1 (6)	12.1 (6)
5/22/73	1400-1600	57.3 (3)	29.3 (3)	25.5 (3)	21.6 (3)
5/22/73	1600-1800	124.1 (6)	64.9 (6)	40.7 (6)	21.0 (6)
5/22/73	1800-2000	71.3 (6)	54.7 (6)	52.2 (6)	36.9 (6)
5/22/73	2000-2200	77.6 (6)	54.1 (6)	47.1 (6)	66.2 (6)
5/22/73	2200-2400	78.3 (6)	56.6 (6)	42.0 (6)	62.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		69.7	39.7	30.6	24.6
5/23/73	0000-0200	91.6 (6)	56.6 (6)	42.6 (6)	54.7 (6)
5/23/73	0200-0400	91.6 (6)	47.7 (6)	37.5 (6)	49.0 (6)
5/23/73	0400-0600	87.8 (6)	42.0 (6)	46.5 (6)	39.5 (6)
5/23/73	0600-0800	81.5 (6)	56.6 (6)	38.8 (6)	46.5 (6)
5/23/73	0800-1000	78.3 (6)	62.4 (6)	62.4 (6)	81.5 (6)
5/23/73	1000-1200	71.8 (5)	54.2 (5)	55.7 (5)	64.0 (4)
5/23/73	1200-1400	85.9 (6)	55.4 (6)	53.5 (6)	39.5 (6)
5/23/73	1400-1600	97.4 (6)	63.6 (6)	57.3 (6)	55.4 (6)
5/23/73	1600-1800	181.4 (6)	112.0 (6)	89.7 (6)	75.7 (6)
5/23/73	1800-2000	88.5 (6)	74.5 (6)	66.2 (6)	68.7 (6)
5/23/73	2000-2200	101.8 (6)	52.2 (6)	50.3 (6)	49.6 (6)
5/23/73	2200-2400	75.1 (6)	46.5 (6)	43.3 (6)	54.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		94.4	60.3	53.6	56.5
5/24/73	0000-0200	70.0 (6)	43.9 (6)	42.6 (6)	34.4 (6)
5/24/73	0200-0400	64.9 (6)	48.4 (6)	40.7 (6)	47.1 (6)
5/24/73	0400-0600	68.1 (6)	45.2 (6)	38.8 (6)	43.9 (6)
5/24/73	0600-0800	163.5 (6)	77.6 (6)	54.7 (6)	54.1 (6)
5/24/73	0800-1000	93.5 (6)	59.8 (6)	49.0 (6)	49.0 (6)
5/24/73	1000-1200	63.0 (6)	43.3 (6)	44.5 (6)	33.7 (6)
5/24/73	1200-1400	87.2 (6)	78.9 (6)	57.9 (6)	34.4 (6)
5/24/73	1400-1600	73.2 (6)	56.6 (6)	46.5 (6)	34.4 (6)
5/24/73	1600-1800	78.9 (6)	59.8 (6)	54.1 (6)	43.3 (6)
5/24/73	1800-2000	87.8 (6)	54.1 (6)	54.1 (6)	38.8 (6)
5/24/73	2000-2200	110.7 (6)	54.7 (6)	56.6 (6)	45.8 (6)
5/24/73	2200-2400	86.5 (6)	49.6 (6)	46.5 (6)	47.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		87.3	56.0	48.8	42.2

HOUSE 1 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/25/73	0000-0200	71.9 (6)	42.6 (6)	35.6 (6)	43.9 (6)
5/25/73	0200-0400	57.9 (6)	40.1 (6)	30.5 (6)	27.4 (6)
5/25/73	0400-0600	55.4 (6)	26.1 (6)	22.3 (6)	12.7 (6)
5/25/73	0600-0800	52.2 (6)	35.6 (6)	28.6 (6)	38.2 (6)
5/25/73	0800-1000	64.9 (6)	30.5 (6)	32.5 (6)	31.8 (6)
5/25/73	1000-1200	59.8 (6)	40.7 (6)	40.1 (6)	36.3 (6)
5/25/73	1200-1400	70.3 (5)	42.0 (5)	39.7 (5)	42.0 (5)
5/25/73	1400-1600	******	******	******	******
5/25/73	1600-1800	******	******	******	******
5/25/73	1800-2000	******	******	******	******
5/25/73	2000-2200	******	******	******	******
5/25/73	2200-2400	******	******	******	******

HOUSE 1 SPRING-SUMMER NO. AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/ 9/73	0000-0200	******	******	******	******
5/ 9/73	0200-0400	******	******	******	******
5/ 9/73	0400-0600	******	******	******	******
5/ 9/73	0600-0800	******	******	******	******
5/ 9/73	0800-1000	******	******	******	******
5/ 9/73	1000-1200	******	******	******	******
5/ 9/73	1200-1400	******	******	******	******
5/ 9/73	1400-1600	275.0 (3)	107.8 (3)	46.8 (3)	15.9 (3)
5/ 9/73	1600-1800	542.4 (6)	314.8 (6)	267.7 (6)	17.6 (6)
5/ 9/73	1800-2000	202.3 (6)	172.6 (6)	156.8 (6)	17.1 (6)
5/ 9/73	2000-2200	128.3 (6)	116.2 (6)	122.9 (6)	10.9 (6)
5/ 9/73	2200-2400	84.9 (6)	64.8 (6)	96.1 (6)	7.9 (6)
5/10/73	0000-0200	74.0 (6)	44.7 (6)	67.3 (6)	7.9 (6)
5/10/73	0200-0400	58.5 (6)	31.8 (6)	48.1 (6)	3.5 (5)
5/10/73	0400-0600	53.1 (6)	28.4 (6)	41.0 (6)	6.7 (6)
5/10/73	0600-0800	115.6 (6)	41.4 (6)	48.1 (6)	10.0 (3)
5/10/73	0800-1000	******	******	******	******
5/10/73	1000-1200	******	******	******	******
5/10/73	1200-1400	******	******	******	******
5/10/73	1400-1600	135.8 (3)	17.6 (3)	10.0 (3)	7.5 (3)
5/10/73	1600-1800	153.8 (6)	39.7 (6)	32.2 (6)	14.6 (6)
5/10/73	1800-2000	7.9 (6)	3.5 (5)	5.4 (6)	5.0 (4)
5/10/73	2000-2200	5.0 (5)	4.2 (3)	2.5 (3)	3.8 (2)
5/10/73	2200-2400	7.1 (6)	4.0 (5)	4.2 (6)	4.2 (6)
BAD TIME ON CARD					
5/11/73	0000-0200	41.6 (5)	17.6 (6)	13.8 (6)	8.4 (6)
5/11/73	0200-0400	57.7 (6)	37.2 (6)	26.3 (6)	12.1 (6)
5/11/73	0400-0600	57.7 (6)	35.5 (6)	21.3 (6)	11.7 (6)
5/11/73	0600-0800	63.5 (6)	33.0 (6)	22.6 (6)	15.0 (6)
5/11/73	0800-1000	49.7 (6)	16.7 (6)	21.3 (6)	9.6 (6)
5/11/73	1000-1200	******	******	******	******
5/11/73	1200-1400	11.3 (2)	6.3 (2)	5.0 (2)	4.2 (3)
5/11/73	1400-1600	3.8 (4)	2.5 (4)	4.5 (5)	3.5 (5)
5/11/73	1600-1800	14.0 (5)	15.0 (5)	35.1 (5)	22.6 (5)
5/11/73	1800-2000	******	******	******	******
5/11/73	2000-2200	118.1 (6)	64.0 (6)	86.1 (6)	4.5 (5)
5/11/73	2200-2400	15.0 (6)	7.1 (6)	10.0 (6)	3.8 (6)

HOUSE 1 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv. Rm	3 BD RM	4 OUTSIDE
5/12/73	0000-0200	14.2 (6)	3.8 (2)	5.0 (2)	2.5 (1)
5/12/73	0200-0400	21.3 (6)	3.3 (3)	4.5 (5)	4.5 (5)
5/12/73	0400-0600	18.8 (6)	6.7 (3)	6.7 (3)	13.4 (3)
5/12/73	0600-0800	92.0 (6)	35.9 (6)	27.6 (6)	29.1 (5)
5/12/73	0800-1000	130.0 (6)	80.3 (6)	130.2 (6)	19.6 (6)
5/12/73	1000-1200	197.2 (4)	105.3 (4)	43.3 (4)	8.8 (4)
5/12/73	1200-1400	313.1 (6)	169.3 (6)	44.3 (6)	13.4 (6)
5/12/73	1400-1600	177.6 (6)	102.8 (6)	103.2 (6)	16.3 (6)
5/12/73	1600-1800	147.6 (6)	110.4 (6)	120.0 (6)	26.3 (6)
5/12/73	1800-2000	87.4 (6)	71.5 (6)	89.9 (6)	24.6 (5)
5/12/73	2000-2200	48.9 (6)	30.9 (6)	42.2 (6)	30.1 (5)
5/12/73	2200-2400	89.3 (6)	60.6 (6)	67.7 (6)	32.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		111.5	65.1	57.1	18.4
5/13/73	0000-0200	84.4 (6)	51.8 (6)	65.2 (6)	42.6 (6)
5/13/73	0200-0400	64.4 (6)	26.3 (6)	49.3 (6)	5.0 (6)
5/13/73	0400-0600	46.4 (6)	15.9 (6)	30.9 (6)	3.3 (6)
5/13/73	0600-0800	41.8 (6)	12.5 (6)	19.6 (6)	4.6 (6)
5/13/73	0800-1000	125.4 (6)	61.9 (6)	61.4 (6)	7.5 (6)
5/13/73	1000-1200	31.8 (6)	26.8 (6)	32.6 (6)	14.2 (6)
5/13/73	1200-1400	28.4 (6)	13.8 (6)	13.4 (6)	13.0 (6)
5/13/73	1400-1600	23.8 (6)	10.9 (6)	13.0 (6)	12.1 (6)
5/13/73	1600-1800	26.8 (6)	13.8 (6)	14.6 (6)	13.0 (6)
5/13/73	1800-2000	25.1 (6)	7.1 (6)	8.4 (6)	7.9 (6)
5/13/73	2000-2200	27.2 (6)	5.0 (6)	6.3 (4)	5.0 (6)
5/13/73	2200-2400	41.0 (6)	16.7 (6)	18.4 (6)	10.9 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		47.2	21.9	27.8	11.6
5/14/73	0000-0200	63.5 (6)	41.4 (6)	42.2 (6)	49.3 (6)
5/14/73	0200-0400	122.9 (6)	105.8 (6)	100.3 (6)	105.8 (6)
5/14/73	0400-0600	99.1 (6)	86.5 (6)	101.6 (6)	62.3 (6)
5/14/73	0600-0800	236.1 (6)	219.7 (6)	191.0 (6)	169.7 (6)
5/14/73	0800-1000	186.4 (6)	150.9 (6)	188.9 (6)	38.5 (6)
5/14/73	1000-1200	45.6 (6)	35.1 (6)	29.3 (6)	13.0 (6)
5/14/73	1200-1400	******	******	******	******
5/14/73	1400-1600	******	******	******	******
5/14/73	1600-1800	202.7 (6)	75.7 (6)	105.3 (5)	4.5 (5)
5/14/73	1800-2000	21.7 (6)	15.7 (4)	28.2 (4)	4.2 (3)
5/14/73	2000-2200	35.1 (6)	14.5 (5)	9.0 (5)	27.0 (4)
5/14/73	2200-2400	78.6 (6)	49.7 (6)	44.7 (6)	30.9 (6)

HOUSE 1 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/15/73	0000-0200	60.6 (6)	27.6 (6)	35.9 (6)	7.9 (6)
5/15/73	0200-0400	58.1 (6)	31.3 (6)	35.9 (6)	28.6 (5)
5/15/73	0400-0600	65.6 (6)	53.7 (6)	43.5 (6)	27.2 (6)
5/15/73	0600-0800	152.8 (6)	76.9 (6)	75.7 (6)	66.0 (6)
5/15/73	0800-1000	155.5 (6)	123.2 (6)	137.5 (6)	49.7 (6)
5/15/73	1000-1200	165.3 (6)	133.3 (6)	132.1 (6)	105.5 (6)
5/15/73	1200-1400	294.5 (6)	296.6 (6)	294.1 (6)	76.1 (6)
5/15/73	1400-1600	360.7 (6)	410.1 (6)	425.5 (6)	39.3 (6)
5/15/73	1600-1800	294.7 (4)	259.6 (4)	279.0 (4)	11.3 (4)
5/15/73	1800-2000	166.6 (6)	116.6 (5)	163.0 (6)	3.5 (5)
5/15/73	2000-2200	62.3 (6)	38.0 (6)	69.8 (6)	15.5 (6)
5/15/73	2200-2400	57.7 (6)	28.8 (6)	42.2 (6)	15.0 (3)
DAILY AVERAGE = (AVG OF 2HR VALUES)		174.5	132.3	144.5	37.2
5/16/73	0000-0200	29.3 (6)	6.5 (5)	16.3 (6)	4.5 (5)
5/16/73	0200-0400	14.2 (6)	3.1 (4)	2.5 (4)	2.5 (5)
5/16/73	0400-0600	15.9 (6)	5.0 (5)	2.5 (1)	3.1 (4)
5/16/73	0600-0800	134.4 (6)	61.9 (6)	46.4 (6)	3.8 (6)
5/16/73	0800-1000	43.9 (6)	23.4 (6)	7.9 (6)	5.9 (6)
5/16/73	1000-1200	18.4 (6)	7.1 (6)	5.4 (6)	5.9 (6)
5/16/73	1200-1400	8.5 (5)	5.4 (6)	3.8 (6)	6.0 (5)
5/16/73	1400-1600	25.7 (4)	10.7 (4)	9.4 (4)	6.3 (4)
5/16/73	1600-1800	******	******	******	******
5/16/73	1800-2000	******	******	******	******
5/16/73	2000-2200	******	******	******	******
5/16/73	2200-2400	******	******	******	******
5/21/73	0000-0200	******	******	******	******
5/21/73	0200-0400	******	******	******	******
5/21/73	0400-0600	******	******	******	******
5/21/73	0600-0800	******	******	******	******
5/21/73	0800-1000	******	******	******	******
5/21/73	1000-1200	******	******	******	******
5/21/73	1200-1400	27.6 (6)	18.8 (6)	18.0 (6)	17.6 (6)
5/21/73	1400-1600	24.7 (6)	10.9 (6)	7.5 (6)	9.6 (6)
5/21/73	1600-1800	20.9 (6)	7.9 (6)	5.0 (6)	7.1 (6)
5/21/73	1800-2000	33.4 (6)	10.9 (6)	7.5 (6)	7.5 (6)
5/21/73	2000-2200	261.9 (6)	155.1 (6)	211.3 (6)	51.8 (6)
5/21/73	2200-2400	84.9 (6)	63.1 (6)	58.9 (6)	8.8 (6)

HOUSE 1 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/22/73	0000-0200	41.0 (6)	21.7 (6)	14.6 (6)	4.5 (5)
5/22/73	0200-0400	33.4 (6)	13.8 (6)	7.5 (6)	5.4 (6)
5/22/73	0400-0600	36.4 (6)	17.1 (6)	12.1 (6)	8.8 (6)
5/22/73	0600-0800	248.3 (6)	54.3 (6)	22.6 (6)	14.6 (6)
5/22/73	0800-1000	99.5 (6)	69.4 (6)	51.4 (6)	12.1 (6)
5/22/73	1000-1200	33.9 (6)	7.9 (6)	6.3 (6)	4.6 (6)
5/22/73	1200-1400	19.2 (6)	11.7 (6)	9.6 (6)	8.4 (6)
5/22/73	1400-1600	16.7 (3)	7.5 (3)	3.3 (3)	3.3 (3)
5/22/73	1600-1800	99.9 (6)	35.5 (6)	17.6 (5)	5.0 (6)
5/22/73	1800-2000	31.3 (6)	15.9 (6)	13.4 (6)	10.0 (6)
5/22/73	2000-2200	42.6 (6)	22.2 (6)	17.6 (6)	21.3 (6)
5/22/73	2200-2400	91.5 (6)	77.3 (6)	59.8 (6)	93.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		66.1	29.5	19.6	15.9
5/23/73	0000-0200	164.7 (6)	127.9 (6)	125.4 (6)	153.0 (6)
5/23/73	0200-0400	190.6 (6)	153.4 (6)	158.0 (6)	143.4 (6)
5/23/73	0400-0600	189.8 (6)	152.6 (6)	164.3 (6)	163.9 (6)
5/23/73	0600-0800	226.1 (6)	178.1 (6)	178.5 (6)	136.3 (6)
5/23/73	0800-1000	142.1 (6)	123.7 (6)	142.1 (6)	39.0 (6)
5/23/73	1000-1200	126.4 (5)	117.9 (5)	98.8 (5)	28.8 (4)
5/23/73	1200-1400	46.4 (6)	32.2 (6)	21.7 (6)	10.4 (6)
5/23/73	1400-1600	52.2 (6)	16.3 (6)	16.3 (6)	16.7 (6)
5/23/73	1600-1800	311.2 (6)	135.0 (6)	142.1 (6)	21.7 (6)
5/23/73	1800-2000	106.2 (6)	94.5 (6)	110.8 (6)	13.0 (6)
5/23/73	2000-2200	91.5 (6)	46.8 (6)	68.6 (6)	4.0 (5)
5/23/73	2200-2400	60.2 (6)	35.9 (6)	47.7 (6)	7.5 (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		142.3	101.2	106.2	65.6
5/24/73	0000-0200	44.3 (6)	20.9 (6)	30.9 (6)	2.5 (5)
5/24/73	0200-0400	42.6 (6)	22.2 (6)	26.3 (6)	4.6 (6)
5/24/73	0400-0600	44.3 (6)	20.9 (6)	25.1 (6)	8.4 (6)
5/24/73	0600-0800	255.0 (6)	100.7 (6)	91.5 (6)	9.2 (6)
5/24/73	0800-1000	142.1 (6)	81.1 (6)	72.7 (6)	20.9 (6)
5/24/73	1000-1200	50.6 (6)	29.3 (6)	23.8 (6)	11.7 (6)
5/24/73	1200-1400	103.0 (6)	43.9 (6)	17.1 (6)	13.8 (6)
5/24/73	1400-1600	18.8 (6)	13.0 (6)	8.4 (6)	9.6 (6)
5/24/73	1600-1800	20.9 (6)	11.7 (6)	10.4 (6)	8.8 (6)
5/24/73	1800-2000	24.2 (6)	11.7 (6)	8.4 (6)	4.6 (6)
5/24/73	2000-2200	58.9 (6)	16.7 (6)	19.2 (6)	4.2 (6)
5/24/73	2200-2400	56.8 (6)	29.7 (6)	40.1 (6)	4.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		71.8	33.5	31.2	8.5

HOUSE 1 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/25/73	0000-0200	51.4 (6)	27.2 (6)	40.5 (6)	16.3 (6)
5/25/73	0200-0400	48.5 (6)	27.6 (6)	33.9 (6)	4.0 (5)
5/25/73	0400-0600	40.1 (6)	17.1 (6)	25.1 (6)	3.5 (5)
5/25/73	0600-0800	43.5 (6)	24.2 (6)	26.3 (6)	13.4 (6)
5/25/73	0800-1000	60.2 (6)	30.5 (6)	25.1 (6)	9.6 (6)
5/25/73	1000-1200	33.0 (6)	15.0 (6)	12.5 (6)	11.3 (6)
5/25/73	1200-1400	42.1 (5)	17.1 (5)	13.5 (5)	11.0 (5)
5/25/73	1400-1600	******	******	******	******
5/25/73	1600-1800	******	******	******	******
5/25/73	1800-2000	******	******	******	******
5/25/73	2000-2200	******	******	******	******
5/25/73	2200-2400	******	******	******	******

HOUSE 1 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/ 9/73	0000-0200	******	******	******	******
5/ 9/73	0200-0400	******	******	******	******
5/ 9/73	0400-0600	******	******	******	******
5/ 9/73	0600-0800	******	******	******	******
5/ 9/73	0800-1000	******	******	******	******
5/ 9/73	1000-1200	1672. (4)	1617. (4)	1450. (4)	1115. (4)
5/ 9/73	1200-1400	1375. (6)	1375. (6)	1189. (6)	1204. (5)
5/ 9/73	1400-1600	1189. (6)	892. (6)	706. (6)	713. (5)
5/ 9/73	1600-1800	3903. (6)	2639. (6)	2342. (6)	713. (5)
5/ 9/73	1800-2000	3160. (6)	2676. (6)	2602. (6)	929. (6)
5/ 9/73	2000-2200	3457. (6)	3234. (6)	3420. (6)	1635. (6)
5/ 9/73	2200-2400	2528. (6)	2230. (6)	2825. (6)	1040. (6)
5/10/73	0000-0200	2453. (2)	2007. (2)	2565. (2)	1449. (2)
5/10/73	0200-0400	******	******	******	******
5/10/73	0400-0600	******	******	******	******
5/10/73	0600-0800	******	******	******	******
5/10/73	0800-1000	******	******	******	******
5/10/73	1000-1200	******	******	******	******
5/10/73	1200-1400	******	******	******	******
5/10/73	1400-1600	6036. (3)	3319. (3)	3018. (3)	2640. (3)
5/10/73	1600-1800	4350. (6)	3482. (6)	3671. (6)	3067. (6)
5/10/73	1800-2000	3413. (6)	3488. (6)	3601. (6)	3601. (6)
5/10/73	2000-2200	4928. (6)	4551. (6)	4513. (6)	4136. (6)
5/10/73	2200-2400	3394. (6)	3054. (6)	3318. (6)	2827. (6)
5/11/73	0000-0200	4321. (6)	4019. (6)	3831. (6)	3265. (6)
5/11/73	0200-0400	4179. (6)	3870. (6)	3802. (6)	3199. (6)
5/11/73	0400-0600	5039. (6)	4889. (6)	4474. (6)	3945. (6)
5/11/73	0600-0800	4979. (6)	4602. (6)	4262. (6)	3923. (6)
5/11/73	0800-1000	5145. (6)	4013. (6)	4285. (6)	4014. (6)
5/11/73	1000-1200	******	******	******	******
5/11/73	1200-1400	3031. (6)	2292. (6)	2292. (6)	1787. (6)
5/11/73	1400-1600	2157. (6)	1962. (6)	1962. (6)	1690. (6)
5/11/73	1600-1800	3964. (6)	1791. (6)	1710. (6)	932. (6)
5/11/73	1800-2000	971. (6)	582. (6)	582. (6)	232. (4)
5/11/73	2000-2200	1574. (6)	1068. (6)	1185. (6)	581. (4)
5/11/73	2200-2400	2565. (6)	2099. (6)	2565. (6)	1340. (6)

HOUSE 1 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/12/73	0000-0200	4547. (6)	4158. (6)	4742. (6)	3536. (6)
5/12/73	0200-0400	3994. (6)	3567. (6)	4111. (6)	3333. (6)
5/12/73	0400-0600	2897. (6)	2431. (6)	3130. (6)	2314. (6)
5/12/73	0600-0300	2920. (6)	2414. (6)	2686. (6)	2103. (6)
5/12/73	0800-1000	3105. (6)	1823. (6)	1605. (6)	1002. (6)
5/12/73	1000-1200	6767. (6)	5873. (6)	5389. (6)	5117. (6)
5/12/73	1200-1400	9950. (6)	9055. (6)	7890. (6)	7346. (6)
5/12/73	1400-1600	8725. (6)	8131. (6)	3026. (6)	6821. (6)
5/12/73	1600-1800	8395. (6)	7812. (6)	7773. (6)	6179. (6)
5/12/73	1800-2000	6396. (6)	6685. (6)	6996. (6)	6219. (6)
5/12/73	2000-2200	9153. (6)	8725. (6)	9231. (6)	8492. (6)
5/12/73	2200-2400	9678. (6)	8901. (6)	9406. (6)	8473. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6427.	5802.	5915.	5078.
5/13/73	0000-0200	10416. (6)	9911. (6)	10455. (6)	9367. (6)
5/13/73	0200-0400	9650. (6)	9183. (6)	9961. (6)	8755. (6)
5/13/73	0400-0600	9389. (6)	8805. (6)	9466. (6)	8494. (6)
5/13/73	0600-0800	9838. (6)	9294. (6)	10033. (6)	8983. (6)
5/13/73	0800-1000	8303. (6)	9382. (6)	9421. (6)	7944. (6)
5/13/73	1000-1200	9859. (6)	9820. (6)	9976. (6)	9043. (6)
5/13/73	1200-1400	7618. (6)	7074. (6)	7074. (6)	6452. (6)
5/13/73	1400-1600	6844. (6)	6534. (6)	6689. (6)	6417. (6)
5/13/73	1600-1800	8014. (6)	7819. (6)	7819. (6)	7742. (6)
5/13/73	1800-2000	9421. (6)	9071. (6)	9071. (6)	9032. (6)
5/13/73	2000-2200	9270. (6)	8570. (6)	8842. (6)	8337. (6)
5/13/73	2200-2400	9118. (6)	8651. (6)	8962. (6)	8224. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8978.	8676.	8981.	8233.
5/14/73	0000-0200	7454. (6)	7027. (6)	7454. (6)	6910. (6)
5/14/73	0200-0400	7964. (6)	7730. (6)	8275. (6)	7575. (6)
5/14/73	0400-0600	8901. (6)	8784. (6)	9173. (6)	8667. (6)
5/14/73	0600-0800	6477. (6)	7674. (6)	7712. (6)	8792. (6)
5/14/73	0800-1000	8290. (6)	7979. (6)	8251. (6)	6774. (6)
5/14/73	1000-1200	7750. (6)	7206. (6)	7089. (6)	6467. (6)
5/14/73	1200-1400	5504. (6)	5628. (6)	5400. (6)	4307. (6)
5/14/73	1400-1600	2829. (6)	2338. (6)	2187. (6)	1735. (6)
5/14/73	1600-1800	2825. (6)	1958. (6)	2108. (6)	1391. (6)
5/14/73	1800-2000	2476. (6)	2325. (6)	2551. (6)	2438. (6)
5/14/73	2000-2200	3695. (6)	3431. (6)	3544. (6)	3280. (6)
5/14/73	2200-2400	3653. (6)	3125. (6)	3616. (6)	2484. (6)
DAILY AVERAGE = (AVG OF 24R VALUES)		5652.	5434.	5613.	5068.

HOUSE 1 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove		2 Liv Rm		3 BD RM		4 OUTSIDE	
5/15/73	0000-0200	5065.	(6)	4612.	(6)	5102.	(6)	4121.	(6)
5/15/73	0200-0400	5528.	(6)	5189.	(6)	5528.	(6)	4811.	(6)
5/15/73	0400-0600	5822.	(6)	5483.	(6)	5822.	(6)	5219.	(6)
5/15/73	0600-0800	5889.	(6)	6248.	(6)	6324.	(6)	5909.	(6)
5/15/73	0800-1000	8023.	(6)	7646.	(6)	7608.	(6)	6778.	(6)
5/15/73	1000-1200	7600.	(6)	7223.	(6)	7336.	(6)	6016.	(6)
5/15/73	1200-1400	5163.	(6)	4262.	(6)	4225.	(6)	2225.	(6)
5/15/73	1400-1600	5073.	(6)	5168.	(6)	5357.	(6)	1886.	(6)
5/15/73	1600-1800	3996.	(6)	3475.	(6)	3587.	(6)	928.	(6)
5/15/73	1800-2000	2118.	(6)	2007.	(6)	2602.	(6)	1070.	(6)
5/15/73	2000-2200	5847.	(6)	5319.	(6)	5847.	(6)	5168.	(6)
5/15/73	2200-2400	5730.	(6)	5127.	(6)	5843.	(6)	4560.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		5655.		5147.		5432.		4058.	
5/16/73	0000-0200	4106.	(6)	3577.	(6)	4256.	(6)	2974.	(6)
5/16/73	0200-0400	3461.	(6)	3008.	(6)	3612.	(6)	2744.	(6)
5/16/73	0400-0600	2703.	(6)	2137.	(6)	2627.	(6)	1986.	(6)
5/16/73	0600-0800	2399.	(6)	1682.	(6)	2015.	(6)	1083.	(6)
5/16/73	0800-1000	4358.	(6)	3716.	(6)	3225.	(6)	3188.	(6)
5/16/73	1000-1200	5070.	(6)	4731.	(6)	4580.	(6)	4316.	(6)
5/16/73	1200-1400	2820.	(6)	2631.	(6)	2593.	(6)	2405.	(6)
5/16/73	1400-1600	2198.	(6)	1858.	(6)	1670.	(6)	1443.	(6)
5/16/73	1600-1800	4099.	(6)	2854.	(6)	2666.	(6)	2327.	(6)
5/16/73	1800-2000	3375.	(6)	2254.	(6)	2236.	(6)	1219.	(6)
5/16/73	2000-2200	2557.	(6)	2360.	(6)	2557.	(6)	1807.	(6)
5/16/73	2200-2400	2261.	(6)	1867.	(6)	2024.	(6)	1354.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3284.		2723.		2838.		2237.	

HOUSE 1 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/21/73	0000-0200	4407. (6)	4135. (6)	4252. (6)	3591. (6)
5/21/73	0200-0400	5007. (6)	4579. (6)	4618. (6)	3841. (6)
5/21/73	0400-0600	4538. (6)	4138. (6)	4032. (6)	3449. (6)
5/21/73	0600-0800	4009. (6)	3076. (6)	2882. (6)	2338. (6)
5/21/73	0800-1000	3210. (6)	2705. (6)	2977. (6)	2510. (6)
5/21/73	1000-1200	3793. (6)	3326. (6)	3294. (6)	3060. (6)
5/21/73	1200-1400	1185. (6)	913. (6)	757. (6)	641. (6)
5/21/73	1400-1600	1002. (6)	614. (6)	497. (6)	341. (6)
5/21/73	1600-1800	1290. (6)	1018. (6)	979. (6)	746. (6)
5/21/73	1800-2000	2514. (6)	2125. (6)	2086. (6)	1931. (6)
5/21/73	2000-2200	4444. (6)	3414. (6)	3272. (6)	2079. (6)
5/21/73	2200-2400	1460. (6)	1421. (6)	1578. (6)	710. (4)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3072.	2626.	2602.	2103.
5/22/73	0000-0200	2407. (6)	2249. (6)	2328. (6)	1658. (6)
5/22/73	0200-0400	1737. (6)	1421. (6)	1539. (6)	947. (6)
5/22/73	0400-0600	1026. (6)	1231. (5)	1105. (6)	1066. (6)
5/22/73	0600-0800	1066. (6)	750. (6)	1026. (6)	1381. (6)
5/22/73	0800-1000	829. (6)	521. (5)	474. (5)	829. (6)
5/22/73	1000-1200	1223. (6)	908. (6)	789. (6)	671. (6)
5/22/73	1200-1400	1302. (6)	1184. (6)	1065. (6)	987. (6)
5/22/73	1400-1600	1697. (6)	1658. (5)	947. (6)	987. (6)
5/22/73	1600-1800	1539. (6)	726. (6)	276. (6)	316. (6)
5/22/73	1800-2000	1105. (3)	434. (6)	434. (6)	434. (6)
5/22/73	2000-2200	710. (5)	379. (5)	323. (6)	521. (5)
5/22/73	2200-2400	2210. (6)	2013. (6)	1894. (6)	1815. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		1404.	1123.	1017.	968.
5/23/73	0000-0200	6038. (6)	5209. (6)	5328. (6)	4105. (6)
5/23/73	0200-0400	5604. (6)	5091. (6)	5367. (6)	4420. (6)
5/23/73	0400-0600	4617. (6)	4183. (6)	4499. (6)	3631. (6)
5/23/73	0600-0800	3749. (6)	3039. (6)	3039. (6)	2170. (6)
5/23/73	0800-1000	2210. (6)	1855. (6)	1894. (6)	1933. (6)
5/23/73	1000-1200	3775. (4)	3593. (4)	3121. (4)	1778. (4)
5/23/73	1200-1400	2259. (6)	1944. (6)	1678. (6)	1049. (6)
5/23/73	1400-1600	1649. (6)	1358. (6)	1431. (6)	898. (6)
5/23/73	1600-1800	3136. (6)	2119. (6)	2192. (6)	837. (6)
5/23/73	1800-2000	2195. (6)	2073. (6)	2347. (6)	1434. (6)
5/23/73	2000-2200	1712. (6)	1243. (6)	1663. (6)	345. (6)
5/23/73	2200-2400	1381. (6)	1258. (6)	1554. (6)	528. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3194.	2747.	2843.	1927.

HOUSE 1 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

		STATION			
DATE	TIME	1A 1M from Stove	2 Liv Rm	3 BD RM	4 OUTSIDE
5/24/73	0000-0200	2201. (6)	2008. (6)	2226. (6)	1718. (6)
5/24/73	0200-0400	3315. (6)	2936. (6)	3242. (6)	2347. (6)
5/24/73	0400-0600	3412. (6)	3049. (6)	3266. (6)	2540. (6)
5/24/73	0600-0800	4646. (6)	3920. (6)	3872. (6)	2928. (6)
5/24/73	0800-1000	4985. (6)	4307. (6)	4085. (6)	3049. (6)
5/24/73	1000-1200	3484. (6)	2352. (6)	2758. (6)	1960. (6)
5/24/73	1200-1400	1727. (6)	1529. (6)	1036. (6)	641. (6)
5/24/73	1400-1600	1350. (6)	1776. (6)	1505. (6)	1381. (6)
5/24/73	1600-1800	1455. (6)	1184. (6)	1011. (6)	888. (6)
5/24/73	1800-2000	1751. (6)	1406. (6)	1357. (6)	838. (6)
5/24/73	2000-2200	2639. (6)	1628. (6)	1677. (6)	863. (6)
5/24/73	2200-2400	1825. (6)	1529. (6)	1973. (6)	666. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		2774.	2356.	2334.	1656.
5/25/73	0000-0200	2602. (6)	2306. (6)	2972. (6)	2479. (6)
5/25/73	0200-0400	3502. (6)	3157. (6)	3551. (6)	2540. (6)
5/25/73	0400-0600	3009. (6)	2688. (6)	2910. (6)	2318. (6)
5/25/73	0600-0800	3530. (6)	3145. (6)	3170. (6)	2504. (6)
5/25/73	0800-1000	1948. (6)	1159. (6)	961. (6)	567. (6)
5/25/73	1000-1200	1583. (6)	1258. (6)	1184. (6)	937. (6)
5/25/73	1200-1400	2220. (4)	1887. (4)	1813. (4)	1813. (4)
5/25/73	1400-1600	******	******	******	******
5/25/73	1600-1800	******	******	******	******
5/25/73	1800-2000	******	******	******	******
5/25/73	2000-2200	******	******	******	******
5/25/73	2200-2400	******	******	******	******

Appendix B-2

NO_2, NO and CO data for House No. 1 - Fall/Winter

HØUSE -1 FALL-WINTER NØ2 AVERAGE CØNCENTRATIØNS , UG/M3
VALUES IN ( ) ARE NØ. ØF ØBSERVATIØNS IN PERIØD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 ØVER STØVE	STATION 1A 1M FRØM STØVE	STATION 2 LIV/	STATION 4 ØUTSIDE
11/ 6/73	0000-0200	*******	*******	*******	*******
11/ 6/73	0200-0400	******	******	******	******
11/ 6/73	0400-0600	******	******	******	******
11/ 6/73	0600-0800	******	******	******	******
11/ 6/73	0800-1000	******	******	******	******
11/ 6/73	1000-1200	******	******	******	******
11/ 6/73	1200-1400	******	******	******	******
11/ 6/73	1400-1600	******	******	******	******
11/ 6/73	1600-1800	311.3 (3)	279.0 (3)	243.3 (3)	125.7 (3)
11/ 6/73	1800-2000	208.2 (6)	143.0 (6)	164.5 (6)	35.3 (6)
11/ 6/73	2000-2200	57.8 (6)	42.8 (6)	59.2 (6)	17.8 (6)
11/ 6/73	2200-2400	33.8 (4)	32.0 (4)	24.8 (4)	13.3 (4)
11/ 7/73	0000-0200	36.7 (6)	35.3 (6)	24.0 (6)	16.7 (6)
11/ 7/73	0200-0400	36.5 (6)	34.8 (5)	25.3 (6)	15.2 (6)
11/ 7/73	0400-0600	41.5 (6)	36.7 (6)	26.5 (6)	13.0 (6)
11/ 7/73	0600-0800	40.2 (6)	34.0 (6)	36.3 (6)	25.3 (6)
11/ 7/73	0800-1000	86.5 (6)	53.0 (6)	93.0 (6)	25.5 (5)
11/ 7/73	1000-1200	46.5 (6)	42.8 (6)	32.8 (6)	25.2 (6)
11/ 7/73	1200-1400	51.3 (6)	45.2 (6)	27.7 (6)	28.0 (6)
11/ 7/73	1400-1600	87.8 (6)	50.3 (6)	41.5 (6)	32.8 (6)
11/ 7/73	1600-1800	194.7 (6)	169.5 (6)	207.3 (6)	61.5 (6)
11/ 7/73	1800-2000	71.3 (6)	72.7 (6)	59.2 (6)	75.3 (6)
11/ 7/73	2000-2200	51.5 (6)	45.0 (6)	65.2 (6)	47.8 (6)
11/ 7/73	2200-2400	61.5 (6)	48.8 (6)	63.0 (6)	42.8 (6)
DAILY AVERAGE = (AVG ØF 24HR VALUES)		67.2	55.7	58.5	34.6
11/ 8/73	0000-0200	50.2 (6)	45.0 (6)	59.2 (6)	44.0 (6)
11/ 8/73	0200-0400	55.3 (6)	46.3 (6)	54.0 (6)	56.5 (6)
11/ 8/73	0400-0600	52.8 (6)	46.5 (6)	56.7 (6)	64.0 (6)
11/ 8/73	0600-0800	81.7 (6)	56.5 (6)	72.8 (6)	74.0 (6)
11/ 8/73	0800-1000	55.3 (6)	49.0 (6)	62.8 (6)	45.3 (6)
11/ 8/73	1000-1200	62.7 (6)	47.0 (4)	77.8 (6)	48.8 (6)
11/ 8/73	1200-1400	61.5 (6)	50.3 (6)	72.7 (6)	41.5 (6)
11/ 8/73	1400-1600	138.3 (3)	105.3 (3)	110.7 (3)	37.7 (3)
11/ 8/73	1600-1800	307.7 (6)	247.3 (6)	316.5 (6)	101.5 (6)
11/ 8/73	1800-2000	109.3 (6)	97.7 (6)	111.7 (6)	64.0 (6)
11/ 8/73	2000-2200	82.7 (6)	65.3 (6)	87.8 (6)	53.8 (6)
11/ 8/73	2200-2400	62.7 (6)	70.2 (6)	81.5 (6)	52.7 (6)
DAILY AVERAGE = (AVG ØF 24HR VALUES)		97.5	77.2	97.0	57.0

HOUSE -1 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/	STATION 4 OUTSIDE
11/ 9/73	0000-0200	51.5 (6)	45.0 (6)	67.5 (6)	36.3 (6)
11/ 9/73	0200-0400	49.0 (6)	55.0 (6)	46.3 (6)	21.2 (5)
11/ 9/73	0400-0600	52.7 (6)	41.3 (6)	37.5 (6)	22.7 (6)
11/ 9/73	0600-0800	59.0 (6)	50.5 (6)	50.3 (6)	37.7 (6)
11/ 9/73	0800-1000	57.8 (6)	49.0 (6)	45.3 (6)	30.2 (6)
11/ 9/73	1000-1200	******	******	******	******
11/ 9/73	1200-1400	251.8 (4)	87.8 (5)	34.5 (4)	17.6 (5)
11/ 9/73	1400-1600	36.5 (6)	32.7 (6)	17.7 (6)	10.3 (6)
11/ 9/73	1600-1800	44.0 (6)	42.7 (6)	21.5 (6)	29.2 (6)
11/ 9/73	1800-2000	30.2 (6)	30.2 (6)	25.3 (6)	21.7 (6)
11/ 9/73	2000-2200	40.2 (6)	37.7 (6)	17.7 (6)	16.3 (6)
11/ 9/73	2200-2400	22.8 (6)	26.5 (6)	10.3 (6)	15.0 (6)

DATE	TIME	1	1A	2	4
11/10/73	0000-0200	22.9 (7)	24.0 (7)	14.0 (7)	15.0 (7)
11/10/73	0200-0400	24.2 (6)	23.0 (6)	11.5 (6)	15.0 (6)
11/10/73	0400-0600	18.2 (5)	23.0 (5)	10.8 (5)	15.0 (5)
11/10/73	0600-0800	26.7 (6)	22.8 (6)	15.0 (6)	15.0 (6)
11/10/73	0800-1000	37.8 (6)	30.3 (6)	12.7 (6)	16.3 (6)
11/10/73	1000-1200	26.5 (6)	30.0 (6)	15.0 (6)	16.3 (6)
11/10/73	1200-1400	29.0 (6)	30.2 (6)	17.7 (6)	17.7 (6)
11/10/73	1400-1600	25.3 (6)	25.3 (6)	9.2 (6)	16.3 (6)
11/10/73	1600-1800	24.2 (6)	27.7 (6)	16.3 (6)	25.2 (6)
11/10/73	1800-2000	33.8 (6)	32.7 (6)	24.2 (6)	26.5 (6)
11/10/73	2000-2200	36.5 (6)	37.8 (6)	20.3 (6)	24.2 (6)
11/10/73	2200-2400	30.0 (6)	31.3 (6)	25.2 (6)	31.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		27.9	28.2	16.0	19.5

DATE	TIME	1	1A	2	4
11/11/73	0000-0200	30.0 (6)	28.8 (6)	25.2 (6)	28.8 (6)
11/11/73	0200-0400	28.8 (6)	27.7 (6)	23.0 (6)	32.7 (6)
11/11/73	0400-0600	28.8 (6)	30.0 (6)	30.2 (6)	34.0 (6)
11/11/73	0600-0800	54.0 (6)	41.5 (6)	29.0 (6)	30.0 (6)
11/11/73	0800-1000	32.7 (6)	33.8 (6)	24.0 (6)	27.7 (6)
11/11/73	1000-1200	55.2 (6)	35.2 (6)	24.2 (6)	16.5 (6)
11/11/73	1200-1400	145.7 (6)	36.5 (6)	44.0 (6)	10.8 (5)
11/11/73	1400-1600	94.2 (6)	84.2 (6)	30.3 (6)	18.2 (5)
11/11/73	1600-1800	143.3 (6)	145.8 (6)	65.2 (6)	43.8 (6)
11/11/73	1800-2000	56.3 (6)	56.5 (6)	41.5 (6)	46.5 (6)
11/11/73	2000-2200	36.5 (6)	37.8 (6)	32.7 (6)	40.3 (6)
11/11/73	2200-2400	35.3 (6)	38.0 (6)	33.3 (6)	56.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		61.7	49.7	33.5	32.1

HOUSE -1 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/	4 OUTSIDE
11/12/73	0000-0200	39.2 (6)	36.7 (6)	35.3 (6)	52.7 (6)
11/12/73	0200-0400	70.3 (6)	30.0 (6)	34.0 (6)	36.7 (6)
11/12/73	0400-0600	39.0 (6)	32.7 (6)	32.7 (6)	41.7 (6)
11/12/73	0600-0800	50.3 (6)	45.2 (6)	34.0 (6)	44.0 (6)
11/12/73	0800-1000	39.8 (4)	39.5 (4)	38.0 (4)	49.3 (4)
11/12/73	1000-1200	68.2 (5)	46.0 (5)	42.0 (5)	42.0 (5)
11/12/73	1200-1400	45.0 (6)	46.7 (6)	28.3 (6)	38.3 (6)
11/12/73	1400-1600	61.7 (6)	53.3 (6)	48.3 (6)	53.3 (6)
11/12/73	1600-1800	115.3 (6)	132.2 (6)	51.7 (6)	90.2 (6)
11/12/73	1800-2000	168.8 (6)	155.7 (6)	98.5 (6)	114.0 (6)
11/12/73	2000-2200	88.5 (6)	83.3 (6)	93.3 (6)	125.2 (6)
11/12/73	2200-2400	60.0 (6)	61.7 (6)	70.0 (6)	76.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		70.5	63.6	50.5	63.7
11/13/73	0000-0200	73.3 (6)	65.0 (6)	61.7 (6)	76.7 (6)
11/13/73	0200-0400	56.7 (6)	60.0 (6)	53.3 (6)	75.0 (6)
11/13/73	0400-0600	60.0 (6)	48.3 (6)	48.3 (6)	65.0 (6)
11/13/73	0600-0800	65.0 (6)	105.3 (6)	61.7 (6)	65.0 (6)
11/13/73	0800-1000	65.0 (6)	53.3 (6)	50.0 (6)	60.0 (6)
11/13/73	1000-1200	65.0 (6)	53.3 (6)	50.0 (6)	61.7 (6)
11/13/73	1200-1400	70.0 (6)	61.7 (6)	50.0 (6)	71.7 (6)
11/13/73	1400-1600	86.7 (6)	65.0 (6)	61.7 (6)	108.8 (6)
11/13/73	1600-1800	185.8 (6)	338.2 (6)	227.5 (6)	157.7 (6)
11/13/73	1800-2000	122.5 (6)	157.3 (6)	139.0 (6)	132.5 (6)
11/13/73	2000-2200	86.7 (6)	70.0 (6)	71.7 (6)	90.0 (6)
11/13/73	2200-2400	76.7 (6)	65.0 (6)	60.0 (6)	73.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		84.4	95.2	77.9	86.4
11/14/73	0000-0200	68.3 (6)	50.0 (6)	50.0 (6)	70.0 (6)
11/14/73	0200-0400	70.0 (6)	53.3 (6)	50.0 (6)	70.0 (6)
11/14/73	0400-0600	70.0 (6)	60.0 (6)	48.3 (6)	58.3 (6)
11/14/73	0600-0800	83.5 (6)	73.3 (6)	81.8 (6)	81.7 (6)
11/14/73	0800-1000	77.5 (4)	62.5 (4)	60.0 (4)	67.5 (4)
11/14/73	1000-1200	58.0 (5)	40.0 (5)	40.0 (5)	48.0 (5)
11/14/73	1200-1400	35.0 (6)	40.0 (6)	40.0 (6)	30.0 (6)
11/14/73	1400-1600	41.7 (6)	43.3 (6)	40.0 (6)	30.0 (6)
11/14/73	1600-1800	58.3 (6)	60.0 (6)	50.0 (6)	60.0 (6)
11/14/73	1800-2000	65.0 (6)	60.0 (6)	58.3 (6)	60.0 (6)
11/14/73	2000-2200	56.7 (6)	50.0 (6)	48.3 (6)	66.7 (6)
11/14/73	2200-2400	64.0 (5)	48.3 (6)	41.7 (6)	51.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		62.3	53.4	50.7	57.8

VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 /BD RM	STATION 4 OUTSIDE
11/15/73	0000-0200	61.7 (6)	53.3 (6)	45.0 (6)	58.3 (6)
11/15/73	0200-0400	81.7 (6)	58.3 (6)	45.0 (6)	87.0 (6)
11/15/73	0400-0600	60.0 (6)	55.0 (6)	41.7 (6)	51.7 (6)
11/15/73	0600-0800	86.8 (6)	[illegible].0 (6)	78.5 (6)	60.0 (6)
11/15/73	0800-1000	114.2 (6)	73.3 (6)	65.0 (6)	75.0 (6)
11/15/73	1000-1200	97.0 (6)	58.3 (6)	51.7 (6)	65.0 (6)
11/15/73	1200-1400	80.0 (6)	65.0 (6)	65.0 (6)	65.0 (6)
11/15/73	1400-1600	104.4 (5)	74.0 (5)	80.0 (5)	106.6 (5)
11/15/73	1600-1800	85.0 (6)	70.0 (6)	73.3 (6)	83.5 (6)
11/15/73	1800-2000	85.0 (6)	66.7 (6)	75.2 (6)	70.0 (6)
11/15/73	2000-2200	91.7 (6)	60.0 (6)	51.7 (6)	56.7 (6)
11/15/73	2200-2400	65.0 (6)	53.3 (6)	41.7 (6)	53.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		84.4	64.5	59.5	69.3
11/16/73	0000-0200	71.7 (6)	58.3 (6)	46.7 (6)	60.0 (6)
11/16/73	0200-0400	75.0 (6)	60.0 (6)	50.0 (6)	61.7 (6)
11/16/73	0400-0600	58.3 (6)	51.7 (6)	40.0 (6)	60.0 (6)
11/16/73	0600-0800	90.2 (6)	78.7 (6)	43.3 (6)	56.7 (6)
11/16/73	0800-1000	85.0 (6)	63.3 (6)	40.0 (6)	38.3 (6)
11/16/73	1000-1200	46.7 (6)	46.7 (6)	40.0 (6)	35.0 (6)
11/16/73	1200-1400	48.3 (6)	46.7 (6)	40.0 (6)	23.3 (6)
11/16/73	1400-1600	46.7 (3)	40.0 (3)	33.3 (3)	20.0 (3)
11/16/73	1600-1800	80.2 (5)	102.0 (6)	58.5 (6)	23.3 (6)
11/16/73	1800-2000	50.0 (6)	55.0 (6)	43.3 (6)	20.0 (6)
11/16/73	2000-2200	60.0 (6)	51.7 (6)	43.3 (6)	15.0 (6)
11/16/73	2200-2400	40.0 (6)	41.7 (6)	36.7 (6)	21.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		62.7	58.0	42.9	36.2
11/17/73	0000-0200	38.3 (6)	40.0 (6)	28.3 (6)	15.0 (6)
11/17/73	0200-0400	41.7 (6)	40.0 (6)	23.3 (6)	16.7 (6)
11/17/73	0400-0600	36.7 (6)	40.0 (6)	20.0 (6)	10.0 (6)
11/17/73	0600-0800	35.0 (6)	56.8 (6)	23.3 (6)	16.7 (6)
11/17/73	0800-1000	50.0 (6)	45.0 (6)	23.3 (6)	18.0 (5)
11/17/73	1000-1200	51.7 (6)	83.5 (6)	28.3 (6)	12.0 (5)
11/17/73	1200-1400	45.0 (6)	40.0 (6)	40.0 (6)	15.0 (6)
11/17/73	1400-1600	43.3 (6)	36.7 (6)	23.3 (6)	16.7 (6)
11/17/73	1600-1800	477.2 (6)	246.2 (6)	65.0 (6)	20.0 (6)
11/17/73	1800-2000	56.7 (6)	48.3 (6)	38.3 (6)	31.7 (6)
11/17/73	2000-2200	85.2 (6)	50.0 (6)	30.0 (6)	25.0 (6)
11/17/73	2200-2400	58.3 (6)	53.3 (6)	35.0 (6)	23.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		84.9	65.0	31.5	18.3

HOUSE -1 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 /BD RM	STATION 4 OUTSIDE
11/18/73	0000-0200	60.0 (6)	58.3 (6)	45.0 (6)	26.7 (6)
11/18/73	0200-0400	56.7 (6)	48.3 (6)	33.3 (6)	23.3 (6)
11/18/73	0400-0600	46.7 (6)	48.3 (6)	30.0 (6)	20.0 (6)
11/18/73	0600-0800	50.0 (6)	43.3 (6)	26.7 (6)	20.0 (6)
11/18/73	0800-1000	88.5 (6)	115.3 (6)	43.3 (6)	18.3 (6)
11/18/73	1000-1200	56.7 (6)	48.3 (6)	33.3 (6)	18.3 (6)
11/18/73	1200-1400	61.7 (6)	68.5 (6)	35.0 (6)	21.7 (6)
11/18/73	1400-1600	48.3 (6)	85.2 (6)	36.7 (6)	26.7 (6)
11/18/73	1600-1800	86.8 (6)	60.0 (6)	41.7 (6)	38.3 (6)
11/18/73	1800-2000	71.7 (6)	45.0 (6)	38.3 (6)	45.0 (6)
11/18/73	2000-2200	88.5 (6)	56.7 (6)	36.7 (6)	43.3 (6)
11/18/73	2200-2400	88.3 (6)	48.3 (6)	38.3 (6)	40.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		67.0	60.5	36.5	28.5
11/19/73	0000-0200	63.3 (6)	50.0 (6)	36.7 (6)	43.3 (6)
11/19/73	0200-0400	63.3 (6)	55.0 (6)	35.0 (6)	61.7 (6)
11/19/73	0400-0600	68.3 (6)	45.0 (6)	30.0 (6)	43.3 (6)
11/19/73	0600-0800	65.0 (6)	80.2 (6)	40.0 (6)	43.3 (6)
11/19/73	0800-1000	65.0 (2)	55.0 (2)	40.0 (2)	35.0 (2)
11/19/73	1000-1200	70.0 (6)	55.0 (6)	40.0 (6)	41.7 (6)
11/19/73	1200-1400	60.0 (3)	56.7 (3)	40.0 (3)	40.0 (3)
11/19/73	1400-1600	978.4 (5)	528.2 (5)	90.4 (5)	28.0 (5)
11/19/73	1600-1800	919.3 (6)	309.8 (6)	152.7 (6)	63.3 (6)
11/19/73	1800-2000	80.0 (6)	70.0 (6)	56.7 (6)	36.7 (6)
11/19/73	2000-2200	107.3 (6)	61.7 (6)	41.7 (6)	43.3 (6)
11/19/73	2200-2400	81.8 (6)	56.7 (6)	38.3 (6)	46.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		218.5	118.6	53.4	43.9
11/20/73	0000-0200	172.8 (4)	90.0 (6)	74.7 (6)	71.5 (6)
11/20/73	0200-0400	107.2 (6)	46.7 (6)	31.7 (6)	35.0 (6)
11/20/73	0400-0600	58.3 (6)	41.7 (6)	25.0 (6)	33.3 (6)
11/20/73	0600-0800	63.3 (6)	45.0 (6)	31.7 (6)	83.7 (6)
11/20/73	0800-1000	197.7 (6)	128.7 (6)	61.8 (6)	53.3 (6)
11/20/73	1000-1200	76.7 (6)	58.3 (6)	40.0 (6)	43.3 (6)
11/20/73	1200-1400	103.7 (6)	46.7 (6)	43.3 (6)	38.3 (6)
11/20/73	1400-1600	78.3 (6)	60.0 (6)	38.3 (6)	43.3 (6)
11/20/73	1600-1800	341.3 (6)	304.7 (6)	123.8 (6)	51.7 (6)
11/20/73	1800-2000	202.7 (6)	145.7 (6)	165.8 (6)	78.5 (6)
11/20/73	2000-2200	118.8 (6)	66.7 (6)	143.8 (6)	50.0 (6)
11/20/73	2200-2400	152.3 (6)	91.8 (6)	71.8 (6)	58.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		139.4	93.8	49.9	74.5

HOUSE -1 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

		STATION			
DATE	TIME	1 OVER STOVE	1A 1M FROM STOVE	3 /BD RM	4 OUTSIDE
11/21/73	0000-0200	117.0 (6)	60.0 (6)	43.3 (6)	63.3 (6)
11/21/73	0200-0400	125.5 (6)	134.4 (6)	81.8 (6)	51.7 (5)
11/21/73	0400-0600	162.5 (6)	111.8 (6)	55.0 (4)	52.8 (6)
11/21/73	0600-0800	113.8 (6)	137.2 (6)	60.0 (2)	35.0 (6)
11/21/73	0800-1000	138.8 (6)	90.2 (6)	60.0 (6)	76.7 (6)
11/21/73	1000-1200	127.0 (3)	50.0 (3)	30.0 (3)	83.7 (3)
11/21/73	1200-1400	******	******	******	******
11/21/73	1400-1600	******	******	******	******
11/21/73	1600-1800	******	******	******	******
11/21/73	1800-2000	******	******	******	******
11/21/73	2000-2200	******	******	******	******
11/21/73	2200-2400	******	******	******	******

HOUSE -1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
11/ 7/73	0000-0200	29.5 (6)	27.0 (6)	15.8 (6)	9.2 (6)
11/ 7/73	0200-0400	26.3 (3)	21.3 (4)	18.3 (3)	8.3 (3)
11/ 7/73	0400-0600	29.3 (6)	23.3 (6)	19.2 (6)	8.0 (5)
11/ 7/73	0600-0800	29.6 (5)	25.8 (5)	20.8 (5)	11.0 (5)
11/ 7/73	0800-1000	123.0 (2)	88.5 (2)	218.5 (2)	22.5 (2)
11/ 7/73	1000-1200	31.8 (6)	23.2 (6)	25.7 (6)	13.3 (6)
11/ 7/73	1200-1400	34.7 (6)	19.8 (6)	19.2 (6)	10.0 (6)
11/ 7/73	1400-1600	65.5 (6)	37.5 (6)	27.7 (6)	16.5 (6)
11/ 7/73	1600-1800	324.0 (6)	212.8 (6)	245.2 (6)	26.3 (6)
11/ 7/73	1800-2000	160.8 (6)	176.0 (6)	99.7 (6)	53.2 (6)
11/ 7/73	2000-2200	110.5 (6)	115.5 (6)	79.7 (6)	31.7 (6)
11/ 7/73	2200-2400	129.7 (6)	130.5 (6)	89.0 (6)	51.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		91.2	75.1	73.2	21.8
11/ 8/73	0000-0200	106.3 (6)	108.0 (5)	74.0 (6)	48.5 (6)
11/ 8/73	0200-0400	107.2 (6)	107.2 (6)	92.7 (6)	103.2 (6)
11/ 8/73	0400-0600	154.2 (6)	150.8 (6)	156.5 (6)	216.5 (6)
11/ 8/73	0600-0800	274.3 (6)	244.8 (6)	252.3 (6)	272.0 (6)
11/ 8/73	0800-1000	244.2 (6)	237.5 (6)	213.7 (6)	136.0 (6)
11/ 8/73	1000-1200	206.0 (2)	115.3 (4)	174.5 (2)	59.0 (2)
11/ 8/73	1200-1400	126.2 (6)	126.5 (6)	103.2 (6)	52.5 (6)
11/ 8/73	1400-1600	226.0 (3)	160.7 (3)	140.7 (3)	42.7 (3)
11/ 8/73	1600-1800	430.0 (6)	416.8 (5)	338.2 (6)	34.2 (6)
11/ 8/73	1800-2000	269.3 (6)	281.8 (6)	161.2 (6)	49.0 (6)
11/ 8/73	2000-2200	179.3 (6)	188.3 (6)	118.0 (6)	41.7 (6)
11/ 8/73	2200-2400	154.8 (6)	153.2 (6)	94.0 (6)	27.8 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		206.5	190.9	159.9	90.2

HOUSE -1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
11/ 9/73	0000-0200	104.8 (6)	100.0 (6)	77.3 (6)	17.5 (6)
11/ 9/73	0200-0400	76.3 (6)	73.7 (6)	54.8 (6)	5.0 (3)
11/ 9/73	0400-0600	31.8 (6)	[illegible].7 (6)	24.0 (6)	6.3 (4)
11/ 9/73	0600-0800	23.8 (5)	13.0 (5)	25.8 (5)	6.0 (5)
11/ 9/73	0800-1000	29.5 (6)	13.8 (5)	22.8 (5)	11.7 (3)
11/ 9/73	1000-1200	******	******	******	******
11/ 9/73	1200-1400	261.3 (4)	109.8 (5)	26.8 (4)	17.0 (5)
11/ 9/73	1400-1600	28.7 (6)	27.7 (6)	9.2 (6)	8.3 (6)
11/ 9/73	1600-1800	64.7 (6)	49.2 (6)	15.0 (3)	8.3 (6)
11/ 9/73	1800-2000	28.5 (6)	30.8 (6)	14.2 (6)	9.2 (6)
11/ 9/73	2000-2200	28.0 (6)	23.8 (6)	10.0 (6)	12.5 (6)
11/ 9/73	2200-2400	15.0 (6)	13.3 (6)	9.2 (6)	8.3 (6)

DATE	TIME	1	1A	2	4
11/10/73	0000-0200	17.1 (7)	15.0 (7)	10.0 (7)	10.7 (7)
11/10/73	0200-0400	15.0 (6)	15.0 (6)	10.0 (6)	10.0 (6)
11/10/73	0400-0600	15.0 (5)	14.0 (5)	10.0 (5)	10.0 (5)
11/10/73	0600-0800	21.5 (6)	16.5 (6)	10.0 (6)	11.7 (6)
11/10/73	0800-1000	33.7 (6)	26.2 (6)	12.5 (6)	15.0 (6)
11/10/73	1000-1200	20.8 (6)	19.2 (6)	13.3 (6)	15.0 (6)
11/10/73	1200-1400	19.0 (6)	20.7 (6)	12.5 (6)	17.5 (6)
11/10/73	1400-1600	15.8 (6)	15.0 (6)	11.7 (6)	13.3 (6)
11/10/73	1600-1800	20.8 (6)	17.5 (6)	10.0 (6)	12.5 (6)
11/10/73	1800-2000	20.8 (6)	21.7 (6)	12.5 (6)	15.0 (6)
11/10/73	2000-2200	23.7 (6)	29.5 (6)	13.3 (6)	16.7 (6)
11/10/73	2200-2400	30.7 (6)	32.3 (6)	15.8 (6)	20.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		21.2	20.2	11.8	13.9

DATE	TIME	1	1A	2	4
11/11/73	0000-0200	30.8 (6)	30.7 (6)	16.7 (6)	18.3 (6)
11/11/73	0200-0400	34.0 (6)	34.0 (6)	23.2 (6)	27.0 (6)
11/11/73	0400-0600	31.5 (6)	30.7 (6)	19.2 (6)	15.8 (6)
11/11/73	0600-0800	51.5 (6)	54.7 (6)	19.2 (6)	21.5 (6)
11/11/73	0800-1000	63.8 (6)	57.3 (6)	27.0 (6)	23.0 (6)
11/11/73	1000-1200	65.5 (6)	50.7 (6)	22.3 (6)	16.7 (6)
11/11/73	1200-1400	82.4 (5)	98.8 (6)	35.3 (6)	16.7 (6)
11/11/73	1400-1600	176.8 (6)	175.3 (6)	51.5 (6)	20.7 (6)
11/11/73	1600-1800	423.3 (6)	460.2 (6)	140.2 (6)	24.7 (6)
11/11/73	1800-2000	220.3 (6)	237.3 (6)	99.0 (6)	45.7 (6)
11/11/73	2000-2200	150.5 (6)	136.2 (6)	102.2 (6)	100.7 (6)
11/11/73	2200-2400	181.0 (6)	191.7 (6)	164.5 (6)	225.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		126.0	129.8	60.0	46.3

HOUSE -1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		STATION 1A 1M FROM STOVE		STATION 2 LIV RM		STATION 4 OUTSIDE	
11/12/73	0000-0200	187.7	(6)	191.7	(6)	159.8	(6)	144.2	(6)
11/12/73	0200-0400	160.5	(6)	158.8	(6)	131.2	(6)	108.0	(6)
11/12/73	0400-0600	138.8	(6)	141.2	(6)	116.3	(6)	128.7	(6)
11/12/73	0600-0800	167.2	(6)	162.2	(6)	137.2	(6)	144.2	(6)
11/12/73	0800-1000	206.5	(4)	159.5	(4)	190.3	(4)	220.0	(4)
11/12/73	1000-1200	177.0	(5)	176.8	(5)	120.6	(5)	35.4	(5)
11/12/73	1200-1400	87.3	(6)	101.7	(6)	63.3	(6)	28.2	(6)
11/12/73	1400-1600	52.5	(6)	57.8	(6)	29.5	(6)	32.8	(6)
11/12/73	1600-1800	174.5	(6)	238.3	(6)	104.0	(6)	128.0	(6)
11/12/73	1800-2000	375.7	(6)	386.7	(6)	188.8	(6)	118.0	(6)
11/12/73	2000-2200	261.3	(6)	285.0	(6)	169.0	(6)	134.3	(6)
11/12/73	2200-2400	213.0	(6)	225.0	(6)	131.2	(6)	124.7	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		183.5		190.4		128.4		112.2	
11/13/73	0000-0200	168.0	(6)	180.0	(6)	114.7	(6)	94.0	(6)
11/13/73	0200-0400	136.6	(5)	142.8	(5)	92.8	(6)	73.3	(6)
11/13/73	0400-0600	121.5	(6)	123.7	(6)	88.5	(6)	73.5	(6)
11/13/73	0600-0800	188.8	(6)	142.0	(6)	103.7	(6)	103.8	(6)
11/13/73	0800-1000	152.8	(6)	157.2	(6)	114.5	(6)	86.3	(6)
11/13/73	1000-1200	123.5	(6)	126.0	(5)	88.5	(6)	70.0	(6)
11/13/73	1200-1400	114.5	(6)	120.3	(6)	87.2	(6)	88.3	(6)
11/13/73	1400-1600	134.5	(6)	144.3	(6)	112.7	(6)	103.7	(6)
11/13/73	1600-1800	575.7	(6)	548.2	(6)	277.5	(6)	166.0	(6)
11/13/73	1800-2000	397.5	(6)	423.8	(6)	243.7	(6)	137.5	(6)
11/13/73	2000-2200	265.5	(6)	296.2	(5)	194.5	(6)	123.7	(6)
11/13/73	2200-2400	205.5	(6)	218.5	(6)	163.7	(6)	78.5	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		215.4		218.6		140.2		99.9	
11/14/73	0000-0200	136.7	(6)	144.2	(6)	105.8	(6)	43.7	(6)
11/14/73	0200-0400	103.7	(6)	111.3	(6)	66.8	(6)	59.0	(6)
11/14/73	0400-0600	85.2	(6)	91.7	(6)	51.2	(6)	30.5	(6)
11/14/73	0600-0800	117.0	(6)	127.8	(6)	86.3	(6)	72.2	(6)
11/14/73	0800-1000	126.5	(4)	137.8	(4)	101.5	(4)	70.5	(4)
11/14/73	1000-1200	107.2	(5)	104.6	(5)	102.0	(5)	35.4	(5)
11/14/73	1200-1400	68.0	(6)	64.5	(6)	56.8	(6)	17.5	(6)
11/14/73	1400-1600	25.0	(6)	23.0	(6)	20.8	(6)	11.0	(6)
11/14/73	1600-1800	64.2	(6)	58.8	(6)	62.3	(6)	36.0	(6)
11/14/73	1800-2000	132.2	(6)	138.7	(6)	92.8	(6)	28.5	(6)
11/14/73	2000-2200	131.0	(6)	141.8	(6)	117.0	(6)	129.0	(6)
11/14/73	2200-2400	208.5	(6)	208.5	(6)	188.8	(6)	178.2	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		108.8		112.7		87.7		59.3	

HOUSE #1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
11/15/73	0000-0200	206.7 (6)	209.8 (6)	195.5 (6)	162.7 (6)
11/15/73	0200-0400	193.3 (6)	199.0 (6)	163.7 (6)	142.0 (6)
11/15/73	0400-0600	203.3 (6)	201.2 (6)	183.5 (6)	178.0 (6)
11/15/73	0600-0800	216.3 (6)	220.8 (6)	184.5 (6)	180.3 (6)
11/15/73	0800-1000	207.5 (6)	216.3 (6)	163.7 (6)	171.3 (6)
11/15/73	1000-1200	175.7 (6)	181.3 (6)	111.7 (6)	103.8 (6)
11/15/73	1200-1400	85.2 (6)	91.8 (6)	75.7 (6)	60.0 (6)
11/15/73	1400-1600	71.0 (5)	57.6 (5)	52.4 (5)	32.6 (5)
11/15/73	1600-1800	84.3 (6)	69.8 (6)	52.2 (6)	36.2 (6)
11/15/73	1800-2000	94.0 (6)	79.8 (6)	58.8 (6)	47.7 (6)
11/15/73	2000-2200	72.2 (6)	70.0 (6)	42.5 (6)	39.2 (6)
11/15/73	2200-2400	79.0 (6)	58.0 (6)	60.2 (6)	29.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		140.7	138.0	112.0	98.6
11/16/73	0000-0200	59.0 (6)	73.3 (6)	31.5 (6)	13.0 (6)
11/16/73	0200-0400	57.8 (6)	74.5 (6)	42.5 (6)	26.0 (6)
11/16/73	0400-0600	77.7 (6)	88.5 (6)	64.7 (6)	44.7 (6)
11/16/73	0600-0800	122.3 (6)	144.0 (6)	73.3 (6)	37.0 (6)
11/16/73	0800-1000	89.7 (6)	106.2 (6)	100.5 (6)	17.5 (6)
11/16/73	1000-1200	66.5 (6)	79.0 (6)	77.8 (6)	25.3 (6)
11/16/73	1200-1400	54.5 (6)	49.0 (6)	51.3 (6)	16.5 (6)
11/16/73	1400-1600	30.7 (3)	26.0 (3)	24.0 (3)	13.0 (3)
11/16/73	1600-1800	93.0 (5)	98.5 (6)	53.7 (6)	15.2 (6)
11/16/73	1800-2000	65.7 (6)	76.7 (6)	76.5 (6)	13.0 (6)
11/16/73	2000-2200	39.2 (6)	39.0 (6)	41.5 (6)	21.8 (6)
11/16/73	2200-2400	31.7 (6)	26.2 (6)	17.5 (6)	17.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		65.6	73.4	54.6	21.7
11/17/73	0000-0200	28.2 (6)	24.2 (6)	13.0 (6)	13.0 (6)
11/17/73	0200-0400	28.3 (6)	26.0 (6)	13.0 (6)	10.0 (6)
11/17/73	0400-0600	28.3 (6)	26.0 (6)	13.0 (6)	10.0 (6)
11/17/73	0600-0800	33.0 (6)	67.5 (6)	14.2 (6)	12.0 (6)
11/17/73	0800-1000	39.2 (6)	39.2 (6)	26.2 (6)	18.5 (6)
11/17/73	1000-1200	41.3 (6)	72.2 (6)	25.0 (6)	14.2 (6)
11/17/73	1200-1400	35.0 (6)	25.2 (6)	16.3 (6)	14.2 (6)
11/17/73	1400-1600	24.0 (6)	16.5 (6)	12.0 (6)	11.0 (6)
11/17/73	1600-1800	377.8 (6)	351.5 (6)	121.2 (6)	29.3 (6)
11/17/73	1800-2000	84.3 (6)	108.3 (6)	116.8 (6)	18.7 (6)
11/17/73	2000-2200	71.2 (6)	84.3 (6)	79.8 (6)	17.5 (6)
11/17/73	2200-2400	55.5 (6)	73.3 (6)	67.8 (6)	16.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		70.5	76.2	43.2	15.4

HOUSE -1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 BD RM	STATION 4 OUTSIDE
11/18/73	0000-0200	38.0 (6)	41.2 (6)	32.7 (6)	13.0 (6)
11/18/73	0200-0400	32.7 (6)	26.2 (6)	16.3 (6)	14.2 (6)
11/18/73	0400-0600	32.8 (6)	23.8 (6)	13.0 (6)	13.0 (6)
11/18/73	0600-0800	30.7 (6)	22.8 (6)	13.0 (6)	13.0 (6)
11/18/73	0800-1000	131.0 (6)	141.0 (6)	49.3 (6)	16.3 (6)
11/18/73	1000-1200	45.8 (6)	38.0 (6)	25.0 (6)	13.0 (6)
11/18/73	1200-1400	34.8 (6)	43.5 (6)	33.8 (6)	15.3 (6)
11/18/73	1400-1600	43.5 (6)	81.7 (6)	33.7 (6)	13.0 (6)
11/18/73	1600-1800	36.3 (6)	75.3 (6)	68.8 (6)	25.2 (6)
11/18/73	1800-2000	30.0 (6)	82.2 (6)	82.2 (6)	57.0 (6)
11/18/73	2000-2200	140.8 (6)	112.5 (6)	99.5 (6)	33.8 (6)
11/18/73	2200-2400	85.3 (6)	88.7 (6)	87.7 (6)	27.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		65.2	64.7	46.2	21.2
11/19/73	0000-0200	78.8 (6)	82.2 (6)	79.0 (6)	37.0 (6)
11/19/73	0200-0400	97.3 (6)	95.0 (6)	85.3 (6)	103.8 (6)
11/19/73	0400-0600	126.6 (6)	126.8 (6)	114.7 (6)	95.0 (6)
11/19/73	0600-0800	129.0 (6)	150.7 (6)	119.2 (6)	71.2 (6)
11/19/73	0800-1000	147.5 (2)	147.5 (2)	131.0 (2)	72.5 (2)
11/19/73	1000-1200	103.8 (6)	93.0 (6)	91.8 (6)	54.3 (6)
11/19/73	1200-1400	76.7 (3)	63.7 (3)	65.7 (3)	41.7 (3)
11/19/73	1400-1600	770.6 (5)	604.2 (5)	169.0 (5)	13.2 (5)
11/19/73	1600-1800	773.2 (6)	490.2 (6)	392.0 (6)	49.0 (6)
11/19/73	1800-2000	181.3 (6)	201.0 (6)	240.3 (6)	19.7 (6)
11/19/73	2000-2200	129.0 (6)	137.7 (6)	140.8 (6)	64.3 (6)
11/19/73	2200-2400	122.2 (6)	147.3 (6)	138.7 (6)	101.8 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		228.0	194.9	147.3	60.3
11/20/73	0000-0200	150.8 (4)	97.2 (6)	96.0 (6)	59.0 (6)
11/20/73	0200-0400	113.7 (6)	111.5 (6)	107.2 (6)	26.2 (5)
11/20/73	0400-0600	32.2 (6)	70.3 (6)	72.5 (6)	19.7 (6)
11/20/73	0600-0800	108.2 (6)	99.5 (6)	76.7 (6)	170.5 (6)
11/20/73	0800-1000	233.8 (6)	299.5 (6)	200.8 (6)	107.2 (6)
11/20/73	1000-1200	164.8 (6)	150.7 (6)	169.2 (6)	48.2 (6)
11/20/73	1200-1400	121.3 (6)	98.5 (6)	109.2 (6)	20.7 (6)
11/20/73	1400-1600	81.0 (6)	59.2 (6)	79.0 (6)	20.8 (6)
11/20/73	1600-1800	351.7 (6)	458.8 (6)	211.8 (6)	276.3 (6)
11/20/73	1800-2000	452.0 (6)	474.8 (6)	446.7 (6)	492.5 (6)
11/20/73	2000-2200	506.3 (6)	491.3 (6)	486.0 (6)	529.7 (6)
11/20/73	2200-2400	452.2 (6)	480.7 (6)	458.7 (6)	281.8 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		234.9	241.0	209.5	171.0

HOUSE #1 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 BEDROOM	4 OUTSIDE
11/21/73	0000-0200	357.0 (6)	356.0 (6)	322.3 (6)	300.2 (6)
11/21/73	0200-0400	301.5 (6)	296.0 (6)	196.7 (6)	194.5 (6)
11/21/73	0400-0600	281.7 (6)	258.0 (6)	95.2 (6)	254.5 (6)
11/21/73	0600-0800	336.5 (6)	309.2 (6)	131.2 (6)	317.7 (6)
11/21/73	0800-1000	372.5 (6)	342.0 (6)	322.5 (6)	299.2 (6)
11/21/73	1000-1200	356.0 (3)	231.7 (3)	223.0 (3)	221.0 (3)
11/21/73	1200-1400	******	******	******	******
11/21/73	1400-1600	******	******	******	******
11/21/73	1600-1800	******	******	******	******
11/21/73	1800-2000	******	******	******	******
11/21/73	2000-2200	******	******	******	******
11/21/73	2200-2400	******	******	******	******

HOUSE 1 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
11/ 6/73	0000-0200	******	******	******	******
11/ 6/73	0200-0400	******	******	******	******
11/ 6/73	0400-0600	******	******	******	******
11/ 6/73	0600-0800	******	******	******	******
11/ 6/73	0800-1000	******	******	******	******
11/ 6/73	1000-1200	******	******	******	******
11/ 6/73	1200-1400	******	******	******	******
11/ 6/73	1400-1600	3816. (3)	4409. (3)	2763. (3)	856. (3
11/ 6/73	1600-1800	6710. (6)	5756. (6)	4012. (6)	1051. (6
11/ 6/73	1800-2000	7300. (6)	6149. (6)	5820. (6)	1510. (6
11/ 6/73	2000-2200	6508. (6)	4501. (6)	4436. (6)	1639. (6
11/ 6/73	2200-2400	3545. (4)	3052. (4)	3101. (4)	1325. (4
11/ 7/73	0000-0200	3070. (6)	2197. (6)	2098. (6)	880. (6
11/ 7/73	0200-0400	3081. (6)	2587. (6)	2423. (6)	1074. (6
11/ 7/73	0400-0600	3026. (5)	2553. (6)	2355. (6)	1138. (6
11/ 7/73	0600-0800	4920. (2)	3736. (2)	3242. (2)	1959. (2
11/ 7/73	0800-1000	5383. (5)	4080. (5)	3609. (5)	1682. (5
11/ 7/73	1000-1200	3671. (6)	3053. (6)	2759. (6)	1782. (6
11/ 7/73	1200-1400	2905. (6)	2481. (6)	2221. (6)	1667. (6
11/ 7/73	1400-1600	4057. (5)	3080. (5)	2885. (5)	1438. (5
11/ 7/73	1600-1800	7045. (6)	4797. (6)	4504. (6)	1930. (6
11/ 7/73	1800-2000	5334. (6)	4845. (6)	5106. (6)	3151. (6
11/ 7/73	2000-2200	6001. (6)	5512. (6)	4958. (6)	2645. (6
11/ 7/73	2200-2400	7028. (5)	6679. (5)	6718. (5)	2188. (5
DAILY AVERAGE = (AVG OF 2HR VALUES)		4668.	3800.	3573.	1794.
11/ 8/73	0000-0200	5479. (6)	4340. (6)	4308. (6)	1468. (6)
11/ 8/73	0200-0400	4953. (6)	4566. (6)	4340. (6)	2210. (6)
11/ 8/73	0400-0600	4598. (6)	4017. (6)	3824. (6)	2501. (6)
11/ 8/73	0600-0800	5275. (5)	5997. (5)	5275. (5)	4705. (5)
11/ 8/73	0800-1000	6586. (6)	6206. (6)	5826. (6)	3388. (6)
11/ 8/73	1000-1200	5987. (6)	5481. (6)	5133. (6)	2505. (6)
11/ 8/73	1200-1400	4597. (6)	4123. (6)	3869. (6)	2445. (6)
11/ 8/73	1400-1600	11364. (2)	7875. (2)	4585. (2)	1994. (2)
11/ 8/73	1600-1800	8639. (6)	5682. (6)	5117. (6)	1861. (6)
11/ 8/73	1800-2000	5549. (6)	4951. (6)	5084. (6)	2559. (6)
11/ 8/73	2000-2200	5316. (6)	5449. (6)	5217. (6)	2525. (6)
11/ 8/73	2200-2400	5226. (5)	5303. (5)	4994. (5)	2205. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6131.	5332.	4798.	2530.

HOUSE 1 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		STATION 1A 1M FROM STOVE		STATION 2 LIV/ RM		STATION 4 OUT...	
11/ 9/73	0000-0200	4718.	(6)	3641.	(6)	3609.	(6)	1221.	(6)
11/ 9/73	0200-0400	4055.	(6)	3603.	(6)	3538.	(6)	1151.	(6)
11/ 9/73	0400-0600	3243.	(6)	2662.	(6)	2533.	(6)	1146.	(6)
11/ 9/73	0600-0800	2815.	(5)	2424.	(5)	2189.	(5)	1134.	(5)
11/ 9/73	0800-1000	3714.	(5)	3323.	(5)	2854.	(5)	1251.	(5)
11/ 9/73	1000-1200	2109.	(1)	1918.	(1)	1726.	(1)	1342.	(1)
11/ 9/73	1200-1400	3068.	(6)	4091.	(6)	2493.	(6)	895.	(6)
11/ 9/73	1400-1600	2693.	(5)	2693.	(5)	2067.	(5)	1012.	(5)
11/ 9/73	1600-1800	3363.	(6)	3147.	(6)	2951.	(6)	1680.	(6)
11/ 9/73	1800-2000	3300.	(6)	2518.	(6)	2583.	(6)	1345.	(6)
11/ 9/73	2000-2200	3029.	(6)	2769.	(6)	2769.	(6)	1302.	(6)
11/ 9/73	2200-2400	2305.	(5)	1640.	(5)	1640.	(5)	937.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3243.		2869.		2579.		1201.	
11/10/73	0000-0200	2378.	(6)	1428.	(6)	1330.	(6)	907.	(6)
11/10/73	0200-0400	2335.	(6)	1651.	(6)	1553.	(6)	1064.	(6)
11/10/73	0400-0600	2265.	(6)	1515.	(6)	1418.	(6)	962.	(6)
11/10/73	0600-0800	2091.	(5)	1587.	(5)	1394.	(5)	1045.	(5)
11/10/73	0800-1000	3114.	(6)	2920.	(6)	1984.	(6)	887.	(6)
11/10/73	1000-1200	2985.	(6)	1952.	(6)	1888.	(6)	952.	(6)
11/10/73	1200-1400	2597.	(6)	1952.	(6)	1985.	(6)	1210.	(6)
11/10/73	1400-1600	2187.	(5)	1568.	(5)	1645.	(5)	910.	(5)
11/10/73	1600-1800	1920.	(6)	1307.	(6)	1242.	(6)	1049.	(6)
11/10/73	1800-2000	2727.	(6)	2243.	(6)	2146.	(6)	1113.	(6)
11/10/73	2000-2200	3388.	(6)	3178.	(6)	3307.	(6)	1339.	(6)
11/10/73	2200-2400	4274.	(5)	3712.	(4)	3664.	(4)	2203.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		2730.		2084.		1963.		1137.	
11/11/73	0000-0200	4469.	(6)	3894.	(6)	3779.	(6)	2858.	(6)
11/11/73	0200-0400	4520.	(3)	4073.	(3)	3945.	(3)	3370.	(3)
11/11/73	0400-0600	******		******		******		******	
11/11/73	0600-0800	******		******		******		******	
11/11/73	0800-1000	******		******		******		******	
11/11/73	1000-1200	******		******		******		******	
11/11/73	1200-1400	******		******		******		******	
11/11/73	1400-1600	7929.	(4)	7687.	(4)	6428.	(4)	2749.	(4)
11/11/73	1600-1800	9483.	(6)	7354.	(6)	7096.	(6)	3321.	(6)
11/11/73	1800-2000	6328.	(6)	6183.	(6)	6377.	(6)	3634.	(6)
11/11/73	2000-2200	7541.	(4)	7105.	(4)	7396.	(4)	5992.	(4)
11/11/73	2200-2400	******		******		******		******	

HOUSE 1 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
11/12/73	0000-0200	******	******	******	******
11/12/73	0200-0400	******	******	******	******
11/12/73	0400-0600	******	******	******	******
11/12/73	0600-0800	******	******	******	******
11/12/73	0800-1000	******	******	******	******
11/12/73	1000-1200	******	******	******	******
11/12/73	1200-1400	******	******	******	******
11/12/73	1400-1600	******	******	******	******
11/12/73	1600-1800	******	******	******	******
11/12/73	1800-2000	7058. (6)	6193. (6)	6055. (6)	3667. (6)
11/12/73	2000-2200	6331. (6)	5847. (6)	5950. (6)	3806. (6)
11/12/73	2200-2400	6638. (5)	6223. (5)	6223. (5)	3234. (5)
11/13/73	0000-0200	4430. (6)	3973. (6)	4014. (6)	3309. (6)
11/13/73	0200-0400	5827. (6)	5411. (6)	5308. (6)	3128. (6)
11/13/73	0400-0600	5717. (3)	5163. (3)	5094. (3)	3295. (3)
11/13/73	0600-0800	******	******	******	******
11/13/73	0800-1000	5393. (4)	4828. (4)	4674. (4)	2620. (4)
11/13/73	1000-1200	4572. (6)	4024. (6)	3989. (6)	2517. (6)
11/13/73	1200-1400	4332. (6)	3989. (6)	3852. (6)	3030. (6)
11/13/73	1400-1600	7732. (3)	7115. (3)	7184. (3)	4718. (3)
11/13/73	1600-1800	9141. (5)	7783. (6)	7578. (6)	5010. (6)
11/13/73	1800-2000	7058. (5)	6518. (5)	6642. (5)	3072. (5)
11/13/73	2000-2200	6227. (3)	5674. (3)	5674. (3)	2491. (3)
11/13/73	2200-2400	******	******	******	******
11/14/73	0000-0200	******	******	******	******
11/14/73	0200-0400	******	******	******	******
11/14/73	0400-0600	******	******	******	******
11/14/73	0600-0800	******	******	******	******
11/14/73	0800-1000	******	******	******	******
11/14/73	1000-1200	4859. (6)	4369. (6)	4439. (6)	2028. (6)
11/14/73	1200-1400	3880. (6)	3251. (6)	3006. (6)	1258. (6)
11/14/73	1400-1600	2849. (5)	2346. (5)	2136. (5)	1423. (5)
11/14/73	1600-1800	3692. (6)	3308. (6)	3133. (6)	2888. (6)
11/14/73	1800-2000	5150. (6)	4696. (6)	4800. (6)	2878. (6)
11/14/73	2000-2200	6468. (6)	6013. (6)	6118. (6)	4930. (6)
11/14/73	2200-2400	7052. (5)	6637. (5)	6637. (5)	3897. (5)

HOUSE 1 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		1A 1M FROM STOVE		3 /BD RM		4 OUTSIDE	
11/15/73	0000-0200	6030.	(6)	4714.	(6)	4714.	(6)	2984.	(6)
11/15/73	0200-0400	5793.	(6)	5447.	(6)	5378.	(6)	3440.	(6)
11/15/73	0400-0600	5663.	(6)	5178.	(6)	5074.	(6)	3276.	(6)
11/15/73	0600-0800	5210.	(5)	4712.	(5)	4795.	(5)	3342.	(5)
11/15/73	0800-1000	6348.	(6)	6175.	(6)	5933.	(6)	3892.	(6)
11/15/73	1000-1200	6106.	(6)	5899.	(6)	5587.	(6)	2647.	(6)
11/15/73	1200-1400	4965.	(6)	3788.	(6)	3961.	(6)	2301.	(6)
11/15/73	1400-1600	4273.	(5)	3650.	(5)	3194.	(5)	2737.	(5)
11/15/73	1600-1800	4208.	(6)	3966.	(6)	3170.	(6)	2582.	(6)
11/15/73	1800-2000	4612.	(6)	4267.	(6)	3851.	(6)	2295.	(6)
11/15/73	2000-2200	4914.	(6)	4395.	(6)	4152.	(6)	2111.	(6)
11/15/73	2200-2400	5127.	(5)	4534.	(5)	3347.	(5)	1821.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		5271.		4727.		4430.		2786.	
11/16/73	0000-0200	4311.	(6)	3522.	(6)	2144.	(6)	1473.	(6)
11/16/73	0200-0400	4217.	(6)	4217.	(6)	2804.	(6)	1956.	(6)
11/16/73	0400-0600	4348.	(6)	4206.	(6)	3146.	(6)	2158.	(6)
11/16/73	0600-0800	4648.	(5)	4262.	(5)	2892.	(5)	2163.	(5)
11/16/73	0800-1000	4373.	(6)	4123.	(6)	3981.	(6)	1732.	(6)
11/16/73	1000-1200	3552.	(6)	3231.	(6)	3124.	(6)	1732.	(6)
11/16/73	1200-1400	3088.	(6)	2517.	(6)	2517.	(6)	1553.	(6)
11/16/73	1400-1600	2389.	(5)	1923.	(5)	1711.	(5)	1245.	(5)
11/16/73	1600-1800	3419.	(6)	2607.	(6)	1794.	(6)	1253.	(5)
11/16/73	1800-2000	4636.	(6)	4530.	(6)	3364.	(6)	1104.	(6)
11/16/73	2000-2200	4863.	(6)	4122.	(6)	4051.	(6)	1084.	(6)
11/16/73	2200-2400	3221.	(6)	2457.	(6)	2669.	(6)	1271.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3922.		3476.		2850.		1560.	
11/17/73	0000-0200	2921.	(6)	1959.	(6)	2080.	(6)	1323.	(6)
11/17/73	0200-0400	2603.	(6)	1932.	(6)	1932.	(6)	1190.	(6)
11/17/73	0400-0600	2633.	(6)	1926.	(6)	1891.	(6)	1291.	(6)
11/17/73	0600-0800	2538.	(5)	2119.	(5)	1909.	(5)	1405.	(5)
11/17/73	0800-1000	2989.	(6)	2639.	(6)	2814.	(6)	1311.	(6)
11/17/73	1000-1200	5051.	(6)	3968.	(6)	2570.	(6)	2045.	(6)
11/17/73	1200-1400	3443.	(6)	2849.	(6)	2370.	(5)	1136.	(6)
11/17/73	1400-1600	2326.	(5)	1734.	(5)	1776.	(5)	1394.	(5)
11/17/73	1600-1800	5420.	(6)	4714.	(6)	3053.	(6)	1747.	(6)
11/17/73	1800-2000	4414.	(5)	3948.	(5)	3777.	(4)	2337.	(5)
11/17/73	2000-2200	5600.	(6)	5247.	(6)	4682.	(6)	2068.	(6)
11/17/73	2200-2400	5072.	(5)	4695.	(5)	4695.	(5)	1381.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3751.		3144.		2796.		1552.	

HOUSE 1 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		1A 1M FROM STOVE		3 /BD RM		4 OUTSIDE	
11/18/73	0000-0200	4176.	(6)	3060.	(6)	3025.	(6)	1173.	(6
11/18/73	0200-0400	3568.	(6)	3113.	(6)	2974.	(6)	1540.	(6
11/18/73	0400-0600	3272.	(6)	2608.	(6)	2538.	(6)	1455.	(6
11/18/73	0600-0800	2538.	(5)	2029.	(5)	1902.	(5)	1097.	(5
11/18/73	0800-1000	4401.	(6)	3482.	(6)	2317.	(6)	1292.	(6
11/18/73	1000-1200	3860.	(6)	3154.	(6)	2412.	(6)	1423.	(6
11/18/73	1200-1400	3496.	(6)	3002.	(6)	2437.	(6)	1412.	(6
11/18/73	1400-1600	3973.	(5)	4016.	(5)	3083.	(5)	1727.	(5
11/18/73	1600-1800	4581.	(6)	4037.	(6)	4016.	(6)	2815.	(6
11/18/73	1800-2000	5745.	(6)	5074.	(6)	5074.	(6)	3237.	(6
11/18/73	2000-2200	5814.	(6)	5284.	(6)	4931.	(6)	3059.	(6
11/18/73	2200-2400	4197.	(6)	3688.	(6)	3900.	(6)	1781.	(6
DAILY AVERAGE = (AVG OF 2HR VALUES)		4135.		3550.		3217.		1834.	
11/19/73	0000-0200	3434.	(6)	3073.	(6)	3109.	(6)	1837.	(6
11/19/73	0200-0400	4239.	(6)	3638.	(6)	3603.	(6)	2649.	(6
11/19/73	0400-0600	4345.	(6)	3638.	(6)	3638.	(6)	2628.	(5
11/19/73	0600-0800	4745.	(5)	4406.	(5)	3854.	(5)	2922.	(5
11/19/73	0800-1000	5467.	(6)	4690.	(6)	4372.	(6)	2394.	(6
11/19/73	1000-1200	3695.	(6)	3236.	(6)	3272.	(6)	1766.	(5
11/19/73	1200-1400	5460.	(5)	4894.	(5)	4671.	(5)	1866.	(4
11/19/73	1400-1600	7293.	(4)	5370.	(4)	3504.	(4)	2429.	(4
11/19/73	1600-1800	6963.	(6)	5606.	(6)	4965.	(6)	1873.	(6
11/19/73	1800-2000	5331.	(6)	4690.	(6)	4992.	(6)	2163.	(6
11/19/73	2000-2200	5282.	(6)	4641.	(6)	4603.	(6)	3095.	(6
11/19/73	2200-2400	4734.	(6)	4376.	(6)	4466.	(6)	2855.	(6
DAILY AVERAGE = (AVG OF 2HR VALUES)		5082.		4355.		4087.		2373.	
11/20/73	0000-0200	5076.	(6)	3820.	(6)	3894.	(6)	2104.	(6)
11/20/73	0200-0400	4695.	(6)	4173.	(6)	4210.	(6)	2122.	(6)
11/20/73	0400-0600	4156.	(6)	3559.	(6)	3746.	(6)	2068.	(6)
11/20/73	0600-0800	4640.	(5)	4377.	(5)	3589.	(5)	4640.	(5)
11/20/73	0800-1000	6420.	(6)	6019.	(6)	5180.	(6)	2626.	(6)
11/20/73	1000-1200	4596.	(6)	3830.	(6)	4085.	(6)	1642.	(6)
11/20/73	1200-1400	5508.	(6)	4414.	(6)	4231.	(6)	1605.	(6)
11/20/73	1400-1600	3751.	(5)	3176.	(5)	3796.	(5)	1627.	(5)
11/20/73	1600-1800	5994.	(6)	5625.	(6)	4187.	(6)	4703.	(6)
11/20/73	1800-2000	9263.	(6)	9152.	(6)	8304.	(6)	9005.	(6)
11/20/73	2000-2200	10504.	(6)	9803.	(6)	9951.	(6)	8033.	(6)
11/20/73	2200-2400	13970.	(6)	14147.	(6)	12112.	(6)	4987.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6548.		6008.		5607.		3763.	

Appendix B-3

NO_2, NO, and CO data for House No. 2 - Spring/Summer

HOUSE 2 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS, UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /BD RM	4 OUTSIDE
5/29/73	0000-0200	******	******	******	******
5/29/73	0200-0400	******	******	******	******
5/29/73	0400-0600	******	******	******	******
5/29/73	0600-0800	******	******	******	******
5/29/73	0800-1000	******	******	******	******
5/29/73	1000-1200	******	******	******	******
5/29/73	1200-1400	******	******	******	******
5/29/73	1400-1600	******	******	******	******
5/29/73	1600-1800	167.0 (4)	93.5 (4)	68.7 (4)	79.2 (4)
5/29/73	1800-2000	54.7 (6)	54.1 (6)	47.1 (6)	42.6 (6)
5/29/73	2000-2200	96.1 (6)	94.8 (6)	87.3 (6)	97.4 (6)
5/29/73	2200-2400	66.2 (6)	63.7 (6)	78.9 (6)	80.2 (6)
5/30/73	0000-0200	60.0 (6)	66.2 (6)	61.1 (6)	74.5 (6)
5/30/73	0200-0400	56.6 (6)	55.4 (6)	57.3 (6)	64.9 (6)
5/30/73	0400-0600	42.0 (6)	42.0 (6)	42.6 (6)	44.5 (6)
5/30/73	0600-0800	95.4 (6)	52.2 (6)	63.0 (6)	57.3 (6)
5/30/73	0800-1000	84.0 (6)	85.9 (6)	97.4 (6)	80.5 (6)
5/30/73	1000-1200	66.5 (6)	60.5 (6)	45.8 (6)	42.0 (6)
5/30/73	1200-1400	126.0 (5)	57.3 (5)	37.4 (5)	29.5 (5)
5/30/73	1400-1600	51.9 (5)	51.2 (5)	43.5 (5)	31.5 (5)
5/30/73	1600-1800	163.2 (6)	87.2 (6)	90.4 (6)	44.5 (6)
5/30/73	1800-2000	53.5 (6)	56.0 (6)	54.1 (6)	50.3 (6)
5/30/73	2000-2200	78.9 (6)	76.4 (6)	78.3 (6)	70.6 (6)
5/30/73	2200-2400	75.7 (6)	70.0 (6)	73.2 (6)	70.6 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		79.5	63.3	62.0	55.1
5/31/73	0000-0200	61.1 (6)	58.5 (6)	56.5 (6)	55.4 (6)
5/31/73	0200-0400	62.4 (6)	52.8 (6)	56.0 (6)	65.5 (6)
5/31/73	0400-0600	48.4 (6)	45.8 (6)	45.2 (6)	39.5 (6)
5/31/73	0600-0800	100.5 (6)	66.2 (6)	54.1 (6)	49.6 (6)
5/31/73	0800-1000	69.4 (6)	67.5 (6)	65.5 (6)	57.2 (6)
5/31/73	1000-1200	56.0 (6)	59.2 (6)	53.5 (6)	47.7 (6)
5/31/73	1200-1400	47.7 (6)	52.8 (6)	50.3 (6)	46.0 (6)
5/31/73	1400-1600	49.0 (6)	54.1 (6)	48.4 (6)	40.1 (6)
5/31/73	1600-1800	46.5 (6)	51.5 (6)	47.1 (6)	42.6 (6)
5/31/73	1800-2000	61.1 (6)	53.5 (6)	56.6 (6)	57.3 (6)
5/31/73	2000-2200	175.9 (6)	93.5 (6)	91.0 (6)	92.9 (6)
5/31/73	2200-2400	70.6 (6)	62.4 (6)	70.0 (6)	84.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		70.7	60.2	57.9	56.5

HOUSE 2 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/ 1/73	0000-0200	60.2 (6)	71.9 (6)	66.2 (6)	66.2 (6)
6/ 1/73	0200-0400	55.4 (6)	57.3 (6)	50.9 (6)	48.4 (6)
6/ 1/73	0400-0600	43.9 (6)	40.1 (6)	38.2 (6)	38.2 (6)
6/ 1/73	0600-0800	33.2 (5)	58.0 (5)	58.8 (5)	58.8 (5)
6/ 1/73	0800-1000	******	******	******	******
6/ 1/73	1000-1200	******	******	******	******
6/ 1/73	1200-1400	******	******	******	******
6/ 1/73	1400-1600	123.7 (5)	110.7 (5)	106.1 (5)	107.7 (5)
6/ 1/73	1600-1800	124.1 (6)	121.5 (6)	126.6 (6)	123.4 (6)
6/ 1/73	1800-2000	157.8 (6)	153.7 (6)	165.4 (6)	164.2 (6)
6/ 1/73	2000-2200	152.1 (6)	152.1 (6)	155.3 (6)	150.2 (6)
6/ 1/73	2200-2400	155.3 (6)	142.5 (6)	150.8 (6)	153.4 (6)
6/ 2/73	0000-0200	139.4 (6)	145.1 (6)	138.1 (6)	133.6 (6)
6/ 2/73	0200-0400	112.6 (6)	113.3 (6)	108.8 (6)	107.5 (6)
6/ 2/73	0400-0600	99.9 (6)	108.2 (6)	105.6 (6)	94.2 (6)
6/ 2/73	0600-0800	105.6 (6)	110.1 (6)	106.3 (6)	102.4 (6)
6/ 2/73	0800-1000	100.5 (6)	109.4 (6)	105.6 (6)	102.4 (6)
6/ 2/73	1000-1200	108.2 (6)	112.6 (6)	110.7 (6)	113.3 (6)
6/ 2/73	1200-1400	277.8 (6)	142.5 (6)	139.4 (6)	116.4 (6)
6/ 2/73	1400-1600	110.1 (6)	108.8 (6)	111.4 (6)	105.0 (6)
6/ 2/73	1600-1800	108.2 (6)	110.1 (6)	115.2 (6)	105.6 (6)
6/ 2/73	1800-2000	120.3 (6)	123.2 (6)	129.8 (6)	133.0 (6)
6/ 2/73	2000-2200	163.5 (6)	160.4 (6)	156.5 (6)	164.2 (6)
6/ 2/73	2200-2400	152.1 (6)	145.1 (6)	143.8 (6)	152.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		133.2	124.6	122.6	119.2
6/ 3/73	0000-0200	126.0 (6)	124.7 (6)	122.8 (6)	135.5 (6)
6/ 3/73	0200-0400	123.4 (6)	120.3 (6)	119.6 (6)	128.5 (6)
6/ 3/73	0400-0600	122.8 (6)	124.7 (6)	127.3 (6)	124.1 (6)
6/ 3/73	0600-0800	117.1 (6)	120.9 (6)	120.3 (6)	117.1 (6)
6/ 3/73	0800-1000	141.9 (6)	125.4 (6)	129.2 (6)	114.5 (6)
6/ 3/73	1000-1200	110.1 (6)	116.4 (6)	119.0 (6)	116.4 (6)
6/ 3/73	1200-1400	111.4 (6)	114.5 (6)	114.5 (6)	107.5 (6)
6/ 3/73	1400-1600	110.1 (6)	112.0 (6)	106.3 (6)	102.4 (6)
6/ 3/73	1600-1800	115.8 (6)	117.7 (6)	115.2 (6)	113.3 (6)
6/ 3/73	1800-2000	117.7 (6)	123.4 (6)	121.5 (6)	119.0 (6)
6/ 3/73	2000-2200	171.2 (6)	153.4 (6)	156.5 (6)	145.7 (6)
6/ 3/73	2200-2400	138.4 (6)	148.9 (6)	138.1 (6)	154.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		127.2	125.2	124.2	123.2

HOUSE 2 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /BD RM	4 OUTSIDE
6/ 4/73	0000-0200	145.7 (6)	140.0 (6)	140.6 (6)	138.7 (6)
6/ 4/73	0200-0400	129.2 (6)	125.4 (6)	128.5 (6)	131.1 (6)
6/ 4/73	0400-0600	112.0 (6)	117.1 (6)	125.4 (6)	126.0 (6)
6/ 4/73	0600-0800	140.6 (6)	126.0 (6)	131.1 (6)	126.6 (6)
6/ 4/73	0800-1000	139.4 (6)	124.1 (6)	133.6 (6)	143.2 (6)
6/ 4/73	1000-1200	146.4 (6)	133.0 (6)	136.8 (6)	138.7 (6)
6/ 4/73	1200-1400	190.9 (6)	162.9 (6)	152.7 (6)	139.4 (6)
6/ 4/73	1400-1600	139.4 (6)	143.8 (6)	141.3 (6)	138.1 (6)
6/ 4/73	1600-1800	147.0 (6)	141.3 (6)	154.6 (6)	161.0 (6)
6/ 4/73	1800-2000	166.7 (6)	157.8 (6)	161.0 (6)	174.4 (6)
6/ 4/73	2000-2200	178.2 (6)	177.5 (6)	173.1 (6)	183.3 (6)
6/ 4/73	2200-2400	192.8 (6)	183.3 (6)	182.6 (6)	226.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		152.3	144.3	146.8	152.2
6/ 5/73	0000-0200	168.6 (6)	163.6 (6)	168.6 (6)	161.6 (6)
6/ 5/73	0200-0400	117.1 (6)	124.7 (6)	125.4 (6)	112.6 (6)
6/ 5/73	0400-0600	117.7 (6)	115.8 (6)	117.1 (6)	115.2 (6)
6/ 5/73	0600-0800	124.7 (6)	122.8 (6)	129.2 (6)	127.9 (6)
6/ 5/73	0800-1000	122.2 (1)	126.0 (1)	122.2 (1)	137.4 (1)
6/ 5/73	1000-1200	******	******	******	******
6/ 5/73	1200-1400	******	******	******	******
6/ 5/73	1400-1600	******	******	******	******
6/ 5/73	1600-1800	******	******	******	******
6/ 5/73	1800-2000	******	******	******	******
6/ 5/73	2000-2200	******	******	******	******
6/ 5/73	2200-2400	57.3 (4)	60.1 (4)	62.0 (4)	44.9 (4)
6/ 6/73	0000-0200	49.6 (1)	53.5 (1)	53.5 (1)	42.0 (1)
6/ 6/73	0200-0400	******	******	******	******
6/ 6/73	0400-0600	******	******	******	******
6/ 6/73	0600-0800	33.1 (3)	38.2 (3)	38.2 (3)	54.7 (3)
6/ 6/73	0800-1000	110.1 (6)	58.5 (6)	57.3 (6)	38.8 (6)
6/ 6/73	1000-1200	36.3 (6)	45.8 (6)	45.8 (6)	35.6 (6)
6/ 6/73	1200-1400	90.4 (3)	59.8 (3)	61.1 (3)	48.4 (3)
6/ 6/73	1400-1600	******	******	******	******
6/ 6/73	1600-1800	******	******	******	******
6/ 6/73	1800-2000	******	******	******	******
6/ 6/73	2000-2200	******	******	******	******
6/ 6/73	2200-2400	******	******	******	******

HOUSE 2 SPRING-SUMMER NO. AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /BD RM	4 OUTSIDE
5/29/73	0000-0200	******	******	******	******
5/29/73	0200-0400	******	******	******	******
5/29/73	0400-0600	******	******	******	******
5/29/73	0600-0800	******	******	******	******
5/29/73	0800-1000	******	******	******	******
5/29/73	1000-1200	******	******	******	******
5/29/73	1200-1400	******	******	******	******
5/29/73	1400-1600	******	******	******	******
5/29/73	1600-1800	81.1 (3)	13.8 (4)	17.6 (4)	13.4 (3)
5/29/73	1800-2000	2.5 (2)	3.8 (2)	3.8 (4)	6.3 (4)
5/29/73	2000-2200	53.9 (6)	47.7 (6)	43.1 (6)	42.2 (6)
5/29/73	2200-2400	120.8 (6)	117.0 (6)	113.3 (6)	117.0 (6)
5/30/73	0000-0200	113.7 (5)	109.5 (6)	107.4 (6)	100.3 (5)
5/30/73	0200-0400	89.9 (6)	89.0 (6)	86.5 (6)	69.0 (6)
5/30/73	0400-0600	80.7 (6)	78.6 (6)	76.9 (6)	78.6 (6)
5/30/73	0600-0800	151.7 (6)	111.2 (6)	104.5 (6)	83.2 (6)
5/30/73	0800-1000	101.2 (6)	100.7 (6)	88.2 (6)	64.0 (6)
5/30/73	1000-1200	7.5 (6)	7.1 (6)	5.9 (6)	8.8 (6)
5/30/73	1200-1400	94.3 (5)	10.0 (5)	5.5 (5)	6.5 (5)
5/30/73	1400-1600	4.0 (5)	4.4 (4)	5.0 (1)	2.5 (2)
5/30/73	1600-1800	109.3 (5)	14.6 (6)	18.0 (6)	3.8 (4)
5/30/73	1800-2000	4.4 (4)	4.2 (3)	3.8 (2)	2.9 (6)
5/30/73	2000-2200	9.2 (6)	8.8 (6)	5.9 (6)	7.9 (6)
5/30/73	2200-2400	13.8 (6)	7.9 (6)	8.4 (6)	4.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		65.0	45.5	43.0	36.0
5/31/73	0000-0200	13.4 (6)	7.5 (6)	4.2 (6)	2.5 (5)
5/31/73	0200-0400	18.0 (6)	10.9 (6)	3.5 (5)	3.1 (4)
5/31/73	0400-0600	15.0 (6)	8.8 (6)	3.1 (4)	2.5 (1)
5/31/73	0600-0800	78.4 (6)	18.8 (6)	16.3 (6)	7.1 (6)
5/31/73	0800-1000	27.2 (6)	23.0 (6)	21.3 (6)	12.1 (6)
5/31/73	1000-1200	10.4 (6)	7.9 (6)	5.0 (6)	4.6 (6)
5/31/73	1200-1400	6.0 (5)	3.8 (6)	3.8 (6)	3.0 (5)
5/31/73	1400-1600	4.0 (5)	4.2 (6)	3.8 (6)	3.8 (6)
5/31/73	1600-1800	6.7 (6)	4.0 (5)	5.0 (4)	6.7 (6)
5/31/73	1800-2000	7.9 (6)	5.9 (6)	5.0 (6)	10.0 (6)
5/31/73	2000-2200	101.4 (6)	48.1 (6)	46.8 (6)	60.6 (6)
5/31/73	2200-2400	87.4 (6)	85.3 (6)	67.3 (6)	51.8 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		31.3	19.0	15.4	14.0

HOUSE 2 SPRING-SUMMER NO. AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/ 1/73	0000-0200	47.2 (6)	43.1 (6)	22.2 (6)	10.9 (6)
6/ 1/73	0200-0400	18.8 (6)	13.8 (6)	6.3 (6)	4.2 (6)
6/ 1/73	0400-0600	13.0 (6)	6.3 (6)	2.5 (6)	3.8 (2)
6/ 1/73	0600-0800	38.1 (5)	19.1 (5)	18.1 (5)	17.1 (5)
6/ 1/73	0800-1000	******	******	******	******
6/ 1/73	1000-1200	******	******	******	******
6/ 1/73	1200-1400	******	******	******	******
6/ 1/73	1400-1600	5.0 (5)	4.4 (4)	5.0 (2)	5.0 (5)
6/ 1/73	1600-1800	5.9 (6)	5.9 (6)	7.1 (6)	8.4 (6)
6/ 1/73	1800-2000	22.6 (6)	23.4 (6)	25.9 (6)	33.9 (6)
6/ 1/73	2000-2200	15.9 (6)	8.8 (6)	8.8 (6)	8.8 (6)
6/ 1/73	2200-2400	18.8 (6)	14.6 (6)	13.4 (6)	10.9 (6)
6/ 2/73	0000-0200	18.4 (6)	12.5 (6)	10.4 (6)	10.4 (6)
6/ 2/73	0200-0400	9.2 (6)	6.3 (6)	5.0 (6)	2.9 (6)
6/ 2/73	0400-0600	10.0 (6)	4.6 (6)	5.0 (5)	3.3 (3)
6/ 2/73	0600-0800	5.0 (6)	4.4 (4)	4.2 ([illegible])	3.8 (4)
6/ 2/73	0800-1000	7.1 (6)	4.2 (6)	2.5 (2)	5.4 (6)
6/ 2/73	1000-1200	7.9 (6)	6.7 (6)	8.5 (5)	10.4 (6)
6/ 2/73	1200-1400	74.8 (6)	11.7 (6)	12.5 (6)	14.6 (6)
6/ 2/73	1400-1600	5.9 (6)	4.5 (5)	4.0 (5)	6.3 (6)
6/ 2/73	1600-1800	8.8 (6)	7.9 (6)	7.9 (6)	10.0 (6)
6/ 2/73	1800-2000	11.3 (6)	15.0 (6)	12.5 (6)	15.5 (6)
6/ 2/73	2000-2200	91.5 (6)	92.8 (6)	94.5 (6)	109.1 (6)
6/ 2/73	2200-2400	159.3 (6)	152.2 (6)	150.9 (6)	110.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		34.1	26.9	26.5	25.2
6/ 3/73	0000-0200	108.7 (6)	107.4 (6)	108.3 (6)	112.4 (6)
6/ 3/73	0200-0400	114.1 (6)	108.7 (6)	107.4 (6)	73.1 (6)
6/ 3/73	0400-0600	35.1 (6)	31.3 (6)	33.9 (6)	19.2 (6)
6/ 3/73	0600-0800	10.0 (6)	7.5 (6)	7.9 (6)	10.0 (6)
6/ 3/73	0800-1000	53.9 (6)	10.4 (6)	18.0 (6)	12.5 (6)
6/ 3/73	1000-1200	7.1 (6)	7.1 (6)	7.1 (6)	8.4 (6)
6/ 3/73	1200-1400	5.9 (6)	6.7 (6)	5.4 (6)	7.1 (6)
6/ 3/73	1400-1600	5.9 (6)	6.7 (6)	5.4 (6)	5.0 (6)
6/ 3/73	1600-1800	7.5 (6)	6.3 (6)	6.3 (6)	5.4 (6)
6/ 3/73	1800-2000	7.1 (6)	6.3 (6)	5.9 (6)	5.4 (6)
6/ 3/73	2000-2200	33.9 (6)	20.5 (6)	18.4 (6)	15.0 (6)
6/ 3/73	2200-2400	25.5 (6)	18.4 (6)	18.0 (6)	14.6 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		34.6	28.1	28.5	24.0

HOUSE 2 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /50 RM	4 OUTSIDE
5/ 4/73	0000-0200	30.1 (6)	16.7 (6)	16.3 (6)	10.0 (6)
5/ 4/73	0200-0400	25.5 (6)	13.4 (6)	11.7 (6)	9.6 (6)
5/ 4/73	0400-0600	21.3 (6)	11.7 (6)	11.7 (6)	9.2 (6)
5/ 4/73	0600-0800	53.3 (6)	23.8 (6)	21.3 (6)	16.7 (6)
5/ 4/73	0800-1000	53.5 (6)	45.1 (6)	41.0 (6)	37.6 (6)
5/ 4/73	1000-1200	33.4 (6)	27.6 (6)	23.0 (6)	18.8 (6)
5/ 4/73	1200-1400	78.2 (6)	43.1 (6)	18.0 (6)	13.4 (6)
5/ 4/73	1400-1600	19.2 (6)	15.0 (6)	11.3 (6)	12.1 (6)
5/ 4/73	1600-1800	24.7 (6)	22.6 (6)	21.7 (6)	17.1 (6)
5/ 4/73	1800-2000	40.1 (6)	27.6 (6)	26.8 (6)	19.6 (6)
5/ 4/73	2000-2200	51.4 (6)	52.2 (6)	48.5 (6)	59.8 (6)
5/ 4/73	2200-2400	74.4 (6)	72.7 (6)	71.1 (6)	45.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		42.1	31.0	26.0	22.4
5/ 5/73	0000-0200	43.9 (6)	33.9 (6)	35.9 (6)	19.2 (6)
5/ 5/73	0200-0400	15.0 (6)	13.0 (6)	9.2 (6)	6.7 (6)
5/ 5/73	0400-0600	16.3 (6)	15.0 (6)	12.1 (6)	10.0 (6)
5/ 5/73	0600-0800	41.0 (6)	33.9 (6)	45.1 (6)	64.0 (6)
5/ 5/73	0800-1000	70.2 (1)	70.2 (1)	70.2 (1)	77.7 (1)
5/ 5/73	1000-1200	******	******	******	******
5/ 5/73	1200-1400	******	******	******	******
5/ 5/73	1400-1600	******	******	******	******
5/ 5/73	1600-1800	******	******	******	******
5/ 5/73	1800-2000	******	******	******	******
5/ 5/73	2000-2200	******	******	******	******
5/ 5/73	2200-2400	13.2 (4)	11.3 (4)	12.5 (4)	7.5 (4)
5/ 6/73	0000-0200	2.5 (1)	5.0 (1)	5.0 (1)	5.0 (1)
5/ 6/73	0200-0400	******	******	******	******
5/ 6/73	0400-0600	******	******	******	******
5/ 6/73	0600-0800	8.4 (3)	7.5 (3)	5.9 (3)	16.7 (3)
5/ 6/73	0800-1000	103.5 (6)	23.0 (6)	25.1 (6)	6.7 (6)
5/ 6/73	1000-1200	10.0 (6)	7.1 (6)	5.0 (6)	7.5 (6)
5/ 6/73	1200-1400	98.5 (3)	10.0 (3)	10.9 (3)	6.7 (3)
5/ 6/73	1400-1600	******	******	******	******
5/ 6/73	1600-1800	******	******	******	******
5/ 6/73	1800-2000	******	******	******	******
5/ 6/73	2000-2200	******	******	******	******
5/ 6/73	2200-2400	******	******	******	******

HOUSE 2 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
5/30/73	0000-0200	3828. (6)	4149. (6)	4124. (6)	4025. (6)
5/30/73	0200-0400	4391. (6)	4662. (6)	4588. (6)	4489. (6)
5/30/73	0400-0600	4909. (6)	5032. (6)	5007. (6)	4983. (6)
5/30/73	0600-0800	5871. (6)	5969. (6)	5846. (6)	6167. (6)
5/30/73	0800-1000	4391. (6)	5772. (6)	5747. (6)	5081. (6)
5/30/73	1000-1200	1554. (6)	2555. (6)	2565. (6)	2023. (6)
5/30/73	1200-1400	806. (6)	3103. (6)	1034. (6)	661. (6)
5/30/73	1400-1600	844. (5)	713. (4)	682. (6)	537. (6)
5/30/73	1600-1800	2474. (6)	3777. (6)	351. (6)	4005. (6)
5/30/73	1800-2000	682. (6)	682. (6)	268. (6)	661. (6)
5/30/73	2000-2200	1820. (6)	1944. (6)	1903. (6)	2130. (6)
5/30/73	2200-2400	3206. (6)	2875. (6)	2896. (6)	3227. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		2898.	3436.	2918.	3166.
5/31/73	0000-0200	2337. (6)	2358. (6)	1799. (6)	2255. (6)
5/31/73	0200-0400	2358. (6)	2420. (6)	2316. (6)	2805. (6)
5/31/73	0400-0600	2296. (6)	2296. (6)	2213. (6)	2482. (5)
5/31/73	0600-0800	2647. (6)	2283. (6)	3640. (6)	2834. (6)
5/31/73	0800-1000	3188. (6)	3234. (6)	3354. (6)	3883. (6)
5/31/73	1000-1200	3073. (6)	2923. (6)	2884. (6)	2475. (6)
5/31/73	1200-1400	2256. (6)	2107. (6)	2007. (6)	2135. (6)
5/31/73	1400-1600	1344. (6)	1270. (6)	1045. (6)	896. (6)
5/31/73	1600-1800	863. (6)	813. (6)	714. (6)	739. (6)
5/31/73	1800-2000	1021. (6)	971. (6)	1071. (6)	1245. (6)
5/31/73	2000-2200	5951. (6)	5164. (6)	5015. (6)	5837. (6)
5/31/73	2200-2400	4409. (6)	4234. (6)	4210. (6)	3014. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		2645.	2506.	2522.	2550.
6/ 1/73	0000-0200	2798. (6)	2674. (6)	2450. (6)	1578. (6)
6/ 1/73	0200-0400	2875. (6)	3180. (6)	3255. (6)	2956. (6)
6/ 1/73	0400-0600	4194. (6)	4218. (6)	4467. (6)	4168. (6)
6/ 1/73	0600-0800	5746. (6)	5238. (6)	5343. (6)	5099. (6)
6/ 1/73	0800-1000	4908. (6)	4784. (6)	4559. (6)	4236. (6)
6/ 1/73	1000-1200	4053. (6)	3356. (6)	3231. (6)	3032. (6)
6/ 1/73	1200-1400	2190. (6)	3037. (6)	2140. (6)	2464. (6)
6/ 1/73	1400-1600	1232. (6)	1196. (6)	1156. (6)	1056. (6)
6/ 1/73	1600-1800	1081. (6)	1081. (6)	1217. (6)	1207. (6)
6/ 1/73	1800-2000	5583. (6)	5759. (6)	5985. (6)	5834. (6)
6/ 1/73	2000-2200	******	******	******	******
6/ 1/73	2200-2400	******	******	******	******

HOUSE 2 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/ 6/73	0000-0200	1767. (6)	1767. (6)	1793. (6)	1717. (6)
6/ 6/73	0200-0400	2120. (6)	2120. (6)	2120. (6)	2070. (6)
6/ 6/73	0400-0600	3428. (6)	3428. (6)	3454. (6)	3479. (6)
6/ 6/73	0600-0800	4343. (6)	4393. (6)	4393. (6)	4520. (6)
6/ 6/73	0800-1000	5702. (6)	4991. (6)	4813. (6)	4330. (6)
6/ 6/73	1000-1200	3987. (6)	3835. (6)	3835. (6)	3504. (6)
6/ 6/73	1200-1400	3835. (6)	3454. (6)	3250. (6)	3047. (6)
6/ 6/73	1400-1600	2019. (6)	1790. (6)	1536. (6)	1434. (6)
6/ 6/73	1600-1800	1625. (6)	1320. (6)	1371. (6)	1015. (6)
6/ 6/73	1800-2000	3454. (6)	3479. (6)	3657. (6)	3657. (6)
6/ 6/73	2000-2200	5295. (6)	5194. (6)	5244. (6)	5041. (6)
6/ 6/73	2200-2400	3936. (6)	3784. (6)	3632. (6)	3327. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3459.	3296.	3258.	3095.
6/ 7/73	0000-0200	1473. (6)	1422. (6)	1396. (6)	1346. (6)
6/ 7/73	0200-0400	939. (6)	939. (6)	863. (6)	812. (6)
6/ 7/73	0400-0600	837. (6)	863. (6)	863. (6)	863. (6)
6/ 7/73	0600-0800	******	******	******	******
6/ 7/73	0800-1000	******	******	******	******
6/ 7/73	1000-1200	******	******	******	******
6/ 7/73	1200-1400	******	******	******	******
6/ 7/73	1400-1600	******	******	******	******
6/ 7/73	1600-1800	******	******	******	******
6/ 7/73	1800-2000	******	******	******	******
6/ 7/73	2000-2200	******	******	******	******
6/ 7/73	2200-2400	******	******	******	******

Appendix B-4

NO_2, NO, and CO data for House No. 3 - Spring/Summer

HOUSE 3 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/14/73	0000-0200	******	******	******	******
6/14/73	0200-0400	******	******	******	******
6/14/73	0400-0600	******	******	******	******
6/14/73	0600-0800	******	******	******	******
6/14/73	0800-1000	******	******	******	******
6/14/73	1000-1200	******	******	******	******
6/14/73	1200-1400	******	******	******	******
6/14/73	1400-1600	71.3 (6)	30.5 (6)	54.7 (6)	26.7 (6)
6/14/73	1600-1800	439.4 (6)	45.2 (6)	75.1 (6)	93.5 (6)
6/14/73	1800-2000	305.2 (6)	73.8 (6)	105.6 (6)	38.2 (6)
6/14/73	2000-2200	227.5 (6)	56.0 (6)	54.7 (6)	41.4 (6)
6/14/73	2200-2400	101.2 (6)	58.5 (6)	52.8 (6)	40.1 (6)
6/15/73	0000-0200	94.2 (6)	71.3 (6)	51.5 (6)	40.7 (6)
6/15/73	0200-0400	87.8 (6)	59.2 (6)	42.6 (6)	22.3 (6)
6/15/73	0400-0600	82.1 (6)	64.9 (6)	45.2 (6)	31.8 (6)
6/15/73	0600-0800	108.2 (6)	73.2 (6)	56.0 (6)	52.8 (6)
6/15/73	0800-1000	103.7 (6)	66.8 (6)	61.1 (6)	34.4 (6)
6/15/73	1000-1200	55.9 (6)	38.2 (6)	36.3 (6)	22.3 (6)
6/15/73	1200-1400	67.8 (6)	34.4 (6)	33.7 (6)	24.3 (6)
6/15/73	1400-1600	96.1 (6)	35.0 (6)	36.9 (6)	28.6 (6)
6/15/73	1600-1800	109.4 (6)	66.2 (6)	56.0 (6)	47.7 (6)
6/15/73	1800-2000	108.2 (6)	56.6 (6)	61.7 (6)	48.4 (6)
6/15/73	2000-2200	97.4 (2)	59.2 (2)	55.4 (2)	45.8 (2)
6/15/73	2200-2400	******	******	******	******
6/20/73	0000-0200	******	******	******	******
6/20/73	0200-0400	******	******	******	******
6/20/73	0400-0600	******	******	******	******
6/20/73	0600-0800	******	******	******	******
6/20/73	0800-1000	******	******	******	******
6/20/73	1000-1200	95.4 (3)	59.8 (3)	40.7 (3)	35.6 (3)
6/20/73	1200-1400	120.3 (6)	66.8 (6)	50.9 (6)	31.2 (6)
6/20/73	1400-1600	101.9 (6)	63.6 (6)	53.5 (6)	29.3 (6)
6/20/73	1600-1800	111.4 (6)	73.2 (6)	54.7 (6)	32.5 (6)
6/20/73	1800-2000	37.5 (6)	45.8 (6)	50.9 (6)	37.5 (6)
6/20/73	2000-2200	129.2 (6)	77.6 (6)	69.4 (6)	56.6 (6)
6/20/73	2200-2400	103.7 (6)	77.6 (6)	58.5 (6)	58.5 (6)

HOUSE 3 SPRING-SUMMER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 Bd RM	STATION 4 OUTSIDE
6/21/73	0000-0200	92.3 (6)	64.9 (6)	43.3 (6)	37.5 (6)
6/21/73	0200-0400	85.9 (6)	58.5 (6)	41.4 (6)	26.1 (6)
6/21/73	0400-0600	77.0 (6)	57.9 (6)	42.0 (6)	22.3 (6)
6/21/73	0600-0800	89.7 (6)	80.8 (6)	43.3 (6)	32.5 (6)
6/21/73	0800-1000	205.9 (6)	115.2 (6)	73.8 (6)	47.7 (6)
6/21/73	1000-1200	120.3 (6)	71.3 (6)	62.4 (6)	55.4 (6)
6/21/73	1200-1400	134.3 (6)	82.7 (6)	56.6 (6)	46.6 (5)
6/21/73	1400-1600	148.3 (6)	103.1 (6)	58.5 (6)	53.5 (6)
6/21/73	1600-1800	141.3 (6)	85.3 (6)	57.3 (6)	52.2 (6)
6/21/73	1800-2000	99.3 (6)	55.4 (6)	53.5 (6)	45.8 (6)
6/21/73	2000-2200	96.1 (6)	60.5 (6)	54.1 (6)	47.1 (6)
6/21/73	2200-2400	98.0 (6)	61.1 (6)	47.7 (6)	32.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		115.7	74.7	52.8	41.6
6/22/73	0000-0200	103.1 (6)	66.8 (6)	47.7 (6)	31.8 (6)
6/22/73	0200-0400	83.4 (6)	59.2 (6)	47.1 (6)	36.9 (6)
6/22/73	0400-0600	88.5 (6)	57.9 (6)	49.0 (6)	45.8 (6)
6/22/73	0600-0800	96.1 (6)	63.6 (6)	47.1 (6)	51.5 (6)
6/22/73	0800-1000	112.6 (6)	82.7 (6)	70.0 (6)	59.2 (6)
6/22/73	1000-1200	131.7 (6)	87.8 (6)	77.0 (6)	71.9 (6)
6/22/73	1200-1400	134.3 (6)	89.1 (6)	77.0 (6)	65.5 (6)
6/22/73	1400-1600	113.3 (3)	73.8 (3)	66.2 (3)	66.2 (3)
6/22/73	1600-1800	130.4 (6)	88.5 (6)	73.8 (6)	83.4 (6)
6/22/73	1800-2000	112.0 (6)	67.5 (6)	54.1 (6)	72.5 (6)
6/22/73	2000-2200	122.2 (6)	76.4 (6)	65.5 (6)	70.0 (6)
6/22/73	2200-2400	106.9 (6)	91.0 (6)	70.6 (6)	66.2 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		111.2	75.4	62.1	60.1

HOUSE 3 SPRING-SUMMER NO AVERAGE CONCENTRATIONS, UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/14/73	0000-0200	******	******	******	******
6/14/73	0200-0400	******	******	******	******
6/14/73	0400-0600	******	******	******	******
6/14/73	0600-0800	******	******	******	******
6/14/73	0800-1000	******	******	******	******
6/14/73	1000-1200	******	******	******	******
6/14/73	1200-1400	******	******	******	******
6/14/73	1400-1600	17.6 (6)	6.3 (6)	26.3 (6)	5.4 (6)
6/14/73	1600-1800	372.9 (6)	14.6 (6)	18.4 (6)	44.7 (6)
6/14/73	1800-2000	292.8 (6)	16.7 (6)	30.9 (6)	7.5 (6)
6/14/73	2000-2200	96.3 (6)	9.6 (6)	9.2 (6)	7.5 (6)
6/14/73	2200-2400	31.8 (6)	10.9 (6)	9.6 (6)	8.4 (6)
6/15/73	0000-0200	32.6 (6)	14.6 (6)	9.2 (6)	6.7 (6)
6/15/73	0200-0400	31.3 (6)	11.3 (6)	8.8 (6)	6.3 (6)
6/15/73	0400-0600	33.9 (6)	15.5 (6)	11.7 (6)	9.2 (6)
6/15/73	0600-0800	46.4 (6)	25.5 (6)	20.9 (6)	23.0 (6)
6/15/73	0800-1000	46.8 (6)	27.6 (6)	28.0 (6)	14.2 (6)
6/15/73	1000-1200	30.1 (6)	14.2 (6)	10.9 (6)	10.9 (6)
6/15/73	1200-1400	30.9 (6)	10.9 (6)	10.4 (6)	10.9 (6)
6/15/73	1400-1600	31.8 (6)	12.1 (6)	10.9 (6)	11.7 (6)
6/15/73	1600-1800	35.5 (6)	15.9 (6)	12.5 (6)	12.1 (6)
6/15/73	1800-2000	44.3 (6)	30.9 (6)	21.3 (6)	13.4 (6)
6/15/73	2000-2200	53.9 (2)	35.1 (2)	41.4 (2)	42.6 (2)
6/15/73	2200-2400	******	******	******	******
6/20/73	0000-0200	******	******	******	******
6/20/73	0200-0400	******	******	******	******
6/20/73	0400-0600	******	******	******	******
6/20/73	0600-0800	******	******	******	******
6/20/73	0800-1000	******	******	******	******
6/20/73	1000-1200	66.0 (3)	34.3 (3)	11.7 (3)	10.9 (3)
6/20/73	1200-1400	51.4 (6)	32.6 (6)	12.5 (6)	7.9 (6)
6/20/73	1400-1600	106.8 (6)	22.6 (6)	9.2 (6)	5.0 (6)
6/20/73	1600-1800	69.0 (6)	55.2 (6)	18.4 (6)	6.7 (6)
6/20/73	1800-2000	23.8 (6)	8.4 (6)	9.2 (6)	5.9 (6)
6/20/73	2000-2200	34.3 (6)	23.8 (6)	18.4 (6)	5.0 (6)
6/20/73	2200-2400	55.2 (6)	50.2 (6)	46.4 (6)	39.3 (6)

HOUSE 3 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2	3 /BD RM	4 OUTSIDE
6/21/73	0000-0200	52.7 (6)	48.1 (6)	39.7 (6)	14.2 (6)
6/21/73	0200-0400	32.2 (6)	26.8 (6)	18.0 (6)	7.5 (6)
6/21/73	0400-0600	33.4 (6)	25.9 (6)	16.7 (6)	7.5 (6)
6/21/73	0600-0800	43.5 (6)	58.5 (6)	32.6 (6)	23.8 (6)
6/21/73	0800-1000	127.7 (6)	80.7 (6)	64.0 (6)	33.4 (6)
6/21/73	1000-1200	32.6 (6)	18.4 (6)	13.0 (6)	12.5 (6)
6/21/73	1200-1400	45.6 (6)	33.4 (6)	12.1 (6)	8.5 (5)
6/21/73	1400-1600	39.7 (6)	24.7 (6)	10.0 (6)	10.4 (6)
6/21/73	1600-1800	28.4 (6)	12.5 (6)	6.7 (6)	6.7 (6)
6/21/73	1800-2000	23.4 (6)	10.9 (6)	10.9 (6)	10.0 (6)
6/21/73	2000-2200	30.1 (6)	15.9 (6)	15.0 (6)	11.7 (6)
6/21/73	2200-2400	50.2 (6)	40.5 (6)	37.2 (6)	10.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		45.0	33.0	23.0	13.1
6/22/73	0000-0200	53.1 (6)	47.7 (6)	42.2 (6)	10.0 (6)
6/22/73	0200-0400	31.3 (6)	22.2 (6)	18.0 (6)	11.7 (6)
6/22/73	0400-0600	31.3 (6)	23.0 (6)	20.1 (6)	11.7 (6)
6/22/73	0600-0800	50.2 (6)	43.1 (6)	40.1 (6)	33.0 (6)
6/22/73	0800-1000	57.3 (6)	56.0 (6)	51.8 (6)	31.8 (6)
6/22/73	1000-1200	42.6 (6)	30.1 (6)	22.6 (6)	19.2 (6)
6/22/73	1200-1400	59.4 (6)	46.8 (6)	19.2 (6)	11.7 (6)
6/22/73	1400-1600	24.2 (3)	11.7 (3)	11.7 (3)	11.7 (3)
6/22/73	1600-1800	64.8 (6)	53.9 (6)	51.8 (6)	26.8 (6)
6/22/73	1800-2000	82.8 (6)	66.0 (6)	62.3 (6)	24.2 (6)
6/22/73	2000-2200	92.8 (6)	82.8 (6)	83.2 (6)	64.8 (6)
6/22/73	2200-2400	125.0 (6)	121.2 (6)	121.6 (6)	94.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		59.6	50.4	45.4	29.2

HOUSE 3 SPRING-SUMMER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /BD RM	4 OUTSIDE
6/27/73	0000-0200	******	******	******	******
6/27/73	0200-0400	******	******	******	******
6/27/73	0400-0600	******	******	******	******
6/27/73	0600-0800	******	******	******	******
6/27/73	0800-1000	******	******	******	******
6/27/73	1000-1200	15.0 (1)	12.5 (1)	15.0 (1)	12.5 (1)
6/27/73	1200-1400	28.8 (6)	24.7 (6)	23.8 (6)	23.8 (6)
6/27/73	1400-1600	25.1 (6)	23.8 (6)	24.7 (6)	18.0 (6)
6/27/73	1600-1800	17.6 (2)	16.3 (2)	13.8 (2)	15.0 (2)
6/27/73	1800-2000	******	******	******	******
6/27/73	2000-2200	******	******	******	******
6/27/73	2200-2400	******	******	******	******

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/20/73	0000-0200	******	******	******	******
6/20/73	0200-0400	******	******	******	******
6/20/73	0400-0600	******	******	******	******
6/20/73	0600-0800	******	******	******	******
6/20/73	0800-1000	******	******	******	******
6/20/73	1000-1200	******	******	******	******
6/20/73	1200-1400	4305. (4)	3396. (4)	2755. (4)	1526. (4)
6/20/73	1400-1600	3154. (6)	2384. (6)	1849. (6)	1421. (6)
6/20/73	1600-1800	4168. (6)	3242. (6)	1674. (6)	961. (6)
6/20/73	1800-2000	3177. (6)	2062. (6)	1933. (6)	1598. (6)
6/20/73	2000-2200	2915. (6)	2095. (6)	2095. (6)	1311. (6)
6/20/73	2200-2400	******	******	******	******
6/21/73	0000-0200	******	******	******	******
6/21/73	0200-0400	1603. (2)	1495. (2)	1175. (2)	748. (2)
6/21/73	0400-0600	1710. (6)	1460. (6)	1032. (6)	641. (6)
6/21/73	0600-0800	2101. (6)	2280. (6)	1638. (6)	1211. (6)
6/21/73	0800-1000	3887. (6)	3509. (6)	2761. (6)	1514. (6)
6/21/73	1000-1200	2921. (6)	2066. (6)	1567. (6)	1389. (6)
6/21/73	1200-1400	4346. (6)	3919. (6)	1710. (6)	1567. (6)
6/21/73	1400-1600	5255. (6)	4344. (6)	2084. (6)	1656. (6)
6/21/73	1600-1800	3954. (6)	2814. (6)	1745. (6)	1567. (6)
6/21/73	1800-2000	2565. (6)	1532. (6)	1603. (6)	1460. (6)
6/21/73	2000-2200	2333. (6)	1514. (6)	1549. (6)	1300. (6)
6/21/73	2200-2400	3064. (6)	2316. (6)	2031. (6)	926. (6)
6/22/73	0000-0200	2993. (6)	2280. (6)	1959. (6)	961. (6)
6/22/73	0200-0400	2013. (6)	1514. (6)	1585. (6)	1086. (6)
6/22/73	0400-0600	2316. (6)	1852. (6)	1710. (6)	1460. (6)
6/22/73	0600-0800	1520. (6)	986. (6)	985. (6)	665. (6)
6/22/73	0800-1000	1978. (6)	1850. (6)	1621. (6)	1087. (6)
6/22/73	1000-1200	4545. (6)	2599. (6)	2774. (6)	2639. (6)
6/22/73	1200-1400	5863. (6)	4910. (6)	3701. (6)	2821. (6)
6/22/73	1400-1600	2718. (5)	1815. (5)	1772. (5)	1184. (5)
6/22/73	1600-1800	4341. (6)	3558. (6)	2809. (6)	2132. (6)
6/22/73	1800-2000	4245. (6)	3319. (6)	2927. (6)	1608. (6)
6/22/73	2000-2200	3513. (6)	3477. (6)	3334. (6)	2408. (6)
6/22/73	2200-2400	5208. (6)	4495. (6)	4389. (6)	3640. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3438.	2721.	2464.	1808.

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		2 Liv Rm		3 /BD RM		4 OUTSIDE	
6/23/73	0000-0200	4198.	(7)	3806.	(7)	3500.	(7)	2615.	(7)
6/23/73	0200-0400	3096.	(6)	2704.	(6)	2419.	(6)	1742.	(6)
6/23/73	0400-0600	2868.	(6)	2404.	(6)	2226.	(6)	1442.	(6)
6/23/73	0600-0800	3341.	(6)	2914.	(6)	2771.	(6)	2201.	(6)
6/23/73	0800-1000	3998.	(6)	3322.	(6)	3393.	(6)	2894.	(6)
6/23/73	1000-1200	4559.	(5)	3832.	(5)	4302.	(5)	4117.	(5)
6/23/73	1200-1400	4596.	(6)	3527.	(6)	3598.	(6)	2850.	(6)
6/23/73	1400-1600	3218.	(6)	1970.	(6)	1507.	(6)	1472.	(6)
6/23/73	1600-1800	3242.	(6)	2280.	(6)	2209.	(6)	2138.	(6)
6/23/73	1800-2000	5295.	(6)	5201.	(6)	5629.	(6)	6306.	(6)
6/23/73	2000-2200	5023.	(6)	4168.	(6)	4417.	(6)	5095.	(6)
6/23/73	2200-2400	3491.	(6)	2351.	(6)	2565.	(6)	2565.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3910.		3207.		3211.		2953.	
6/24/73	0000-0200	4133.	(6)	2529.	(6)	2672.	(6)	2707.	(6)
6/24/73	0200-0400	3705.	(6)	2422.	(6)	2494.	(6)	2351.	(6)
6/24/73	0400-0600	3384.	(6)	1995.	(6)	2066.	(6)	1817.	(6)
6/24/73	0600-0800	3135.	(6)	2138.	(6)	2244.	(6)	2031.	(6)
6/24/73	0800-1000	4988.	(6)	2173.	(6)	2209.	(6)	1282.	(6)
6/24/73	1000-1200	1482.	(6)	641.	(6)	854.	(6)	342.	(5)
6/24/73	1200-1400	2636.	(6)	1389.	(6)	676.	(6)	498.	(6)
6/24/73	1400-1600	3491.	(6)	2209.	(6)	1496.	(6)	1389.	(6)
6/24/73	1600-1800	3901.	(6)	3153.	(6)	2048.	(6)	908.	(6)
6/24/73	1800-2000	5451.	(6)	4524.	(6)	2529.	(6)	1603.	(6)
6/24/73	2000-2200	5059.	(6)	4026.	(6)	3064.	(6)	1995.	(6)
6/24/73	2200-2400	5490.	(6)	5433.	(6)	6074.	(6)	4506.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3905.		2719.		2369.		1786.	
6/25/73	0000-0200	8087.	(6)	6306.	(6)	6626.	(6)	6377.	(6)
6/25/73	0200-0400	6805.	(6)	4987.	(6)	5308.	(6)	4952.	(6)
6/25/73	0400-0600	3519.	(6)	1809.	(6)	2023.	(6)	1667.	(6)
6/25/73	0600-0800	4553.	(6)	2843.	(6)	3092.	(6)	2701.	(6)
6/25/73	0800-1000	5024.	(6)	3491.	(6)	3776.	(6)	2957.	(6)
6/25/73	1000-1200	2160.	(6)	2721.	(6)	1973.	(6)	1061.	(6)
6/25/73	1200-1400	2515.	(6)	2087.	(6)	1517.	(6)	1481.	(6)
6/25/73	1400-1600	2422.	(6)	840.	(6)	890.	(6)	676.	(6)
6/25/73	1600-1800	3393.	(6)	2039.	(6)	2039.	(6)	1861.	(6)
6/25/73	1800-2000	3044.	(6)	2046.	(6)	1797.	(6)	1405.	(6)
6/25/73	2000-2200	3790.	(6)	2686.	(6)	3042.	(6)	2223.	(6)
6/25/73	2200-2400	6475.	(6)	4244.	(6)	4529.	(6)	3781.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		4316.		3008.		3051.		2595.	

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
6/26/73	0000-0200	4571. (6)	3610. (6)	3538. (6)	3075. (6)
6/26/73	0200-0400	2364. (6)	2613. (6)	2685. (6)	2399. (6)
6/26/73	0400-0600	2202. (6)	777. (6)	884. (6)	813. (6)
6/26/73	0600-0800	2669. (6)	1172. (6)	1457. (6)	1386. (6)
6/26/73	0800-1000	4460. (6)	2358. (6)	1895. (6)	1610. (6)
6/26/73	1000-1200	3938. (6)	2980. (6)	2909. (6)	2802. (6)
6/26/73	1200-1400	3091. (6)	1808. (6)	1808. (6)	1665. (6)
6/26/73	1400-1600	2296. (6)	1082. (6)	1227. (6)	1156. (6)
6/26/73	1600-1800	2983. (6)	1843. (6)	1701. (6)	1380. (6)
6/26/73	1800-2000	2824. (6)	2402. (6)	1690. (6)	906. (6)
6/26/73	2000-2200	4311. (6)	2829. (6)	2579. (6)	1973. (6)
6/26/73	2200-2400	3442. (6)	2836. (6)	2551. (6)	2694. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3263.	2193.	2077.	1822.
6/27/73	0000-0200	4743. (6)	2283. (6)	2635. (6)	2248. (6)
6/27/73	0200-0400	3795. (6)	2178. (6)	2283. (6)	1405. (6)
6/27/73	0400-0600	3830. (6)	1616. (6)	1897. (6)	1265. (6)
6/27/73	0600-0800	4076. (6)	1686. (6)	2108. (6)	1475. (6)
6/27/73	0800-1000	3852. (5)	1918. (5)	2002. (5)	1328. (5)
6/27/73	1000-1200	3584. (6)	2354. (6)	2354. (6)	1792. (6)
6/27/73	1200-1400	2776. (6)	1265. (6)	1229. (6)	913. (6)
6/27/73	1400-1600	2512. (6)	1177. (6)	931. (6)	931. (6)
6/27/73	1600-1800	2002. (6)	703. (6)	632. (6)	527. (6)
6/27/73	1800-2000	3338. (7)	1716. (7)	1385. (7)	903. (7)
6/27/73	2000-2200	4568. (6)	2846. (6)	2986. (6)	2846. (6)
6/27/73	2200-2400	6254. (6)	4778. (6)	4603. (6)	4111. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		3777.	2043.	2087.	1645.
6/29/73	0000-0200	3479. (6)	2459. (6)	1967. (6)	1229. (6)
6/29/73	0200-0400	3092. (6)	2037. (6)	1581. (6)	759. (5)
6/29/73	0400-0600	2776. (6)	1756. (6)	1335. (6)	632. (6)
6/29/73	0600-0800	3198. (6)	2002. (6)	1721. (6)	1019. (6)
6/29/73	0800-1000	2951. (6)	1791. (6)	1475. (6)	1019. (6)
6/29/73	1000-1200	2494. (6)	913. (6)	878. (6)	773. (6)
6/29/73	1200-1400	2389. (6)	738. (6)	667. (6)	667. (6)
6/29/73	1400-1600	2108. (1)	843. (1)	843. (1)	843. (1)
6/29/73	1600-1800	******	******	******	******
6/29/73	1800-2000	******	******	******	******
6/29/73	2000-2200	******	******	******	******
6/29/73	2200-2400	******	******	******	******

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 Liv Rm	STATION 3 /BD RM	STATION 4 OUTSIDE
7/ 5/73	0000-0200	******	******	******	******
7/ 5/73	0200-0400	******	******	******	******
7/ 5/73	0400-0600	******	******	******	******
7/ 5/73	0600-0800	******	******	******	******
7/ 5/73	0800-1000	******	******	******	******
7/ 5/73	1000-1200	******	******	******	******
7/ 5/73	1200-1400	******	******	******	******
7/ 5/73	1400-1600	2791. (3)	1660. (3)	1886. (3)	1584. (3)
7/ 5/73	1600-1800	1869. (6)	1228. (6)	1303. (6)	1076. (6)
7/ 5/73	1800-2000	2882. (6)	1649. (6)	4162. (6)	2766. (6)
7/ 5/73	2000-2200	4380. (6)	3588. (6)	3323. (6)	2758. (6)
7/ 5/73	2200-2400	4288. (6)	3043. (6)	2893. (6)	2176. (6)

DATE	TIME	1	2	3	4
7/ 6/73	0000-0200	2997. (6)	1865. (6)	1865. (6)	1299. (6)
7/ 6/73	0200-0400	2498. (6)	1366. (6)	1404. (6)	839. (6)
7/ 6/73	0400-0600	2671. (6)	1539. (6)	1614. (6)	1011. (6)
7/ 6/73	0600-0800	3622. (5)	2399. (5)	2490. (5)	1902. (5)
7/ 6/73	0800-1000	3009. (6)	1862. (6)	1749. (6)	1409. (6)
7/ 6/73	1000-1200	3995. (6)	2539. (6)	2486. (6)	2184. (6)
7/ 6/73	1200-1400	3157. (6)	1988. (6)	1761. (6)	1422. (6)
7/ 6/73	1400-1600	2583. (6)	1520. (6)	1451. (6)	1262. (6)
7/ 6/73	1600-1800	3543. (7)	2121. (7)	2282. (7)	2185. (7)
7/ 6/73	1800-2000	4482. (6)	2746. (6)	2860. (6)	2746. (6)
7/ 6/73	2000-2200	7303. (6)	5568. (6)	5983. (6)	5530. (6)
7/ 6/73	2200-2400	9173. (6)	8305. (6)	8456. (6)	7890. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		4086.	2823.	2867.	2473.

DATE	TIME	1	2	3	4
7/ 7/73	0000-0200	8863. (6)	7391. (6)	7263. (6)	7354. (6)
7/ 7/73	0200-0400	7534. (6)	6214. (6)	6327. (6)	5497. (6)
7/ 7/73	0400-0600	5216. (6)	4311. (6)	4348. (6)	3179. (6)
7/ 7/73	0600-0800	4227. (6)	3058. (6)	3171. (6)	1714. (6)
7/ 7/73	0800-1000	4068. (6)	2785. (6)	2747. (6)	1163. (6)
7/ 7/73	1000-1200	3296. (6)	2240. (6)	1373. (6)	920. (6)
7/ 7/73	1200-1400	2120. (6)	687. (6)	875. (6)	687. (6)
7/ 7/73	1400-1600	3788. (6)	2619. (6)	921. (6)	997. (6)
7/ 7/73	1600-1800	5842. (6)	4711. (6)	3315. (6)	3428. (6)
7/ 7/73	1800-2000	8166. (6)	8680. (6)	5499. (6)	7624. (6)
7/ 7/73	2000-2200	8665. (6)	9254. (6)	7231. (6)	7594. (6)
7/ 7/73	2200-2400	9007. (6)	8177. (6)	7800. (6)	6932. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		5899.	5010.	4239.	3924.

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		STATION 2 Liv Rm		STATION 3 /BD RM		STATION 4 OUTSIDE	
7/ 8/73	0000-0200	5620.	(6)	4639.	(6)	4413.	(6)	3432.	(6)
7/ 8/73	0200-0400	4194.	(6)	3327.	(6)	3176.	(6)	1969.	(6)
7/ 8/73	0400-0600	3041.	(6)	2061.	(6)	1910.	(6)	778.	(6)
7/ 8/73	0600-0800	2635.	(6)	1654.	(6)	1616.	(6)	447.	(6)
7/ 8/73	0800-1000	2820.	(6)	2568.	(6)	1624.	(6)	681.	(6)
7/ 8/73	1000-1200	3188.	(6)	2509.	(6)	1339.	(6)	510.	(6)
7/ 8/73	1200-1400	2857.	(6)	1687.	(6)	329.	(6)	518.	(6)
7/ 8/73	1400-1600	3280.	(6)	2035.	(6)	639.	(6)	715.	(6)
7/ 8/73	1600-1800	3032.	(6)	1674.	(6)	316.	(6)	354.	(6)
7/ 8/73	1800-2000	5568.	(6)	4022.	(6)	928.	(6)	2400.	(6)
7/ 8/73	2000-2200	8482.	(6)	7954.	(6)	6180.	(6)	5848.	(6)
7/ 8/73	2200-2400	10158.	(6)	8913.	(6)	6423.	(6)	6310.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		4573.		3587.		2408.		1997.	
7/ 9/73	0000-0200	6620.	(6)	5677.	(6)	3451.	(6)	2471.	(6)
7/ 9/73	0200-0400	4327.	(6)	3233.	(6)	2328.	(6)	1196.	(6)
7/ 9/73	0400-0600	2835.	(6)	1779.	(6)	1401.	(6)	534.	(6)
7/ 9/73	0600-0800	3258.	(6)	2277.	(6)	1900.	(6)	1221.	(6)
7/ 9/73	0800-1000	4134.	(6)	2927.	(6)	1606.	(6)	2419.	(6)
7/ 9/73	1000-1200	3849.	(6)	2529.	(6)	1057.	(6)	452.	(6)
7/ 9/73	1200-1400	4497.	(6)	3327.	(6)	1555.	(6)	1155.	(6)
7/ 9/73	1400-1600	3713.	(6)	2657.	(6)	1789.	(6)	1865.	(6)
7/ 9/73	1600-1800	3202.	(6)	1768.	(6)	336.	(6)	336.	(6)
7/ 9/73	1800-2000	3387.	(6)	3172.	(6)	555.	(6)	481.	(6)
7/ 9/73	2000-2200	4803.	(6)	3520.	(6)	3077.	(6)	3077.	(6)
7/ 9/73	2200-2400	7422.	(6)	6404.	(6)	3235.	(6)	2442.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		4337.		3273.		1858.		1471.	
7/10/73	0000-0200	6639.	(6)	5658.	(6)	2263.	(6)	1547.	(6)
7/10/73	0200-0400	5696.	(6)	4790.	(6)	1999.	(6)	1244.	(6)
7/10/73	0400-0600	5168.	(6)	4263.	(6)	2074.	(6)	1471.	(6)
7/10/73	0600-0800	5847.	(6)	4790.	(6)	2414.	(6)	2187.	(6)
7/10/73	0800-1000	6038.	(6)	7420.	(6)	5771.	(6)	2640.	(6)
7/10/73	1000-1200	5762.	(5)	5407.	(5)	2920.	(5)	2486.	(5)
7/10/73	1200-1400	4233.	(6)	3115.	(6)	944.	(6)	812.	(6)
7/10/73	1400-1600	3458.	(6)	2340.	(6)	1090.	(6)	1057.	(6)
7/10/73	1600-1800	4635.	(6)	2859.	(6)	1116.	(6)	1182.	(6)
7/10/73	1800-2000	5296.	(6)	3783.	(6)	2073.	(6)	1908.	(6)
7/10/73	2000-2200	5606.	(6)	4554.	(6)	3501.	(6)	2811.	(6)
7/10/73	2200-2400	6027.	(6)	4909.	(6)	2212.	(6)	1949.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		5367.		4491.		2365.		1775.	

HOUSE 3 SPRING-SUMMER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	2 Liv Rm	3 /BD RM	4 OUTSIDE
7/11/73	0000-0200	7205. (6)	5884. (6)	1773. (6)	1282. (6)
7/11/73	0200-0400	5356. (6)	4451. (6)	2602. (6)	1131. (6)
7/11/73	0400-0600	3848. (6)	2716. (6)	2150. (6)	1018. (6)
7/11/73	0600-0800	4036. (6)	2904. (6)	2376. (6)	1697. (6)
7/11/73	0800-1000	5658. (6)	4942. (6)	4414. (6)	1961. (6)
7/11/73	1000-1200	5922. (6)	4489. (6)	2376. (6)	1886. (6)
7/11/73	1200-1400	4526. (6)	3244. (6)	2753. (6)	1773. (6)
7/11/73	1400-1600	4489. (6)	2867. (6)	2263. (6)	1999. (6)
7/11/73	1600-1800	4036. (6)	2489. (6)	2112. (6)	1622. (6)
7/11/73	1800-2000	5356. (6)	3885. (6)	3621. (6)	4640. (6)
7/11/73	2000-2200	7959. (6)	6828. (6)	6601. (6)	6111. (6)
7/11/73	2200-2400	3432. (6)	2338. (6)	1999. (6)	1508. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		5152.	3920.	2920.	2219.
7/12/73	0000-0200	1735. (6)	905. (6)	754. (6)	452. (6)
7/12/73	0200-0400	1358. (6)	528. (6)	452. (6)	226. (6)
7/12/73	0400-0600	1519. (7)	743. (7)	517. (7)	498. (5)
7/12/73	0600-0800	2402. (6)	1018. (6)	1244. (6)	679. (6)
7/12/73	0800-1000	6564. (6)	3998. (6)	4451. (6)	3923. (6)
7/12/73	1000-1200	6602. (6)	5432. (6)	6526. (6)	4828. (6)
7/12/73	1200-1400	5545. (6)	4225. (6)	4262. (6)	3960. (6)
7/12/73	1400-1600	2942. (5)	1856. (5)	1901. (5)	1720. (5)
7/12/73	1600-1800	2451. (6)	1244. (6)	1244. (6)	1433. (6)
7/12/73	1800-2000	5095. (6)	2339. (6)	2603. (6)	2678. (6)
7/12/73	2000-2200	6451. (6)	5621. (6)	5960. (6)	6262. (6)
7/12/73	2200-2400	5470. (6)	4829. (6)	4527. (6)	3848. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		4011.	2728.	2870.	2542.
7/13/73	0000-0200	3696. (6)	2829. (6)	2716. (6)	2678. (6)
7/13/73	0200-0400	2829. (6)	1886. (6)	1886. (6)	1206. (6)
7/13/73	0400-0600	2565. (6)	1622. (6)	1735. (6)	980. (6)
7/13/73	0600-0800	3357. (6)	2376. (6)	2414. (6)	2075. (6)
7/13/73	0800-1000	4753. (1)	3621. (1)	3621. (1)	2489. (1)
7/13/73	1000-1200	******	******	******	******
7/13/73	1200-1400	******	******	******	******
7/13/73	1400-1600	******	******	******	******
7/13/73	1600-1800	******	******	******	******
7/13/73	1800-2000	******	******	******	******
7/13/73	2000-2200	******	******	******	******
7/13/73	2200-2400	******	******	******	******

Appendix B-5

NO_2, NO, and CO data for House No. 3 - Fall/Winter

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS, UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
11/28/73	0000-0200	******	******	******	******
11/28/73	0200-0400	******	******	******	******
11/28/73	0400-0600	******	******	******	******
11/28/73	0600-0800	******	******	******	******
11/28/73	0800-1000	******	******	******	******
11/28/73	1000-1200	******	******	******	******
11/28/73	1200-1400	******	******	******	******
11/28/73	1400-1600	85.0 (2)	80.0 (2)	60.0 (1)	70.0 (2)
11/28/73	1600-1800	266.2 (6)	98.7 (6)	58.5 (6)	65.0 (6)
11/28/73	1800-2000	415.3 (6)	159.3 (6)	115.8 (6)	68.3 (6)
11/28/73	2000-2200	173.8 (6)	95.2 (6)	78.0 (5)	53.3 (6)
11/28/73	2200-2400	97.0 (3)	62.5 (4)	124.0 (3)	30.0 (3)
11/29/73	0000-0200	86.8 (6)	51.7 (6)	56.7 (6)	26.7 (6)
11/29/73	0200-0400	75.0 (6)	51.7 (6)	46.7 (6)	26.7 (6)
11/29/73	0400-0600	86.8 (6)	38.3 (6)	41.7 (6)	21.7 (6)
11/29/73	0600-0800	71.7 (6)	40.0 (6)	33.3 (6)	23.3 (6)
11/29/73	0800-1000	139.0 (6)	56.7 (6)	38.3 (6)	31.7 (6)
11/29/73	1000-1200	******	******	******	******
11/29/73	1200-1400	******	******	******	******
11/29/73	1400-1600	36.7 (3)	46.7 (3)	16.7 (3)	20.0 (3)
11/29/73	1600-1800	103.7 (6)	86.8 (6)	20.0 (6)	35.0 (6)
11/29/73	1800-2000	128.8 (6)	85.2 (6)	38.3 (6)	31.7 (6)
11/29/73	2000-2200	155.5 (6)	68.5 (6)	25.0 (6)	41.7 (6)
11/29/73	2200-2400	75.2 (6)	35.0 (6)	31.7 (6)	15.0 (6)
11/30/73	0000-0200	38.3 (6)	48.3 (6)	28.3 (6)	35.0 (6)
11/30/73	0200-0400	48.3 (6)	40.0 (6)	16.7 (6)	25.0 (6)
11/30/73	0400-0600	48.3 (6)	36.7 (6)	23.3 (6)	28.0 (5)
11/30/73	0600-0800	92.0 (6)	60.2 (6)	31.7 (6)	40.0 (6)
11/30/73	0800-1000	46.7 (6)	41.7 (6)	36.7 (6)	26.7 (6)
11/30/73	1000-1200	46.7 (6)	43.3 (6)	23.3 (6)	21.7 (6)
11/30/73	1200-1400	42.0 (5)	44.0 (5)	16.0 (5)	28.0 (5)
11/30/73	1400-1600	50.0 (4)	42.5 (4)	25.0 (4)	35.0 (4)
11/30/73	1600-1800	53.3 (6)	51.7 (6)	30.0 (6)	45.0 (6)
11/30/73	1800-2000	58.3 (6)	60.0 (6)	33.3 (6)	58.3 (6)
11/30/73	2000-2200	61.7 (6)	53.3 (6)	55.2 (6)	58.5 (6)
11/30/73	2200-2400	45.0 (6)	41.7 (6)	20.0 (6)	21.7 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		52.6	46.9	28.3	35.2

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
12/ 1/73	0000-0200	50.0 (6)	41.7 (6)	18.3 (6)	21.7 (6)
12/ 1/73	0200-0400	43.3 (6)	[illegible]0.0 (6)	18.3 (6)	20.0 (6)
12/ 1/73	0400-0600	38.3 (6)	40.0 (6)	16.7 (3)	20.0 (4)
12/ 1/73	0600-0800	45.0 (6)	41.7 (6)	17.5 (4)	17.5 (4)
12/ 1/73	0800-1000	48.3 (6)	45.0 (6)	20.0 (2)	17.5 (4)
12/ 1/73	1000-1200	61.7 (6)	43.3 (6)	13.3 (3)	18.3 (6)
12/ 1/73	1200-1400	71.7 (6)	53.3 (6)	16.7 (3)	16.0 (5)
12/ 1/73	1400-1600	******	******	******	******
12/ 1/73	1600-1800	******	******	******	******
12/ 1/73	1800-2000	******	******	******	******
12/ 1/73	2000-2200	******	******	******	******
12/ 1/73	2200-2400	******	******	******	******
12/ 2/73	0000-0200	******	******	******	******
12/ 2/73	0200-0400	******	******	******	******
12/ 2/73	0400-0600	******	******	******	******
12/ 2/73	0600-0800	73.3 (3)	36.7 (3)	15.0 (2)	20.0 (3)
12/ 2/73	0800-1000	66.7 (6)	46.7 (6)	14.0 (5)	20.0 (5)
12/ 2/73	1000-1200	73.3 (6)	55.0 (6)	12.5 (4)	15.0 (4)
12/ 2/73	1200-1400	70.0 (6)	58.3 (6)	13.3 (6)	18.3 (6)
12/ 2/73	1400-1600	76.7 (6)	58.3 (6)	18.3 (6)	28.3 (6)
12/ 2/73	1600-1800	63.3 (3)	56.7 (3)	36.7 (3)	60.0 (3)
12/ 2/73	1800-2000	******	******	******	******
12/ 2/73	2000-2200	******	******	******	******
12/ 2/73	2200-2400	******	******	******	******
12/ 3/73	0000-0200	******	******	******	******
12/ 3/73	0200-0400	******	******	******	******
12/ 3/73	0400-0600	******	******	******	******
12/ 3/73	0600-0800	******	******	******	******
12/ 3/73	0800-1000	******	******	******	******
12/ 3/73	1000-1200	100.3 (3)	46.7 (3)	53.3 (3)	46.7 (3)
12/ 3/73	1200-1400	81.7 (6)	43.3 (6)	70.0 (6)	41.7 (6)
12/ 3/73	1400-1600	95.3 (6)	50.0 (6)	61.7 (6)	53.3 (6)
12/ 3/73	1600-1800	80.0 (6)	40.0 (6)	60.0 (6)	76.7 (6)
12/ 3/73	1800-2000	277.7 (6)	162.3 (6)	58.3 (6)	130.5 (6)
12/ 3/73	2000-2200	112.2 (6)	63.5 (6)	90.2 (6)	71.8 (6)
12/ 3/73	2200-2400	73.3 (6)	43.3 (6)	46.7 (6)	50.0 (6)

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
12/ 4/73	0000-0200	45.0 (6)	45.0 (6)	36.7 (6)	56.7 (6)
12/ 4/73	0200-0400	53.3 (6)	51.7 (6)	45.0 (6)	41.7 (6)
12/ 4/73	0400-0600	46.7 (6)	48.3 (6)	40.0 (6)	46.7 (6)
12/ 4/73	0600-0800	132.3 (6)	83.7 (6)	51.7 (6)	73.3 (6)
12/ 4/73	0800-1000	81.8 (6)	76.7 (6)	90.3 (6)	95.2 (6)
12/ 4/73	1000-1200	83.5 (6)	68.3 (6)	98.7 (6)	91.7 (6)
12/ 4/73	1200-1400	107.2 (6)	108.5 (6)	97.2 (6)	93.7 (6)
12/ 4/73	1400-1600	******	******	******	******
12/ 4/73	1600-1800	******	******	******	******
12/ 4/73	1800-2000	******	******	******	******
12/ 4/73	2000-2200	******	******	******	******
12/ 4/73	2200-2400	******	******	******	******
12/ 5/73	0000-0200	******	******	******	******
12/ 5/73	0200-0400	******	******	******	******
12/ 5/73	0400-0600	******	******	******	******
12/ 5/73	0600-0800	******	******	******	******
12/ 5/73	0800-1000	65.0 (2)	70.0 (2)	85.5 (2)	60.0 (2)
12/ 5/73	1000-1200	61.7 (6)	63.3 (6)	55.0 (6)	51.7 (6)
12/ 5/73	1200-1400	65.0 (6)	61.7 (6)	48.3 (6)	41.7 (6)
12/ 5/73	1400-1600	60.0 (6)	60.0 (6)	45.0 (6)	36.7 (6)
12/ 5/73	1600-1800	314.8 (6)	210.8 (6)	83.7 (6)	78.8 (6)
12/ 5/73	1800-2000	82.2 (5)	60.0 (5)	56.0 (5)	32.0 (5)
12/ 5/73	2000-2200	******	******	******	******
12/ 5/73	2200-2400	******	******	******	******
12/11/73	0000-0200	******	******	******	******
12/11/73	0200-0400	******	******	******	******
12/11/73	0400-0600	******	******	******	******
12/11/73	0600-0800	******	******	******	******
12/11/73	0800-1000	******	******	******	******
12/11/73	1000-1200	******	******	******	******
12/11/73	1200-1400	******	******	******	******
12/11/73	1400-1600	74.0 (5)	60.0 (5)	36.0 (5)	38.0 (5)
12/11/73	1600-1800	50.0 (6)	50.0 (6)	31.7 (6)	36.7 (6)
12/11/73	1800-2000	56.7 (6)	53.3 (6)	43.3 (6)	38.3 (6)
12/11/73	2000-2200	68.3 (6)	48.3 (6)	46.7 (6)	35.0 (6)
12/11/73	2200-2400	58.3 (6)	48.3 (6)	28.3 (6)	25.0 (6)

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	3 /BD RM	4 OUTSIDE
12/12/73	0000-0200	48.3 (6)	55.0 (6)	31.7 (6)	31.7 (6)
12/12/73	0200-0400	63.3 (	.7 (6)	43.3 (6)	31.7 (6)
12/12/73	0400-0600	73.3 (6)	45.0 (6)	38.3 (6)	26.7 (6)
12/12/73	0600-0800	61.7 (6)	48.3 (6)	30.0 (6)	43.3 (6)
12/12/73	0800-1000	48.3 (6)	53.3 (6)	33.3 (6)	26.7 (6)
12/12/73	1000-1200	28.3 (6)	40.0 (6)	20.0 (6)	16.7 (6)
12/12/73	1200-1400	45.0 (2)	40.0 (2)	15.0 (2)	15.0 (2)
12/12/73	1400-1600	******	******	******	******
12/12/73	1600-1800	******	******	******	******
12/12/73	1800-2000	******	******	******	******
12/12/73	2000-2200	******	******	******	******
12/12/73	2200-2400	******	******	******	******
12/14/73	0000-0200	******	******	******	******
12/14/73	0200-0400	******	******	******	******
12/14/73	0400-0600	******	******	******	******
12/14/73	0600-0800	******	******	******	******
12/14/73	0800-1000	******	******	******	******
12/14/73	1000-1200	******	******	******	******
12/14/73	1200-1400	******	******	******	******
12/14/73	1400-1600	395.3 (3)	351.7 (3)	314.7 (3)	100.3 (3)
12/14/73	1600-1800	462.3 (6)	443.7 (6)	360.0 (6)	164.3 (6)
12/14/73	1800-2000	236.3 (6)	212.7 (6)	142.5 (6)	98.5 (6)
12/14/73	2000-2200	151.0 (6)	80.2 (6)	65.0 (6)	45.0 (6)
12/14/73	2200-2400	179.3 (6)	75.0 (6)	65.0 (6)	33.3 (6)
12/15/73	0000-0200	147.7 (6)	60.0 (6)	60.0 (6)	30.0 (6)
12/15/73	0200-0400	147.7 (6)	61.7 (6)	60.0 (6)	33.3 (6)
12/15/73	0400-0600	137.8 (6)	101.8 (6)	66.7 (6)	30.0 (6)
12/15/73	0600-0800	141.0 (3)	63.3 (3)	60.0 (3)	23.3 (3)
12/15/73	0800-1000	293.2 (6)	194.0 (6)	125.5 (6)	35.0 (6)
12/15/73	1000-1200	174.3 (6)	70.0 (6)	66.7 (6)	38.5 (6)
12/15/73	1200-1400	157.7 (6)	68.3 (6)	56.7 (6)	20.0 (6)
12/15/73	1400-1600	141.0 (6)	85.0 (6)	50.0 (6)	20.0 (6)
12/15/73	1600-1800	136.0 (6)	88.3 (6)	53.3 (6)	26.7 (6)
12/15/73	1800-2000	120.8 (6)	88.3 (6)	56.7 (6)	31.7 (6)
12/15/73	2000-2200	141.0 (6)	76.8 (6)	48.3 (6)	38.3 (6)
12/15/73	2200-2400	144.3 (6)	88.7 (6)	51.7 (6)	38.3 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		161.0	87.2	63.0	30.4

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 2 1M FROM STOVE	STATION 3 /BD RM	STATION 4 OUTSIDE
12/16/73	0000-0200	159.3 (6)	75.0 (6)	50.0 (6)	33.3 (6)
12/16/73	0200-0400	147.7 (6)	73.3 (6)	41.7 (6)	30.0 (6)
12/16/73	0400-0600	124.2 (6)	73.3 (6)	41.7 (6)	30.0 (6)
12/16/73	0600-0800	141.0 (6)	76.7 (6)	50.0 (6)	26.7 (6)
12/16/73	0800-1000	141.0 (6)	81.7 (6)	51.7 (6)	30.0 (6)
12/16/73	1000-1200	149.3 (6)	68.3 (6)	55.0 (6)	28.3 (6)
12/16/73	1200-1400	156.0 (6)	68.3 (6)	46.7 (6)	21.7 (6)
12/16/73	1400-1600	187.0 (5)	144.4 (5)	60.0 (5)	32.0 (5)
12/16/73	1600-1800	154.3 (6)	88.5 (6)	58.3 (6)	38.3 (6)
12/16/73	1800-2000	224.5 (6)	175.7 (6)	103.7 (6)	38.3 (6)
12/16/73	2000-2200	171.0 (6)	130.3 (6)	78.5 (6)	25.0 (6)
12/16/73	2200-2400	159.3 (6)	61.7 (6)	63.3 (6)	20.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		159.6	93.1	58.4	29.5

DATE	TIME	STATION 1 OVER STOVE	STATION 2 1M FROM STOVE	STATION 3 /BD RM	STATION 4 OUTSIDE
12/22/73	0000-0200	******	******	******	******
12/22/73	0200-0400	******	******	******	******
12/22/73	0400-0600	******	******	******	******
12/22/73	0600-0800	******	******	******	******
12/22/73	0800-1000	******	******	******	******
12/22/73	1000-1200	104.0 (3)	472.3 (3)	207.3 (3)	33.3 (3)
12/22/73	1200-1400	132.5 (6)	130.8 (6)	60.0 (6)	33.3 (6)
12/22/73	1400-1600	127.5 (6)	206.0 (6)	71.8 (6)	35.0 (6)
12/22/73	1600-1800	156.0 (6)	157.7 (6)	70.0 (6)	36.7 (6)
12/22/73	1800-2000	382.0 (6)	398.5 (6)	147.3 (6)	33.3 (6)
12/22/73	2000-2200	162.7 (6)	162.7 (6)	61.7 (6)	20.0 (6)
12/22/73	2200-2400	214.5 (6)	164.2 (6)	71.7 (6)	35.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		182.7	241.7	98.5	32.4

HOUSE -3 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		STATION 1A 1M FROM STOVE		STATION 3 /BD RM		STATION 4 OUTSIDE	
12/23/73	0000-0200	181.0	(6)	181.0	(6)	80.0	(6)	28.3	(6)
12/23/73	0200-0400	177.7	(6)	181.0	(6)	80.0	(6)	30.0	(6)
12/23/73	0400-0600	181.0	(6)	181.0	(6)	80.0	(6)	30.0	(6)
12/23/73	0600-0800	179.3	(6)	177.7	(6)	78.3	(6)	30.0	(6)
12/23/73	0800-1000	266.3	(6)	263.0	(6)	105.3	(6)	31.7	(6)
12/23/73	1000-1200	244.7	(6)	166.0	(6)	73.3	(6)	25.0	(6)
12/23/73	1200-1400	146.0	(6)	147.7	(6)	60.0	(6)	28.3	(6)
12/23/73	1400-1600	159.3	(6)	204.5	(6)	71.8	(6)	31.7	(6)
12/23/73	1600-1800	164.3	(6)	167.7	(6)	51.7	(6)	41.7	(6)
12/23/73	1800-2000	345.2	(6)	583.7	(6)	150.5	(6)	53.3	(6)
12/23/73	2000-2200	460.8	(6)	464.0	(6)	154.0	(6)	63.3	(6)
12/23/73	2200-2400	137.7	(6)	174.5	(6)	76.8	(6)	46.7	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		220.3		241.5		88.5		36.7	

HOUSE -3 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
11/28/73	0000-0200	******	******	******	******
11/28/73	0200-0400	******	******	******	******
11/28/73	0400-0600	******	******	******	******
11/28/73	0600-0800	******	******	******	******
11/28/73	0800-1000	******	******	******	******
11/28/73	1000-1200	******	******	******	******
11/28/73	1200-1400	******	******	******	******
11/28/73	1400-1600	216.5 (2)	216.5 (2)	163.5 (2)	190.0 (2)
11/28/73	1600-1800	321.0 (6)	243.7 (6)	220.5 (6)	245.5 (6)
11/28/73	1800-2000	431.3 (6)	338.8 (6)	310.3 (6)	123.5 (6)
11/28/73	2000-2200	384.3 (6)	270.8 (6)	206.5 (6)	16.3 (6)
11/28/73	2200-2400	233.2 (5)	179.4 (5)	183.4 (5)	18.0 (4)
		317.3	249.8	216.8	118.7
11/29/73	0000-0200	162.2 (5)	101.0 (5)	106.2 (5)	******
11/29/73	0200-0400	119.0 (6)	65.7 (6)	64.7 (6)	******
11/29/73	0400-0600	96.3 (6)	42.3 (6)	41.3 (6)	******
11/29/73	0600-0800	84.2 (6)	45.7 (6)	41.3 (6)	******
11/29/73	0800-1000	131.3 (6)	50.2 (6)	28.3 (6)	******
11/29/73	1000-1200	******	******	******	******
11/29/73	1200-1400	******	******	******	******
11/29/73	1400-1600	21.7 (3)	24.0 (3)	7.0 (1)	******
11/29/73	1600-1800	59.0 (6)	20.7 (6)	10.8 (5)	******
11/29/73	1800-2000	101.8 (6)	62.5 (6)	22.8 (6)	******
11/29/73	2000-2200	174.8 (6)	96.3 (6)	36.2 (6)	******
11/29/73	2200-2400	100.7 (6)	52.0 (6)	45.7 (6)	******
11/30/73	0000-0200	250.2 (6)	297.4 (5)	18.0 (4)	59.0 (2)
11/30/73	0200-0400	76.7 (6)	52.0 (5)	20.0 (5)	13.0 (1)
11/30/73	0400-0600	70.8 (4)	50.5 (4)	13.0 (3)	16.5 (2)
11/30/73	0600-0800	153.0 (6)	70.8 (6)	41.7 (6)	28.8 (5)
11/30/73	0800-1000	82.0 (6)	68.8 (6)	58.8 (6)	19.7 (6)
11/30/73	1000-1200	81.0 (6)	73.3 (6)	32.5 (6)	12.0 (6)
11/30/73	1200-1400	71.2 (5)	60.4 (5)	21.0 (5)	8.2 (5)
11/30/73	1400-1600	75.5 (4)	64.3 (4)	31.0 (4)	8.5 (4)
11/30/73	1600-1800	87.7 (6)	72.5 (6)	35.2 (6)	59.2 (6)
11/30/73	1800-2000	126.8 (6)	115.7 (6)	85.3 (6)	96.2 (6)
11/30/73	2000-2200	169.0 (6)	147.3 (6)	124.3 (6)	120.8 (5)
11/30/73	2200-2400	86.3 (6)	62.2 (6)	21.8 (6)	***** (4)
DAILY AVERAGE = (AVG OF 2HR VALUES)		110.8	94.6	41.9	40.2

HOUSE -3 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	3 LIV/ RM	4 OUTSIDE
12/ 1/73	0000-0200	62.5 (6)	43.5 (6)	11.0 (6)	******
12/ 1/73	0200-0400	67.0 (6)	52.0 (6)	13.0 (6)	******
12/ 1/73	0400-0600	54.7 (6)	36.8 (6)	10.0 (4)	******
12/ 1/73	0600-0800	45.8 (6)	31.5 (6)	999.0 (6)	******
12/ 1/73	0800-1000	41.3 (6)	26.0 (6)	999.0 (6)	******
12/ 1/73	1000-1200	33.8 (6)	22.0 (6)	999.0 (6)	******
12/ 1/73	1200-1400	39.2 (6)	26.0 (6)	999.0 (5)	******
12/ 1/73	1400-1600	******	******	******	******
12/ 1/73	1600-1800	******	******	******	******
12/ 1/73	1800-2000	******	******	******	******
12/ 1/73	2000-2200	******	******	******	******
12/ 1/73	2200-2400	******	******	******	******
12/ 2/73	0000-0200	******	******	******	******
12/ 2/73	0200-0400	******	******	******	******
12/ 2/73	0400-0600	******	******	******	******
12/ 2/73	0600-0800	56.7 (3)	39.0 (3)	7.0 (2)	
12/ 2/73	0800-1000	61.2 (6)	39.0 (6)	7.0 (6)	7.0 (2)
12/ 2/73	1000-1200	55.8 (6)	38.0 (6)	7.0 (2)	7.0 (1)
12/ 2/73	1200-1400	61.3 (6)	43.5 (6)	8.0 (6)	7.0 (6)
12/ 2/73	1400-1600	73.5 (6)	53.2 (6)	11.0 (6)	9.6 (5)
12/ 2/73	1600-1800	74.7 (3)	61.3 (3)	15.3 (3)	28.3 (3)
12/ 2/73	1800-2000	******	******	******	******
12/ 2/73	2000-2200	******	******	******	******
12/ 2/73	2200-2400	******	******	******	******
12/ 3/73	0000-0200	******	******	******	******
12/ 3/73	0200-0400	******	******	******	******
12/ 3/73	0400-0600	******	******	******	******
12/ 3/73	0600-0800	******	******	******	******
12/ 3/73	0800-1000	******	******	******	******
12/ 3/73	1000-1200	183.3 (3)	122.3 (3)	126.7 (3)	26.0 (3)
12/ 3/73	1200-1400	124.7 (6)	85.3 (6)	86.5 (6)	15.3 (6)
12/ 3/73	1400-1600	107.0 (6)	56.8 (6)	60.3 (6)	14.2 (6)
12/ 3/73	1600-1800	90.8 (6)	66.7 (6)	62.2 (6)	59.0 (6)
12/ 3/73	1800-2000	254.5 (6)	193.3 (6)	157.3 (6)	267.7 (6)
12/ 3/73	2000-2200	332.2 (6)	304.7 (6)	297.0 (6)	241.3 (6)
12/ 3/73	2200-2400	279.5 (6)	256.7 (6)	200.0 (6)	202.0 (6)

HOUSE -3 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 LIV/ RM	STATION 4 OUTSIDE
12/ 4/73	0000-0200	278.5 (6)	276.2 (6)	250.2 (6)	268.5 (6)
12/ 4/73	0200-0400	292.5 (6)	291.5 (6)	249.0 (6)	227.0 (6)
12/ 4/73	0400-0600	280.5 (6)	279.5 (6)	223.0 (6)	226.3 (6)
12/ 4/73	0600-0800	376.8 (6)	353.8 (6)	314.7 (6)	376.7 (6)
12/ 4/73	0800-1000	358.2 (6)	359.2 (6)	267.7 (6)	169.2 (6)
12/ 4/73	1000-1200	246.7 (6)	226.2 (6)	149.3 (6)	112.5 (6)
12/ 4/73	1200-1400	173.7 (6)	130.2 (6)	74.2 (6)	27.2 (6)
12/ 4/73	1400-1600	******	******	******	******
12/ 4/73	1600-1800	******	******	******	******
12/ 4/73	1800-2000	******	******	******	******
12/ 4/73	2000-2200	******	******	******	******
12/ 4/73	2200-2400	******	******	******	******
12/ 5/73	0000-0200	******	******	******	******
12/ 5/73	0200-0400	******	******	******	******
12/ 5/73	0400-0600	******	******	******	******
12/ 5/73	0600-0800	******	******	******	******
12/ 5/73	0800-1000	45.5 (2)	52.5 (2)	85.5 (2)	23.0 (2)
12/ 5/73	1000-1200	94.2 (6)	80.0 (6)	67.0 (6)	24.0 (6)
12/ 5/73	1200-1400	116.6 (5)	105.0 (6)	67.0 (6)	27.2 (6)
12/ 5/73	1400-1600	98.3 (6)	87.3 (6)	66.0 (6)	26.0 (6)
12/ 5/73	1600-1800	277.5 (6)	147.7 (6)	98.5 (6)	24.0 (6)
12/ 5/73	1800-2000	82.8 (5)	56.4 (5)	56.2 (5)	23.6 (5)
12/ 5/73	2000-2200	******	******	******	******
12/ 5/73	2200-2400	******	******	******	******
12/11/73	0000-0200	******	******	******	******
12/11/73	0200-0400	******	******	******	******
12/11/73	0400-0600	******	******	******	******
12/11/73	0600-0800	******	******	******	******
12/11/73	0800-1000	******	******	******	******
12/11/73	1000-1200	******	******	******	******
12/11/73	1200-1400	******	******	******	******
12/11/73	1400-1600	59.0 (5)	52.0 (5)	28.6 (5)	20.0 (5)
12/11/73	1600-1800	43.7 (6)	38.0 (6)	24.2 (6)	17.3 (6)
12/11/73	1800-2000	43.5 (6)	33.7 (6)	21.7 (6)	8.0 (6)
12/11/73	2000-2200	50.0 (6)	48.0 (6)	27.2 (6)	9.0 (6)
12/11/73	2200-2400	53.5 (6)	44.5 (6)	27.3 (6)	7.0 (6)

HOUSE -3 FALL-WINTER NO. AVERAGE CONCENTRATIONS, UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	3 LIV/BD RM	4 OUTSIDE
12/12/73	0000-0200	44.5 (6)	39.0 (6)	26.0 (6)	10.0 (6)
12/12/73	0200-0400	55.7 (6)	42.5 (6)	26.0 (6)	15.8 (5)
12/12/73	0400-0600	50.0 (6)	39.0 (6)	25.0 (6)	13.2 (6)
12/12/73	0600-0800	71.2 (6)	66.7 (6)	51.3 (6)	64.5 (6)
12/12/73	0800-1000	67.7 (6)	68.8 (6)	42.7 (6)	13.0 (6)
12/12/73	1000-1200	11.5 (4)	13.0 (6)	7.0 (4)	7.0 (6)
12/12/73	1200-1400	19.5 (2)	13.0 (2)	999.0 (6)	7.0 (2)
12/12/73	1400-1600	******	******	******	******
12/12/73	1600-1800	******	******	******	******
12/12/73	1800-2000	******	******	******	******
12/12/73	2000-2200	******	******	******	******
12/12/73	2200-2400	******	******	******	******
12/14/73	0000-0200	******	******	******	******
12/14/73	0200-0400	******	******	******	******
12/14/73	0400-0600	******	******	******	******
12/14/73	0600-0800	******	******	******	******
12/14/73	0800-1000	******	******	******	******
12/14/73	1000-1200	******	******	******	******
12/14/73	1200-1400	******	******	******	******
12/14/73	1400-1600	168.0 (3)	194.7 (3)	135.3 (3)	91.3 (3)
12/14/73	1600-1800	315.7 (6)	321.2 (6)	257.7 (6)	38.0 (6)
12/14/73	1800-2000	142.0 (6)	122.2 (6)	108.3 (6)	32.7 (6)
12/14/73	2000-2200	83.2 (6)	67.0 (6)	53.5 (6)	26.2 (6)
12/14/73	2200-2400	130.2 (6)	90.8 (6)	88.7 (6)	32.7 (6)
12/15/73	0000-0200	88.5 (6)	61.3 (6)	63.7 (6)	26.0 (6)
12/15/73	0200-0400	79.0 (6)	53.2 (6)	52.0 (6)	23.0 (6)
12/15/73	0400-0600	123.3 (6)	68.7 (6)	64.2 (6)	18.8 (6)
12/15/73	0600-0800	100.3 (3)	79.0 (3)	79.0 (3)	15.3 (3)
12/15/73	0800-1000	171.5 (6)	143.2 (6)	115.7 (6)	20.8 (6)
12/15/73	1000-1200	106.0 (6)	72.3 (6)	77.8 (6)	15.3 (6)
12/15/73	1200-1400	78.7 (6)	54.7 (6)	52.7 (6)	13.0 (6)
12/15/73	1400-1600	67.0 (6)	51.2 (6)	33.7 (6)	13.0 (6)
12/15/73	1600-1800	65.7 (6)	50.0 (6)	32.7 (6)	13.0 (6)
12/15/73	1800-2000	68.0 (6)	51.3 (6)	35.8 (6)	17.5 (6)
12/15/73	2000-2200	75.7 (6)	48.8 (6)	34.8 (6)	19.7 (6)
12/15/73	2200-2400	85.2 (6)	64.5 (6)	40.2 (6)	26.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		92.4	66.5	56.8	18.5

HOUSE -3 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	3 /BD RM	4 OUTSIDE
12/16/73	0000-0200	90.8 (6)	69.2 (6)	52.0 (6)	26.0 (6)
12/16/73	0200-0400	92.0 (6)	68.0 (6)	52.0 (6)	26.0 (6)
12/16/73	0400-0600	90.8 (6)	65.7 (6)	52.0 (6)	26.0 (6)
12/16/73	0600-0800	90.8 (6)	66.8 (6)	52.0 (6)	26.0 (6)
12/16/73	0800-1000	90.8 (6)	65.5 (6)	52.0 (6)	26.0 (6)
12/16/73	1000-1200	87.5 (6)	57.7 (6)	52.0 (6)	23.0 (6)
12/16/73	1200-1400	83.2 (6)	55.7 (6)	48.8 (6)	19.7 (6)
12/16/73	1400-1600	105.2 (5)	83.8 (5)	41.8 (5)	18.4 (5)
12/16/73	1600-1800	79.0 (6)	56.8 (6)	39.0 (6)	17.3 (6)
12/16/73	1800-2000	156.2 (6)	150.8 (6)	101.8 (6)	24.0 (6)
12/16/73	2000-2200	102.8 (6)	120.3 (6)	85.3 (6)	12.0 (6)
12/16/73	2200-2400	90.8 (6)	64.3 (6)	66.7 (6)	12.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		96.7	77.1	58.0	21.4
12/22/73	0000-0200	******	******	******	******
12/22/73	0200-0400	******	******	******	******
12/22/73	0400-0600	******	******	******	******
12/22/73	0600-0800	******	******	******	******
12/22/73	0800-1000	******	******	******	******
12/22/73	1000-1200	484.7 (3)	382.0 (3)	242.3 (3)	150.7 (3)
12/22/73	1200-1400	98.0 (6)	42.7 (6)	91.7 (6)	90.5 (6)
12/22/73	1400-1600	52.5 (6)	26.2 (6)	118.0 (6)	61.0 (6)
12/22/73	1600-1800	52.5 (6)	14.2 (6)	54.7 (6)	53.2 (6)
12/22/73	1800-2000	171.5 (6)	17.5 (6)	206.3 (6)	123.5 (6)
12/22/73	2000-2200	86.5 (6)	15.2 (6)	90.8 (6)	64.5 (6)
12/22/73	2200-2400	86.5 (6)	25.0 (6)	76.7 (6)	43.5 (6)

HOUSE -3 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	3 /BD RM	4 OUTSIDE
12/23/73	0000-0200	89.7 (6)	91.8 (6)	65.8 (6)	18.8 (6)
12/23/73	0200-0400	96.0 (6)	103.8 (6)	75.5 (6)	17.7 (6)
12/23/73	0400-0600	99.3 (6)	101.5 (6)	75.5 (6)	16.5 (6)
12/23/73	0600-0800	94.0 (6)	98.3 (6)	66.0 (6)	13.0 (6)
12/23/73	0800-1000	130.0 (6)	122.3 (6)	66.8 (6)	16.5 (6)
12/23/73	1000-1200	141.0 (6)	87.5 (6)	55.5 (6)	13.0 (6)
12/23/73	1200-1400	59.0 (6)	63.7 (6)	29.3 (6)	13.0 (6)
12/23/73	1400-1600	64.5 (6)	124.5 (6)	40.3 (6)	12.0 (6)
12/23/73	1600-1800	52.2 (6)	49.8 (6)	15.3 (6)	8.0 (6)
12/23/73	1800-2000	404.0 (6)	468.3 (6)	161.8 (6)	27.2 (6)
12/23/73	2000-2200	397.5 (6)	438.0 (6)	202.0 (6)	63.2 (6)
12/23/73	2200-2400	97.3 (6)	139.8 (6)	82.2 (6)	22.8 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		143.7	157.5	78.0	20.1
12/24/73	0000-0200	90.7 (6)	93.0 (6)	62.3 (6)	14.2 (6)
12/24/73	0200-0400	96.3 (6)	99.3 (6)	67.0 (6)	24.0 (6)
12/24/73	0400-0600	95.2 (6)	97.2 (6)	67.0 (6)	24.0 (6)
12/24/73	0600-0800	93.0 (6)	93.0 (6)	64.8 (6)	17.5 (6)
12/24/73	0800-1000	83.2 (6)	87.5 (6)	57.8 (6)	18.8 (6)
12/24/73	1000-1200	133.3 (6)	141.8 (6)	92.8 (6)	26.0 (6)
12/24/73	1200-1400	******	******	******	******
12/24/73	1400-1600	******	******	******	******
12/24/73	1600-1800	******	******	******	******
12/24/73	1800-2000	******	******	******	******
12/24/73	2000-2200	******	******	******	******
12/24/73	2200-2400	******	******	******	******

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
11/28/73	0000-0200	******	******	******	******
11/28/73	0200-0400	******	******	******	******
11/28/73	0400-0600	******	******	******	******
11/28/73	0600-0800	******	******	******	******
11/28/73	0800-1000	******	******	******	******
11/28/73	1000-1200	10341. (3)	7876. (3)	7602. (3)	4315. (3)
11/28/73	1200-1400	10549. (6)	7775. (6)	7844. (6)	4385. (6)
11/28/73	1400-1600	10849. (5)	8354. (5)	8354. (5)	5684. (5)
11/28/73	1600-1800	11133. (4)	9163. (4)	8178. (4)	7194. (4)
11/28/73	1800-2000	28074. (2)	26870. (2)	22493. (2)	3890. (2)
11/28/73	2000-2200	22073. (6)	19373. (6)	15033. (6)	3324. (6)
11/28/73	2200-2400	12060. (6)	10659. (5)	8003. (5)	1835. (5)
11/29/73	0000-0200	9565. (6)	7852. (6)	5246. (6)	1426. (6)
11/29/73	0200-0400	7892. (6)	6000. (6)	3679. (6)	1573. (6)
11/29/73	0400-0600	6897. (6)	5361. (6)	3077. (6)	1684. (6)
11/29/73	0600-0800	6355. (3)	4712. (3)	2928. (3)	2142. (3)
11/29/73	0800-1000	6176. (6)	4820. (6)	3249. (6)	1678. (6)
11/29/73	1000-1200	3933. (5)	2562. (5)	2605. (5)	1791. (5)
11/29/73	1200-1400	4674. (6)	2782. (6)	2925. (6)	1354. (6)
11/29/73	1400-1600	5090. (6)	3213. (5)	3339. (5)	2081. (5)
11/29/73	1600-1800	5519. (5)	3673. (5)	3547. (5)	2247. (5)
11/29/73	1800-2000	10178. (5)	8290. (5)	7158. (5)	1998. (5)
11/29/73	2000-2200	9929. (6)	9279. (6)	5993. (6)	2602. (6)
11/29/73	2200-2400	7230. (6)	5781. (5)	3894. (5)	1713. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6870.	5360.	3970.	1857.
11/30/73	0000-0200	7254. (6)	5227. (6)	4283. (6)	2046. (6)
11/30/73	0200-0400	7526. (3)	5359. (3)	4171. (3)	1863. (3)
11/30/73	0400-0600	7032. (3)	5214. (3)	3746. (3)	2068. (3)
11/30/73	0600-0800	8523. (6)	8382. (5)	4481. (5)	2719. (5)
11/30/73	0800-1000	7918. (6)	5471. (6)	5087. (6)	2500. (6)
11/30/73	1000-1200	7558. (6)	5216. (6)	5006. (6)	2210. (6)
11/30/73	1200-1400	7128. (6)	4716. (6)	4332. (6)	2235. (6)
11/30/73	1400-1600	******	******	******	******
11/30/73	1600-1800	******	******	******	******
11/30/73	1800-2000	******	******	******	******
11/30/73	2000-2200	******	******	******	******
11/30/73	2200-2400	******	******	******	******

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV RM	4 OUTSIDE
12/ 3/73	0000-0200	******	******	******	******
12/ 3/73	0200-0400	******	******	******	******
12/ 3/73	0400-0600	******	******	******	******
12/ 3/73	0600-0800	******	******	******	******
12/ 3/73	0800-1000	******	******	******	******
12/ 3/73	1000-1200	10935. (3)	9673. (3)	7879. (3)	2429. (3
12/ 3/73	1200-1400	8926. (6)	7830. (6)	5769. (6)	2613. (6
12/ 3/73	1400-1600	7443. (6)	6238. (5)	4540. (5)	2843. (5
12/ 3/73	1600-1800	7469. (6)	5790. (6)	4145. (6)	3290. (6
12/ 3/73	1800-2000	7732. (6)	6317. (6)	5198. (6)	6317. (6
12/ 3/73	2000-2200	14015. (3)	12765. (3)	10265. (3)	6712. (3)
12/ 3/73	2200-2400	12271. (6)	10468. (5)	9542. (5)	5918. (5)
12/ 4/73	0000-0200	12171. (6)	10157. (6)	9486. (6)	7405. (6)
12/ 4/73	0200-0400	12261. (6)	10147. (6)	10046. (6)	6590. (6)
12/ 4/73	0400-0600	11949. (6)	9801. (6)	9600. (6)	5640. (6)
12/ 4/73	0600-0800	11338. (3)	9051. (2)	8847. (2)	7525. (2)
12/ 4/73	0800-1000	17251. (6)	15488. (6)	15013. (6)	7963. (6)
12/ 4/73	1000-1200	12703. (6)	10568. (6)	10127. (6)	4975. (6)
12/ 4/73	1200-1400	12190. (5)	10237. (5)	9058. (5)	3892. (5)
12/ 4/73	1400-1600	6740. (2)	4785. (1)	4186. (1)	3190. (1)
12/ 4/73	1600-1800	******	******	******	******
12/ 4/73	1800-2000	******	******	******	******
12/ 4/73	2000-2200	******	******	******	******
12/ 4/73	2200-2400	12000. (5)	10470. (5)	8779. (5)	5557. (5)
12/ 5/73	0000-0200	9631. (6)	8255. (6)	5940. (6)	2953. (6)
12/ 5/73	0200-0400	8020. (6)	6510. (6)	4564. (6)	2483. (6)
12/ 5/73	0400-0600	7350. (6)	5738. (6)	4128. (6)	2685. (6)
12/ 5/73	0600-0800	7058. (6)	5600. (5)	4179. (5)	3784. (5)
12/ 5/73	0800-1000	7502. (6)	6087. (6)	5462. (6)	4541. (6)
12/ 5/73	1000-1200	6222. (6)	4347. (6)	4577. (6)	2768. (6)
12/ 5/73	1200-1400	7311. (6)	5535. (6)	5206. (6)	2640. (6)
12/ 5/73	1400-1600	6801. (6)	4752. (5)	4027. (5)	1450. (5)
12/ 5/73	1600-1800	5477. (5)	3262. (5)	2497. (5)	725. (5)
12/ 5/73	1800-2000	******	******	******	******
12/ 5/73	2000-2200	******	******	******	******
12/ 5/73	2200-2400	******	******	******	******

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
12/ 6/73	0000-0200	******	******	******	******
12/ 6/73	0200-0400	******	******	******	******
12/ 6/73	0400-0600	******	******	******	******
12/ 6/73	0600-0800	******	******	******	******
12/ 6/73	0800-1000	******	******	******	******
12/ 6/73	1000-1200	4866. (6)	2853. (6)	3255. (6)	1980. (6)
12/ 6/73	1200-1400	5101. (6)	2953. (6)	2685. (6)	1846. (6)
12/ 6/73	1400-1600	4671. (5)	3322. (4)	2618. (5)	2013. (5)
12/ 6/73	1600-1800	5134. (6)	3759. (6)	2483. (6)	1745. (6)
12/ 6/73	1800-2000	5470. (6)	3994. (6)	3222. (6)	1879. (6)
12/ 6/73	2000-2200	6362. (5)	5336. (6)	3826. (6)	2987. (6)
12/ 6/73	2200-2400	7048. (6)	5453. (5)	4417. (5)	3141. (5)
12/ 7/73	0000-0200	6442. (6)	5213. (6)	4117. (6)	3020. (6)
12/ 7/73	0200-0400	6147. (6)	4187. (6)	4154. (6)	3131. (3)
12/ 7/73	0400-0600	5819. (6)	4092. (6)	3925. (6)	3128. (6)
12/ 7/73	0600-0800	6913. (6)	5201. (5)	5240. (5)	7586. (4)
12/ 7/73	0800-1000	11210. (3)	10076. (4)	8399. (4)	6227. (4)
12/ 7/73	1000-1200	7875. (6)	6512. (6)	4552. (6)	4087. (6)
12/ 7/73	1200-1400	7011. (6)	6213. (6)	4718. (6)	3854. (6)
12/ 7/73	1400-1600	5823. (6)	3652. (6)	3040. (5)	2527. (5)
12/ 7/73	1600-1800	5494. (6)	4277. (6)	2863. (6)	2665. (6)
12/ 7/73	1800-2000	6810. (6)	5461. (6)	3948. (6)	2369. (6)
12/ 7/73	2000-2200	7238. (6)	6120. (6)	4738. (6)	4178. (6)
12/ 7/73	2200-2400	9004. (6)	8992. (5)	7261. (5)	6415. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		7149.	5833.	4746.	4099.
12/ 8/73	0000-0200	8941. (6)	7431. (6)	5719. (6)	2095. (6)
12/ 8/73	0200-0400	6294. (6)	5086. (6)	3341. (6)	1495. (6)
12/ 8/73	0400-0600	5324. (6)	4116. (6)	2472. (6)	1566. (6)
12/ 8/73	0600-0800	5063. (6)	3780. (5)	2572. (5)	1847. (5)
12/ 8/73	0800-1000	7134. (6)	5724. (6)	3979. (6)	2100. (6)
12/ 8/73	1000-1200	5681. (6)	4003. (6)	4103. (6)	2560. (6)
12/ 8/73	1200-1400	6476. (6)	4596. (6)	4462. (6)	2952. (6)
12/ 8/73	1400-1600	7522. (6)	9066. (5)	6697. (5)	2946. (5)
12/ 8/73	1600-1800	10124. (6)	8973. (6)	6275. (6)	3610. (6)
12/ 8/73	1800-2000	8384. (6)	7397. (6)	5587. (6)	4337. (6)
12/ 8/73	2000-2200	8025. (6)	6775. (6)	5591. (6)	4110. (6)
12/ 8/73	2200-2400	6568. (6)	5157. (5)	4051. (5)	2354. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		7128.	6009.	4571.	2664.

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		1A 1M FROM STOVE		2 LIV RM		4 OUTSIDE	
12/ 9/73	0000-0200	6373.	(6)	4959.	(6)	3610.	(6)	2327.	(6
12/ 9/73	0200-0400	6311.	(6)	4962.	(6)	3515.	(6)	2561.	(6
12/ 9/73	0400-0600	6545.	(6)	5163.	(6)	3715.	(6)	2794.	(6
12/ 9/73	0600-0800	5559.	(6)	4130.	(5)	2722.	(5)	2018.	(5
12/ 9/73	0800-1000	6057.	(6)	4721.	(6)	3581.	(6)	2702.	(6
12/ 9/73	1000-1200	8086.	(6)	7272.	(6)	5773.	(6)	3981.	(6
12/ 9/73	1200-1400	13048.	(6)	11973.	(6)	9008.	(6)	6662.	(6)
12/ 9/73	1400-1600	17412.	(6)	15158.	(5)	11625.	(5)	4521.	(5)
12/ 9/73	1600-1800	8896.	(6)	7123.	(6)	5952.	(6)	4432.	(6)
12/ 9/73	1800-2000	7978.	(6)	7535.	(6)	5604.	(6)	3007.	(6)
12/ 9/73	2000-2200	6522.	(6)	5002.	(6)	3957.	(6)	2469.	(6)
12/ 9/73	2200-2400	7259.	(6)	5930.	(6)	5026.	(5)	1949.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8337.		6994.		5341.		3285.	
12/10/73	0000-0200	8213.	(6)	6282.	(6)	4984.	(6)	2166.	(6)
12/10/73	0200-0400	6919.	(6)	4608.	(6)	3658.	(6)	1980.	(6)
12/10/73	0400-0600	6353.	(6)	4643.	(6)	3092.	(6)	1635.	(6)
12/10/73	0600-0800	6410.	(6)	4671.	(5)	3101.	(5)	2497.	(5)
12/10/73	0800-1000	6275.	(6)	4933.	(6)	4094.	(6)	2450.	(6)
12/10/73	1000-1200	6889.	(4)	4798.	(4)	4658.	(4)	1781.	(4)
12/10/73	1200-1400	7274.	(6)	4995.	(6)	3602.	(6)	2083.	(6)
12/10/73	1400-1600	5852.	(6)	4860.	(5)	3720.	(5)	2315.	(5)
12/10/73	1600-1800	7207.	(6)	6193.	(6)	4072.	(6)	5244.	(6)
12/10/73	1800-2000	15365.	(6)	13940.	(6)	10489.	(6)	8716.	(6)
12/10/73	2000-2200	15735.	(6)	14089.	(6)	12981.	(6)	13044.	(6)
12/10/73	2200-2400	17768.	(6)	16398.	(5)	15508.	(5)	15120.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		9188.		7534.		6163.		4919.	
12/11/73	0000-0200	17828.	(6)	16182.	(6)	14504.	(6)	11245.	(6)
12/11/73	0200-0400	14311.	(6)	12697.	(6)	10471.	(6)	5889.	(6)
12/11/73	0400-0600	9600.	(6)	7986.	(6)	5953.	(6)	2694.	(6)
12/11/73	0600-0800	7274.	(6)	5737.	(5)	4369.	(5)	3989.	(5)
12/11/73	0800-1000	10068.	(6)	8136.	(6)	6237.	(6)	4464.	(6)
12/11/73	1000-1200	8073.	(6)	6522.	(6)	4907.	(6)	2722.	(6)
12/11/73	1200-1400	6711.	(6)	5161.	(6)	3514.	(6)	2343.	(6)
12/11/73	1400-1600	5756.	(6)	4956.	(5)	4621.	(5)	2383.	(5)
12/11/73	1600-1800	5178.	(6)	3872.	(6)	3531.	(6)	1946.	(6)
12/11/73	1800-2000	3459.	(6)	2248.	(6)	1781.	(6)	756.	(6)
12/11/73	2000-2200	4600.	(6).	4009.	(6)	3512.	(6)	1213.	(6)
12/11/73	2200-2400	5763.	(6)	4101.	(6)	4360.	(5)	1663.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8218.		6801.		5647.		3442.	

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/12/73	0000-0200	4936. (6)	3954. (6)	3353. (6)	1390. (6)
12/12/73	0200-0400	4939. (6)	3895. (6)	3483. (6)	1837. (6)
12/12/73	0400-0600	5260. (6)	4310. (6)	3708. (6)	1936. (6)
12/12/73	0600-0800	5739. (6)	4187. (6)	4642. (5)	4338. (5)
12/12/73	0800-1000	10016. (6)	7705. (6)	7040. (6)	3083. (6)
12/12/73	1000-1200	6063. (6)	4131. (6)	4606. (6)	2833. (6)
12/12/73	1200-1400	5574. (5)	3827. (5)	3743. (4)	2841. (4)
12/12/73	1400-1600	******	******	******	******
12/12/73	1600-1800	******	******	******	******
12/12/73	1800-2000	******	******	******	******
12/12/73	2000-2200	******	******	******	******
12/12/73	2200-2400	******	******	******	******
12/13/73	0000-0200	******	******	******	******
12/13/73	0200-0400	******	******	******	******
12/13/73	0400-0600	******	******	******	******
12/13/73	0600-0800	******	******	******	******
12/13/73	0800-1000	******	******	******	******
12/13/73	1000-1200	******	******	******	******
12/13/73	1200-1400	******	******	******	******
12/13/73	1400-1600	12514. (5)	17212. (5)	10986. (5)	3752. (5)
12/13/73	1600-1800	20903. (6)	18293. (6)	14005. (6)	3099. (6)
12/13/73	1800-2000	13655. (5)	13058. (5)	12020. (6)	2884. (6)
12/13/73	2000-2200	13079. (6)	12831. (6)	9941. (6)	2856. (6)
12/13/73	2200-2400	11763. (5)	10547. (5)	9939. (5)	2018. (6)
12/14/73	0000-0200	9616. (6)	7747. (6)	7937. (6)	2239. (6)
12/14/73	0200-0400	8764. (6)	6833. (6)	6959. (6)	2432. (6)
12/14/73	0400-0600	8514. (6)	6741. (6)	6867. (6)	2657. (6)
12/14/73	0600-0800	3031. (5)	6315. (5)	6539. (5)	2239. (8)
12/14/73	0800-1000	9187. (5)	7732. (5)	8180. (5)	2773. (5)
12/14/73	1000-1200	7164. (5)	6045. (5)	7539. (6)	3717. (6)
12/14/73	1200-1400	10249. (5)	9802. (5)	8176. (6)	3546. (6)
12/14/73	1400-1600	10521. (5)	10263. (5)	6679. (5)	2586. (6)
12/14/73	1600-1800	9541. (6)	9449. (6)	7540. (6)	2737. (6)
12/14/73	1800-2000	10930. (4)	7482. (6)	6343. (6)	2094. (6)
12/14/73	2000-2200	5977. (6)	4099. (6)	3853. (6)	1513. (6)
12/14/73	2200-2400	7832. (5)	5246. (5)	5246. (5)	1850. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8860.	7313.	6821.	2532.

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		1A 1M FROM STOVE		3 BD RM		4 OUTSIDE	
12/15/73	0000-0200	7112.	(6)	4187.	(6)	4279.	(6)	1693.	(6)
12/15/73	0200-0400	6527.	(6)	3756.	(6)	3725.	(6)	1663.	(6)
12/15/73	0400-0600	7020.	(6)	4310.	(6)	4064.	(6)	1816.	(6)
12/15/73	0600-0800	7140.	(5)	4493.	(5)	4717.	(5)	1846.	(6)
12/15/73	0800-1000	8166.	(5)	7215.	(5)	7256.	(6)	1756.	(6)
12/15/73	1000-1200	6541.	(6)	4987.	(6)	5205.	(6)	1569.	(6)
12/15/73	1200-1400	5173.	(6)	3931.	(6)	3775.	(6)	1663.	(6)
12/15/73	1400-1600	4778.	(5)	4118.	(5)	3276.	(5)	1790.	(6)
12/15/73	1600-1800	4866.	(6)	4195.	(6)	3463.	(6)	1968.	(6)
12/15/73	1800-2000	5354.	(6)	4530.	(6)	3829.	(6)	1998.	(6)
12/15/73	2000-2200	5446.	(6)	4470.	(6)	3432.	(6)	1937.	(6)
12/15/73	2200-2400	5663.	(5)	4880.	(5)	3762.	(5)	1979.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6149.		4589.		4232.		1806.	
12/16/73	0000-0200	5762.	(6)	4674.	(6)	3898.	(6)	1940.	(6)
12/16/73	0200-0400	5935.	(6)	4816.	(6)	4070.	(6)	2050.	(6)
12/16/73	0400-0600	6076.	(6)	4926.	(6)	4211.	(6)	2285.	(6)
12/16/73	0600-0800	5537.	(5)	4521.	(5)	3760.	(5)	1925.	(6)
12/16/73	0800-1000	5929.	(6)	4932.	(6)	4176.	(6)	2241.	(6)
12/16/73	1000-1200	6549.	(6)	5340.	(6)	4886.	(6)	2740.	(6)
12/16/73	1200-1400	6867.	(6)	5748.	(6)	5234.	(6)	3178.	(6)
12/16/73	1400-1600	5890.	(4)	4756.	(4)	4056.	(5)	2262.	(6)
12/16/73	1600-1800	5897.	(6)	5051.	(6)	4174.	(6)	2118.	(6)
12/16/73	1800-2000	9926.	(6)	9200.	(6)	7749.	(6)	2398.	(6)
12/16/73	2000-2200	7152.	(6)	5839.	(5)	6305.	(6)	2829.	(6)
12/16/73	2200-2400	5835.	(5)	4615.	(5)	4763.	(5)	2006.	(6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6446.		5368.		4773.		2331.	
12/17/73	0000-0200	5715.	(6)	4330.	(6)	4452.	(6)	2113.	(6)
12/17/73	0200-0400	5706.	(6)	4413.	(6)	4443.	(6)	2042.	(6)
12/17/73	0400-0600	5881.	(6)	4650.	(6)	4527.	(6)	2217.	(6)
12/17/73	0600-0800	5668.	(5)	4586.	(5)	4474.	(5)	2197.	(6)
12/17/73	0800-1000	6227.	(5)	4568.	(4)	4894.	(4)	2535.	(5)
12/17/73	1000-1200	******		******		******		******	
12/17/73	1200-1400	******		******		******		******	
12/17/73	1400-1600	******		******		******		******	
12/17/73	1600-1800	******		******		******		******	
12/17/73	1800-2000	******		******		******		******	
12/17/73	2000-2200	******		******		******		******	
12/17/73	2200-2400	******		******		******		******	

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/20/73	0000-0200	******	******	******	******
12/20/73	0200-0400	******	******	******	******
12/20/73	0400-0600	******	******	******	******
12/20/73	0600-0800	******	******	******	******
12/20/73	0800-1000	******	******	******	******
12/20/73	1000-1200	******	******	******	******
12/20/73	1200-1400	******	******	******	******
12/20/73	1400-1600	******	******	******	******
12/20/73	1600-1800	6333. (5)	5491. (5)	5674. (5)	5088. (5)
12/20/73	1800-2000	6681. (6)	6010. (6)	6071. (6)	5369. (6)
12/20/73	2000-2200	7780. (6)	7841. (6)	7383. (6)	6468. (6)
12/20/73	2200-2400	9579. (6)	8695. (6)	9061. (6)	7810. (6)

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/21/73	0000-0200	9481. (5)	8530. (5)	8603. (5)	7175. (5)
12/21/73	0200-0400	7223. (6)	6095. (6)	6461. (6)	3715. (6)
12/21/73	0400-0600	6596. (6)	5436. (6)	5955. (6)	3362. (6)
12/21/73	0600-0800	6304. (6)	5206. (6)	5602. (6)	3223. (6)
12/21/73	0800-1000	6538. (2)	5348. (2)	5806. (2)	3609. (2)
12/21/73	1000-1200	10922. (2)	11014. (2)	9275. (2)	3417. (2)
12/21/73	1200-1400	8105. (6)	7739. (6)	7129. (6)	3163. (6)
12/21/73	1400-1600	5556. (5)	6749. (5)	4922. (5)	2711. (6)
12/21/73	1600-1800	6230. (6)	6323. (6)	5112. (6)	2532. (6)
12/21/73	1800-2000	11000. (5)	11979. (4)	9471. (5)	1789. (5)
12/21/73	2000-2200	8219. (6)	8188. (6)	6059. (5)	1694. (6)
12/21/73	2200-2400	5956. (4)	6101. (5)	4274. (5)	1495. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		7677.	7392.	6556.	3157.

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/22/73	0000-0200	6859. (6)	7045. (6)	5212. (6)	1700. (6)
12/22/73	0200-0400	7390. (6)	7483. (6)	5463. (6)	2045. (6)
12/22/73	0400-0600	7517. (6)	7486. (6)	5746. (6)	2390. (6)
12/22/73	0600-0800	6480. (5)	6480. (5)	4686. (5)	1598. (5)
12/22/73	0800-1000	7185. (4)	7002. (4)	6590. (6)	1617. (6)
12/22/73	1000-1200	7261. (6)	6468. (6)	4881. (6)	1739. (6)
12/22/73	1200-1400	5003. (6)	5003. (6)	3265. (6)	1556. (6)
12/22/73	1400-1600	5623. (6)	6429. (5)	3992. (5)	1777. (6)
12/22/73	1600-1800	5240. (6)	5122. (6)	3032. (6)	2090. (6)
12/22/73	1800-2000	6535. (6)	6217. (5)	4887. (6)	2708. (6)
12/22/73	2000-2200	7595. (6)	7665. (5)	6005. (6)	3827. (6)
12/22/73	2200-2400	5554. (6)	5605. (5)	4418. (5)	2325. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6520.	6500.	4848.	2114.

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/23/73	0000-0200	5920. (6)	6190. (6)	4751. (6)	2414. (6
12/23/73	0200-0400	6900. (6)	6960. (6)	5731. (6)	3454. (6
12/23/73	0400-0600	8598. (6)	8778. (6)	7909. (6)	5602. (6
12/23/73	0600-0800	6282. (6)	5676. (5)	4274. (5)	3044. (5
12/23/73	0800-1000	5560. (6)	5710. (6)	4332. (6)	2534. (6
12/23/73	1000-1200	7421. (5)	7601. (5)	7229. (6)	2256. (6
12/23/73	1200-1400	6201. (6)	6291. (6)	4793. (6)	2306. (6
12/23/73	1400-1600	5915. (5)	6055. (4)	4379. (5)	2274. (5
12/23/73	1600-1800	9146. (5)	9217. (5)	8481. (6)	3106. (6
12/23/73	1800-2000	6690. (6)	6750. (6)	5740. (6)	3156. (6
12/23/73	2000-2200	6325. (6)	7156. (6)	4870. (6)	2345. (6
12/23/73	2200-2400	5893. (3)	5828. (2)	3885. (2)	2110. (2
DAILY AVERAGE = (AVG OF 2HR VALUES)		6738.	6851.	5531.	2883.
12/24/73	0000-0200	5296. (1)	5650. (1)	3883. (1)	1764. (1
12/24/73	0200-0400	5676. (6)	5706. (6)	3881. (6)	1821. (6
12/24/73	0400-0600	5702. (6)	5643. (6)	3847. (6)	1845. (6
12/24/73	0600-0800	5663. (6)	5771. (5)	3753. (5)	2165. (5
12/24/73	0800-1000	5947. (6)	6005. (6)	4182. (6)	2504. (6)
12/24/73	1000-1200	6307. (6)	6191. (6)	4600. (6)	2343. (6)
12/24/73	1200-1400	5394. (6)	5046. (6)	3744. (6)	2414. (6)
12/24/73	1400-1600	5694. (6)	5659. (5)	3992. (5)	2147. (5)
12/24/73	1600-1800	6972. (6)	7420. (4)	6307. (6)	2459. (6)
12/24/73	1800-2000	9323. (6)	9836. (6)	7551. (6)	3298. (6)
12/24/73	2000-2200	9547. (6)	9749. (6)	8187. (6)	2980. (6)
12/24/73	2200-2400	11680. (6)	14124. (5)	10804. (5)	2916. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		6983.	7233.	5395.	2388.
12/25/73	0000-0200	9745. (6)	9568. (6)	7772. (6)	2621. (6)
12/25/73	0200-0400	7716. (6)	7716. (6)	5450. (6)	2624. (6)
12/25/73	0400-0600	7130. (6)	7219. (6)	4923. (6)	2774. (6)
12/25/73	0600-0800	6341. (6)	6250. (5)	3989. (5)	2169. (5)
12/25/73	0800-1000	6815. (6)	7639. (6)	5520. (6)	2193. (6)
12/25/73	1000-1200	6714. (6)	6831. (6)	5094. (6)	2681. (6)
12/25/73	1200-1400	7671. (6)	7554. (6)	5905. (6)	2667. (6)
12/25/73	1400-1600	7292. (6)	7346. (5)	5580. (5)	2321. (5)
12/25/73	1600-1800	7649. (6)	7766. (6)	5971. (6)	2998. (6)
12/25/73	1800-2000	8263. (6)	8292. (6)	6585. (6)	3435. (6)
12/25/73	2000-2200	8435. (6.)	8464. (6)	6698. (6)	3224. (6)
12/25/73	2200-2400	8064. (6)	8054. (5)	6284. (5)	3168. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		7653.	7725.	5814.	2739.

HOUSE 3 FALL-WINTER CO AVERAGE CONCENTRATIONS ,UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 BD RM	STATION 4 OUTSIDE
12/26/73	0000-0200	7912. (6)	7912. (6)	6119. (6)	3081. (6)
12/26/73	0200-0400	7623. (6)	7739. (6)	6061. (6)	3284. (6)
12/26/73	0400-0600	7912. (6)	8028. (6)	6235. (6)	3804. (6)
12/26/73	0600-0800	8582. (6)	8720. (5)	7095. (5)	5826. (5)
12/26/73	0800-1000	9686. (6)	9803. (6)	7978. (6)	3769. (6)
12/26/73	1000-1200	10189. (6)	10248. (6)	8540. (6)	5332. (6)
12/26/73	1200-1400	11075. (6)	11163. (6)	9485. (6)	5511. (6)
12/26/73	1400-1600	10906. (6)	10844. (5)	9184. (5)	5527. (5)
12/26/73	1600-1800	11466. (6)	11319. (6)	9552. (6)	7374. (6)
12/26/73	1800-2000	12474. (4)	12562. (4)	10399. (4)	10752. (4)
12/26/73	2000-2200	******	******	******	******
12/26/73	2200-2400	******	******	******	******
12/27/73	0000-0200	11834. (3)	11598. (3)	9479. (3)	1943. (3)
12/27/73	0200-0400	8684. (6)	8566. (6)	6623. (6)	2473. (6)
12/27/73	0400-0600	7830. (6)	7860. (6)	6005. (6)	3945. (6)
12/27/73	0600-0800	8287. (6)	8389. (5)	6588. (5)	4681. (5)
12/27/73	0800-1000	9317. (6)	9376. (6)	7639. (6)	5137. (6)
12/27/73	1000-1200	6962. (6)	6835. (5)	5254. (6)	3253. (6)
12/27/73	1200-1400	5431. (6)	5549. (6)	4018. (6)	3164. (6)
12/27/73	1400-1600	5179. (6)	4978. (5)	3212. (5)	2682. (5)
12/27/73	1600-1800	4934. (6)	4846. (6)	3492. (6)	2226. (6)
12/27/73	1800-2000	7074. (6)	7339. (6)	6044. (6)	3012. (6)
12/27/73	2000-2200	8892. (4)	8980. (4)	7037. (4)	3726. (4)
12/27/73	2200-2400	******	******	******	******

Appendix B-6

NO_2, NO, and CO data for House No. 4 - Fall/Winter

HOUSE -4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
1/29/74	0000-0200	******	******	******	******
1/29/74	0200-0400	******	******	******	******
1/29/74	0400-0600	******	******	******	******
1/29/74	0600-0800	******	******	******	******
1/29/74	0800-1000	******	******	******	******
1/29/74	1000-1200	******	******	******	******
1/29/74	1200-1400	86.4 (5)	74.4 (5)	72.4 (5)	120.6 (5)
1/29/74	1400-1600	75.4 (6)	40.2 (6)	30.1 (6)	120.6 (6)
1/29/74	1600-1800	63.6 (6)	40.2 (6)	33.5 (6)	219.4 (6)
1/29/74	1800-2000	110.5 (6)	38.5 (6)	56.9 (6)	232.7 (6)
1/29/74	2000-2200	67.0 (6)	139.0 (6)	78.7 (6)	162.4 (6)
1/29/74	2200-2400	40.2 (6)	142.3 (6)	100.5 (6)	55.2 (6)
1/30/74	0000-0200	40.2 (6)	70.3 (6)	70.3 (6)	51.9 (6)
1/30/74	0200-0400	33.5 (6)	78.7 (6)	100.5 (6)	56.9 (6)
1/30/74	0400-0600	35.1 (6)	68.7 (6)	67.0 (6)	48.5 (6)
1/30/74	0600-0800	46.9 (6)	118.9 (6)	65.3 (6)	70.3 (6)
1/30/74	0800-1000	40.2 (6)	113.9 (6)	83.7 (6)	67.0 (6)
1/30/74	1000-1200	190.9 (4)	277.3 (5)	77.8 (4)	145.7 (4)
1/30/74	1200-1400	******	******	******	******
1/30/74	1400-1600	235.1 (5)	120.6 (5)	166.8 (5)	56.3 (5)
1/30/74	1600-1800	649.7 (6)	453.8 (6)	206.0 (6)	159.1 (6)
1/30/74	1800-2000	180.9 (6)	154.0 (6)	130.6 (6)	130.6 (6)
1/30/74	2000-2200	199.3 (6)	129.0 (6)	125.6 (6)	144.0 (6)
1/30/74	2200-2400	254.5 (6)	103.8 (6)	123.9 (6)	110.5 (6)
1/31/74	0000-0200	234.4 (6)	103.8 (6)	102.2 (6)	87.1 (6)
1/31/74	0200-0400	115.6 (6)	95.5 (6)	70.3 (6)	80.4 (6)
1/31/74	0400-0600	108.8 (6)	80.4 (6)	70.3 (6)	82.1 (6)
1/31/74	0600-0800	147.4 (6)	97.1 (6)	107.2 (6)	93.8 (6)
1/31/74	0800-1000	117.2 (6)	85.4 (6)	92.1 (6)	83.7 (6)
1/31/74	1000-1200	83.7 (6)	70.3 (6)	60.3 (6)	80.4 (6)
1/31/74	1200-1400	174.1 (6)	97.1 (6)	82.1 (6)	92.1 (6)
1/31/74	1400-1600	113.9 (6)	75.3 (6)	82.0 (6)	56.9 (6)
1/31/74	1600-1800	587.7 (6)	301.4 (6)	82.1 (6)	67.0 (6)
1/31/74	1800-2000	207.6 (6)	98.8 (6)	128.9 (6)	80.4 (6)
1/31/74	2000-2200	147.4 (6)	75.3 (6)	78.7 (6)	26.8 (6)
1/31/74	2200-2400	87.1 (6)	60.3 (6)	40.2 (6)	10.0 (3)
DAILY AVERAGE = (AVG OF 2HR VALUES)		177.1	103.4	83.0	70.1

HOUSE -4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/ 1/74	0000-0200	72.0 (6)	43.5 (6)	31.8 (6)	12.5 (4)
2/ 1/74	0200-0400	63.6 (6)	43.5 (6)	31.8 (6)	12.0 (5)
2/ 1/74	0400-0600	58.6 (6)	43.5 (6)	28.4 (6)	12.0 (5)
2/ 1/74	0600-0800	97.1 (6)	60.3 (6)	36.8 (6)	25.1 (6)
2/ 1/74	0800-1000	125.6 (6)	73.7 (6)	50.2 (6)	20.1 (6)
2/ 1/74	1000-1200	204.3 (3)	180.8 (2)	63.6 (3)	35.1 (2)
2/ 1/74	1200-1400	155.7 (6)	82.1 (6)	46.9 (6)	15.0 (6)
2/ 1/74	1400-1600	207.7 (6)	93.8 (6)	40.2 (6)	14.0 (5)
2/ 1/74	1600-1800	514.6 (6)	346.6 (6)	90.4 (6)	26.8 (6)
2/ 1/74	1800-2000	249.5 (6)	107.2 (6)	73.7 (6)	26.8 (6)
2/ 1/74	2000-2200	231.1 (6)	117.2 (6)	88.8 (6)	43.5 (6)
2/ 1/74	2200-2400	165.8 (6)	75.4 (6)	56.9 (6)	33.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		187.1	106.1	53.3	23.0
2/ 2/74	0000-0200	142.4 (6)	60.3 (6)	41.9 (6)	20.1 (6)
2/ 2/74	0200-0400	125.6 (6)	55.2 (6)	48.5 (6)	15.0 (6)
2/ 2/74	0400-0600	117.2 (6)	55.2 (6)	36.8 (6)	21.8 (6)
2/ 2/74	0600-0800	122.3 (6)	56.9 (6)	35.1 (6)	20.1 (6)
2/ 2/74	0800-1000	239.5 (6)	97.1 (6)	45.2 (6)	21.8 (6)
2/ 2/74	1000-1200	150.7 (6)	60.3 (6)	53.6 (6)	18.4 (6)
2/ 2/74	1200-1400	582.7 (6)	125.6 (6)	50.2 (6)	26.8 (6)
2/ 2/74	1400-1600	185.9 (6)	123.9 (6)	63.6 (6)	33.5 (6)
2/ 2/74	1600-1800	169.1 (6)	95.5 (6)	67.0 (6)	38.5 (6)
2/ 2/74	1800-2000	177.5 (6)	60.3 (6)	88.8 (6)	36.8 (6)
2/ 2/74	2000-2200	160.8 (6)	63.6 (6)	65.3 (6)	25.1 (6)
2/ 2/74	2200-2400	184.2 (6)	87.1 (6)	46.9 (6)	23.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		196.5	78.4	53.6	25.1
2/ 3/74	0000-0200	127.3 (6)	58.6 (6)	41.8 (6)	20.1 (6)
2/ 3/74	0200-0400	130.6 (6)	55.2 (6)	41.8 (6)	20.1 (6)
2/ 3/74	0400-0600	144.0 (6)	51.9 (6)	43.5 (6)	18.4 (6)
2/ 3/74	0600-0800	118.9 (6)	50.2 (6)	30.1 (6)	20.1 (6)
2/ 3/74	0800-1000	127.3 (6)	51.9 (6)	28.4 (6)	21.8 (6)
2/ 3/74	1000-1200	204.3 (6)	100.5 (6)	58.6 (6)	21.8 (6)
2/ 3/74	1200-1400	164.1 (6)	67.0 (6)	75.4 (6)	20.1 (6)
2/ 3/74	1400-1600	236.1 (6)	73.7 (6)	67.0 (6)	30.1 (6)
2/ 3/74	1600-1800	******	******	******	******
2/ 3/74	1800-2000	******	******	******	******
2/ 3/74	2000-2200	******	******	******	******
2/ 3/74	2200-2400	******	******	******	******

HOUSE #4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
2/ 4/74	0000-0200	******	******	******	******
2/ 4/74	0200-0400	******	******	******	******
2/ 4/74	0400-0600	******	******	******	******
2/ 4/74	0600-0800	******	******	******	******
2/ 4/74	0800-1000	******	******	******	******
2/ 4/74	1000-1200	******	******	******	******
2/ 4/74	1200-1400	******	******	******	******
2/ 4/74	1400-1600	******	******	******	******
2/ 4/74	1600-1800	562.6 (3)	264.6 (3)	144.0 (3)	53.6 (3)
2/ 4/74	1800-2000	197.6 (6)	93.8 (6)	77.0 (6)	48.6 (6)
2/ 4/74	2000-2200	200.9 (6)	85.4 (6)	67.0 (6)	31.8 (6)
2/ 4/74	2200-2400	182.5 (6)	77.0 (6)	58.6 (6)	23.4 (6)
2/ 5/74	0000-0200	127.3 (6)	56.9 (6)	48.6 (6)	20.1 (6)
2/ 5/74	0200-0400	115.6 (6)	46.9 (6)	40.2 (6)	18.4 (6)
2/ 5/74	0400-0600	105.5 (6)	45.2 (6)	25.1 (6)	21.8 (6)
2/ 5/74	0600-0800	251.2 (6)	87.1 (6)	48.6 (6)	28.4 (6)
2/ 5/74	0800-1000	187.6 (6)	83.7 (6)	50.2 (6)	20.1 (6)
2/ 5/74	1000-1200	164.1 (3)	80.4 (3)	67.0 (3)	13.4 (3)
2/ 5/74	1200-1400	******	******	******	******
2/ 5/74	1400-1600	******	******	******	******
2/ 5/74	1600-1800	281.3 (3)	224.4 (3)	83.7 (3)	20.1 (3)
2/ 5/74	1800-2000	135.9 (6)	100.5 (6)	88.7 (6)	25.1 (6)
2/ 5/74	2000-2200	169.2 (6)	82.0 (6)	51.9 (6)	20.1 (6)
2/ 5/74	2200-2400	159.1 (6)	97.1 (6)	46.9 (6)	26.8 (6)
2/ 6/74	0000-0200	117.2 (6)	56.9 (6)	36.8 (6)	26.8 (6)
2/ 6/74	0200-0400	38.7 (6)	55.2 (6)	30.1 (6)	23.4 (6)
2/ 6/74	0400-0600	83.7 (6)	48.5 (6)	36.8 (6)	36.8 (6)
2/ 6/74	0600-0800	144.0 (6)	97.1 (6)	50.2 (6)	61.9 (6)
2/ 6/74	0800-1000	144.0 (6)	87.1 (6)	75.4 (6)	62.0 (6)
2/ 6/74	1000-1200	120.6 (1)	60.3 (1)	80.4 (1)	40.2 (1)
2/ 6/74	1200-1400	******	******	******	******
2/ 6/74	1400-1600	296.4 (6)	236.1 (6)	160.7 (6)	48.5 (6)
2/ 6/74	1600-1800	1239.2 (6)	765.3 (6)	649.7 (6)	72.0 (6)
2/ 6/74	1800-2000	301.4 (6)	251.2 (6)	195.9 (6)	85.4 (6)
2/ 6/74	2000-2200	274.6 (6)	182.5 (6)	140.7 (6)	63.6 (6)
2/ 6/74	2200-2400	254.5 (6)	170.8 (6)	127.3 (6)	46.9 (6)

HOUSE -4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/ 7/74	0000-0200	132.5 (6)	115.5 (6)	80.4 (6)	30.1 (6)
2/ 7/74	0200-0400	157.4 (6)	122.2 (6)	70.3 (6)	41.9 (6)
2/ 7/74	0400-0600	144.0 (6)	92.1 (6)	70.3 (6)	40.2 (6)
2/ 7/74	0600-0800	130.7 (6	127.3 (6)	88.8 (6)	50.2 (6)
2/ 7/74	0800-1000	176.8 (5)	133.7 (5)	103.8 (6)	53.6 (6)
2/ 7/74	1000-1200	334.9 (6)	288.0 (6)	234.4 (6)	36.8 (6)
2/ 7/74	1200-1400	353.3 (6)	214.3 (6)	165.8 (6)	35.2 (6)
2/ 7/74	1400-1600	214.3 (6)	170.8 (6)	128.9 (6)	46.9 (6)
2/ 7/74	1600-1800	555.9 (6)	348.3 (6)	272.9 (6)	46.2 (5)
2/ 7/74	1800-2000	247.8 (6)	164.1 (6)	115.5 (6)	67.0 (6)
2/ 7/74	2000-2200	216.0 (6)	149.0 (6)	190.9 (6)	25.1 (6)
2/ 7/74	2200-2400	212.7 (6)	147.3 (6)	100.5 (6)	33.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		246.4	173.2	135.2	42.2
2/ 8/74	0000-0200	172.5 (6)	105.5 (6)	75.3 (6)	55.3 (6)
2/ 8/74	0200-0400	132.3 (6)	90.4 (6)	68.6 (6)	58.6 (6)
2/ 8/74	0400-0600	134.0 (3)	90.4 (3)	67.0 (3)	56.9 (3)
2/ 8/74	0600-0800	******	******	******	******
2/ 8/74	0800-1000	******	******	******	******
2/ 8/74	1000-1200	******	******	******	******
2/ 8/74	1200-1400	136.9 (5)	116.6 (5)	90.4 (5)	40.2 (5)
2/ 8/74	1400-1600	236.1 (6)	182.5 (6)	105.5 (6)	58.6 (6)
2/ 8/74	1600-1800	750.2 (6)	465.5 (6)	304.8 (6)	70.3 (6)
2/ 8/74	1800-2000	234.4 (6)	182.5 (6)	130.6 (6)	70.3 (6)
2/ 8/74	2000-2200	244.5 (6)	175.8 (6)	113.9 (6)	62.0 (6)
2/ 8/74	2200-2400	214.3 (6)	142.3 (6)	93.8 (6)	60.3 (6)
2/ 9/74	0000-0200	170.8 (6)	108.8 (6)	72.0 (6)	60.3 (6)
2/ 9/74	0200-0400	139.0 (6)	93.8 (6)	70.3 (6)	60.3 (6)
2/ 9/74	0400-0600	117.2 (6)	83.7 (6)	62.0 (6)	53.6 (6)
2/ 9/74	0600-0800	107.2 (6)	75.3 (6)	63.6 (6)	53.6 (6)
2/ 9/74	0800-1000	263.3 (5)	172.8 (5)	96.5 (5)	38.2 (5)
2/ 9/74	1000-1200	222.7 (6)	150.7 (6)	85.4 (6)	17.6 (4)
2/ 9/74	1200-1400	164.1 (6)	152.4 (6)	72.0 (6)	**********
2/ 9/74	1400-1600	201.0 (6)	142.3 (6)	93.8 (6)	10.0 (3)
2/ 9/74	1600-1800	209.3 (6)	184.2 (6)	145.7 (6)	22.6 (4)
2/ 9/74	1800-2000	239.4 (6)	167.4 (6)	120.6 (6)	48.5 (6)
2/ 9/74	2000-2200	159.1 (6)	103.8 (6)	77.0 (6)	33.5 (6)
2/ 9/74	2200-2400	338.2 (6)	192.6 (6)	118.9 (6)	18.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		194.3	136.1	89.8	38.3

HOUSE -4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/10/74	0000-0200	207.6 (6)	150.7 (6)	88.8 (6)	20.1 (6)
2/10/74	0200-0400	169.1 (6)	88.8 (6)	68.6 (6)	51.9 (6)
2/10/74	0400-0600	122.2 (6)	73.7 (6)	56.9 (6)	46.9 (6)
2/10/74	0600-0800	88.7 (6)	63.6 (6)	48.5 (6)	46.9 (6)
2/10/74	0800-1000	177.5 (6)	107.2 (6)	73.6 (6)	40.2 (6)
2/10/74	1000-1200	192.6 (6)	130.6 (6)	85.4 (6)	36.8 (6)
2/10/74	1200-1400	227.7 (6)	142.3 (6)	88.7 (6)	30.1 (6)
2/10/74	1400-1600	216.0 (6)	155.7 (6)	107.2 (6)	16.7 (6)
2/10/74	1600-1800	286.3 (6)	219.3 (6)	142.4 (6)	28.4 (6)
2/10/74	1800-2000	207.6 (6)	132.3 (6)	92.1 (6)	51.9 (6)
2/10/74	2000-2200	214.3 (6)	117.2 (6)	87.1 (6)	92.1 (6)
2/10/74	2200-2400	155.8 (6)	90.4 (6)	63.6 (6)	67.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		188.8	122.7	83.5	44.1
2/11/74	0000-0200	132.3 (6)	80.4 (6)	60.3 (6)	48.5 (6)
2/11/74	0200-0400	137.3 (6)	73.7 (6)	77.0 (6)	75.3 (6)
2/11/74	0400-0600	125.6 (6)	85.4 (6)	62.0 (6)	67.0 (6)
2/11/74	0600-0800	182.5 (6)	128.9 (6)	87.1 (6)	75.3 (6)
2/11/74	0800-1000	325.5 (5)	226.0 (6)	160.8 (6)	97.1 (6)
2/11/74	1000-1200	487.3 (6)	321.5 (6)	254.5 (6)	65.3 (6)
2/11/74	1200-1400	323.9 (6)	565.0 (6)	370.1 (6)	30.1 (6)
2/11/74	1400-1600	194.3 (3)	167.5 (3)	123.9 (3)	15.0 (2)
2/11/74	1600-1800	******	******	******	******
2/11/74	1800-2000	******	******	******	******
2/11/74	2000-2200	******	******	******	******
2/11/74	2200-2400	******	******	******	******
2/13/74	0000-0200	******	******	******	******
2/13/74	0200-0400	******	******	******	******
2/13/74	0400-0600	******	******	******	******
2/13/74	0600-0800	******	******	******	******
2/13/74	0800-1000	******	******	******	******
2/13/74	1000-1200	******	******	******	******
2/13/74	1200-1400	******	******	******	******
2/13/74	1400-1600	268.8 (4)	268.8 (4)	120.6 (4)	135.7 (4)
2/13/74	1600-1800	346.6 (6)	288.0 (6)	189.2 (6)	154.1 (6)
2/13/74	1800-2000	227.7 (6)	180.9 (6)	112.2 (6)	154.1 (6)
2/13/74	2000-2200	236.1 (6)	202.6 (6)	134.0 (6)	117.2 (6)
2/13/74	2200-2400	219.4 (6)	164.1 (6)	120.6 (6)	100.5 (6)

HOUSE -4 FALL-WINTER NO2 AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 3 LIV/ RM	STATION 4 OUTSIDE
2/14/74	0000-0200	192.6 (6)	175.6 (6)	92.1 (6)	90.4 (6)
2/14/74	0200-0400	184.2 (6)	113.9 (6)	87.1 (6)	82.0 (6)
2/14/74	0400-0600	170.3 (6)	98.8 (6)	77.0 (6)	36.8 (6)
2/14/74	0600-0800	329.9 (6)	179.2 (6)	108.9 (6)	36.8 (6)
2/14/74	0800-1000	205.9 (6)	149.1 (6)	93.8 (6)	24.1 (5)
2/14/74	1000-1200	296.4 (6)	182.5 (6)	103.8 (6)	12.0 (5)
2/14/74	1200-1400	195.9 (6)	117.2 (6)	95.4 (6)	13.4 (3)
2/14/74	1400-1600	838.9 (6)	619.6 (6)	333.2 (6)	12.0 (5)
2/14/74	1600-1800	555.9 (6)	413.6 (6)	344.9 (6)	18.4 (6)
2/14/74	1800-2000	289.7 (6)	180.9 (6)	120.6 (6)	20.1 (5)
2/14/74	2000-2200	222.7 (6)	110.5 (6)	95.4 (6)	20.1 (6)
2/14/74	2200-2400	169.1 (6)	98.8 (6)	73.7 (6)	20.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		304.3	199.6	135.5	32.2

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
1/29/74	0000-0200	******	******	******	******
1/29/74	0200-0400	******	******	******	******
1/29/74	0400-0600	******	******	******	******
1/29/74	0600-0800	******	******	******	******
1/29/74	0800-1000	******	******	******	******
1/29/74	1000-1200	******	******	******	******
1/29/74	1200-1400	165.2 (5)	183.5 (5)	101.6 (4)	173.0 (5)
1/29/74	1400-1600	125.6 (6)	120.1 (6)	*******	243.5 (6)
1/29/74	1600-1800	130.0 (6)	105.9 (6)	*******	512.2 (6)
1/29/74	1800-2000	159.5 (6)	136.5 (6)	*******	560.2 (6)
1/29/74	2000-2200	180.2 (6)	340.8 (6)	144.1 (5)	366.9 (6)
1/29/74	2200-2400	282.8 (6)	478.3 (6)	291.6 (6)	116.8 (6)
1/30/74	0000-0200	263.2 (6)	340.7 (6)	264.3 (6)	53.5 (6)
1/30/74	0200-0400	219.5 (6)	265.4 (6)	221.7 (6)	65.5 (5)
1/30/74	0400-0600	186.8 (6)	227.2 (6)	187.9 (6)	65.5 (6)
1/30/74	0600-0800	225.0 (6)	340.7 (6)	232.6 (6)	136.5 (6)
1/30/74	0800-1000	293.8 (6)	389.9 (6)	297.0 (6)	146.3 (6)
1/30/74	1000-1200	609.4 (5)	633.0 (5)	370.9 (5)	96.6 (4)
1/30/74	1200-1400	******	******	******	******
1/30/74	1400-1600	491.4 (5)	454.7 (5)	302.7 (5)	110.1 (5)
1/30/74	1600-1800	1053.9 (6)	873.7 (6)	350.6 (6)	36.0 (6)
1/30/74	1800-2000	511.1 (6)	416.1 (6)	345.1 (6)	32.8 (6)
1/30/74	2000-2200	478.3 (6)	454.3 (6)	255.5 (6)	54.6 (6)
1/30/74	2200-2400	480.5 (6)	445.6 (6)	192.2 (6)	22.9 (6)
1/31/74	0000-0200	433.6 (6)	398.6 (6)	145.3 (6)	23.0 (6)
1/31/74	0200-0400	291.6 (6)	283.9 (6)	156.2 (6)	16.0 (6)
1/31/74	0400-0600	219.5 (6)	201.0 (6)	155.1 (6)	17.0 (6)
1/31/74	0600-0800	270.8 (6)	235.9 (6)	168.2 (6)	38.0 (6)
1/31/74	0800-1000	245.7 (6)	231.5 (6)	185.7 (6)	69.0 (6)
1/31/74	1000-1200	184.6 (6)	172.6 (6)	172.6 (6)	100.0 (6)
1/31/74	1200-1400	280.7 (6)	232.6 (6)	158.4 (6)	51.0 (6)
1/31/74	1400-1600	166.0 (6)	146.3 (6)	102.6 (6)	23.0 (6.)
1/31/74	1600-1800	917.4 (6)	655.3 (6)	167.1 (6)	21.0 (6)
1/31/74	1800-2000	437.9 (6)	393.1 (6)	195.5 (6)	18.0 (6)
1/31/74	2000-2200	288.3 (6)	218.4 (6)	123.4 (6)	10.0 (6)
1/31/74	2200-2400	130.0 (6)	90.6 (6)	66.6 (6)	15.0 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		322.2	271.7	149.7	33.0

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV RM	STATION 4 OUTSIDE
2/ 1/74	0000-0200	61.1 (6)	37.1 (6)	30.6 (6)	10.0 (6)
2/ 1/74	0200-0400	52.4 (6)	36.0 (6)	25.1 (6)	12.0 (6)
2/ 1/74	0400-0600	52.4 (6)	40.4 (6)	26.2 (6)	7.0 (6)
2/ 1/74	0600-0800	131.0 (6)	89.5 (6)	55.7 (6)	10.0 (6)
2/ 1/74	0800-1000	151.8 (6)	128.9 (6)	67.7 (6)	13.0 (6)
2/ 1/74	1000-1200	231.5 (3)	114.6 (2)	89.5 (3)	8.8 (3)
2/ 1/74	1200-1400	170.4 (6)	115.7 (6)	73.1 (6)	12.0 (6)
2/ 1/74	1400-1600	310.2 (6)	178.0 (6)	71.0 (6)	16.4 (6)
2/ 1/74	1600-1800	779.8 (6)	723.0 (6)	140.9 (6)	19.7 (6)
2/ 1/74	1800-2000	539.5 (6)	492.5 (6)	182.4 (6)	14.2 (6)
2/ 1/74	2000-2200	391.0 (6)	344.0 (6)	205.3 (6)	9.8 (6)
2/ 1/74	2200-2400	299.2 (6)	242.4 (6)	168.2 (6)	7.9 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		264.2	211.9	94.6	12. 0
2/ 2/74	0000-0200	229.3 (6)	168.2 (6)	122.3 (6)	7.7 (6)
2/ 2/74	0200-0400	190.0 (6)	136.5 (6)	97.2 (6)	6.6 (4)
2/ 2/74	0400-0600	174.7 (6)	123.4 (6)	85.2 (6)	6.6 (2)
2/ 2/74	0600-0800	163.8 (6)	114.6 (6)	77.5 (6)	6.6 (2)
2/ 2/74	0800-1000	288.3 (6)	222.8 (6)	105.9 (6)	6.6 (2)
2/ 2/74	1000-1200	222.8 (6)	175.8 (6)	114.7 (6)	6.6 (3)
2/ 2/74	1200-1400	491.4 (6)	290.5 (6)	115.7 (6)	9.9 (6)
2/ 2/74	1400-1600	406.3 (6)	407.3 (6)	206.4 (6)	13.1 (6)
2/ 2/74	1600-1800	370.2 (6)	326.5 (6)	193.3 (6)	10.9 (6)
2/ 2/74	1800-2000	326.5 (6)	269.7 (6)	171.5 (6)	8.8 (6)
2/ 2/74	2000-2200	250.1 (6)	202.0 (6)	123.4 (6)	6.6 (4)
2/ 2/74	2200-2400	261.0 (6)	221.7 (6)	111.3 (6)	6.6 (2)
DAILY AVERAGE = (AVG OF 2HR VALUES)		281.2	221.6	127.0	8.0
2/ 3/74	0000-0200	136.6 (6)	150.7 (6)	98.3 (6)	6.6 (1)
2/ 3/74	0200-0400	166.0 (6)	110.3 (6)	72.0 (6)	6.6 (1)
2/ 3/74	0400-0600	157.3 (6)	92.8 (6)	65.5 (6)	6.6 (5)
2/ 3/74	0600-0800	145.3 (6)	90.6 (6)	60.1 (6)	6.6 (6)
2/ 3/74	0800-1000	144.2 (6)	88.4 (6)	57.9 (6)	10.9 (6)
2/ 3/74	1000-1200	221.7 (6)	166.0 (6)	92.8 (6)	13.1 (6)
2/ 3/74	1200-1400	227.1 (6)	173.6 (6)	126.7 (6)	14.2 (6)
2/ 3/74	1400-1600	328.7 (6)	230.4 (6)	125.6 (6)	17.5 (6)
2/ 3/74	1600-1800	******	******	******	******
2/ 3/74	1800-2000	******	******	******	******
2/ 3/74	2000-2200	******	******	******	******
2/ 3/74	2200-2400	******	******	******	******

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
2/ 4/74	0000-0200	******	******	******	******
2/ 4/74	0200-0400	******	******	******	******
2/ 4/74	0400-0600	******	******	******	******
2/ 4/74	0600-0800	******	******	******	******
2/ 4/74	0800-1000	******	******	******	******
2/ 4/74	1000-1200	******	******	******	******
2/ 4/74	1200-1400	******	******	******	******
2/ 4/74	1400-1600	******	******	******	******
2/ 4/74	1600-1800	672.7 (3)	626.9 (3)	172.6 (3)	32.8 (3)
2/ 4/74	1800-2000	423.7 (6)	396.4 (6)	205.3 (6)	17.5 (6)
2/ 4/74	2000-2200	334.2 (6)	271.9 (6)	162.7 (6)	13.1 (6)
2/ 4/74	2200-2400	271.9 (6)	202.0 (6)	139.8 (6)	13.1 (6)
2/ 5/74	0000-0200	180.2 (6)	124.5 (6)	91.7 (6)	12.0 (6)
2/ 5/74	0200-0400	143.1 (6)	91.7 (6)	69.9 (6)	8.8 (6)
2/ 5/74	0400-0600	122.3 (6)	71.0 (6)	53.5 (6)	12.0 (6)
2/ 5/74	0600-0800	245.7 (6)	122.3 (6)	78.6 (6)	14.2 (6)
2/ 5/74	0800-1000	204.2 (6)	145.2 (6)	85.2 (6)	18.6 (6)
2/ 5/74	1000-1200	227.2 (3)	163.8 (3)	107.0 (3)	13.1 (3)
2/ 5/74	1200-1400	******	******	******	******
2/ 5/74	1400-1600	******	******	******	******
2/ 5/74	1600-1800	552.6 (3)	463.1 (3)	192.2 (3)	19.7 (3)
2/ 5/74	1800-2000	338.5 (6)	293.8 (6)	169.3 (6)	16.4 (6)
2/ 5/74	2000-2200	258.8 (6)	214.0 (6)	128.9 (6)	13.1 (6)
2/ 5/74	2200-2400	204.2 (6)	151.8 (6)	99.4 (6)	14.2 (6)
2/ 6/74	0000-0200	147.4 (6)	97.2 (6)	74.2 (6)	13.1 (6)
2/ 6/74	0200-0400	113.6 (6)	84.1 (6)	64.4 (6)	13.1 (6)
2/ 6/74	0400-0600	114.7 (6)	80.8 (6)	59.0 (6)	9.8 (6)
2/ 6/74	0600-0800	263.2 (6)	173.6 (6)	115.8 (6)	96.1 (6)
2/ 6/74	0800-1000	300.3 (6)	259.9 (6)	206.4 (6)	136.5 (6)
2/ 6/74	1000-1200	268.7 (1)	235.9 (1)	209.7 (1)	52.4 (1)
2/ 6/74	1200-1400	******	******	******	******
2/ 6/74	1400-1600	499.1 (6)	428.1 (6)	344.0 (6)	31.7 (6)
2/ 6/74	1600-1800	1245.0 (6)	1245.0 (6)	1216.6 (6)	52.4 (6)
2/ 6/74	1800-2000	1150.0 (6)	1143.4 (6)	1105.2 (6)	66.6 (6)
2/ 6/74	2000-2200	780.8 (6)	753.5 (6)	744.8 (6)	39.3 (6)
2/ 6/74	2200-2400	518.8 (6)	489.3 (6)	459.8 (6)	13.1 (6)

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/ 7/74	0000-0200	340.7 (6)	301.4 (6)	286.1 (6)	7.7 (6)
2/ 7/74	0200-0400	261.0 (6)	211.9 (6)	204.2 (6)	6.6 (6)
2/ 7/74	0400-0600	219.5 (6)	168.2 (6)	164.9 (6)	6.6 (6)
2/ 7/74	0600-0800	250.1 (6)	210.8 (6)	182.4 (6)	14.2 (6)
2/ 7/74	0800-1000	263.2 (6)	265.4 (6)	212.9 (6)	29.5 (6)
2/ 7/74	1000-1200	575.5 (6)	594.1 (6)	545.0 (6)	26.2 (6)
2/ 7/74	1200-1400	540.6 (6)	489.3 (6)	474.0 (6)	26.2 (6)
2/ 7/74	1400-1600	358.2 (6)	351.7 (6)	325.4 (6)	26.2 (6)
2/ 7/74	1600-1800	798.3 (6)	778.7 (6)	664.0 (6)	25.1 (6)
2/ 7/74	1800-2000	508.9 (6)	537.3 (6)	525.3 (6)	30.6 (6)
2/ 7/74	2000-2200	451.0 (6)	389.9 (6)	336.4 (6)	13.1 (6)
2/ 7/74	2200-2400	350.5 (6)	332.0 (6)	300.3 (6)	16.4 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		409.8	385.9	351.7	19.0
2/ 8/74	0000-0200	242.4 (6)	203.1 (6)	193.3 (6)	40.4 (6)
2/ 8/74	0200-0400	197.7 (6)	158.4 (6)	148.5 (6)	16.4 (6)
2/ 8/74	0400-0600	170.4 (3)	139.8 (3)	131.1 (3)	21.9 (3)
2/ 8/74	0600-0800	******	******	******	******
2/ 8/74	0800-1000	******	******	******	******
2/ 8/74	1000-1200	******	******	******	******
2/ 8/74	1200-1400	267.3 (5)	239.8 (5)	221.5 (5)	14.4 (5)
2/ 8/74	1400-1600	326.5 (6)	303.6 (6)	250.1 (6)	27.3 (6)
2/ 8/74	1600-1800	789.6 (6)	705.5 (6)	606.1 (6)	24.1 (6)
2/ 8/74	1800-2000	476.2 (6)	462.0 (6)	431.4 (6)	9.8 (4)
2/ 8/74	2000-2200	364.8 (6)	322.1 (6)	310.2 (6)	22.9 (2)
2/ 8/74	2200-2400	317.8 (6)	274.1 (6)	262.1 (6)	15.3 (6)
2/ 9/74	0000-0200	238.1 (6)	187.9 (6)	179.1 (6)	19.6 (4)
2/ 9/74	0200-0400	192.2 (6)	152.9 (6)	143.1 (6)	6.6 (2)
2/ 9/74	0400-0600	156.2 (6)	132.2 (6)	120.1 (6)	21.3 (4)
2/ 9/74	0600-0800	150.7 (6)	132.1 (6)	129.9 (6)	64.4 (6)
2/ 9/74	0800-1000	326.5 (6)	288.3 (6)	249.0 (6)	98.3 (4)
2/ 9/74	1000-1200	250.1 (6)	223.9 (6)	172.6 (6)	20.8 (6)
2/ 9/74	1200-1400	186.7 (6)	126.7 (6)	114.7 (6)	10.4 (6)
2/ 9/74	1400-1600	156.2 (6)	128.9 (6)	95.0 (5)	6.7 (6)
2/ 9/74	1600-1800	191.1 (6)	161.6 (6)	135.4 (6)	6.3 (6)
2/ 9/74	1800-2000	229.3 (6)	203.1 (6)	182.4 (6)	11.1 (6)
2/ 9/74	2000-2200	219.5 (6)	183.5 (6)	170.4 (6)	10.0 (6)
2/ 9/74	2200-2400	393.2 (6)	297.0 (6)	233.7 (6)	6.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		224.2	184.8	160.4	23.5

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO• OF OBSERVATIONS IN PERIOD
MAX•: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV RM	4 OUTSIDE
2/10/74	0000-0200	320•0 (6)	304•7 (6)	275•2 (6)	6.4 (6)
2/10/74	0200-0400	207•5 (6)	173•6 (6)	161•6 (6)	21.3 (6)
2/10/74	0400-0600	157•3 (6)	130•0 (6)	117•9 (6)	6.0 (6)
2/10/74	0600-0800	109•2 (6)	100•5 (6)	92•8 (6)	19.8 (6)
2/10/74	0800-1000	216•2 (6)	176•9 (6)	151•8 (6)	34.2 (6)
2/10/74	1000-1200	245•7 (6)	205•3 (6)	181•3 (6)	27.9 (6)
2/10/74	1200-1400	244•6 (6)	202•0 (6)	171•5 (6)	21.0 (6)
2/10/74	1400-1600	246•8 (6)	190•0 (6)	172•6 (6)	9.1 (6)
2/10/74	1600-1800	305•8 (6)	254•5 (6)	225•0 (6)	10.7 (6)
2/10/74	1800-2000	275•2 (6)	237•0 (6)	211•8 (6)	14.8 (6)
2/10/74	2000-2200	283•9 (6)	234•8 (6)	211•9 (6)	16.0 (6)
2/10/74	2200-2400	217•3 (6)	163•8 (6)	155•1 (6)	9.5 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		235•8	197•8	177•4	16.4
2/11/74	0000-0200	185•6 (6)	126•7 (6)	119•0 (6)	6.0 (6)
2/11/74	0200-0400	151•8 (6)	101•5 (6)	91•7 (6)	9.3 (6)
2/11/74	0400-0600	137•6 (6)	108•1 (6)	92•8 (6)	13•1 (6)
2/11/74	0600-0800	267•6 (6)	208•6 (6)	175•8 (6)	31•7 (6)
2/11/74	0800-1000	405•2 (6)	372•4 (6)	309•0 (6)	132•1 (6)
2/11/74	1000-1200	457•6 (6)	448•9 (6)	418•3 (6)	41•5 (6)
2/11/74	1200-1400	712•1 (6)	618•1 (6)	576•6 (6)	13•1 (2)
2/11/74	1400-1600	377•9 (3)	406•3 (3)	393•2 (3)	
2/11/74	1600-1800	******	******	******	******
2/11/74	1800-2000	******	******	******	******
2/11/74	2000-2200	******	******	******	******
2/11/74	2200-2400	******	******	******	******
2/13/74	0000-0200	******	******	******	******
2/13/74	0200-0400	******	******	******	******
2/13/74	0400-0600	******	******	******	******
2/13/74	0600-0800	******	******	******	******
2/13/74	0800-1000	******	******	******	******
2/13/74	1000-1200	******	******	******	******
2/13/74	1200-1400	******	******	******	******
2/13/74	1400-1600	389•9 (4)	419•4 (4)	299•8 (4)	57•3 (4)
2/13/74	1600-1800	498•0 (6)	441•2 (6)	393•1 (6)	59•0 (6)
2/13/74	1800-2000	354•9 (6)	335•3 (6)	303•6 (6)	49•1 (6)
2/13/74	2000-2200	441•2 (6)	439•0 (6)	407•3 (6)	72•0 (6)
2/13/74	2200-2400	411•7 (6)	391•0 (6)	369•1 (6)	83•0 (6)

HOUSE -4 FALL-WINTER NO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/14/74	0000-0200	317.8 (6)	300.3 (6)	286.1 (6)	69.9 (6)
2/14/74	0200-0400	277.4 (6)	241.3 (6)	233.7 (6)	54.6 (6)
2/14/74	0400-0600	243.5 (6)	206.4 (6)	193.3 (6)	18.6 (6)
2/14/74	0600-0800	375.7 (6)	280.7 (6)	228.2 (6)	7.7 (6)
2/14/74	0800-1000	263.2 (6)	277.4 (6)	204.2 (6)	13.1 (6)
2/14/74	1000-1200	270.8 (6)	208.6 (6)	175.8 (6)	13.1 (6)
2/14/74	1200-1400	231.5 (6)	194.4 (6)	192.2 (6)	7.7 (6)
2/14/74	1400-1600	836.5 (6)	678.8 (5)	591.9 (6)	12.0 (6)
2/14/74	1600-1800	819.1 (5)	795.5 (5)	775.8 (5)	14.2 (6)
2/14/74	1800-2000	522.0 (6)	522.0 (6)	486.0 (6)	13.1 (6)
2/14/74	2000-2200	397.5 (6)	310.2 (6)	308.0 (6)	13.1 (6)
2/14/74	2200-2400	249.0 (6)	206.4 (6)	197.7 (6)	13.1 (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		400.3	351.8	322.8	20.8
2/15/74	0000-0200	190.0 (6)	139.8 (6)	131.1 (6)	9.8 (6)
2/15/74	0200-0400	160.6 (6)	114.7 (6)	103.7 (6)	7.7 (6)
2/15/74	0400-0600	199.9 (6)	135.4 (6)	102.6 (6)	8.8 (6)
2/15/74	0600-0800	221.7 (6)	185.6 (6)	161.6 (6)	8.8 (6)
2/15/74	0800-1000	234.8 (6)	240.2 (6)	167.1 (6)	13.1 (6)
2/15/74	1000-1200	256.6 (6)	213.0 (6)	167.1 (6)	14.2 (6)
2/15/74	1200-1400	208.0 (4)	175.3 (4)	172.0 (4)	13.1 (4)
2/15/74	1400-1600	******	******	******	******
2/15/74	1600-1800	******	******	******	******
2/15/74	1800-2000	******	******	******	******
2/15/74	2000-2200	******	******	******	******
2/15/74	2200-2400	******	******	******	******

HOUSE 4 FALL-WINTER CO AVERAGE CONCENTRATIONS, UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	1A 1M FROM STOVE	2 LIV/ RM	4 OUTSIDE
1/30/74	0000-0200	******	******	******	******
1/30/74	0200-0400	******	******	******	******
1/30/74	0400-0600	******	******	******	******
1/30/74	0600-0800	******	******	******	******
1/30/74	0800-1000	******	******	******	******
1/30/74	1000-1200	******	******	******	******
1/30/74	1200-1400	******	******	******	******
1/30/74	1400-1600	11268. (5)	10751. (5)	10344. (5)	1145. (5)
1/30/74	1600-1800	17051. (6)	16436. (6)	13449. (6)	2089. (6)
1/30/74	1800-2000	9991. (6)	11469. (6)	8667. (6)	2140. (6)
1/30/74	2000-2200	12842. (6)	13058. (6)	12349. (6)	3329. (6)
1/30/74	2200-2400	14377. (5)	14377. (5)	13262. (5)	2871. (5)
1/31/74	0000-0200	13308. (6)	13308. (6)	12140. (6)	2162. (6)
1/31/74	0200-0400	9216. (6)	8887. (6)	8468. (6)	1666. (6)
1/31/74	0400-0600	6597. (6)	6298. (6)	5788. (6)	1564. (6)
1/31/74	0600-0800	8603. (5)	8127. (5)	7578. (5)	3149. (5)
1/31/74	0800-1000	8819. (6)	8118. (6)	7690. (6)	2931. (6)
1/31/74	1000-1200	6442. (6)	6198. (6)	5618. (6)	2751. (6)
1/31/74	1200-1400	6477. (6)	7301. (6)	5959. (6)	2084. (6)
1/31/74	1400-1600	7260. (5)	6817. (5)	6374. (5)	2605. (5)
1/31/74	1600-1800	11747. (6)	12178. (6)	11378. (6)	3034. (6)
1/31/74	1800-2000	9617. (6)	9832. (6)	8354. (6)	2751. (6)
1/31/74	2000-2200	9256. (6)	9256. (6)	7871. (6)	1652. (6)
1/31/74	2200-2400	6443. (5)	6077. (5)	5491. (5)	2380. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8649.	8533.	7726.	2394.

DATE	TIME	1	1A	2	4
2/ 1/74	0000-0200	5183. (6)	4512. (6)	4146. (6)	2467. (6)
2/ 1/74	0200-0400	4394. (6)	3998. (6)	3632. (6)	2198. (6)
2/ 1/74	0400-0600	4291. (6)	3558. (6)	3375. (6)	2094. (6)
2/ 1/74	0600-0800	5175. (5)	4662. (5)	4370. (5)	2429. (5)
2/ 1/74	0800-1000	6131. (6)	6649. (6)	4880. (6)	1799. (6)
2/ 1/74	1000-1200	11083. (6)	11388. (6)	9679. (6)	3053. (5)
2/ 1/74	1200-1400	11149. (6)	10752. (6)	9257. (6)	2180. (6)
2/ 1/74	1400-1600	9079. (5)	9445. (5)	7798. (5)	1903. (5)
2/ 1/74	1600-1800	15901. (6)	15321. (6)	14863. (6)	2020. (6)
2/ 1/74	1800-2000	13739. (6)	12855. (6)	12214. (6)	591. (6)
2/ 1/74	2000-2200	13004. (6)	12820. (6)	11753. (6)	953. (6)
2/ 1/74	2200-2400	10619. (5)	10766. (5)	10217. (5)	2456. (5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		9146.	8894.	8015.	2012.

HOUSE 4 FALL-WINTER CO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR, 72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		STATION 1A 1M FROM STOVE		STATION 2 LIV/BD RM		STATION 4 OUTSIDE	
2/ 2/74	0000-0200	7348.	(9)	7737.	(9)	7001.	(9)	2315.	(9)
2/ 2/74	0200-0400	5640.	(6)	6006.	(6)	5396.	(6)	1766.	(6)
2/ 2/74	0400-0600	4783.	(6)	5362.	(6)	4630.	(6)	1640.	(6)
2/ 2/74	0600-0800	5158.	(3)	5841.	(3)	5158.	(3)	2672.	(3)
2/ 2/74	0800-1000	8598.	(6)	8971.	(6)	7324.	(6)	2527.	(6)
2/ 2/74	1000-1200	7507.	(6)	7848.	(6)	7631.	(6)	2534.	(5)
2/ 2/74	1200-1400	10703.	(6)	11635.	(6)	9584.	(6)	3438.	(5)
2/ 2/74	1400-1600	10433.	(3)	11653.	(3)	11105.	(3)	2929.	(3)
2/ 2/74	1600-1800	10903.	(6)	10689.	(6)	9987.	(6)	2636.	(5)
2/ 2/74	1800-2000	10930.	(6)	11235.	(6)	10442.	(6)	2907.	(6)
2/ 2/74	2000-2200	8658.	(6)	8934.	(6)	8567.	(6)	2528.	(5)
2/ 2/74	2200-2400	13660.	(1)	14542.	(1)	14542.	(1)	2051.	(1)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8660.		9209.		8447.		2495.	
2/ 3/74	0000-0200	8585.	(6)	8740.	(6)	8274.	(6)	1687.	(6)
2/ 3/74	0200-0400	5650.	(6)	6303.	(6)	5433.	(6)	1518.	(6)
2/ 3/74	0400-0600	5361.	(6)	5454.	(6)	4616.	(6)	1726.	(6)
2/ 3/74	0600-0800	4050.	(5)	4752.	(5)	3939.	(5)	1760.	(5)
2/ 3/74	0800-1000	3440.	(5)	4031.	(5)	3449.	(5)	1666.	(5)
2/ 3/74	1000-1200	******		******		******		******	
2/ 3/74	1200-1400	******		******		******		******	
2/ 3/74	1400-1600	******		******		******		******	
2/ 3/74	1600-1800	******		******		******		******	
2/ 3/74	1800-2000	******		******		******		******	
2/ 3/74	2000-2200	******		******		******		******	
2/ 3/74	2200-2400	9947.	(5)	10132.	(5)	9836.	(5)	2115.	(5)
2/ 4/74	0000-0200	6826.	(6)	7134.	(6)	6611.	(6)	1746.	(6)
2/ 4/74	0200-0400	5136.	(6)	5752.	(6)	4951.	(6)	1657.	(6)
2/ 4/74	0400-0600	4116.	(6)	4916.	(6)	3993.	(6)	1468.	(6)
2/ 4/74	0600-0800	6170.	(5)	6539.	(5)	5135.	(5)	2632.	(4)
2/ 4/74	0800-1000	9951.	(4)	13091.	(4)	9074.	(4)	2470.	(4)
2/ 4/74	1000-1200	10635.	(6)	10481.	(6)	10019.	(6)	2384.	(6)
2/ 4/74	1200-1400	8332.	(6)	8302.	(6)	8363.	(6)	2329.	(6)
2/ 4/74	1400-1600	7350.	(5)	7716.	(5)	7460.	(5)	2627.	(5)
2/ 4/74	1600-1800	16735.	(6)	18108.	(6)	15576.	(6)	3251.	(6)
2/ 4/74	1800-2000	12282.	(6)	12160.	(6)	11764.	(6)	2093.	(6)
2/ 4/74	2000-2200	10277.	(6)	10216.	(6)	9850.	(6)	1949.	(6)
2/ 4/74	2200-2400	8608.	(5)	9162.	(5)	8349.	(5)	2993.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8868.		9465.		8429.		2300.	

HOUSE 4 FALL-WINTER CO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE		1A 1M FROM STOVE		2 LIV/ RM		4 OUTSIDE	
2/ 5/74	0000-0200	5962.	(6)	6454.	(6)	5715.	(6)	3006.	(6)
2/ 5/74	0200-0400	4411.	(5)	4842.	(6)	4781.	(6)	1918.	(6)
2/ 5/74	0400-0600	3065.	(6)	3435.	(6)	2881.	(6)	1403.	(6)
2/ 5/74	0600-0800	8386.	(5)	9051.	(5)	7721.	(5)	4396.	(5)
2/ 5/74	0800-1000	11391.	(6)	11668.	(6)	9852.	(6)	4988.	(6)
2/ 5/74	1000-1200	14840.	(6)	14347.	(6)	12253.	(6)	4557.	(6)
2/ 5/74	1200-1400	13856.	(6)	15578.	(6)	13639.	(6)	4125.	(6)
2/ 5/74	1400-1600	11752.	(5)	11935.	(5)	11861.	(5)	4905.	(5)
2/ 5/74	1600-1800	16612.	(6)	16246.	(6)	14385.	(6)	5568.	(6)
2/ 5/74	1800-2000	14618.	(6)	13276.	(6)	12086.	(6)	4245.	(6)
2/ 5/74	2000-2200	12098.	(6)	12190.	(6)	11824.	(6)	4441.	(6)
2/ 5/74	2200-2400	11125.	(5)	11850.	(5)	10435.	(5)	5284.	(5)
DAILY AVERAGE = (AVG OF 2HR VALUES)		10843.		10906.		9786.		4070.	
2/ 6/74	0000-0200	8413.	(6)	8927.	(6)	8141.	(6)	5088.	(6)
2/ 6/74	0200-0400	7001.	(6)	7364.	(6)	6819.	(6)	4491.	(6)
2/ 6/74	0400-0600	6476.	(6)	6718.	(6)	6264.	(6)	4478.	(5)
2/ 6/74	0600-0800	******		******		******		******	
2/ 6/74	0800-1000	******		******		******		******	
2/ 6/74	1000-1200	******		******		******		******	
2/ 6/74	1200-1400	******		******		******		******	
2/ 6/74	1400-1600	12245.	(5)	13930.	(5)	10643.	(5)	925.	(4)
2/ 6/74	1600-1800	21806.	(6)	21669.	(6)	21361.	(6)	1431.	(6)
2/ 6/74	1800-2000	18734.	(6)	19453.	(6)	17980.	(6)	1256.	(5)
2/ 6/74	2000-2200	15139.	(6)	14352.	(6)	14489.	(6)	929.	(5)
2/ 6/74	2200-2400	12484.	(5)	11678.	(5)	10873.	(5)	282.	(5)

HOUSE 4 FALL-WINTER CO AVERAGE CONCENTRATIONS , UG/M3
VALUES IN ( ) ARE NO. OF OBSERVATIONS IN PERIOD
MAX.: 6 PER 2HR,72 PER DAY

DATE	TIME	STATION 1 OVER STOVE	STATION 1A 1M FROM STOVE	STATION 2 LIV/ RM	STATION 4 OUTSIDE
2/13/74	0000-0200	******	******	******	******
2/13/74	0200-0400	******	******	******	******
2/13/74	0400-0600	******	******	******	******
2/13/74	0600-0800	******	******	******	******
2/13/74	0800-1000	******	******	******	******
2/13/74	1000-1200	******	******	******	******
2/13/74	1200-1400	******	******	******	******
2/13/74	1400-1600	12345. (5)	12986. (5)	10469. (5)	3285. (5)
2/13/74	1600-1800	14246. (6)	13368. (6)	12606. (6)	4025. (6)
2/13/74	1800-2000	12093. (6)	11712. (6)	10530. (6)	3055. (6)
2/13/74	2000-2200	13038. (6)	12886. (6)	12466. (6)	2475. (6)
2/13/74	2200-2400	11410. (5)	11141. (5)	10515. (5)	2685. (5)
2/14/74	0000-0200	8073. (6)	7737. (6)	7290. (6)	1995. (6)
2/14/74	0200-0400	5078. (6)	5668. (6)	5332. (6)	1007. (6)
2/14/74	0400-0600	4385. (6)	4362. (6)	4139. (6)	783. (2)
2/14/74	0600-0800	10248. (5)	8145. (5)	7206. (5)	1960. (4)
2/14/74	0800-1000	10247. (6)	10695. (6)	8718. (6)	1634. (6)
2/14/74	1000-1200	8469. (6)	6642. (6)	5672. (6)	1309. (3)
2/14/74	1200-1400	5413. (6)	5189. (6)	5333. (6)	398. (4)
2/14/74	1400-1600	14497. (5)	10873. (5)	10112. (5)	890. (6)
2/14/74	1600-1800	14142. (6)	13173. (6)	13732. (6)	1330. (6)
2/14/74	1800-2000	11015. (6)	9375. (6)	8181. (6)	550. (6)
2/14/74	2000-2200	5248. (6)	5638. (6)	5838. (6)	400. (6)
2/14/74	2200-2400	5209. (5)	4633. (5)	4596. (5)	2060. (6)
DAILY AVERAGE = (AVG OF 2HR VALUES)		8710.	7686.	7179.	1193.
2/15/74	0000-0200	3191. (6)	2644. (6)	2498. (6)	1840. (6)
2/15/74	0200-0400	1767. (6)	1329. (6)	1147. (6)	1230. (6)
2/15/74	0400-0600	1701. (6)	1008. (6)	753. (6)	1620. (6)
2/15/74	0600-0800	5865. (5)	5515. (5)	4727. (5)	2100. (5)
2/15/74	0800-1000	9557. (6)	10638. (6)	5718. (6)	1860. (6)
2/15/74	1000-1200	10615. (6)	9338. (6)	5499. (6)	1880. (6)
2/15/74	1200-1400	7733. (3)	7295. (3)	7295. (3)	1640. (6)
2/15/74	1400-1600	******	******	******	******
2/15/74	1600-1800	******	******	******	******
2/15/74	1800-2000	******	******	******	******
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16. ABSTRACT

A study of indoor air quality was carried out over a 15-month period by TRC - The Research Corporation of New England. The program consisted of three tasks:

1. Laboratory investigations
2. Field studies
3. Inventory of indoor sources

Tasks 1 and 2 established the emissions and effect on air quality (NO_2, NO, and CO) of gas stoves and heaters both in the laboratory and in 4 homes with gas-fired stoves in the Hartford, Connecticut area.

Task 3 developed information on indoor sources of air contamination in typical southern New England homes and provided the basis for assessing the impact of aerosol products and their use on indoor air quality.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
1. Indoor Air Quality 2. Indoor/Outdoor Pollution 3. Nitrogen Oxides-generation 4. Nitrogen Oxides-indoor concentration 5. Indoor Pollutant Sources 6. Aerosol Products	Air Pollution Pollutant generation Indoor Air Pollution	13 b
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