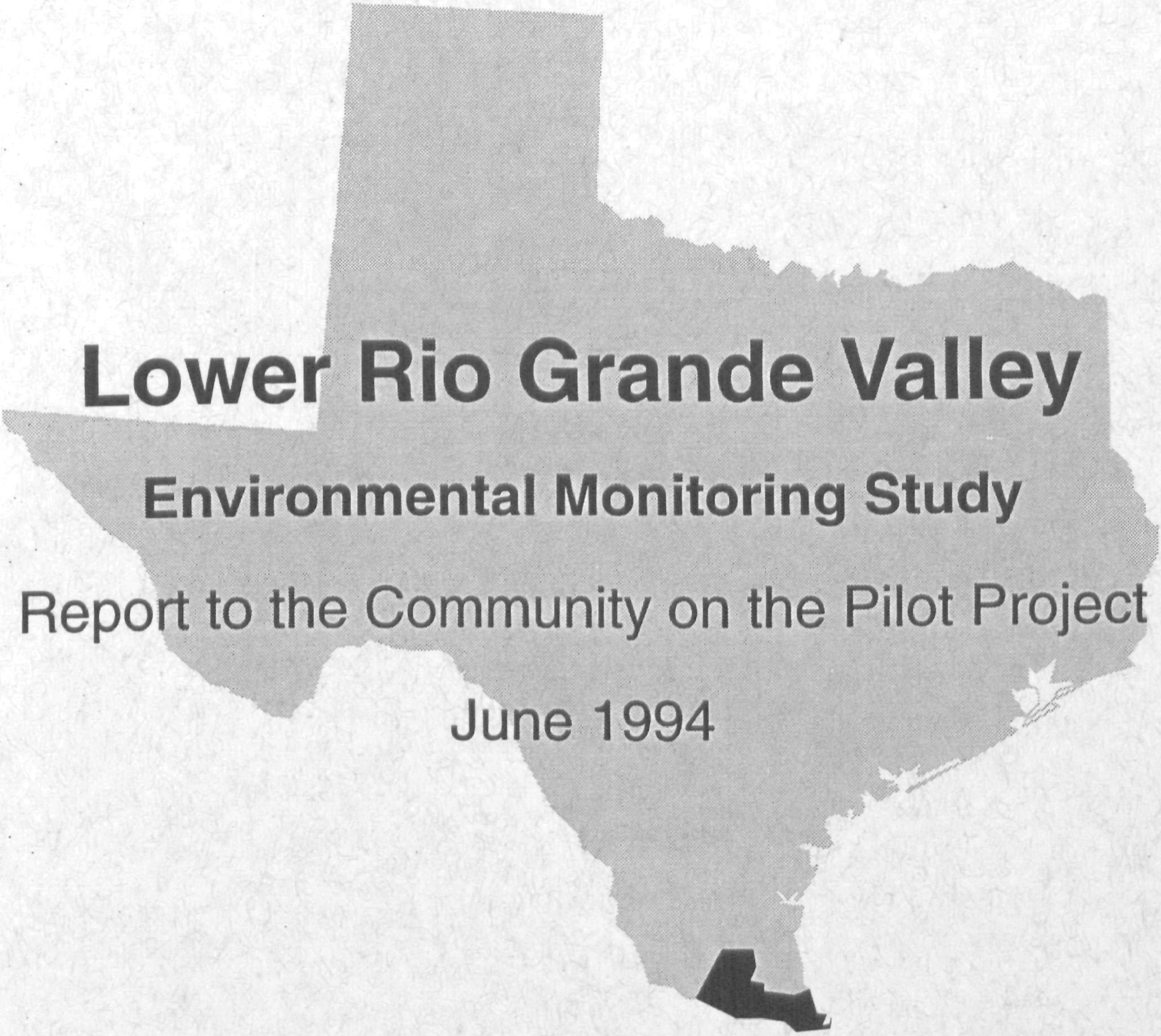
Lower Rio Grande Valley

Environmental Monitoring Study

Report to the Community on the Pilot Project

June 1994



U.S. Environmental Protection Agency

Lower Rio Grande Valley Environmental Monitoring Study:

Report to the Community on the Pilot Project

WHAT IS THIS REPORT ABOUT?

This report explains a pilot investigation of the potential for human contact with environmental pollutants in the Lower Rio Grande Valley.

WHY WAS THIS RESEARCH DONE?

This research began because of the community's concerns about the potential health impact of local environmental contaminants.

WHO HAS BEEN INVOLVED IN THIS RESEARCH?

This research was conducted by the U.S. Environmental Protection Agency (EPA), working with the U.S. Department of Health and Human Services/Public Health Service (especially the Centers for Disease Control and Prevention, the Food and Drug Administration, and Agency for Toxic Substance and Disease Registry), and the State of Texas (Governor's Office, Texas Department of Health, Texas Department of Agriculture, and Texas Natural Resource Conservation Commission).

The scope and design of the research were developed through an ongoing collaboration between community leaders and representatives of several state and federal agencies.

HOW WAS THE RESEARCH DONE?

The first part of this study was a small-scale pilot project conducted during 1993. During the pilot project, samples of indoor and outdoor air, household water, food, housedust, soil, blood, and urine were collected at each of the nine homes located in the Valley.

The primary purpose of the pilot project was to provide information that would strengthen the scientific basis of the design for a larger study of potential exposure in Cameron and Hidalgo counties.

WHAT DID THE RESEARCH FIND?

In general, we found that the levels of pollutants from the nine households studied were similar to those often seen in other parts of the country. The people in the project were reassured that their results did not show significant exposure to most of the contaminants measured during the brief monitoring period. In addition, several areas were identified that require further investigation.

The State of Texas has already begun investigations to determine the source of elevated PCBs found in fish caught in irrigation ditches near the Donna Reservoir.

The levels of pesticides measured in the pilot project were, in general, remarkably low. Given the widespread use of pesticides over the years, however, it is not surprising that we found pesticide residues in the blood and urine of several of participants. Thus, it is recommended that community exposure to pesticides be further documented.

Follow-up investigations should be conducted to identify the source of lead in the diet and the origins of the higher than average urinary arsenic levels found among most of the participants of the pilot project. It should be noted that a less harmful form of arsenic is found in seafood; recent eating of seafood may explain the arsenic levels found in the urine.

Educational initiatives are suggested to inform residents about the necessity of disinfecting containers used to store drinking water.

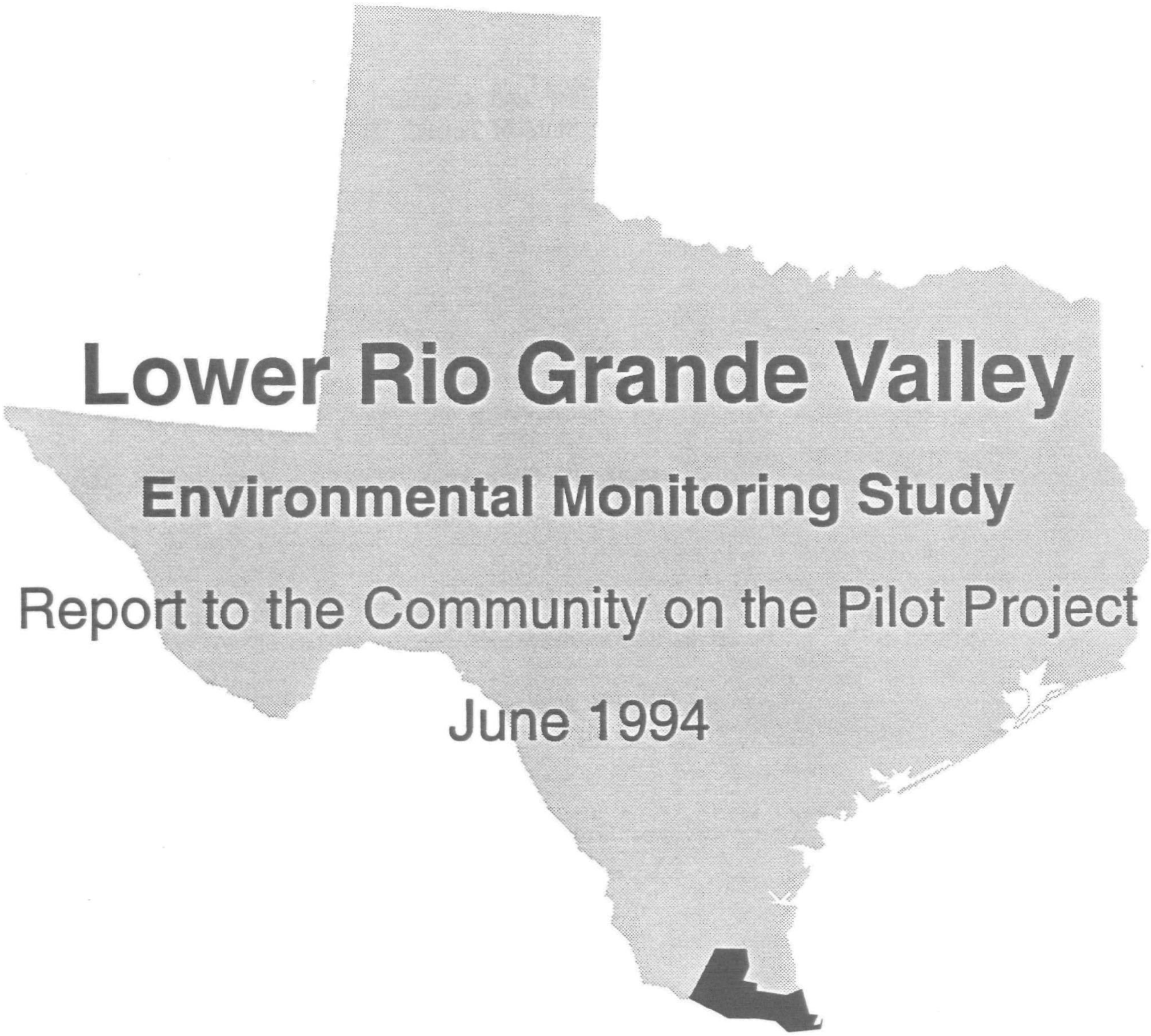
WHAT HAPPENS NOW?

A report to the residents of Cameron and Hidalgo Counties is planned during community meetings on June 15 and 16, 1994.

A follow-up visit is planned to address the community's questions regarding the results of the pilot project and to obtain their suggestions for the next phase of the Lower Rio Grande Valley Environmental Monitoring Study. The U.S. EPA, in conjunction with the State of Texas, anticipate the continuation of some environmental monitoring activities during the planning period.

HOW DO I GET MORE INFORMATION?

A report that summarizes the design and results of the pilot project is available from the local representative from the Texas Department of Health in Harligen, Ramiro Gonzales (210-423-0130) or Hector Gonzalez at the Office of Border Environmental and Consumer Health, Texas Department of Health (1-800-693-6699) or Harold Zenick at the U.S. Environmental Protection Agency (919-541-2245).



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Note

This report has benefited from the review and comment from representatives of participating Federal agencies and agencies of the State of Texas. These agencies are listed in Appendix 1.

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I. SUMMARY

Background

The U.S. Environmental Protection Agency (EPA), working with the U.S. Department of Health and Human Services/Public Health Service (especially the Centers for Disease Control and Prevention, the Food and Drug Administration, and the Agency for Toxic Substance and Disease Registry), and the State of Texas (Governor's Office, Texas Department of Health, Texas Department of Agriculture, and Texas Natural Resource Conservation Commission), is investigating the potential for human contact with environmental pollutants in the Lower Rio Grande Valley. This research began because of the community's concerns about the potential health impact of local environmental contaminants. The scope and design of the research were developed through an ongoing collaboration between community leaders and representatives of several state and federal agencies.

Valley residents have identified many potential sources of pollution, including cross-border emissions from industry (maquiladors), agricultural pesticide use, waste burning, and inadequate water and sewage facilities in the colonias outside the city limits. However, there is only limited information on emission levels and the resulting ambient pollution concentrations. Furthermore, prior to this study, there had been no monitoring that indicated which pollutants residents might actually come in contact with during their daily activities. Without information on the extent or the causes of the exposure faced by the local population, it is difficult to evaluate the relationship between local pollutant levels and health effects. Such information is also needed to formulate effective mitigation strategies.

The Lower Rio Grande Valley Environmental Study was designed because of the need for data about actual human exposure to environmental contaminants in the Valley. The long-term goals of this project are:

- to document the types of pollutants and the distribution of exposures to these pollutants faced by the local population,
- to identify the sources of contamination, and
- to trace the pathways of exposure.

The first part of this study was a small-scale pilot project conducted during the spring and summer of 1993. The primary purpose of the pilot project was to provide information that would strengthen the scientific basis of the design for a larger study of potential exposure in the Valley. This report summarizes the design and results of the pilot project.

The Pilot Project

The pilot project was designed to accomplish three specific objectives: (1) to evaluate the methods required for a larger study, (2) to collect preliminary information about potential sources and levels of environmental contaminants in Cameron and Hidalgo Counties, and (3) to develop methods for disseminating the results of environmental investigations to the community as well as to explain the implications of these results for reducing exposures to environmental contaminants.

In this small-scale pilot project, samples of indoor and outdoor air, household water, food, housedust, and soil were collected at each of the nine homes during the spring of 1993. Additional sampling was performed at six of these nine homes during the summer, to allow collection of data during the primary agricultural pesticide application season. The samples were analyzed for elements, pesticides, and other selected organic compounds. Samples of blood and urine were collected from one or two adults in each participating household. These samples were also analyzed for elements, pesticides, and other selected organic compounds. In addition, nutrients and natural toxins were measured in the food, and microbial analyses were performed on the household water samples in the spring sampling period. Also, to provide information that might help explain the levels and type of contaminants measured, a questionnaire on household characteristics and life styles was administered to the study participants. Although breath samples were collected in the spring, the analytical results were not valid.

The pilot project also included the measurement of contaminants in the outdoor air in Brownsville, TX, at a site near the U.S./Mexico border. Outdoor air samples were collected for 22 days during the spring and 14 days during the summer, coinciding with the periods when sampling was being conducted at the participant's homes.

In interpreting the results presented in this report, it is important to remember that data from small-scale pilot projects cannot be generalized to the larger population. The data presented below represent only the people, periods, and locations sampled. The interpretation of the pilot findings is limited by four factors: (1) the number of participants, (2) the very short time during which samples were collected in each home, (3) the limited portion of the year represented by the monitoring period, and (4) the limited reference data to which the results can be directly compared.

Pilot Project Results

The results of the pilot project provide three types of information. First, the results allow preliminary identification of the compounds, pathways, and sources of contamination faced by local residents. Second, the findings identify topics that may require further investigation.

Third, the findings in specific cases, suggest intervention actions that can mitigate exposures. Each of these types of findings is discussed below. In addition, this information improves our ability to plan the design of the larger study for the Lower Rio Grande Valley.

The pilot project provided preliminary information on the three general areas of environmental concern raised by community leaders: pesticide exposure, trans-boundary pollution, and inadequate public services to some areas.

- In general, the results for the nine households studied in this pilot project were similar to those often seen in other parts of the country. Thus, each of the participants was reassured that their results did not show significant exposure to most of the environmental pollutants measured during the one-day monitoring period.

Pesticide Exposure Findings:

- Pesticides at low levels were found in each of the media sampled except public drinking water. The levels of some pesticides observed in the air and dust of several households exceeded those typically seen in the available comparison databases. The elevated levels were observed in the summer when application of pesticides is usually heavier. Many of the detected pesticides have both domestic and agricultural uses, which make it difficult to determine the exact source of the pesticides found in the domestic environment. Pesticide residues were also detected in low levels in the blood and/or urine of many of the participants, particularly metabolites of parathion, DDT, and heptachlor. DDT and heptachlor are no longer in use in the U.S. Pesticides were not found in household water used for drinking. The food samples were analyzed for over 200 pesticide residues, and no unusual results were reported. In only two cases (lindane in one participant's 24-hour diet and dieldrin in another participant's 24-hour diet) did pesticide levels exceed EPA's health-based standard Reference Dose (RFD), and/or the World Health Organization's Allowable Daily Intake (ADI). These results do not indicate that exposures were at levels which are considered to be of health concern.

- Very high levels of PCBs were found in a fish caught in a local irrigation canal. This fish was in the freezer for later consumption by a participant. Immediately after notification that these high PCB levels were detected, the Texas Department of Health and Texas Natural Resource Conservation Commission conducted more monitoring that confirms contamination of bottom fish near the Donna Reservoir in Hidalgo County. A fishing advisory (later changed to a ban) has been issued in this area.

Industrial and Automobile Pollution Findings:

- Outdoor air pollution levels of chemicals from all sources were very low. In fact, they were similar or lower than those typically recorded other places in the United States. However, wind speeds were relatively high, and prevailing winds were from the North, especially during the spring sampling period, which make it difficult to document the actual transboundary contribution to the measured air pollution levels.

- Air inside the residences contained elevated levels of the by-products of burning propane and butane. There are no known health effects associated with such exposures.

- The blood of a few participants showed evidence of very low exposure to organic compounds associated with automobile exhaust and solvents.

- Elements (calcium, chlorine, iron, potassium, silicon, sulfur, aluminum, and zinc) were found in the air and dust sampled at the households. These elements are typically found at elevated levels in the soil of the southwestern U.S. Elements found in the water are typical of this area of the U.S.; high sulfate levels were found in some water samples.

- Urinary arsenic levels in many participants were somewhat above those typically seen across the U.S. This finding is being followed up by the Texas Department of Health to determine whether exposure to arsenic is likely to be of the form which is less toxic, e.g., coming from seafood or fish.

- Lead levels in the single-day diets of many of the participants were above those typically seen across the U.S. However, there were no elevated blood lead levels.

Household Water Contamination Findings:

- Microbiological contamination of containers used to store vended water was highlighted as a potential problem. Coliforms were found in water of several participants who did not regularly disinfect the containers in which they stored their purchased water.

- The water from the single private well sampled was not suitable for drinking without further treatment, but was not being used for this purpose.

<u>Areas Requiring Further Investigation</u>

- Follow-up investigations should be conducted to identify the source of lead in the diet found among the pilot project participants.

- Follow-up investigations should be conducted to identify the origins of the higher than average urinary arsenic levels found among the pilot project participants.

- The State of Texas (Department of Health and Natural Resource Conservation Commission) is continuing to investigate the source of the PCB contamination in the Donna Reservoir area and the potential for elevated PCB levels in fish caught in other parts of the Lower Rio Grande Valley.

- More information is needed before citizens' concerns about pesticide exposure and exposure to cross-border contaminants can be adequately addressed.

Areas Recommended for Intervention

Finally, the pilot project identified several areas where immediate action can reduce exposure to environmental pollutants among the residents of the Lower Rio Grande Valley. Many of these activities involve environmental health education initiatives. Specifically:

- The nutritional analyses suggest that participants had relatively low intakes of calories and carbohydrates and limited intakes of many essential water-soluble vitamins and several essential major and trace minerals. Daily intakes of protein appeared to approach reference values more closely than did daily intakes of most other nutrients. In general, intakes of fat and salt (sodium) were above current guidelines. Diets that contain increased amounts of fresh fruits, fruit juices, and vegetables can help provide essential vitamins and minerals. Reducing intake of fat and salty foods may help reduce the risk of heart disease and hypertension. Dissemination of information on the value of eating a balanced and nutritious diet is suggested.

- Educational initiatives are suggested to reduce the incidence of microbiological contamination of containers used to store water. Regular disinfection of water storage containers will reduce exposure to hazardous microbes.

- Although the finding of unsuitable drinking water for the private well tested cannot be generalized to all private wells, increased publicity about the need for having water from private wells tested is suggested.

- Guidance on the potential sources of lead in the diet and ways to help reduce exposure to lead in the diet is being distributed.

- As a general precaution, it is recommended that fishing advisories be used as guidance for individuals who eat locally caught fish. In addition, the fat and skin of all fish should be removed before cooking to lower exposures to pesticides and PCBs that normally concentrate in these parts of the fish. This information needs to be disseminated to communities.

The success of this study depends upon its value to the community. Several aspects of the pilot study design were based on the issues and concerns raised during a series of meetings with community leaders (city, county, and state representatives of government agencies and local activist groups) as well as the general public. As we plan the full study, we will again meet with community leaders and the public to determine if the pilot project provided the type of information that the community needs and to solicit ideas for improving the design of the larger study.

II. PROJECT DESCRIPTION AND DESIGN

Project Purpose

The Office of Research and Development, U.S. Environmental Protection Agency (EPA), in conjunction with agencies from the Department of Health and Human Services/Public Health Service, and the State of Texas, are investigating the potential for human contact with environmental pollutants in the Lower Rio Grande Valley. As part of this process, a small-scale pilot project was conducted during the spring and summer of 1993. The primary purpose of this small-scale pilot was to provide researchers with information that could be used to strengthen the scientific basis of the design for a larger study of potential exposure in the Valley. The pilot project was designed to accomplish three specific objectives: (1) to evaluate the methods required for a larger study, (2) to collect preliminary information about potential sources and levels of environmental contaminants in Cameron and Hidalgo Counties, and (3) to develop methods for disseminating the results of environmental investigations to the community as well as to explain the implications of these results for reducing exposures to environmental contaminants. Below we describe the pilot project and its findings.

Project Design

In this small-scale pilot project, concentrations of environmental contaminants were measured in nine homes. Samples of indoor and outdoor air, household water, food, housedust, and soil were collected at each of the nine homes during the spring of 1993. Additional sampling was performed at six of these nine homes during the summer to allow collection of data during the primary agricultural pesticide application season. The environmental samples collected during the spring and the summer were analyzed for elements, pesticides, and other selected organic compounds. Samples of blood and urine were collected from one or two adults in each participating household. These samples were also analyzed for elements, pesticides, and other selected organic compounds. In addition, nutrients and toxins were measured in the food, and microbiological analyses were performed on household water samples in the spring sampling period. To provide information that might help explain the levels and type of contaminants measured, a questionnaire on household characteristics and life styles was administered to the study participants. Breath samples were collected during the spring, but analyses were not valid.

The pilot project also included the measurement of contaminants in the outdoor air in Brownsville, TX, at a site near the U.S./Mexico border. Outdoor air samples were collected for 22 days during the spring and 14 days during the summer, coinciding with the same periods that sampling was being conducted at the participant's homes.

Limitations of A Pilot Project

The primary reasons for conducting pilot projects are to evaluate methods and to provide information for designing future projects. As such, the data from small-scale pilot projects cannot be generalized. In the case of this pilot project, it is important to emphasize that the data presented below is representative of only the people, periods, and locations sampled. The interpretation of the pilot project findings is limited by four factors: (1) the number of participants, (2) the very short time during which samples were collected in each home, (3) the limited portion of the year represented by the monitoring period, and (4) the limited reference data to which the results can be directly compared.

Information was collected at just nine households in the two-county area, and therefore may not be representative of the larger study area (Cameron and Hidalgo Counties). Specifically, the households were chosen to provide information about residences with a variety of characteristics. The measurements made at these residences were obtained during either a single 24-hour period, or at six of the nine houses, two separate 24-hour periods. These data are representative only of these short time periods, and caution must be exercised in using this type of short-term data to make assumptions about longer-term exposures.

Although this pilot project was a comprehensive attempt to monitor as many chemicals and media as current technology permits, there were certain limits on the types of measurements that could be performed. For example, large, noisy monitors could not be placed inside homes. Also, the list of pesticides looked for in the samples is only a partial list of those which are, or have been, used in the Valley. The selected list of compounds measured will serve as an indicator of the types of exposure which could be experienced by people in the Valley. An additional limitation to this type of pilot project is that the list of compounds being analyzed varies by media according to the compounds expected to be found in a particular media. Therefore, the compound lists for air, water, etc., differ somewhat.

Participant Selection and Household Description

The selection of participants for the pilot project was based primarily on residential location. The nine sites were chosen according to their proximity to: (1) areas downwind of air pollutants emitted along the Mexican border, particularly from maquiladoras, traffic congestion, and the occasional burning at the Matamoros Municipal Dump; or (2) areas that bring individuals into contact with agricultural pesticides. Households were also chosen for participation so that they provided variations in both: (1) the source of drinking, cooking, and washing water (municipal, well, or vended); and (2) lifestyle conditions as determined by socioeconomic status and level of public services available in the community (such as living in a colonia).

The nine households were chosen to reflect maximum variation in exposure sources. Of the nine participating households, three were located within the city of Brownsville and were serviced by municipal sewage, garbage, and water systems; the other sites, two located in colonias in Cameron County adjacent to the Brownsville city limits, and four in the rural agricultural parts of Cameron and Hidalgo counties, had a mixture of public and private services. In homes not serviced by the municipal sewage and garbage system, septic tanks were commonly used and garbage was either burned, dumped into nearby ditches, or picked up by a private service.

Eight of the nine households participating in this pilot project lived in single family, single-floor, wood-framed structures. The other family lived in a mobile home. Several of the homes had unfinished wood floors and/or walls. One home did not have indoor plumbing. Hot water was not available in three of the homes. Five of the nine homes purchased their drinking water from local vending stations, even though tap water from municipal water supplies was available in four of these five homes.

All homes in the city used natural gas for cooking. Bottled propane or butane gas was used in the other homes. None of the homes had central heating. On the few days each year that heating was necessary, most participants used small space heaters fueled by electricity or propane, or used their cooking range to heat the house. Two of the nine homes had window air conditioning units; the remainder of the homes used electric fans for cooling. None of the primary participants in the pilot project smoked, but smokers visited seven of the nine homes.

All of the nine families who participated in the pilot project were of Hispanic origin; one family member in one of the participating households was a Native American. Four of the primary participants (the adult in the household who answered the questions) were born in the U.S. Young children (under 10 years) lived in six of the households; children visited frequently in the other three. The household income in these homes varied from less than $6,000/year to $25,000/year.

III. SUMMARY OF PILOT PROJECT RESULTS

Basis of Interpretation

The interpretation of results is based upon how the information collected in this pilot project compares with available health-based regulatory levels and/or information on pollutant levels collected in other geographic areas. The regulatory levels and pollutant level data available varies from medium to medium, and may not include all of the compounds of interest.

Health-based regulatory values are criteria established by federal or state governments to protect human health and are available for many of the water and air contaminants that were studied. For example, the Texas Effects Screening Level (TESL) is the regulatory guideline used for air data comparisons, and the Federal Maximum Contaminant Level (MCL), among others, is used for water data comparisons. If a compound was detected in the pilot project at a level higher than the applicable comparison value, the local environmental agency was notified, and remedial or follow-up actions were initiated.

If the results of the pilot project were below applicable regulatory values, they were then compared to the high values observed in studies or surveys conducted in other areas in the United States. Such comparison data, however, are very limited because few exposure studies have been conducted that are as detailed as the pilot project conducted in the Lower Rio Grande Valley. Some of the comparison data come from national studies conducted by government agencies. For instance, the levels of many of the compounds analyzed in blood and urine can be compared with levels found in the Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES). The contaminants found in food can often be compared with nationwide market-basket data collected by the Food and Drug Administration (FDA). In contrast, the comparison data available for indoor air pollutants is based on smaller-scale studies limited to only a few cities. The data available for comparing housedust and soil contamination levels are even more limited, as this form of data collection is still relatively new, and its relationship to actual human exposure is still unknown.

Because air, dust, and soil comparison information is very limited, the interpretation of results includes a discussion of whether the compounds were found at levels above or below a selected cut-off point. The choice of cut-off point was not based upon information relevant to health effects, but rather was chosen as a point substantially above the detection limit of the measurement system. Sorting the data based upon such an arbitrary value is useful for two reasons. First, it allows comparison across media of pollutants that are above the background levels of the measurement system. For example, was the same compound found in air and dust? Second, it allows one to relate known sources of contaminants with whether compounds were actually measured at levels above the background. Thus, the selected cut-off values are most useful in the context of pattern and source identification, and should not be interpreted as having any known health significance.

In conclusion, given the limited availability of health-based regulatory values and comparable pollutant level data, the comparisons provided for many of the compounds can be used only to provide perspective. A result that shows levels of a certain pollutant higher in the pilot project than in the comparison data does not necessarily imply that health consequences are likely from such exposure levels, nor that levels are consistently high. Such a result only implies that further study may be appropriate.

Summary of Results

The results are presented below in five categories: dietary information (food), household water, indoor and outdoor air, soil and housedust, and biological samples (blood and urine). The major findings are:

- In general, we found that the results for the nine households studied in this pilot project were similar to those often seen in other parts of the country. Each of the participants was reassured that their results did not show significant exposure to most of the environmental contaminants measured during the one-day monitoring period. It is important, however, to keep in mind that the results of a 24-hour sampling period may not reflect longer-term exposures.

- Pesticides were found in air, dust, blood, urine, and food at low levels. Higher levels of pesticides were observed in the air and dust of several households than those typically seen in the available comparison databases which represent urban non-agricultural areas. The elevated levels were observed in the summer, the season when application of pesticides is usually heavier. Pesticides (or their metabolites) were also detected at low levels in the blood and/or urine of many of the participants, particularly metabolites of parathion, DDT, and heptachlor. DDT and heptachlor are no longer in use in the U.S. Pesticides were not found to be elevated in the drinking water. The food samples were analyzed for over 200 pesticide residues and no unusual results were reported. In only two cases (lindane and dieldrin) did a pesticide level exceed the Reference Dose (RFD). These levels do not indicate that exposures were at levels which are considered to be of health concern.

- Some elements, particularly those elements typically found at elevated levels in the soil of the southwestern U.S. (calcium, chlorine, iron, manganese, titanium, bromine, potassium, silicon, sulfur, aluminum, and zinc), were in the air and dust sampled at every household. Elements were found in relatively low levels in the water.

- Urinary arsenic levels in many participants tended to be somewhat above those typically seen across the U.S. This finding is currently being followed up by the Texas Department of Health to determine whether exposure is to the toxic or the less toxic form of this metal.

- Lead levels in the diets of many of the participants were above those typically seen across the U.S. Guidance is being distributed to the participants on the potential sources of lead in the diet and what they can do to help reduce exposure. Follow-up investigation into the source of lead in the diet is recommended.

- Levels of volatile organic compounds (VOCs), such as benzene, in the outdoor air were similar to or lower than those typically recorded. The results show that the air monitored inside the residences contained elevated levels of the by-products of burning propane and butane. In all but two cases, the contaminant levels were below the Texas Effects Screening Levels (TESLs) and generally lower than pollutant results obtained in other studies. The two exceptions were, first, during the summer, chloroform was measured in the air inside one home at levels slightly higher than the TESL. Second, propane was measured in the air inside one home at levels above the TESL. Health officials do not consider these exposures to be of immediate health concern, however, further investigation may be required. Levels of organic compounds in the blood were relatively low; a few participants showed evidence of low-level exposure to compounds that could be associated with automobile exhaust and solvents.

- Microbiological contamination of containers used to store vended water was highlighted as a potential problem. Coliforms were found in water of several participants who purchased vended water but did not regularly disinfect the containers in which they were stored. Educational initiatives to better inform the public on the value of disinfecting the containers are suggested.

- The single private well from which water was tested was not suitable for drinking (but was not being used for this purpose). Although this finding cannot be generalized to all private wells, it suggests that it may be necessary to increase publicity about the need for having the quality of water in private wells tested.

- Very high levels of polychlorinated biphenyls (PCBs) were found in a fish caught in a local irrigation canal. This fish was in the freezer for later consumption by a participant. Immediately after being informed of the high PCB level detected, the Texas Department of Health and Texas Natural Resource Conservation Commission conducted additional monitoring that confirms contamination of fish caught in the vicinity of the Donna Reservoir in Hidalgo County. A fishing ban has been issued in this area. As a general precaution, it is recommended that the public be made aware that the fat and skin of all fish should be removed before cooking to reduce potential exposure to some environmental contaminants.

- The nutritional analyses suggests that participants had relatively low intakes of calories and carbohydrates and limited intakes of many essential water-soluble vitamins and several essential major and trace minerals. Daily intakes of protein appeared to approach recommended daily reference values more closely than did daily intakes of most other nutrients. In general, intakes of fat and salt (sodium) were above current guidelines. Diets that contain increased amounts of fresh fruits, fruit juices, and vegetables can help provide essential vitamins and minerals. Reducing intake of fat and salty foods may help reduce the risk of heart disease and hypertension. Dissemination of information on the value of well-balanced and nutritious diets is recommended.

These results are discussed in more detail in the sections that follow.

IV. DETAILED DESCRIPTION OF RESULTS

Dietary Information

How the Information Was Collected

One individual in each household was asked to save a "duplicate plate" of all foods and beverages consumed during the designated 24-hour period. This means that during the monitoring period, the participant was asked to prepare a second plate of solid food or glass of liquid that was identical to what they consumed. This second plate or glass was saved in a cooler for collection by the study team. If the participant ate any meals away from home (at a friend's home or at a restaurant), that food was not collected. In this project, all of the duplicate diets were collected by adult females.

All of the participants reported that they were able to collect and provide a duplicate portion of all foods prepared and consumed at home during the monitoring periods. (This food was all put into two containers, one for the liquid portion of the sample and one for the solid sample. Each of these samples represent the composite liquid or composite solid portion of the diet.) One participant in the spring consumed two meals away from home during the 24-hour collection period, thus, the results of this participant's diet were not included in the description of the nutritional findings. Two other participants in the spring 1993 phase ate one meal each away from home during the monitoring period. Even though this meal was not included in the composite food and beverage samples analyzed, the results of contaminant analyses for these two participants are reported with those who reported providing all meals.

It is important to note that these duplicate food collections may not be representative of the amounts or types of foods consumed over time (over a week, month, or year). Thus, the results reported below should be interpreted cautiously. For example, underestimates may occur during 24-hour food collections if duplicate portions of all foods consumed are not provided by the participants. In addition, a person may "skip" breakfast or lunch on a particular day. If collections were made on such a day, the results may suggest lower than actual nutrient intake or may underestimate the individual's typical intake of contaminants.

Food composites representing the 24-hour consumption in each of the homes were analyzed by the FDA according to standard analytical methods. Solid foods and beverages were collected and analyzed separately. However, for ease of comparison in this report, the total 24-hour intake of contaminants from beverages and solids has been added together.

The specific list of chemicals chosen for analysis represented those most frequently analyzed by regulatory agencies to estimate chemical contamination. The FDA analyzed each composite diet sample for nutrients and a broad range of pesticides and chemical contaminants, including pesticides, toxic elements and PCBs. A private laboratory, Research Triangle Institute, performed analyses of the food samples for polycyclic aromatic hydrocarbons (PAHs).

The nutrient, pesticide, PCB, PAH, and elemental results are expressed on an "intake per day" basis. These results are compared with EPA's health-based values (Reference Dose, RFD) or the World Health Organization/Food and Agriculture Organization Acceptable Daily Intake (ADI) values, when available. In addition, the results are compared with the findings from the FDA's Total Diet Study, in which foods were collected from grocery stores across the U.S. and prepared in kitchens before analysis. The data from the Total Diet Study can be used as an indication of the levels of contamination frequently found in foods in the U.S. However, because the types of food collection conducted in this pilot project may not be representative of amounts or types of foods consumed over time and may underestimate the actual food intake of participants, comparisons with national databases must be interpreted cautiously.

In addition to the 24-hour diet composites collected from the homes of participants, selected individual food items of local origin were collected both from the residences and from places where these individuals shop, particularly local vendors on both sides of the border. Preference was given to locally grown or locally produced foods to determine if such foods were contaminated with pesticides and other chemical contaminants found in environmental samples collected in the pilot project. The individual foods were analyzed for the same list of potential contaminants as were the 24-hour composites, with the exception of PAHs. In addition, selected corn-based products were analyzed for aflatoxins and fumonisins, two classes of naturally occurring toxic compounds produced by certain molds.

The results from the analyses of these individual foods are compared with information compiled by the FDA for the maximum levels found in monitoring programs across the U.S. and with the same health-based values (RFDs or ADIs) noted above.

What the Results Show: Summary and Possible Explanations

Contaminants in 24-Hour Food Composites

In most cases, no unusually high level of any element (e.g., calcium, zinc) was found in the nine diet composites collected during the spring and six diet composites collected during the summer. The levels of contaminants found in this one day collection from each home were similar to levels found in foods collected throughout the U.S. However, estimated intake of some contaminants from several of the 24-hour diet composites did exceed the calculated, average daily intakes found in FDA's market basket survey known as the Total Diet Study. For example, in some of the homes during the single 24-hour monitoring period, the estimated intake of lead (a toxic metal sometimes found in food or products that come in contact with food) exceeded the average intake seen by the Total Diet Study. Lead is a common environmental contaminant often present in dust, soil, in some house paints, and some consumer products such as ceramic cookware. The findings of this one-day study do not indicate that a serious problem with lead exposure exists in the Valley. Nonetheless, general precautions should be taken by individuals to reduce or eliminate potential sources of dietary exposure to lead; FDA suggestions on how to do so are being provided to all participants. Additional investigation of the sources of lead in the diet in this area should, however, be conducted in association with future monitoring activities. Broad dissemination of this information throughout the community is warranted.

A similar, somewhat elevated 24-hour intake was noted for arsenic in one of the homes. Again, the finding itself does not indicate a problem, but does indicate the need for additional monitoring to determine if this finding recurs on a continuing basis.

The nine beverage composites were essentially free of toxic elements. The absence of toxic elements in beverages is typical of results obtained in FDA's market basket survey.

The 24-hour diet composites were analyzed for over 200 pesticide residues. No unusual results were reported. Although the observed 24-hour intake of some of the pesticide residues exceeded the typical values found by the Total Diet Study, FDA notes that they commonly find low levels of pesticide residues in about half of the foods tested throughout the country. In the pilot project, only traces of two pesticide residues were found in the beverage samples (DDE and dieldrin). The residues detected in solid foods included: chlorpropham (a commonly used inhibitor of sprouting in stored potatoes), DCPA (an herbicide), DDE (a break down product of DDT, a currently banned insecticide which was once used extensively and persists in the environment, or is stored in fatty foods, fish and root crops), chlorpyrifos (an insecticide commonly used to control household pests), dieldrin (a currently banned insecticide which persists in the environment, or is stored in fatty foods), permethrins and lindane (insecticides used on fruits and vegetables and indoors for fly control), and malathion and pirimiphos-methyl (insecticides commonly used on grain). However, in only two cases (lindane and dieldrin) did the observed 24-hour intake exceed that of the health-based value. Again, additional monitoring is warranted to determine the frequency of this occurrence.

PAHs were found at very low levels (less than 20 ppb) in some of the diet composites. These compounds are sometimes found when foods are smoked, fried or grilled. The levels found in the composites are most likely due to cooking rather than to environmental contamination from petroleum or other local sources. However, PAHs can also result from contamination of foods in the field or garden from air or soil pollution.

Contaminants in Individual Food Items

The most important finding associated with the individual food items is the detection of an extremely high level of PCBs in one locally caught fish (a carp). Five of the participants reported eating locally caught fish at some point during the past year. Common sources of locally caught fish included local irrigation canals, the Rio Grande, the Arroyo Colorado, and off South Padre Island. The fish with the high PCB levels was provided by a participant who had caught it in an irrigation canal in Hidalgo county. This fish sample also had relatively high levels of some elements, including lead, mercury, and nickel. The high level of PCBs found in this sample prompted considerable additional sampling by the Texas Department of Health and Texas Natural Resource Conservation Commission and has resulted in fishing advisories and subsequent closing of some local waters for fishing in parts of Hidalgo County. Efforts are continuing to identify the source of the PCB contamination.

With the exception of this fish sample, the element and pesticide levels found in the individual food items were, for the most part, similar to the findings for the 24-hour diet composites, and are typical of those found in nationwide samples. In addition, no new or unusual chemicals were found. However, some individual findings were higher than the corresponding typical (average) findings of FDA's Total Diet Study. Again, this does not indicate an unusual situation, but does indicate the need for some additional follow-up monitoring to determine if a consistent pattern emerges. For example, locally prepared white cheese appears to contain somewhat higher than usual levels of lead; the source of the lead should be sought to determine if it is associated with the milk, with contaminated equipment used to produce or store the cheese, or from environmental sources in and around the home. Similarly, while the pesticide residue findings are not outstanding, some of the results indicate usage patterns which are not consistent with U.S. regulations, for example, methamidophos in squash. Some of these situations may warrant further educational activities, since they represent possible pesticide misuse, even though these levels are not known to be associated with adverse health risks. No unusual findings were noted for the levels of the naturally occurring aflatoxins and fumonisins in the local corn-based items.

Nutrient Component

In interpreting the nutritional results, it is necessary to keep several caveats in mind. First, the analysis reported below is based only on the solid food component of the 24-hour "duplicate plate" samples provided. Beverages consumed by the participants may have provided some additional nutrients that are not included in these estimates. Second, because vitamins C, A, and riboflavin may be lost during sample collection and preparation procedures, values for these nutrients may be lower than amounts actually consumed. Third, because participants may not have included all of the food items that they consumed in their duplicate plate, the nutrient values may be underestimated. Finally, the nutrient results reported in the table do not include food collected from the participant who ate most of her meals away from home during the collection period.

Fat/Carbohydrates/Energy (calories). Calorie intakes were low during both the spring and summer phases of the project, even after taking into consideration the lower calorie requirements of females. For instance, 5 of 8 participants who participated during the spring consumed less than 1300 calories per day. Intakes of carbohydrates by most subjects in both phases were below average reference values. The percentage of calories derived from fat was similar to that observed in usual U.S. diets, which is higher than the current Federal recommendations.

Protein. In general, daily intake of protein by most participants was only slightly below the recommended range of 46 to 63 g. Daily protein intakes in 5 of 8 participants in the spring and in 3 of 6 participants in the summer fell within the recommended range. These observations are consistent with the participants' dietary records. All participants reported that they consumed at least one portion of beef, pork, lamb, or poultry during the monitoring periods. Two of 8 participants in the spring, however, had protein intakes below 30 grams per day.

Vitamins. Participants reported consumption of fruits, fruit juices, and vegetables less frequently than consumption of protein-containing foods. Some participants appeared to have low intakes of several essential water-soluble vitamins. For example, in the spring, values in the range of half or less of the recommended intakes were found for riboflavin, niacin, folic acid, biotin, and vitamin B_{12}. Analyses of a wider range of vitamins were included for the summer. Again, low intakes were observed for riboflavin, niacin, folic acid, biotin, and vitamin B_{12}. In addition, low intakes were also observed for pantothenic acid, thiamin, and vitamin B_6. Ranges of intake of folic acid were about 67 to 108 mcg per day for participants in the spring and 31 to 75 mcg per day for participants in the summer. These values are significantly below the recommended daily intake (180-200 mcg/day) for this vitamin.

Vitamin C was not detectable in 3 of 8 samples analyzed during the spring, and was very low in 3 of the 5 samples in which it was detected. It was not detected in any of the 6 samples analyzed during the summer phase. As noted above, vitamin C is very unstable and loss of this vitamin during processing of the samples may account for the observations. Alternatively, since concentrations of all other water-soluble vitamins were also low, the participants' diets may have contained little vitamin C. In general, daily intakes of vitamins A and E exceeded recommendations. This may reflect contributions from specific foods as well as contributions from oils used in cooking.

Minerals. For many participants, daily intakes of calcium, phosphorous, and magnesium from the solid food composites collected during both the spring and summer fell significantly below recommended ranges, while average intakes of sodium and chloride were well above daily reference values. "Low values" in the range of about half or less of the recommended daily intakes were found for the essential trace minerals iron, zinc, manganese, and copper during both phases of the project.

Summary Comment. During the 24-hour study periods, the solid food consumed by a number of participants appeared to provide low carbohydrate and calorie intakes, and also appeared to provide limited intakes of many essential water-soluble vitamins and several essential major and trace minerals. Daily intakes of protein appeared to approach reference values more closely than did daily intakes of most other nutrients. In general, intakes of fat and salt (sodium) were above current guidelines. Diets that contain increased amounts of fresh fruits, fruit juices, and vegetables, and lower amounts of fat and salty foods, can help provide essential vitamins and minerals, and may improve the overall dietary pattern. Dissemination of information on the value of well-balanced and nutritious diets is recommended.

Water

How the Information Was Collected

The purpose of the water sampling was to identify the occurrence and range of concentrations of environmental contaminants in the water residents used for drinking or other household uses, such as cooking, bathing, and dish washing. Only one water source was sampled at each household. When the family used both vended and tap water for household purposes, the sample source chosen was the source less frequently tested at that point in the pilot project. Of the resulting nine samples collected during the spring, seven were drinking water samples and two were samples only used for other household purposes. The same water sources (municipal, well or vended) collected in the spring were repeated in the six summer homes.

All household water samples were collected in private residences, directly from the source used by the participants to dispense the water. In the case of tap water, the water was collected from the kitchen tap after first removing the aerator, but leaving any final filtering devices in place. In homes where containers were filled at local vending machines, samples were collected from the containers currently being used by the family. Due to the frequent use of vended water for drinking water, an additional sample (non-household sample) was collected directly from a vending machine.

The water samples collected in this pilot project were traceable to essentially three sources that are inspected/regulated for use as drinking water by specific authorities. These sources include: 1) public utilities, which are the responsibility of the Texas Natural Resource Conservation Commission (TNRCC), 2) vending machines, which are inspected by the Texas

Department of Health, Division of Food and Drugs, and 3) private wells, which are not routinely inspected.

The water samples were analyzed at the U.S. EPA laboratory in Cincinnati, Ohio. Analyses were conducted for a broad range of chemical contaminants and for microbial quality. The results were compared to the U.S. EPA's standards, which are appropriate for regulating public drinking water supplies (those serving at least 25 persons or having at least 15 service connections).

What the Results Show: Summary and Possible Explanations

Microbiological Results

Analyses for microbiological organisms were performed only on the water samples collected during the spring. The results indicate that some water being used for either drinking or household purposes would not pass federal drinking water regulations designed for public water supplies. Of particular interest is the presence of bacteria (such as coliforms, including Escherichia coli and heterotrophs), in samples taken from containers used by participants for storing drinking water. Similar contaminants were found in the kitchen tap water sample supplied from the private well.

The explanation for this bacteriologic contamination differs between the water sources. Water vending machines (locally referred to as "water mills") are sanitized routinely and are inspected by local health officials. It is likely that the source of contamination in the vended water sampled in this pilot was the use of unsanitary storage containers after the water was purchased by the participants. Instructions to customers regarding the proper procedures to sanitize containers used to transport and store vended water are posted on the vending machines. It is possible that customers do not sanitize their containers on a routine basis. Furthermore, in some cases it would be difficult to implement the instructions without a readily available source of safe water with which to cleanse the containers. As follow-up to this project, customers of vended water supplies should be provided with materials or community training on the importance of sanitizing containers. They also should be informed that the public water is safe, but that improper handling and storage of any water may make safe water unsafe for household uses.

The source of contamination in the private well water sampled in this project was likely related to the well's shallowness and its proximity to irrigation ditches. It is known that shallow wells can be contaminated by nearby sources, including untreated sewage and chemical wastes or residues produced by industrial or farming practices. Furthermore, the owners of the well did not further treat or sanitize the water before piping it into their home. It is recommended that the public be made aware that the quality of well water should be tested before it is used for drinking or other hygienic purposes.

Participants at households where microbiologic problems were identified were notified that their water was not safe to drink. Those who purchased vended water were advised of the recommended sanitation procedures. The owner of the well water received retesting and advice from the Texas Department of Health.

Chemical Results

Analyses for inorganic and organic chemicals and pesticides were performed on both spring and summer samples. The results indicate that all federal criteria established for regulating drinking water from public water supplies were met, with only one exception. During the summer phase, a sample was collected (in a home served by a public drinking water supply) which exceeded the current health-based standard, the Maximum Contaminant Level (MCL), for trihalomethanes (THMs). THMs are defined as the total of the concentrations of bromodichloromethane, bromoform, chloroform, and dibromochloromethane. These pollutants are formed from the reaction of chlorine with organic material in the water. THMs are regulated in drinking water because long-term high-level exposures have been associated with health effects. But because the same water source did not exceed the MCL for THMs when sampled in the spring, it is unlikely the household experienced long-term exposure to elevated THMs. Local authorities were notified of the situation for appropriate follow-up action. Haloacetic acids, another by-product of chlorination that is not currently regulated under federal statute, were also found in relatively high levels in this sample.

High sulfate levels were found in several water samples. Although not harmful, this may cause a bad taste or smell, or change the color of the water. Water samples taken in 1986-1991 of the Cameron County Public Water Supply Systems also indicated that sulfate levels were relatively high when compared with EPA's Secondary Maximum Contaminant Level, which is based on taste, smell, and color. In addition, the pilot project found that one sample from a municipal water supply contained tetrahydrofuran, an unregulated compound in drinking water, commonly used as a solvent. Tetrahydrofuran is not associated with health effects at low levels. Tetrahydrofuran was also detected in the Cameron County Water System (FWSD #1) during the 1989-1990 sampling period.

The private well water had observable levels of contamination in addition to the microbial contaminants noted above. Specifically, two agricultural pesticides were detected in the well water (atrazine and dacthal), but neither were at levels of concern. The well water also had relatively high nitrate, chloride, manganese, and molybdenum levels. These results are not unusual for a shallow (<50 feet) well located in a rural, agricultural area of the country.

Indoor and Outdoor Air

How the Information Was Collected

Air pollution sampling systems were placed both inside and outside each residence. The outdoor samplers were placed in the participant's yard. The indoor samplers were placed in the primary living space of the participant's home. The air sampling at each residence was performed for a 24-hour period. Separate pieces of equipment were used to collect each type of air pollutant measured: PAHs, volatile organic compounds (VOCs), pesticides, and chemical elements. The same types of equipment were used to collect outdoor air samples at a measuring station on top of a building in Brownsville, TX, near the border with Mexico. This outdoor measuring station is referred to as a "fixed site", because the measurements were always taken at the same location.

The air samples were sent to various private laboratories for analysis: Research Triangle Institute performed the analyses for PAHs, Southwest Research Institute performed the analyses for pesticides, ManTech Environmental Technology, Inc., weighed the samples and performed the carbon and elemental analyses, and Biospherics, Inc., performed the analyses for VOCs.

The results are compared with contaminant concentrations documented in the air during monitoring in other cities. For some compounds, there is an extensive database, whereas for other compounds, comparative data are not available. Thus, the ability to offer interpretation of the levels of air contamination found at these residences, with respect to levels found elsewhere, varies by compound.

The results are also compared with health-based screening levels set by the State of Texas. These Texas Effects Screening Levels (TESLs) are designed to evaluate potential health impacts. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather is an indication that some follow-up action, or further review, is warranted.

What the Results Show: Summary and Possible Explanations

The results do not document unusually high levels for any of the compounds measured at either the indoor or outdoor residential sites or fixed site. In all but two cases, the contaminant levels were below the Texas Effects Screening Levels (TESLs) and generally lower than pollutant results obtained in other studies. The two exceptions were, first, during the summer, chloroform was measured in the air inside one home at levels slightly higher than the TESL. Because the levels measured at this home were very low during the spring, it is unlikely that the family has received elevated exposure over a prolonged period, and no immediate follow-up is planned. Second, propane was measured in the air inside one home during the summer at levels above the TESL. Levels in the spring were elevated above the comparison data, but below the TESL. Health officials do not consider this exposure to be of immediate health concern, however, further investigation is planned when we present the results to the participant. These results suggest that there may be a malfunctioning gas burner and/or very small leak around a pipe fitting.

As has been found in other studies, indoor contaminant levels generally exceeded outdoor levels. VOCs and PAHs were higher in the spring than in the summer, possibly reflecting increased use of combustion sources. In contrast, concentrations of chemical elements and pesticides were higher in the summer, a finding that is consistent with increased farming activities and pesticide usage. Because the prevailing wind direction was from the north during the spring monitoring period, evaluation of air pollutant transport from Mexico was precluded. In general, the winds were more favorable for this type of comparison in the summer. A brief description, by type of chemical analysis, follows.

Elemental Results

Among the 42 elements assessed, only 13 to 20 were detected, depending on the season or the location (fixed, indoor, or outdoor). The total elemental loading (found by adding the concentration levels of all the elements) was higher in the summer than in the spring, and higher indoors than outdoors. For example, the total mass loading of measured elements was 11.2 $\mu g/m^3$ indoors during the summer and 8.2 $\mu g/m^3$ indoors during the spring. In contrast, the loading was 10.4 $\mu g/m^3$ outdoors in the summer, an increase from 3.8 $\mu g/m^3$ in the spring. Six elements had concentration levels above the chosen cut-off point of 100 ng/m^3 in each of the seasons and locations: calcium, chlorine, iron, potassium, silicon, and sulfur. Aluminum was found above 100 ng/m^3 in all locations except in the spring at the fixed location in Brownsville. In addition, zinc was found indoors during both sampling periods above 100 ng/m^3. The residential monitoring results exceed comparison values for bromine, calcium, chlorine, silicon, zinc, aluminum, iron, and lead in indoor air; and for bromine, calcium, chlorine, silicon, aluminum, iron, manganese, potassium, and titanium in outdoor air. Also, chlorine, silicon, iron, potassium, and titanium exceeded comparison values in outdoor air as measured at the fixed site. All of these elements are normally found in the soil in the southwest, and the concentrations most likely reflect transfer from the soil into the air.

Lead was measured indoors above the comparison value in one home during the spring at very low levels, but it was not detected at any of the residences (indoor or outdoor) in the summer. In addition, titanium, another element found in soil, was measured above 100 ng/m^3 outdoors and at the fixed site during the summer. The sulfur found in the air samples at the central site was primarily in the fine particulate. This sulfur is generally in the form of ammonia sulfate and is derived from sulfur dioxide (SO_2) from power plants using fossil fuels. In summary, the naturally occurring elements appear to be slightly higher in the air in the Valley than were documented in studies in non-agricultural areas, but the levels observed here are, nevertheless, very low.

VOC Results

Volatile organic compounds (VOCs) are air pollutants that are emitted into the air through a variety of mechanisms. Some VOCs are produced as a result of combustion processes; sources of combustion emissions including automobiles, cooking stoves, space heaters, and power tools such as lawn mowers. VOCs are also used in solvents. Examples of commercial facilities that may emit VOCs include dry cleaning establishments, automobile repair shops, and shoe repair shops. Some manufacturing processes also produce VOCs.

The indoor and outdoor air samples were analyzed for 78 VOCs; about 80 to 85% of these compounds showed measurable concentrations. In general, the concentrations of the compounds that were detected were lower than those observed in other exposure studies. There were some seasonal differences -- in the spring, 10 compounds were above 100 ng/m^3 indoors in at least one household: cis-2-butane, i-butane, i-butene, n-butane, n-pentane, trans-2-butane, methane, propane, propene, and 1-butane. However, in the summer, only 4 compounds were above this level -- i-butane, n-butane, methane, and propane. These observations are consistent with our knowledge of local sources. Specifically, the compounds found at elevated levels are typically found in auto exhaust, and they are also products from incomplete combustion of propane and butane gases used in kitchen stoves and home heating. For some residences, the VOC measurements indicated there were substantial levels of these VOCs which may be the result of a poor burner maintenance. The residential monitoring results exceed comparison values for i-butane, n-butane, n-pentane, propane, ethane, ethylene, 3-methylhexane, n-propylbenzene, and p-ethyltoluene in indoor air; and for cis-2-pentane, methyl cyclohexane, and propane in outdoor air. Also, cis-2-butene, cis-2-pentene, carbon tetrachloride, chloroform, and trichloroethene exceeded comparison values in outdoor air as measured at the fixed site. These combustion by-products were found at higher levels indoors in the spring than during the summer, possibly because the appliances were not in use during the summer sampling, or doors and windows were more likely to be open during the summer. There are few outdoor sources of these compounds, with the exception of methane, which is a natural, biologically related compound that is seen throughout the world.

The low concentrations of VOCs observed outdoors are consistent with the low air emission estimates for the area.

Pesticide Results

Pesticides are actively used in agriculture as herbicides, insecticides, and fungicides. Pesticides are also used for a variety of household purposes, including control of roaches, ants, and flies indoors, for control of weeds and pests in yards and gardens, and for control of fleas and ticks on pets.

In this pilot project, 22 separate pesticides were analyzed. However, because this list does not include all pesticides that have been used in the past or are being used currently in the Valley, conclusions cannot be drawn about whether residents are exposed to the other, unmeasured pesticides.

All levels of pesticides measured in the air were low. Consistent with the increased use of pesticides in the summer, more compounds were found above the detection limit in the summer monitoring season than in the spring monitoring season. In addition, the types of pesticides (herbicides vs. insecticides vs. fungicides) varied between the two monitoring seasons. For example, 3 of the 5 herbicides measured were detected in outdoor air in the spring, but only 1 was detected in the summer. DDT and atrazine were measured at levels greater than the comparison level at the fixed location in Brownsville. Indoors at the residential sites, atrazine, DDE, DDD, and DDT were greater than outdoor comparison values. Outdoors at the residential sites, DDD and permethrins were detected at levels above the comparison values. In contrast, 4 herbicides were detected in at least one of the indoor air samples in both seasons, an indication that these compounds persist or can be tracked indoors and are resuspended in the air during normal activities, such as sweeping or vacuuming.

When the compounds are sorted by whether or not they were measured above 100 ng/m^3, a similar seasonal pattern to that described in the preceding paragraph is displayed. Only two pesticides were found in the indoor air samples in the spring above the cut-off point: propoxur and chlorpyrifos. In the summer, four pesticides were found indoors (lindane, malathion, propoxur, and permethrin) and two pesticides were found outdoors (malathion and methyl parathion) above the cut-off point. These insecticides are commonly used during the respective sampling periods.

PAH Results

Polycyclic aromatic hydrocarbons (PAHs) are air pollutants that result from combustion processes and, as such, have a number of sources. Potential indoor sources include smoking, burning wood, and grilling or frying food. The most common outdoor source of PAHs is automobile exhaust. Because PAHs are usually present in air samples at very low levels, sophisticated and expensive monitoring methods are required and, as a consequence, only a few monitoring studies have been performed which include both indoor and outdoor measurements.

The indoor and outdoor air samples were analyzed for 17 separate PAHs in the spring and 15 PAHs in the summer. Fifteen of the 17 compounds were identified in the spring at the fixed location, as well as at the residences, both indoors and outdoors. However in the summer, whereas 13 of the 15 compounds were identified at the fixed location in Brownsville, only 7 were identified indoors and 6 outdoors at the residences. The concentrations in all of the air samples were typical of results found in other indoor monitoring studies.

The residential monitoring results exceed comparison values for benzo[g,h,i]perylene, pyrene, and anthracene in indoor air; and benzo[a]anthracene and coronene in outdoor air. Also, anthracene, benzo[g,h,i]perylene, coronene, fluoranthene, and pyrene exceeded comparison values in outdoor air as measured at the fixed site. With few exceptions, however, the PAH measurements were less than 100 ng/m^3. One indoor spring measurement of naphthalene did have a value of over 1100 ng/m^3. Naphthalene is commonly found in mothballs and is sometimes used as a wood preservative. Two other compounds had levels above 100 ng/m^3: phenanthrene and fluorene. Both of these compounds, which are usually found in indoor and outdoor air samples, serve as general indicators of combustion, and typically account for 50-75% of the total PAH mass. In this pilot project, phenanthrene and fluorene accounted for over 80% of the total PAH mass in the indoor samples (1.3 $\mu g/m^3$ in the spring and 1.1$\mu g/m^3$ in the summer). The total PAH mass outdoors was only 10-15% of the indoor PAH mass. The contribution of phenanthrene and fluorene accounted for about 50% of the outdoor total mass in the spring and about 70% in the summer. Total PAH mass loading in the spring was about 0.1 $\mu g/m^3$ higher than in the summer at the indoor, outdoor, and fixed site locations.

Household Dust and Soil

How the Information Was Collected

Elements, pesticides, and PAHs can accumulate in surface soil and street dust. These materials may then be carried into a home on shoes, clothing, and pets, and can be measured as "housedust." Information about levels of contaminants in soil and dust provides an indication of possible sources of exposure. Specifically, an individual may be exposed to contaminants by touching dusty or dirty surfaces. Particular concern has been raised about children, because they generally spend more time sitting and crawling on the floor and/or on the ground outdoors. Walking bare-foot is another way in which people come into contact with dust and soil. The presence of contaminants, particularly pesticides and chemical elements, in dust within the residence means that if they become resuspended in indoor air and that foods may become contaminated with soil and dust during preparation or consumption.

Samples of soil were collected from the surface of the roadway in front of each participant's home and from bare spots in their yard. Housedust was collected by vacuuming a part of the main living areas inside each participant's residence using a specially designed heavy-duty vacuum cleaner. To collect a sample of sufficient size for analysis, participants were asked not to sweep the room from which the sample would be taken on the day before monitoring.

The dust samples were analyzed for both pesticides and chemical elements; the soil samples were analyzed only for chemical elements. Laboratory analysis of the housedust samples for pesticides was performed by Southwest Research Institute. Laboratory analysis of both the housedust and outdoor soil samples for elements was performed by ManTech Environmental, Inc. Laboratory analysis of the housedust samples for PAHs was performed by Research Triangle Institute.

What the Results Show: Summary and Possible Explanations

It is important to reiterate that the measurement and interpretation of housedust and soil samples is a new and evolving science. Interpretation of measurements collected in this pilot project is difficult because there are few data with which to compare the results. In addition, the implications of contaminant levels in dust for potential human exposure is not well understood at this point. Because of these limitations, we simply present the results below, with little interpretation.

The laboratory analyses found 20 elements, 23 pesticides, and 17 PAH's in the housedust samples collected during the spring. This compares with 19 elements, 20 pesticides, and 14 PAHs detected in the summer. There was about 10 times more total pesticide residue in the housedust collected in the summer than in the spring. In addition, more herbicides and fungicides were found in the spring, whereas more insecticides were found in the summer. All of the households reported problems with roaches for which they used some method for insect control, including the use of household insecticides. Even though there were a large number of pesticides detected, the concentrations were low. The fact that all participants in this project reported sweeping their floors with a broom 3-5 times a day and wet-washing on the weekends, probably reduced the tendency to accumulate high concentrations in the housedust on the floor.

The pesticides found in housedust are similar to those found in indoor air. For example, in the spring, the pesticides found in the highest levels in the air were propoxur, chlorpyrifos, diazinon, and chlordane. These same four pesticides, as well as permethrin, were found to be the pesticides of highest concentrations in housedust during the spring. A similar relationship occurs for the summer results. In a few homes, levels of permethrins and carbaryls were detected at levels above comparison values, but below levels thought to cause health effects.

The consistency between the compounds found in the indoor air and in the housedust also holds for the chemical elements. In addition, the four roadway elements with the highest concentration levels are identical with the highest levels of elements in housedust. Also, the six elements with the highest concentrations in yardway soil samples are identical to the list of the first six elements in the housedust samples. Because this suggested that there was a redundancy in the measurements, soil sampling was discontinued in the subsequent summer sampling. In some homes, potassium and sulfur were detected in housedust at levels above the comparison values. In addition, copper, manganese, potassium, and sulfur were detected in the soil at levels above the comparison values. We are not aware of health effects associated with exposure to the levels of these elements that were found in this study.

For PAHs, we found cyclopenta[cd]pyrene in dust at a level above the comparison value, but below the level thought to cause health effects. There is little consistency between the PAH compounds identified in the air and the dust, which may be due to the very low levels of PAHs measured. Phenanthrene was the only compound that showed consistency between air and dust.

Biological Samples

How the Information Was Collected

Ideally, examination of blood and urine for the pesticide, elemental, and VOC metabolites monitored in air, water, food, and dust can be used to estimate the extent to which the compounds with which people come into contact actually get inside the body. Unfortunately, however, there are limitations to this approach. Some compounds breakdown and disappear very quickly, and thus do not remain in the body. Others are stored in various tissues, rather than blood or urine. In addition, analytical methods do not exist for a number of the compounds measured in the air, water, food, and dust. Therefore, comparisons between the environmental measurements and these "internal" measures of actual exposures are only possible for a few compounds.

During both the spring and summer, two adults in each household were asked to provide blood and urine samples. The blood was drawn by a specialist from a local hospital. Analysis of the blood and urine samples was performed by CDC. The blood samples were analyzed for selected pesticides, elements, and VOCs in the spring and for pesticides and elements during the summer. The urine samples were analyzed for pesticides and elements during both seasons.

The results are compared with data collected in 1988-1993 by the CDC's National Center for Health Statistics, as part of the National Health and Nutrition Examination Survey (NHANES III). For the compounds for which data from NHANES III were not available for comparison, the results were compared with those from previously published studies.

What the Results Show: Summary and Possible Explanations

In general, analysis of body fluids provides the best indication that a person has been exposed to a pollutant. However, the results from the analyses used in the pilot project should not be used to assess a person's health status.

Urine

With the exception of arsenic and 4-nitrophenol, a metabolite of the pesticide parathion, the measured concentrations of compounds in urine were within the range of values found in NHANES III or other health studies. Higher than average arsenic levels may be indicative of eating shellfish, since a less harmful form of arsenic is known to be contained in seafood, and most of the families reported eating fish or shellfish on occasion. Higher than average arsenic levels may also be indicative of past exposures to pesticide materials containing arsenic. Arsenic was not detected in indoor or outdoor air, soil, or household dust. However, the levels detected in the food and water samples were not sufficient to explain the levels observed in the urine samples.

Pesticide residues, including naphthol, nitrophenol, 2,4-D, 2,4,5-trichlorophenol, and chlorpyrifos were found in the urine of some of the participants at levels above the comparison values. These levels may be indicative of past or present exposure to agricultural and household pesticides. It is not unusual to find small amounts of pesticides in urine from people across the country, particularly in agricultural areas, and no known health problems have been associated with these low levels.

Blood

Pesticide residues, including trans-nonachlor, DDE, heptachlor epoxide, hexachlorobenzene, and oxychlordane were found in the blood of some of the participants at levels above the comparison values. These residues are very persistent in human blood and can be detected long after exposure. The observed levels may be indicative of past or present exposure to agricultural and household pesticides. It is not unusual to find small amounts of pesticides in blood from people across the country, particularly in agricultural areas, and no documented health problems have been associated with these low levels.

In general, the concentrations of VOCs, pesticides, and elemental metabolites found in the blood in this pilot project were comparable to those detected in NHANES III. Elevated PCB levels were measured in the two participants who ate fish contaminated with high levels of PCBs. Metabolites of some persistent chlorinated pesticides, especially DDT and heptachlor, neither of which are allowed to be used in the U.S. anymore, were found in the blood of several participants. Further study is warranted however, to determine actual pesticide exposures to the community.

In addition, certain VOCs (bromodichloromethane, bromoform, dibromochloromethane, butanone, xylene, and tetrachloroethene) were detected in the blood of several of the participants. These compounds may result from the type of water supply disinfection used in the Valley, which includes the use of chlorine. No known health significance is attached to these findings, but it is suggested that they be explored more thoroughly in future studies.

In summary, with the exception of PCBs in the participants' blood from one household, the blood and urine values for the participants in this pilot project were similar to those often seen in other parts of the country. Thus, participants were reassured that at this time, their results do not show significant exposure to the environmental contaminants that were measured.

Appendix 1

Contributors to the Lower Rio Grande Valley Exposure Study

United States Environmental Protection Agency:

Office of Research & Development
Region 6 Office (Texas Region)
Region 9 Office (Arizona and California)

United States Public Health Services:

Agency for Toxic Substance and Disease Registry
Centers for Disease Control and Prevention
Food and Drug Administration
National Institute of Occupational Safety and Health
Office of International Health
Texas Region/USPHS

State of Texas:

Office of the Governor
Texas Department of Agriculture
Texas Department of Health
Texas Natural Resource Conservation Commission
University of Texas at Brownsville

Under contract to the U.S. Environmental Protection Agency:

Biospherics, Inc.
Eastern Research
ManTech Environmental Technology, Inc.
Research Triangle Institute
Southwest Research Institute

Appendix 2

A Guide to Understanding the Results of the Pilot Project

Tables of Results

This Appendix contains tables that display the results of the pilot project of the Lower Rio Grande Valley Environmental Monitoring Study. The tables for each type of sample collected are presented in different sections. The sections include: indoor and outdoor air (residential), fixed monitoring station air, household water, 24-hour diet, individual food items, housedust, soil, blood, and urine. Within each section, a separate table is provided for each class of compound analyzed: elements, polycyclic aromatic hydrocarbons (PAHs), pesticides and polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), nutrients, and natural toxins. Each table has three parts: the first part summarizes the results of the monitoring conducted during the spring, the second part summarizes the results of the monitoring conducted during the summer, and the third part displays the available comparison data.

Part One: Spring Results

Part one of each table summarizes the results of the monitoring conducted during the spring of 1993. The first column lists the name of the compounds analyzed in the given compound class for the specific type of sample (e.g., elements in air or VOCs in blood). This column only lists compounds that were detected in at least one household. The @ footnotes list the other compounds for which laboratory analysis was performed, but no samples had results above the limit of detection. The second column gives the number of households in which the compound was found above the detection limit. For instance, aluminum was detected in the indoor air in 6 homes and in the outdoor air at 1 home. The maximum number in this column will be nine, as only nine households were monitored during the spring. The third column shows the lowest value that was found at a level above the limit of detection. Thus, if the compound was only detected in six of the nine households, the number listed in the column labeled "lowest" is the lowest among the six households in which the compound was detected. The fourth column lists the highest concentration above the limit of detection recorded across the nine households.

In addition, tables for residential air include separate columns of results for indoor versus outdoor air sampling. The tables of blood and urine results include separate columns for the results of samples collected from the primary versus the secondary participant. And the tables of soil results include separate columns for the results from samples collected from the road versus the yard. The tables for local food items include a description of the food item and the location where it was collected. Nutrient results also include the median value from the nine households.

In reviewing these data, it is important to emphasize that the results of this small-scale pilot project cannot be generalized. The data presented below represents only the people, period, and locations sampled. The interpretation of the pilot findings is limited by four factors: (1) the number of participants, (2) the very short time during which samples were collected in each home, (3) the limited portion of the year represented by the monitoring period, and (4) the comparison values available to represent other monitoring results.

Specifically, information was collected at nine households in the two-county area. These nine households may not be representative of the larger study area (Cameron and Hidalgo Counties). Rather, the households were chosen to provide information for households with a variety of characteristics. In addition, the measurements collected at these residences were obtained during a single 24-hour period, with a 24-hr follow-up in six of the nine houses. Thus, these data are indicative only of those short time periods. Caution must be used in using 24-hour measurements to make assumptions about chronic or long-term exposures.

Part Two: Summer Results

The second part of each table presents the results of the monitoring conducted in the summer of 1993. The format of the tables is identical to that in part one. The differences that are important for interpretation of the results are as follows. First, only six of the nine household who participated in the spring monitoring participated in the summer. Thus, the maximum number of household that can be listed in the "# Detects" column is 6. Second, some of the classes of compounds analyzed during the spring were not analyzed during the summer. In particular, there are no summer results for VOCs in blood, for elements in food, for microbiologicals and other selected chemical elements in water, for PAHs in food, or elements in soil. Third, some individual compounds were added to the list of analytes for summer that were not included in the spring; similarly, a few of the individual compounds analyzed in the spring were not analyzed in the summer. Thus, the lists of compounds are not identical between parts one and two of the tables. Footnotes to the tables explain the differences in the compound lists between the seasons.

Part Three: Comparison Data

The third part of each table lists the compounds detected in either the spring or the summer along with the available comparison data. Two types of comparison data are provided:

health-based regulatory values and/or information on pollutant levels collected in other places. Regulatory values are criteria established by federal or state governments to protect human health. Such regulatory values are available for many of the water and air contaminants that were studied. The comparison data table for water lists the Maximum Contaminant Levels (MCLs) or Health Advisory Levels relevant to each compound, where available. The comparison portions of the air tables list the Texas Effects Screening Levels (TESLs), where available.

Each of the tables, with the exception of the water and food tables, also lists typical and high values documented in previously conducted exposure studies. The water table only provides health-based levels for comparison and the food tables provide advisory levels and, where relevant, contaminants found in food are compared with Market-Basket data collected by the Food and Drug Administration (FDA).

The footnotes on each table define the "typical" and "high" values provided in each table. In most cases the typical value is either the median (i.e., the 50th percentile) or the arithmetic average. The high value listed is usually the 95th percentile, but is sometimes the maximum.

The availability of comparison data for many of the compounds studied in this project, however, is very limited. Few exposure studies have been conducted that are as detailed as the pilot project conducted in the Lower Rio Grande Valley. Some of the comparison data come from national studies conducted by government agencies. For instance, the levels of many of the compounds analyzed in blood and urine can be compared with levels found in the CDC's National Health and Nutrition Examination Survey. On the other hand, the comparison data available for indoor air pollutants is based on smaller-scale studies limited to only a few cities. The data available for comparing housedust and soil contamination levels is even more limited, as this form of data collection is still new.

The limited availability of comparison data and regulatory screening levels suggests that the comparisons provided can be used only to provide perspective. A result that shows that levels of a certain contaminant are higher in the Lower Rio Grande Valley than in the comparison data does not imply that there is likely to be health consequences from such exposure levels, nor that levels are consistently high. Such a result only implies that further study may be appropriate.

DEFINITION OF TERMS:

Metabolite: a compound that results when a chemical is broken down by the body or in the environment.

Median:	the midpoint value: exactly half of the participants will have a result equal to or higher than the median and half of the participants will have a result equal to or lower than the median.
Mean:	the value which is halfway between the highest and the lowest value; the average
95th %:	95 of 100 people tested might be expected to have a result equal to or lower than this value.
Maximum:	the highest value recorded.
Detection Limit:	the smallest amount which can be reliably measured by the procedure used.
Primary Participant:	the person who answered most of the questions during the study
Secondary Participant:	a second adult who provided blood and/or urine samples

Appendix 3

Tables of Pilot Project Results

Food Nutrient Results from Residential Monitoring
24-Hour Combined Solid Food and Beverage Elemental Results from Residential Monitoring
Pesticide Results for 24-Hour Solid Food Sample
Food PAH Results from Residential Monitoring
Elemental Results for Local Foods
Pesticide Results for Local Foods
Biotoxin Levels Found in Local Food Samples
Household Water Results from Residential Monitoring
Air Elemental Fine Particle Results from Residential Monitoring
Fixed Site Outdoor Air Elemental Fine Particle Results
Air VOC Results from Residential Monitoring
Fixed Site Outdoor Air VOC Results
Air Pesticide Results from Residential Monitoring
Fixed Site Air Pesticide Results
Air PAH Results from Residential Monitoring
Fixed Site Outdoor Air Monitoring Results for PAHs
House Dust Elemental Results from Residential Monitoring
Soil Elemental Results from Residential Monitoring
House Dust Pesticide Results from Residential Monitoring
House Dust PAH Results from Residential Monitoring
Urine Element Results from Residential Monitoring
Urine Pesticide Results from Residential Monitoring
Blood Element Results from Residential Monitoring
Blood Pesticide and Polychlorinated Biphenyl Results from Residential Monitoring
Blood VOC Results from Residential Monitoring

Food Nutrient Results[1] from Residential Monitoring (24-hour Composite Diet for 9 Participants)
Units in Daily Intake for 24 Hours

NUTRIENT*	SPRING RESULTS			
	SOLID FOOD			
	#Analyses[2]	Detectable Results		Median
		Lowest	Highest	
MAJOR NUTRIENTS & CALORIES				
Protein (g)	8	19.7	58.2	47.3
Carbohydrate (g)	8	84.1	263	137
Fat (g)	8	16.0	98.7	44.7
Calories (cal)	8	631	2050	1180
Fat (% Total cal)	8	22.8	54.5	35.1
VITAMINS				
Vitamin C (mg)	5	0.02	32.8	2.9
Riboflavin (mg)	7[3]	0.4	1.2	0.8
Niacin (mg)	8	7.1	16.8	11.4
Vitamin B12 (μg)	8	1.1	3.0	2.1
Folic Acid (μg)	6	66.7	108	91.0
Biotin (μg)	4	10.2	11.3	10.8
Total Vitamin A (IU)	8	5550	11000	9360
Vitamin E (IU)	8	33.2	95.8	46.0
MINERALS				
Calcium (mg)	8	215	395	308
Phosphorus (mg)	8	419	1060	682
Magnesium (mg)	8	126	291	159
Potassium (mg)	8	987	2320	1470

Food Nutrient Results[1] from Residential Monitoring (24-hour Composite Diet for 9 Participants)
Units in Daily Intake for 24 Hours

NUTRIENT@	SPRING RESULTS			
	SOLID FOOD			
	#Analyses[2]	Detectable Results		Median
		Lowest	Highest	
Sodium (mg)	8	1440	2860	2000
Chloride (mg)	8	2080	4050	2870
Iron (mg)	8	6.1	15.3	8.9
Manganese (mg)	8	0.9	2.6	1.4
Copper (mg)	8	0.6	1.5	0.7
Zinc (mg)	8	2.9	10.1	5.2
Selenium (μg)	7	34.2	90.1	70.9

1 Samples analyzed by FDA - Washington DC, Center for Food Safety and Applied Nutrition; information listed is for solid foods only.
2 The data for one participant who ate most meals out of the home was excluded from this table.
3 One value excluded due to laboratory QA.
@ The following vitamins were not measured in the Spring:

Pantothenic acid
Thiamin
Vitamin B_6

Food Nutrient Results[1] from Residential Monitoring (24-Hour Composite Diet for 6 Participants)
Units in Daily Intake for 24 Hours

NUTRIENT●	SUMMER RESULTS			
	SOLID FOOD			
	#Analyses	Detectable Results		Median
		Lowest	Highest	
MAJOR NUTRIENTS & CALORIES				
Protein (g)	6	31.6	53.1	44.3
Carbohydrates (g)	6	78.7	177	118
Fat (g)	6	48.7	64.7	57.8
Calories (cal)	6	990	1380	1190
Fat (% Total cal)	6	33.5	51.3	44.2
VITAMINS				
Vitamin C (mg)	6	NR	NR	NR
Vitamin B6 (mg)	6	0.06	0.12	0.07
Riboflavin (mg)	6[+]	0.3	0.9	0.7
Thiamin (mg)	6	0.4	1.0	0.7
Niacin (mg)	6	6.0	15.2	10.3
Pantothenic Acid (mg)	5[+]	1.4	3.1	1.8
Vitamin B12 (μg)	6	1.1	3.1	2.4
Folic Acid (μg)	6	31.2	74.8	54.9
Total Vitamin A (IU)	6	1660	3790	2710
Biotin (μg)	6	9.0	29.2	19.4
Vitamin E (IU)	6	18.6	46.5	33.9
MINERALS				
Calcium (mg)	6	146	408	244

Food Nutrient Results[1] from Residential Monitoring (24-Hour Composite Diet for 6 Participants)
Units in Daily Intake for 24 Hours

NUTRIENT@	SUMMER RESULTS			
	SOLID FOOD			
	#Analyses	Detectable Results		Median
		Lowest	Highest	
Phosphorus (mg)	6	593	845	636
Magnesium (mg)	6	83.1	192	145
Potassium (mg)	6	928	1690	1280
Sodium (mg)	6	1320	2470	2090
Chloride (mg)	6	1840	3490	3250
Copper	6	0.4	0.6	0.5
Iron (mg)	6	5.0	10.4	8.0
Manganese (mg)	6	0.9	1.8	1.4
Zinc (mg)	6	3.0	9.8	5.0

1 Samples analyzed by FDA - Washington DC, Center for Food Safety and Applied Nutrition; information listed is for solid foods only.
\+ One value was at the limit of quantitation.
NR Not reported.
@ The following mineral was not measured in the Summer:

Selenium

Food Nutrient Comparison Data
All Units in Daily Intake for 24 Hours

NUTRIENT	COMPARISON DATA[1] DAILY REFERENCE VALUE
MAJOR NUTRIENTS & CALORIES	
Protein (g)	46-63
Carbohydrate (g)	177-287
Calories (cal)	1900-2900
Fat (% Total cal)	≤30
VITAMINS	
Vitamin C (mg)	60
Vitamin B6 (mg)	1.6-2.0
Riboflavin (mg)	1.2-1.7
Thiamin (mg)	1.0-1.2
Niacin (mg)	13-19
Pantothenic Acid (mg)	4-7
Vitamin B12 (μg)	2-3
Folic Acid (μg)	180-200
Biotin (μg)	30-100
Total Vitamin A (IU)	8000
Vitamin E (IU)	30
MINERALS	
Calcium (mg)	800-1200
Phosphorus (mg)	800-1200
Magnesium (mg)	280-350
Potassium (mg)	2000

Food Nutrient Comparison Data
All Units in Daily Intake for 24 Hours

NUTRIENT	COMPARISON DATA[1] DAILY REFERENCE VALUE
Sodium (mg)	500
Chloride (mg)	750
Iron (mg)	10-15
Manganese (mg)	2-5
Copper (mg)	1.5-3.0
Zinc (mg)	12-15
Selenium (μg)	55-70

1 Reference values listed are ranges of average daily intakes for adults, females and males, ages 19-50 and 51+ years. Values are from the 10th edition (1989) of the National Research Council's Recommended Daily Allowances. Dietary allowances are average daily intakes over time. Although the reference daily allowances (RDAs) are most appropriately applied to groups of individuals, a comparison of individual intakes, averaged over a sufficient length of time, to the RDA allows an estimate to be made about the probable risk of deficiency for that individual.

24-Hour Combined Solid Food and Beverage Elemental Results[1] from Residential Monitoring
Units in μg/day - Daily Intake

ELEMENT[@]	#DETECTS		SPRING RESULTS[2]	
	Solids	Beverages	Detectable Results	
			Lowest	Highest
Aluminum	9	9	785	41200
Arsenic	1	0	43.6	43.6
Cadmium	8	1	4.1	12.5
Lead	6	9	3.5	126
Mercury	2	3	1.1	2.3
Nickel	9	8	28.6	420
Strontium	9	9	2080	3760

1 Analyzed by FDA - Kansas City Laboratories.
2 Reported for Spring phase only; no elemental analyses for foods in the Summer phase.
@ The following analyte was analyzed for but was not detected:

Antimony

24-Hour Combined Solid Food and Beverage Elemental Comparison Data
All Units in μg/day - Daily Intake

ELEMENT[a]	COMPARISON DATA
Aluminum	12000[1]
Arsenic	23.3[2]
Cadmium	9.0[2]
Lead	3.3[2]
Mercury	2.4[2]
Nickel	106[3]
Strontium	999[3]

1 Pennington, J.A.T. and Jones, J.W. Aluminum and Health: A Critical Review. Ed. by H. Gitelman, 1989. Marcel Dekkar Publisher, p.67.
2 Five market basket surveys conducted by FDA-KC Lab between April 1990 and April 1991 for females age 25-30.
3 Pennington, J.A.T. and Jones, J.W. Journal of the American Dietetic Association Vol. 87, 1987, p. 169. (One market of 234 foods in June/July 1984).

Pesticide Results[1] for 24-Hour Solid Food Sample (9 Households)

PESTICIDE[@]	SPRING RESULTS				
	Results in µg/g			Results in µg/kg body weight per day	
	#Detects	Detectable Results		Detectable Results	
		Lowest	Highest	Lowest	Highest
Chlorpropham	2	0.020	0.030	0.203	0.342
DCPA	1	0.002	0.002	0.021	0.021
DDE, p,p'-	1	0.009	0.009	0.092	0.092
Lindane	1	0.116	0.116	1.18	1.18
Malathion	2	0.004	0.006	0.041	0.068
Permethrin, cis	1	0.055	0.055	0.454	0.454
Permethrin, trans	1	0.074	0.074	0.611	0.611
Pirimiphos-methyl	2	0.005	0.064	0.057	1.00

1 Data provided by FDA-Kansas City; data reported for solid foods only; only DDE was found in the beverage samples (one positive finding of .002µg/g).
@ The following pesticides were analyzed for but were not detected.

Acephate
Alachlor
Aldrin
Anilazine
Azinphos-ethyl
Azinphos-methyl
Azinphos-methyl oxygen analog
Benfluralin
Benoxacor
Bensulide
Bifenox
Bromophos
Bromophos-ethyl
BHC, alpha-
BHC, beta
BHC, delta
Cadusafos
Captan
Carbophenothion
Carbophenothion oxygen analog
Carbophenothion sulfone
Chlorbenside
Chlorbromuron
Chlordane, cis-
Chlordane, trans-
Chlordecone
Chlordene
Chlorfenvinphos, alpha-
Chlorfenvinphos, beta-
Chlornitrofen
Chlorobenzilate
Chloropropylate
Chlorothalonil
Chlorpyrifos
Chlorpyrifos oxygen analog
Chlorpyrifos-methyl
Chlorthiophos
Chlorthiophos oxygen analog
Chlorthiophos sulfone
Chlorthiophos sulfoxide
Coumaphos
Coumaphos oxygen analog
Crotoxyphos
Crufomate
Cyanofenphos
Cyanophos
Cypermethrin
Deltamethrin
Demeton-O
Demeton-O sulfone
Demeton-O sulfoxide
Demeton-S
Demeton-S sulfone
Des-N-isopropyl isofenphos
Dialifor
Diazinon
Diazinon oxygen analog
Dichlobenil
Dichlofenthion
Dichlorobenzene, p-
Dichlorvos
Diclofop-methyl
Dicloran
Dicofol, p,p'-
Dicrotophos
Dieldrin
Dimethoate
Dioxabenzofos
Dioxathion
Disulfoton
Disulfoton sulfone
DDE, o,p'-
DDT, o,p'-
DDT, p,p'-
DEF
Endosulfan sulfate
Endosulfan I
Endosulfan II
Endrin
Endrin alcohol
Endrin aldehyde

Pesticide Results[1] for 24-Hour Solid Food Sample (9 Households)

Endrin ketone
Esfenvalerate
Ethalfluralin
Ethiofencarb
Ethion
Ethion oxygen analog
Ethoprop
Etridiazole
Etrimfos
Etrimfos oxygen analog
EPN
Famphur
Famphur oxygen analog
Fenamiphos
Fenamiphos sulfone
Fenamiphos sulfoxide
Fenarimol
Fenitrothion
Fenitrothion oxygen analog
Fenoxaprop ethyl ester
Fensulfothion
Fensulfothion oxygen analog
Fensulfothion sulfone
Fenthion
Fenthion oxygen analog
Fenthion oxygen analog sulfoxide
Fenthion sulfone
Fenvalerate
Fluazifop butyl ester
Fonofos
Fonofos oxygen analog
Formothion
Gardona
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Iprobenfos
Isofenphos
Isofenphos oxygen analog
Lactofen
Leptophos
Leptophos oxygen analog
Leptophos photoproduct
Linuron
Malathion oxygen analog
Mecarbam
Mephosfolan
Merphos
Metasystox thiol
Methamidophos
Methidathion Methoxychlor olefin
Methoxychlor, p, p'-
Mevinphos, (E)-
Mevinphos, (Z)-
Mirex
Monocrotophos
Naled
Nitrofen
Nitrofluorfen
Nonachlor, cis
Nonachlor, trans
Octachlor epoxide
Omethoate
Ovex
Oxadiazon
Oxydemeton-methyl
Oxydemeton-methyl sulfone
Parathion
Parathion oxygen analog
Parathion-methyl
Pentachloroaniline
Pentachlorobenzene
Pentachlorobenzonitrile
Pentachlorophenyl methyl ether
Pentachlorophenyl methyl sulfide
Perthane
Phenthoate
Phorate
Phorate oxygen analog
Phorate sulfone
Phorate sulfoxide
Phosalone
Phosalone oxygen analog
Phosmet
Phosphamidon
Photodieldrin
Phoxim oxygen analog
Piperophos
Pirimiphos-ethyl
Pirimiphos-ethyl oxygen analog
Polychlorinated biphenyls
Procymidone
Profenofos
Prometryn
Propetamphos
Prothiofos
Prothoate
Pyrazophos
Pyridaphenthion
PPG-1576
Quinalphos
Quintozene
Ronnel
Ronnel oxygen analog
Schradan
Strobane
Sulfallate
Sulfotep
Sulprofos
Sulprofos oxygen analog sulfone
Sulprofos sulfone
Sulprofos sulfoxide
Tecnazene
Terbufos
Terbufos oxygen analog
Terbufos oxygen analog sulfone
Terbufos sulfone
Tetradifon
Tetraiodoethylene
Tetrasul
Thiobencarb
Thiometon
Thionazin
Toxaphene
Tri-allate
Triazophos
Trichlorfon
Trichloronat
Trichloronat oxygen analog
Tris(beta-chloroethyl) phosphate
Tris(chloropropyl) phosphate
TDE, o,p'-
TDE, p,p'-
TDE, p,p'-, olefin
TEPP
Vinclozolin
1,2,3-trichlorobenzene

Pesticide Results[1] for 24-Hour Solid Food Sample (6 Households)

PESTICIDE@	SUMMER RESULTS				
	Results in μg/g			Results in μg/kg body weight per day	
	#Detects	Detectable Results		Detectable Results	
		Lowest	Highest	Lowest	Highest
Chlorpropham	3	0.010	0.053	0.085	0.494
Chlorpyrifos methyl	1	0.004	0.004	0.036	0.036
Dieldrin	1	0.018	0.018	0.162	0.162
DDE, p,p'-	1	0.030	0.030	0.270	0.270
DDT, p,p'-	1	0.004	0.004	0.036	0.036
Malathion	4	0.003	0.009	0.017	0.072
Profenofos	1	0.009	0.009	0.069	0.069

1 Data provided by FDA-Kansas City; data reported for solid foods only; only Dieldren was found in one beverage at 0.002 μg/g.
@ The following pesticides were analyzed for but were not detected:

Acephate
Alachlor
Aldicarb
Aldicarb sulfone
Aldrin
Anilazine
Azinphos-ethyl
Azinphos-methyl
Azinphos-methyl oxygen analog
Benfluralin
Benoxacor
Bensulide
BHC, alpha-
BHC, beta
BHC, delta
Bifenox
Bromophos
Bromophos-ethyl
Bufencarb
Cadusafos
Captan
Carbaryl
Carbofuran
Carbophenothion
Carbophenothion oxygen analog
Carbophenothion sulfone
Chlorbenside
Chlorbromuron
Chlordane, cis-
Chlordane, trans-
Chlordecone
Chlordene
Chlorfenvinphos, alpha-
Chlorfenvinphos, beta-
Chlornitrofen
Chlorobenzilate
Chloropropylate
Chlorothalonil
Chlorpyrifos
Chlorpyrifos oxygen analog
Chlorthiophos
Chlorthiophos oxygen analog
Chlorthiophos sulfone
Chlorthiophos sulfoxide
Coumaphos
Coumaphos oxygen analog
Crotoxyphos
Crufomate
Cyanofenphos
Cyanophos
Cypermethrin
Deltamethrin
Demeton-O
Demeton-O sulfone
Demeton-O sulfoxide
Demeton-S
Demeton-S sulfone
Des-N-isopropyl isofenphos
Dialifor
Diazinon
Diazinon oxygen analog
Dichlobenil
Dichlofenthion
Dichlorobenzene, p-
Dichlorvos
Diclofop-methyl
Dicloran
Dicofol, p,p'-
Dicrotophos
Dimethoate
Dioxabenzofos
Dioxathion
Disulfoton
Disulfoton sulfone
DDE, o,p'-
DDT, o,p'-
DEF
Endosulfan sulfate
Endosulfan I
Endosulfan II
Endrin
Endrin alcohol
Endrin aldehyde
Endrin ketone
Esfenvalerate
Ethalfluralin
Ethiofencarb
Ethion
Ethion oxygen analog
Ethoprop
Etridiazole

Pesticide Results[1] for 24-Hour Solid Food Sample (6 Households)

Etrimfos
Etrimfos oxygen analog
EPN
Famphur
Famphur oxygen analog
Fenamiphos
Fenamiphos sulfone
Fenamiphos sulfoxide
Fenarimol
Fenitrothion
Fenitrothion oxygen analog
Fenoxaprop ethyl ester
Fensulfothion
Fensulfothion oxygen analog
Fensulfothion sulfone
Fenthion
Fenthion oxygen analog
Fenthion oxygen analog sulfoxide
Fenthion sulfone
Fenvalerate
Fluazifop butyl ester
Fonofos
Fonofos oxygen analog
Formothion
Gardona
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Iprobenfos
Isofenphos
Isofenphos oxygen analog
Lactofen
Leptophos
Leptophos oxygen analog
Leptophos photoproduct
Lindane
Linuron
Malathion oxygen analog
Mecarbam
Mephosfolan
Merphos
Metasystox thiol
Methamidophos
Methidathion
Methoxychlor olefin
Methoxychlor, p, p'-
Mevinphos, (E)-
Mevinphos, (Z)-
Mirex
Monocrotophos
Methiocarb
Methomyl
Nitrofen
Nitrofluorfen
Nonachlor, cis
Nonachlor, trans
Octachlor epoxide
Omethoate
o,p'- Methoxychlor
Ovex
Oxadiazon
Oxydemeton-methyl
Oxydemeton-methyl sulfone
Parathion
Parathion oxygen analog
Parathion-methyl
Pentachloroaniline
Pentachlorobenzene
Pentachlorobenzonitrile
Pentachlorophenyl methyl ether
Pentachlorophenyl methyl sulfide
Perthane
Phenthoate
Phorate
Phorate oxygen analog
Phorate sulfone
Phorate sulfoxide
Phosalone
Phosalone oxygen analog
Phosmet
Phosphamidon
Photodieldrin
Phoxim oxygen analog
Piperophos
Pirimiphos-ethyl
Pirimiphos-ethyl oxygen analog
Polychlorinated biphenyls
Procymidone
Prometryn
Propetamphos
Prothiofos
Prothoate
Pyrazophos
Pyridaphenthion
PPG-1576
Quinalphos
Quintozene
Ronnel
Ronnel oxygen analog
Schradan
Strobane
Sulfallate
Sulfotep
Sulprofos
Sulprofos oxygen analog sulfone
Sulprofos sulfone
Sulprofos sulfoxide
Tecnazene
Terbufos
Terbufos oxygen analog
Terbufos oxygen analog sulfone
Terbufos sulfone
Tetradifon
Tetraiodoethylene
Tetrasul
Thiobencarb
Thiometon
Thionazin
Toxaphene
Tri-allate
Triazophos
Trichlorfon
Trichloronat
Trichloronat oxygen analog
Tris(beta-chloroethyl) phosphate
Tris(chloropropyl) phosphate
TDE, o,p'-
TDE, p,p'-
TDE, p,p'-, olefin
TEPP
Vinclozolin
1,2,3-trichlorobenzene
2,3,6-TBA
2,4-D
2,4,5-T
3-Hydroxy carbofuran
4(2,4-DB)
4(2,4,5-TB)
Naled

Pesticide Results for 24-Hour Solid Food Sample
Comparison Data

PESTICIDE	COMPARISON DATA		
	ADI[1]	RFD[2]	TOTAL DIET[3]
Chlorpropham	NA	200	0.1824
DCPA	NA	500	0.0029
DDE, p,p'-	20[4]	0.5[5]	0.0103[4]
Lindane	8	0.3	0.0005
Malathion	20	20	0.0446
Permethrin, cis	50[6]	50[6]	0.0391[6]
Permethrin, trans	50[6]	50[6]	0.0391[6]
Pirimiphos-methyl	10	10	0.0014
Chlorpyrifos-methyl	1	NA	0.013
Dieldrin	0.1	0.05	0.0016
DDT,p,p'-	20[4]	0.5[5]	0.0103[4]
Profenofos	10	NA	<0.0001

1 Acceptable Daily Intake (1990 revisions) established by FAO/WHO expressed in μg/kg body weight/day
2 Reference Dose established by EPA; (1991 revisions), expressed in μg/kg body weight per day.
3 Total Diet Study conducted by the Food & Drug Administration for females age 60-65 years old, 1990, expressed in μg/kg body weight per day.
4 Includes parent compound.
5 Parent compound only.
6 Denotes that reference information is for the sum of concentrations for cis and trans permethrin.
NA Not available.

Food Polycyclic Aromatic Hydrocarbon Results[1] from Residential Monitoring
(9 Primary Participants)
Units in μg/day - Daily Intake

PAH@	SPRING RESULTS		
	#Detects	Detectable Results	
		Lowest	Highest
Benzo(a)anthracene/Chrysene[2]	2	1.5	1.6
Benzo(a)pyrene	3	0.3	0.6
Benzo(g,h,i)perylene	2	0.6	1.0
Benzo(e)pyrene/Benzo(k)fluoranthene[2]	2	0.2	0.3
Fluoranthene	7	1.5	10.1
Naphthalene	5	1.2	4.4
Pyrene	1	1.4	1.4

1 Samples analyzed by RTI.
2 Sum of two compounds reported.
@ The following analytes were analyzed for but were not detected:

Anthracene
Coronene
Dibenzo(a,h)anthracene
Fluorene
Indeno[1,2,3,c,d]pyrene
Phenanthrene

Food Polycyclic Aromatic Hydrocarbon (PAH) Comparison Data
All Units in μg/day - Daily Intake

PAH	COMPARISON DATA[1]
Benzo(a)anthracene/Chrysene[2]	1.89
Benzo(a)pyrene	0.29
Benzo(g,h,i)perylene	0.36
Benzo(e)pyrene/Benzo(k)fluoranthene	NA/0.14
Fluoranthene	2.7
Naphthalene	NA
Pyrene	NA

1 No comparison data are available for PAH's in 24-hour diets consumed in the US; comparison values are the maximum values for diets for the Netherlands and United Kingdom (deVos, R.H. et al., Food Chem. Toxic. 28(4), 1990).

2 Sum of two compounds reported.

NA Not available.

Elemental Results[1] for Local Foods (Spring)
Units in $\mu g/g$

ELEMENTS[5]	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUE[3]
Al-Aluminum[4]	Black Drum Fish	Cleaned	L	0.211	NA
	Cabbage	Raw	R	0.402	0.130
	Cabbage	Raw	R	2.81	0.130
	Calf Liver	Fresh	L	0.219	0.540 (Beef)
	Carp	Cleaned & Frozen	R	6.68	NA
	Catfish	Whole	L	0.166	NA
	Cilantro	Fresh	M	22.1	0.081 (Lettuce)
	Cola	Canned	R	0.168	0.114
	Fish-Gar	Cleaned	M	0.328	NA
	Garlic	Whole	M	28.7	NA
	Grapefruit	Whole	R	0.214	0.041
	Jalapeno Pepper	Fresh	M	1.82	0.386 (Sweet)
	Mexican Squash	Whole	M	0.661	0.793
	Orange	Whole	M	0.223	0.148
	Potato	Whole	M	1.49	25.8
	Shrimp	Headless, in-shell, fresh	L	9.06	8.09
	Tomato	Whole	M	0.198	0.546
	White Cheese	Soft	M	0.407	411 (Amer. Proc. Cheese)
	White Cheese	Soft	R	1.03	411
	White Cheese	Soft	R	1.46	411
	White Cheese	Soft	R	2.06	411
As-Arsenic	Black Drum Fish	Cleaned	L	2.65	7.31 (Cod/Haddock)
	Calf Liver	Fresh	L	0.042	0.06
	Catfish	Whole	L	0.032	7.31 (Cod/Haddock)
	Cilantro	Fresh	M	0.069	NA
	Garlic	Whole	M	0.033	NA
	Shrimp	Headless, in-shell, fresh	L	2.26	5.46

Elemental Results[1] for Local Foods (Spring)
Units in $\mu g/g$

ELEMENTS*	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUE[3]
Cd-Cadmium	Avocado	Whole	M	0.006	0.16
	Black Drum Fish	Cleaned	L	0.018	0.054 (Cod/Haddock)
	Cabbage	Raw	R	0.011	0.014
	Cabbage	Raw	R	0.005	0.014
	Calf Liver	Fresh	L	0.043	0.334
	Carp	Cleaned & frozen	R	0.008	0.054 (Cod/Haddock)
	Catfish	Whole	L	0.002	0.054 (Cod/Haddock)
	Cilantro	Fresh	M	0.153	NA
	Cola	Canned	R	0.001	0.006
	Fish-Gar	Cleaned	M	0.001	0.054 (Cod/Haddock)
	Garlic	Whole	M	0.016	NA
	Grapefruit	Whole	R	0.002	0.005
	Jalapeno Pepper	Fresh	M	0.027	0.110 (Sweet)
	Mexican Squash (Tatome)	Whole	M	0.002	0.021 (Summer)
	Orange	whole	M	0.002	0.007
	Potato	Whole	M	0.052	0.094 (Baked)
	Shrimp	Headless, in-shell, fresh	L	0.001	0.055
	Tomato	Whole	M	0.016	0.052
	White Cheese	Soft	R	0.001	0.016 (American)
	White Cheese	Soft	M	0.001	0.016 (American)
Hg-Mercury (Total)	Black Drum Fish	Cleaned	L	0.078	0.494 (Cod/Haddock)
	Carp	Cleaned & frozen	R	0.271	0.494 (Cod/Haddock)
	Catfish	Whole	L	0.036	0.494 (Cod/Haddock)
	Cilantro	Fresh	M	0.002	NA
	Fish-Gar	Cleaned	M	0.223	0.494 (Cod/Haddock)
	Garlic	Whole	M	0.002	NA
	Orange	Whole	M	0.002	ND
	Shrimp	Headless, in-shell, fresh	L	0.016	0.050
	Tomato	Whole	M	0.002	0.010

Elemental Results[1] for Local Foods (Spring)
Units in $\mu g/g$

ELEMENTS[@]	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUE[3]
Ni-Nickel[4]	Avocado	Whole	M	0.194	0.361
	Black Drum Fish	Cleaned	L	0.031	NA
	Cabbage	Raw	R	0.059	0.019
	Cabbage	Raw	R	0.156	0.019
	Calf Liver	Fresh	L	0.015	0.038 (Beef)
	Carp	Cleaned & Frozen	R	0.265	NA
	Catfish	Whole	L	0.132	NA
	Cilantro	Fresh	M	0.263	0.171 (Lettuce)
	Egg	Fresh	R	0.128	0.014
	Fish-Gar	Cleaned	M	0.017	NA
	Garlic	Whole	M	0.150	NA
	Grapefruit	Whole	R	0.039	0.023
	Jalapeno Pepper	Fresh	M	0.531	0.016 (Sweet)
	Mexican Squash	Whole	M	0.774	0.041
	Orange	Whole	M	0.069	0.024
	Potato	Whole	M	0.070	0.169
	Shrimp	Headless, in-shell, fresh	L	0.027	0.143
	Tomato	Whole	M	0.016	0.146
	White Cheese	Soft	R	0.027	0.061 (American)
	White Cheese	Soft	R	0.054	0.061
	White Cheese	Soft	M	0.116	0.061
Pb-Lead	Black Drum Fish	Cleaned	L	0.024	0.080 (Cod/Haddock)
	Cabbage	Raw	R	0.014	0.040
	Cabbage	Raw	R	0.004	0.040
	Calf Liver	Fresh	L	0.054	0.140
	Carp	Cleaned & frozen	R	0.093	0.080 (Cod/Haddock)
	Catfish	Whole	L	0.011	0.080 (Cod/Haddock)
	Cilantro	Fresh	M	0.107	NA
	Cola	Canned	R	0.007	0.020
	Egg	Fresh	R	0.028	0.06
	Fish-Gar	Cleaned	M	0.015	0.080 (Cod/Haddock)
	Garlic	Whole	M	0.014	NA
	Grapefruit	Whole	R	0.022	0.030
	Jalapeno Pepper	Fresh	M	0.007	0.070 (Sweet)
	Mexican Squash (Tatome)	Whole	M	0.004	0.070 (Summer)
	Orange	Whole	M	0.015	0.52
	Potato	whole	M	0.011	0.070
	Shrimp	Headless, in-shell, fresh	L	0.011	0.200
	Tomato	Whole	M	0.003	0.040
	White Cheese	Soft	R	0.004	0.080 (Cheddar)
	White Cheese	Soft	R	0.050	0.080 (Cheddar)
	White Cheese	Soft	M	0.059	0.080 (Cheddar)
	White Cheese	Soft	R	0.520	0.080 (Cheddar)

Elemental Results[1] for Local Foods (Spring)
Units in $\mu g/g$

ELEMENTS@	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUE[3]
Sr-Strontium[4]	Avocado	Whole	M	2.23	0.638
	Black Drum Fish	Cleaned	L	9.63	NA
	Cabbage	Raw	R	6.95	0.587
	Cabbage	Raw	R	9.41	0.587
	Calf Liver	Fresh	L	0.118	0.053 (Beef)
	Carp	Cleaned & Frozen	R	52.0	NA
	Catfish	Whole	L	7.32	NA
	Cilantro	Fresh	M	6.39	0.458 (Lettuce)
	Cola	Canned	R	1.25	0.080
	Egg	Fresh	R	1.79	1.01
	Fish-Gar	Cleaned	M	5.40	NA
	Garlic	Whole	M	17.3	NA
	Grapefruit	Whole	R	4.65	0.581
	Jalapeno Pepper	Fresh	M	0.306	0.158 (Sweet)
	Mexican Squash	Whole	M	2.33	0.341
	Orange	Whole	M	3.72	4.03
	Potato	Whole	M	0.913	0.583
	Shrimp	Headless, in-shell, fresh	L	18.9	24.2
	Tomato	Whole	M	1.07	2.72
	White Cheese	Soft	R	2.51	4.18 (Amer. Proc. Cheese)
	White Cheese	Soft	R	3.02	4.18
	White Cheese	Soft	R	6.63	4.18
	White Cheese	Soft	M	11.6	4.18

1 Analyzed by FDA-KC Laboratory.
2 Local foods were identified by participants as food items normally consumed that are grown locally or obtained from local sources. Local foods were collected from residences (R) or from sources identified by participants in the lower Rio Grande Valley (L) or in Matamoras, Mexico (M).
3 FDA = Total Diet Study Comparative Result, 37 market baskets (maximum)
4 FDA Comparison Values, 1984 Total Diet Market Basket, unpublished data; not routinely analyzed for in FDA's Total Diet Study.
NA Not available.
ND Not detected.
@ The following analyte was analyzed for but was not detected:

Antimony

Pesticide Results[1] for Local Foods (Spring)
Units in μg/g

PESTICIDES[5]	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUES: FDA 1992 MONITORING FINDINGS (U.S. & Mexican) MAXIMUM	COMPARISON VALUES: EPA TOLERANCE or FDA ACTION LEVEL[4] (AL)	COMPARISON VALUES: FDA TOTAL DIET STUDY[3]
Chlordane	Catfish	Whole	L	0.013	0.151	0.3 AL	NA
	Fish-Gar	Cleaned	M	TRACE	NA	NA	NA
Chlorothalonil	Cabbage	Raw	R	0.019	TRACE	5.0	ND
Chlorpyrifos	Carp	Cleaned & frozen	R	TRACE	ND	There is a 0.1 ppm blanket F.A. Tolerance (185.1000) applicable to food service establishments	NA
	Cilantro	Fresh	M	TRACE	NA		NA
	Diced cactus	Raw	M	TRACE	NA		NA
	Mexican Squash (Tatome)	Whole	M	0.006	0.03		0.002
	Potato	Whole	M	0.003	ND		0.002
	Tomato	Whole	M	0.155	0.33	0.5	0.028
	White Cheese	Soft	R/M	0.007	ND	0.25 (fat)	ND
Diazinon	Carp	Cleaned & frozen	R	TRACE	ND	NA	0.003 (Cod/Haddock)
	Jalapeno Pepper	Fresh	M	0.004	0.05	0.5	0.015 (Sweet)
	Manzanilla Tea	Dried	R	0.002	NA	NA	ND
Dieldrin	Calf Liver	Fresh	L	0.002	NA	NA	0.002
	Carp	Cleaned & frozen	R	0.012	0.05	0.3 AL	NA
	Catfish	Whole	L	TRACE	0.107	0.3 AL	NA
	Egg	Fresh	R	TRACE	0.01	0.03 AL	0.001
Dimethoate	Jalapeno Pepper	Fresh	M	0.033	1.4	2.0	0.027 (Sweet)
DCPA	Carp	Cleaned & frozen	R	0.113	TRACE	NA	NA
	Catfish	Whole	L	TRACE	0.08	NA	NA
DDE, p,p'-	Black Drum Fish	Cleaned	L	0.019	NA	5.0 AL	0.023 (Cod/Haddock)
	Cabbage	Raw	R	TRACE	ND	0.5 AL	ND
	Calf Liver	Fresh	L	0.018	NA	NA	0.005
	Catfish	Whole	L	0.091	1.01	5.0 AL	0.023 (Cod/Haddock)
	Egg	Fresh	R	0.006	TRACE	0.5 AL	0.008
	Fish-Gar	Cleaned	M	0.112	NA	5.0 AL	0.23 (Cod/Haddock)
	Manzanilla Tea	Dried	R	0.007	NA	NA	ND
	White Cheese	Soft	R/M	0.002	0.03	1.25 (Milk fat basis)	0.01-0.03
			M	0.004	0.03	1.25 (Milk fat basis)	0.01-0.03
			R/M	0.008	0.03	1.25 (Milk fat basis)	0.01-0.03
			R	0.075	0.03	1.25 (Milk fat basis)	0.01-0.03
DDT, o,p'-	Manzanilla Tea	Dried	R	TRACE	NA	NA	ND

Pesticide Results[1] for Local Foods (Spring)
Units in $\mu g/g$

PESTICIDES[6]	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUES: FDA 1992 MONITORING FINDINGS (U.S. & Mexican) MAXIMUM	COMPARISON VALUES: EPA TOLERANCE or FDA ACTION LEVEL[4] (AL)	COMPARISON VALUES: FDA TOTAL DIET STUDY[3]
DDT, p,p'-	Manzanilla Tea	Dried	R	TRACE	NA	NA	ND
Endosulfan Sulfate	Cabbage	Raw	R	0.005	11.66 (Total)	2.0	ND
				0.072	(0.06 max from Mexico)	2.0	ND
	Calf Liver	Fresh	L	0.015	NA	0.2	ND
	Jalapeno Pepper	Fresh	M	0.003	1.61 (Total)	2.0	0.06 (Sweet)
	Manzanilla Tea	Dried	R	0.005	NA	24.0	ND
	Tomato	Whole	M	0.021	0.68 (Total	2.0	0.019
Endosulfan I	Cabbage	Raw	R	0.007	(See above)	See above, which is applicable to "Total" Endosulfan residues	See above, which is applicable to "Total" Endosulfan residues
	Carp	Cleaned & frozen	R	0.007	ND		
	Jalapeno Pepper	Fresh	M	0.014	(See above)		
	Manzanilla Tea	Dried	R	TRACE	NA		
	Tomato	Whole	M	0.050	(See above)		
Endosulfan II	Cabbage	Raw	R	0.002	(See above)	See above, which is applicable to "Total" Endosulfan residues	See above which is applicable to "Total" Endosulfan residues
				0.018			
	Jalapeno Pepper	Fresh	M	0.014	(See above)		
	Manzanilla Tea	Dried	R	TRACE	NA		
	Tomato	Whole	M	0.095	(See above)		
Ethion	Orange	Whole	M	0.009	0.40	2.0	0.011
Ethion oxiygen analog	Orange	Whole	M	TRACE	ND	2.0	ND
Fenvalerate	Tomato	Whole	M	0.037	0.06	1.0	ND
Hexachlorobenzene	Egg	Fresh	R	TRACE	ND	NA	0.0003
	Potato	Whole	M	0.060	ND	NA	0.001
Lindane	Potato	Whole	M	0.003	ND	0.5 AL	0.0005
Malathion	Onion	Whole	R	0.005	TRACE	8.0	ND
Methamidophos	Cilantro	Fresh	M	0.002	NA	NA	NA
	Jalapeno Pepper	Fresh	M	0.869	6.93	1.0	0.49 (Sweet)
	Tomato	Whole	M	0.188	0.38	1.0	0.121
Omethoate	Jalapeno Pepper	Fresh	M	0.048	1.77	2.0	0.185 (Sweet)
Parathion-methyl	Cilantro	Fresh	M	0.018	NA	NA	NA

Pesticide Results[1] for Local Foods (Spring)
Units in $\mu g/g$

PESTICIDES[@]	FOOD	TYPE	LOCATION[2]	SPRING RESULTS	COMPARISON VALUES		
					FDA 1992 MONITORING FINDINGS (U.S. & Mexican) MAXIMUM	EPA TOLERANCE or FDA ACTION LEVEL[4] (AL)	FDA TOTAL DIET STUDY[3]
Pentachloroaniline	Potato	Whole	M	0.045	(See quintozene)	NA	0.015
Pentachlorobenzene	Potato	Whole	M	0.025	ND	NA	0.0002
Pentachlorophenyl methyl sulfide	Potato	Whole	M	0.062	(See quintozene)	NA	ND
Permethrin, cis	Tomato	Whole	M	TRACE	0.21 (Total)	2.0 (Total)	ND
Permethrin, trans	Tomato	Whole	M	TRACE	(See above)	2.0 (Total)	ND
Polychlorinated biphenyls (PCBs)	Black drum fish Carp Catfish Fish-Gar Shrimp	Cleaned Cleaned & frozen Whole Cleaned Headless, in-shell, fresh	L R M M L	TRACE 399.000 0.056 0.423 TRACE	TRACE 3.63 1.59 NA ND	2.0 "Temporary" tolerance applicable to edible portion of fish and shellfish	0.014 (Cod or Haddock fillet)
Quintozene	Potato	Whole	M	0.082	0.01 (Total)	0.1	0.003
Tecnazene	Potato	Whole	M	0.008	ND	25.0	0.242

1 Analyzed by FDA-KC Laboratory.
2 Local foods were identified by participants as food items normally consumed that are grown locally or obtained from local sources. Local foods were collected from residences (R) or from sources identified by participants in the lower Rio Grande Valley (L) or in Matamoras, Mexico (M).
3 FDA = Total Diet Study Comparative Result, 37 market baskets (maximum)
4 Tolerance and Action Level (AL) refer to regulatory limits used by FDA for enforcement purposes.
NA Not available.
ND Not detected.
@ Detected compounds only; see footnote of 24 hour solid foods table for complete analyte list.

Pesticide Results[1] for Local Foods (Summer)
Units in $\mu g/g$

PESTICIDES[6]	FOOD	TYPE	LOCATION[2]	SUMMER RESULTS	COMPARISON VALUES: FDA 1992[3] MONITORING FINDINGS (U.S. & Mexican) MAXIMUM	COMPARISON VALUES: EPA TOLERANCE or FDA ACTION LEVEL[4] (AL)	COMPARISON VALUES: FDA TOTAL DIET STUDY[5]
Acephate	Jalapeno Pepper	Fresh	R	0.005	2.90	4.0	0.72 (Sweet)
BHC, alpha	Carrot	Raw	M	0.002	ND	0.3 AL	ND
	Chile	Verde	M	0.002	NA	NA	NA
	Squash	Raw	M	TRACE	0.043	0.05 AL	0.003
Chlordane, cis	Carp	Fresh	L	0.004	0.16 (Total)	0.3 AL	ND (Cod/Haddock)
	Tomato	Whole	R/M	TRACE	ND	0.1 AL	ND
Chlordane, trans	Carp	Fresh	L	0.004	(See above)	See above; applies to "Total" Chlordane	ND (Cod/Haddock)
	Tomato	Whole	R/M	TRACE	(See above)		ND
Chlorpyrifos	Carp	Fresh	L	0.003	ND	NA	ND (Cod/Haddock)
	Jalapeno Pepper	Fresh	R	TRACE	0.27	1.0	0.078 (Sweet)
	Tomato	Raw	R	TRACE	0.33	0.5	0.028
	White Cheese	Soft	R/M	TRACE	ND	0.25 (fat)	ND
Diazinon	Carp	Fresh	L	0.002	ND	NA	0.003 (Cod/Haddock)
	Tortilla Mix	Corn	L	TRACE	NA	NA	0.023 (Flour tortilla)
	Jalapeno Pepper	Fresh	R	0.009	0.05	0.5	0.015 (Sweet)
	Tomato	Whole	R/M	TRACE	0.19	0.75	0.022
Dieldrin	Unidentified Fish	Whole & gutted	L	0.002	NA	0.3 AL	ND
DCPA	Unidentified Fish	Whole & gutted	L	0.008	NA	NA	ND
DDE, p,p'-	Carp	Fresh	L	0.256	0.58 (Total)	5.0 AL	0.023 (Cod/Haddock)
	Deer Meat	Frozen	R	0.002	NA	NA	NA
	Unidentified Fish	Whole & gutted	L	0.071	NA	5.0 AL	NA
	White Cheese	Soft	R/M	0.003	0.03 (Total)	1.25	0.31 (Cheddar)
	White Cheese	Soft	R/M	0.008		(Milk fat)	
DDT, p,p'-	Carp	Fresh	L	0.008	(See above)	(See above)	ND
	White Cheese	Soft	R/M	0.021	(See above)	NA	ND
Endosulfan Sulfate	Carp	Fresh	L	0.039	ND	NA	ND(Cod/Haddock)
	Potato	Whole	R	TRACE	ND	0.2 (Total)	0.025 (Baked)
	Squash	Raw	M	0.004	0.64	2.0 (Total)	0.057 (Summer)
	Unidentified Fish	Whole & gutted	L	0.007		NA	NA

Pesticide Results[1] for Local Foods (Summer)
Units in $\mu g/g$

PESTICIDES[6]	FOOD	TYPE	LOCATION[2]	SUMMER RESULTS	COMPARISON VALUES: FDA 1999[2] MONITORING FINDINGS (U.S. & Mexican) MAXIMUM	COMPARISON VALUES: EPA TOLERANCE or FDA ACTION LEVEL[4] (AL)	COMPARISON VALUES: FDA TOTAL DIET STUDY[3]
Endosulfan I	Carp	Fresh	L	0.194	ND	NA	NA
	Unidentified Fish	Whole & gutted	L	0.002	NA	NA	NA
Endosulfan II	Carp	Fresh	L	0.055	ND	NA	NA
	Unidentified Fish	Whole & gutted	L	TRACE	NA	NA	NA
Hexachlorobenzene	Deer Meat	Frozen	R	0.002	NA	NA	0.003 (Beef steak)
Lindane	Carrot	Raw	M	TRACE	ND	0.5 AL	ND
	Chile	Verde	M	TRACE	ND	NA	NA
	White Cheese	Soft	R/M	0.009	ND	0.3 AL (Fat)	0.008 (Cheddar)
Malathion	Tortilla Mix	Corn	L	0.003	NA	8.0	0.087 (Flour tortilla)
	Corn Masa Mix	Instant	L	TRACE	NA	8.0	0.087 (Flour tortilla)
Methamidophos	Jalapeno Pepper	Fresh	R	0.014	6.93	1.0	0.49 (Sweet)
	Squash	Raw	M	0.001	0.79	NA	0.008 (Summer)
Parathion methyl	Carp	Fresh	L	0.004	ND	NA	ND (Cod/Haddock)
Pentachlorophenyl methyl ether	White Cheese	Soft	R/M	TRACE	ND	NA	0.0001 (Cheddar)
Permethrin, cis	Broccoli	Raw	R	0.008	0.19 (Total)	1.0	0.009
	Jalapeno Pepper	Fresh	R	0.051	0.96 (Total)	NA	0.062 (Sweet)
Permethrin, trans	Broccoli	Raw	R	0.008	(See above)	1.0	0.007
	Jalapeno Pepper	Fresh	R	0.070	(See above)	NA	0.067 (Sweet)
Phorate sulfone	Potato	Whole	R	0.004	0.104 (Total)	0.5 (Total)	0.002 (Baked)
Phorate sulfoxide	Potato	Whole	R	0.004	0.104 (Total)	0.5 (Total)	0.011 (Baked)
Polychlorinated biphenyls	Carp	Fresh	L	1.340	3.63	2.0	0.014 (Cod/Haddock)
TDE, p,p'	Carp	Fresh	L	0.021	0.58 (Total)	5.0	ND (Cod/Haddock)
	Unidentified Fish	Whole & gutted	L	0.009		5.0	ND (Cod/Haddock)
	White Cheese	Soft	R/M	0.002	0.03 (Total)	1.25 (Milk fat)	ND

Pesticide Results[1] for Local Foods (Summer)
Units in $\mu g/g$

1 Analyzed by FDA-KC Laboratory.

2 Local foods were identified by participants as food items normally consumed that are grown locally or obtained from local sources. Local foods were collected from residences (R) or from sources identified by participants in the lower Rio Grande Valley (L) or in Matamoras, Mexico (M).

3 FDA = Total Diet Study Comparative Result, 37 market baskets (maximum)

4 Tolerance and Action Level (AL) refer to regulatory limits used by FDA for enforcement purposes.

NA Not available.

ND Not detected.

@ Detected compounds only; see footnote of 24 hour solid foods table for complete analyte list.

Biotoxin Levels Found[1] in Local Food Samples (Spring)
Units in ng/g

BIOTOXINS[@]	TYPE OF FOOD	LOCATION[2]	SPRING RESULTS	COMPARISON VALUE[3]
Aflatoxin-AB1	Corn Flour	M	1.2	20.0
	Corn Flour	R	4.8	20.0
Aflatoxin-AB2	Corn Flour	M	TRACE	20.0
	Corn Flour	R	0.6	20.0
Fumonisin-FB1	Corn Flour	R	124	NA
	Corn Flour	M	246	NA
	Ear Corn	L	61	NA
	Tortillas	L	63	NA
	Tortillas	M	88	NA

1 Analyzed by FDA - Center for Food Safety and Applied Nutrition
2 Local foods were idendified by participants as food items normally consumed that are grown locally or obtained from local sources. Local foods were collected from residence (R) or from sources identified by participants in the lower Rio Grande Valley (L) or in Matamoras, Mexico (M).
3 Action level - Regulatory limits used by FDA for enforcement purposes.
NA Not available.
@ The following toxin was analyzed for but was not detected:

Fumonisin-FB2

Biotoxin Levels Found[1] in Local Food Samples (Summer)
Units in ng/g

BIOTOXINS	TYPE OF FOOD	LOCATION[2]	SUMMER RESULTS	COMPARISON VALUE[3]
Aflatoxin-AB1	Corn Tortilla Mix	L	2.2	20.0
	Corn Tortilla	M	2.7	20.0
	Instant Corn Masa Mix	L	2.0	20.0
Aflatoxin-AG1	Corn Tortilla Mix	L	1.4	20.0
	Instant Corn Masa	L	1.1	20.0

1 Analyzed by FDA - Center for Food Safety and Applied Nutrition

2 Local foods were idendified by participants as food items normally consumed that are grown locally or obtained from local sources. Local foods were collected from residence (R) or from sources identified by participants in the lower Rio Grande Valley (L) or in Matamoras, Mexico (M).

3 Action level - Regulatory limits used by FDA for enforcement purposes.

@ The following toxin was analyzed for but was not detected:

Fumonisin-FB1
Fumonisin-FB2
Aflatoxin-AB2
Aflatoxin-AG2

Household Water Results[1] from Residential Monitoring at 9 Households
Units as noted

COMPOUND*	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest	Highest
ANION in mg/l			
Bromide	1	1.8	1.8
Chloride	8	71.9	528
Nitrate (as N)	8	0.4	8.3
Sulfate (as S)	8	170	785
BACTERIA			
Avg Presumptive Total Coliforms (TC/100 ml)	4	0.3	6430
Avg Confirmed E.coli (EC/100 ml)	1	1.5	1.5
Avg Heterotrophic Total Bacteria (CFU/ml)	9	0.1	310000
HALOACETIC ACID in µg/l			
Bromoacetic Acid	5	3.6	5.7
Bromochloroacetic Acid	5	6.7	20.0
Dibromoacetic Acid	5	10.7	19.2
Dichloroacetic Acid	5	3.3	17.4
Trichloroacetic Acid	4	2.7	14.0
METALS in µg/l			
Antimony	2	0.6	0.8
Arsenic	6	1.1	4.5
Barium	7	3.0	115
Chromium	2	1.0	2.6
Cobalt	1	1.0	1.0
Copper	8	2.7	24.7
Lead	1	2.0	2.0
Manganese	7	0.3	713
Mercury	1	0.1	0.1
Molybdenum	6	7.1	48.7
Nickel	8	0.5	2.7
Selenium	3	8.8	14.3
Silver	1	0.1	0.1
Thallium	1	0.3	0.3
Uranium	6	2.6	7.9

Household Water Results[1] from Residential Monitoring at 9 Households
Units as noted

COMPOUND●	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest	Highest
Vanadium	6	4.8	17.3
Zinc	7	2.1	51.4
MISCELLANEOUS (Semivolatile Organic Compound) in µg/l			
Bis(2-ethylhexyl)adipate[2]	5	0.2	1.7
PAH and PESTICIDES in µg/l			
MCPA/2,4-D[3]	1	3.1	3.1
Atrazine	1	0.5	0.5
PHTHALATE (Semivolatile Organic Compound) in µg/l			
Bis(2-ethylhexyl)phthalate	8[2]	0.3	0.7
Butyl benzylphthalate	7[2]	0.1	0.2
Di-n-butylphthalate	8[2]	0.1	0.3
Diethylphthalate	8[2]	0.1	0.3
VOC in µg/l			
Acetone	1	10.7	10.7
Bromochloromethane	1	0.6	0.6
Bromodichloromethane	7	3.2	24.4
Bromoform	7	1.0	14.1
2-Butanone	1	1.2	1.2
Chloroform	7	1.1	26.1
Dibromochloromethane	7	3.3	17.3
Dibromomethane	2	0.3	0.7
Methylene Chloride	4	0.4	0.7
Tetrahydrofuran	1	6.9	6.9
Toluene	1	0.9	0.9

1 Samples analyzed by EPA/EMSL Cincinnati or its contractor.
2 Values shown are about the same levels as blanks.
3 Method cannot identify specific compound.
4 Bacterial analyses were conducted for all 9 households; chemical analyses were only conducted for 8 residences.
● The following were analyzed for but were not detected:

Acids

Acifluorfen
Bentazon
Chloramben
Dicamba
3,5-Dichlorobenzoic acid
2,4-DB
Dinoseb
5-Hydroxydicamba
MCPP/Dichloroprop
4-Nitrophenol
Pentachlorophenol
Picloram
2,4,5-T
2,4,5-TP

Household Water Results[1] from Residential Monitoring at 9 Households
Units as noted

Benzidines
Benzidine
Benzoylprop ethyl
Carbaryl
3,3'-Dimethoxybenzidine
3,3'-Dimethylbenzidine
Diuron
Linuron
Monuron
Rotenone
Siduron

Haloacetic Acids
Chloroacetic Acid

Metals
Beryllium
Cadmium
Thorium

Miscellaneous
Cyanazine
Isophorone
2,4-Dinitrotoluene
2,6-Dinitrotoluene

PAHs and Pesticides
Acenaphthylene
Alachlor
Aldrin
Anthracene
Benzo[a]anthracene
Benzo[a]pyrene
Benzo[b]fluoranthene
Benzo{g,h,i}perylene
Benzo{k}fluoranthene
Bromacil
Butachlor
alpha Chlordane
gamma Chlordane
Chrysene
Dachthal
Dibenz{a,h}anthracene
Dieldrin
Endrin
Fluorene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorocyclopentadiene
Indeno[1,2,3,c,d]pyrene
Lindane
Methoxychlor
Metolachlor
Metribuzin
Nonachlor, trans
Pentachlorophenol
Phenanthrene
Prometon
Propachlor
Pyrene
Simazine
Trifluralin

PCBs
2-Chlorobiphenyl
2,2',3,3',4,4',6-Heptachlorobiphenyl
2,2',3,3',4,5',6,6'-Octachlorobinphenyl
2,2',3',4,6-Pentachlorobiphenyl
2,2',4,4',-Tetrachlorobiphenyl
2,2',4,4',5,6'-Hexachlorobiphenyl
2,3-Dichlorobiphenyl
2,4,5-Trichlorobiphenyl

VOCs
Benzene
Bromobenzene
Bromomethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
cis-1,2-Dichloropropene
trans-1,3-Dichloropropene
Diethyl ether
Ethylbenzene
Hexachlorobutadiene
Hexachloroethane
2-Hexanone
Isopropylbenzene
4-Isopropyltoluene
4-Methyl-2-pentanone
Methyl-tert-butyl ether
Naphthalene
Nitrobenzene
n-Propylbenzene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl Chloride
o-Xylene
Xylene (m+p)

Phthalates
Dimethylphthalate

Household Water Results[1] from Residential Monitoring at 6 Households
Units as noted

COMPOUND[@]	SUMMER RESULTS		
	#Detects	Detectable Results	
		Lowest	Highest
ANION in mg/l			
Nitrate (as N)	6	0.2	8.5
HALOACETIC ACID in µg/l			
Bromoacetic Acid	4	3.0	5.8
Bromochloroacetic Acid	4	0.2	24.5
Dibromoacetic Acid	4	3.2	21.3
Dichloroacetic Acid	4	2.0	12.4
Trichloroacetic Acid	3	2.6	12.9
PAH and PESTICIDES in µg/l			
Dacthal	1	6.0	6.0
VOC in µg/l			
Bromodichloromethane	5	2.3	34.4
Bromoform	5	1.6	31.7
Chloroform	5	2.0	18.2
Dibromochloromethane	5	1.8	49.9
Dibromomethane	1	1.5	1.5
Toluene	1	0.8	0.8
Trichlorofluoromethane	1	8.8	8.8

1 Samples analyzed by EPA/EMSL Cincinnati or its contractor.
@ The following were analyzed for but were not detected:

Haloacetic Acids
Chloroacetic Acid

Miscellaneous
Bis(2-ethylhexyl)adipate
Cyanazine
Isophorone
2,4-Dinitrotoluene
2,6-Dinitrotoluene

PAHs and Pesticides
Acenaphthylene
Acifluorfen
Alachlor
Aldicarb
Aldrin
Anthracene
Atrazine
Baygon
Bentazon
Benzo[a]anthracene
Benzo[b]fluoranthene
Benzo{k}fluoranthene
Benzo{g,h,i}perylene
Benzo[a]pyrene
Bromacil
Butachlor
alpha Chlordane
gamma Chlordane
Carbaryl
Carbofuran
Chlorothalonil
Chlorpyrifos
Chrysene
Dachthal
Dyfonate
2,4-D
2,4-DB
4,4'-DDD
4,4'-DDE
4,4'-DDT
Diazinon
Dibenz{a,h}anthracene
Dicamba
3,5-Dichlorobenzoic acid
Dichloroprop
Dicloran
Dieldrin
Dinoseb
Endrin
Fluorene

Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorocyclopentadiene
5-Hydroxydicamba
Indeno[1,2,3,c,d]pyrene
Lindane
Malathion
Metalaxyl
Methomyl
Methoxychlor
Metolachlor
Metribuzin
1-Naphthol
Nonachlor, trans
Oxamyl
Pentachlorophenol
Permethrin, cis
Permethrin, trans
Phenanthrene
Phorate
Picloram
Prometon
Propachlor
Propoxur
Pyrene
Simazine
Sulfone
Sulfoxide
2,4,5-T
2,4,5-TP (Silvex)
Terbufos
Toxaphene
Trifluralin
Triphenylphosphate

PCBs
2-Chlorobiphenyl
2,2',3,3',4,4',6-Heptachlorobiphenyl
2,2',3,3',4,5',6,6'-Octachlorobinphenyl
2,2',3',4,6-Pentachlorobiphenyl
2,2',4,4',-Tetrachlorobiphenyl
2,2',4,4',5,6'-Hexachlorobiphenyl
2,3-Dichlorobiphenyl
2,4,5-Trichlorobiphenyl
4,4'-Dichlorobiphenyl

Phthalate
Bis(2-ethylhexyl)phthalate
Butyl benzylphthalate
Di-n-butylphthalate
Diethylphthalate
Dimethylphthalate

VOCs
Acetone
Benzene
Bromobenzene
Bromomethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Chloroethane
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
cis-1,2-Dichloropropene
trans-1,3-Dichloropropene
Diethyl ether
Ethylbenzene
Hexachlorobutadiene
Hexachloroethane
2-Hexanone
Isopropylbenzene
4-Isopropyltoluene
Methylene chloride
4-Methyl-2-pentanone
Methyl-tert-butyl ether
Naphthalene
Nitrobenzene
n-Propylbenzene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl Chloride
o-Xylene
Xylene (m+p)

Household Water Comparison Data[a]
All Units as Noted

COMPARISON DATA	
COMPOUND	***REGULATION LEVELS***
ANION in mg/l	
Bromide	NA
Chloride	250[5]
Nitrate (as N)	10[4,1]
Sulfate (as S)	250[5]
BACTERIA	
Avg Presumptive Total Coliforms (TC/100 ml)	0[2]
Avg Confirmed E.coli (EC/100 ml)	0[2]
Avg Heterotrophic Total Bacteria (CFU/ml)	NA
HALOACETIC ACID in µg/l	
Bromoacetic Acid	NA
Bromochloroacetic Acid	NA
Dibromoacetic Acid	NA
Dichloroacetic Acid	4000[3]
Trichloroacetic Acid	300[3]
METALS in µg/l	
Antimony	6.0[1]
Arsenic	50[1]
Barium	2000[1]
Chromium	100[1]
Cobalt	NA
Copper	1300[3]
Lead	15[1,3]
Manganese	50[5]
Mercury	2.0[1]
Molybdenum	40[3]
Nickel	100[1]
Selenium	50[1]
Silver	100[5]
Thallium	2.0[1]
Uranium	20[1]
Vanadium	NA

Household Water Comparison Data[a]
All Units as Noted

COMPARISON DATA	
COMPOUND	**REGULATION LEVELS**
Zinc	5000[5]
MISCELLANEOUS (Semivolatile Organic Compound) in µg/l	
Bis(2-ethylhexyl)adipate	400[1]
PAH and PESTICIDES in µg/l	
MCPA	10[3]
2,4-D	70[1]
Atrazine	3[1]
Dacthal	NA
PHTHALATE (Semivolatile Organic Compound) in µg/l	
Bis(2-ethylhexyl)phthalate	6[1]
Butyl benzylphthalate	7000[6]
Di-n-butylphthalate	3500[6]
Diethylphthalate	5000[3]
VOC in µg/l	
Acetone	3500[6]
Bromochloromethane	90[3]
Bromodichloromethane	100[7]
Bromoform	100[7]
2-Butanone	NA
Chloroform	100[7]
Dibromochloromethane	100[7]
Dibromomethane	NA
Methylene Chloride	2100[6]
Tetrahydrofuran	NA
Toluene	1000[1]
Trichlorofluoromethane	NA

Household Water Comparison Data[a]
All Units as Noted

- a Comparison data are for regulated compounds in drinking water even though all samples were not water used for drinking.
- 1 Maximum Contaminant Level (MCL), USEPA.
- 2 Maximum Contaminant Level Goal (MCLG), USEPA.
- 3 Lifetime exposure health advisory for 70 kg adult.
- 4 Total for nitrate and nitrite.
- 5 Secondary Maximum Contaminant Level (SMCL), USEPA.
- 6 Screening criteria as provided by USEPA Region VI.
- 7 Total for all four Trihalomethanes.
- NA Not available - not currently regulated by EPA.

Air Elemental Fine Particle Results[1] from Residential Monitoring (9 Households)
All Units in ng/m^3

ELEMENT[e]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Aluminum	6	192.2	517.3	1	187.4	187.4
Bromine	9	17.9	25.3	9	17.2	27.5
Calcium	9	280.6	1425.9	9	71.9	621.8
Cesium	1	33.6	33.6	0	≤22.3	--
Chlorine	8	54.9	863.1	4	21.5	109.5
Chromium	2	3.6	4.1	4	3.0	5.6
Copper	2	4.2	6.8	3	4.1	6.0
Gallium	0	≤1.7	--	2	2.4	2.4
Iron	9	37.0	314.6	9	9.5	147.5
Lanthanum	1	98.6	98.6	0	≤66.8	--
Lead	4	7.8	209.7	2	11.0	13.9
Manganese	4	4.0	5.9	1	3.0	3.0
Phosphorous	4	47.1	50.9	0	≤27.0	--
Potassium	9	84.9	376.0	9	44.3	201.6
Silicon	9	294.4	1798.6	9	115.2	704.8
Strontium	8	3.0	7.7	2	3.3	3.8
Sulfur	9	680.9	1640.0	9	721.1	1730.8
Titanium	4	23.6	35.5	0	≤12.5	--
Zinc	9	3.7	763.8	9	3.0	15.6

Air Elemental Fine Particle Results[1] from Residential Monitoring (9 Households)
All Units in ng/m^3

1 Collected using a microenvironmental sampler (MES); analyzed using XRF.
2 If all measured results were below the reporting limit, the reporting limit is listed. For this table, the quantification limit is calculated by multiplying the standard deviation of the blank filters by 3.
-- Not applicable.
● The following analytes were analyzed for but were not detected:

Antimony	Cobalt	Mercury	Rhodium	Silver	Vanadium
Arsenic	Germanium	Molybdenum	Rubidium	Tellurium	Yttrium
Barium	Gold	Nickel	Scandium	Tin	Zirconium
Cadmium	Iodine	Palladium	Selenium	Tungsten	

Air Elemental Fine Particle Results[1] from Residential Monitoring (6 Households)
All Units in ng/m^3

ELEMENT[@]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Aluminum	6	300.1	1359.7	6	256.4	2090.0
Bromine	6	6.8	20.0	6	6.0	9.8
Calcium	6	286.9	1401.2	6	327.5	957.4
Chlorine	6	113.0	639.6	6	79.6	564.0
Iron	6	197.9	762.6	6	151.0	1266.6
Manganese	6	4.3	12.9	6	4.2	24.4
Potassium	6	148.4	435.2	6	107.1	417.3
Silicon	6	953.6	2686.5	6	634.3	4119.8
Strontium	6	4.0	7.1	4	3.7	8.3
Sulfur	6	150.2	733.6	6	295.2	774.2
Titanium	6	25.0	87.2	6	18.0	149.5
Vanadium	1	7.8	7.8	1	11.0	11.0
Zinc	6	3.7	3039.0	3	3.6	7.8

1 Collected using a microenvironmental sampler (MES); analyzed using XRF.
2 If all measured results were below the reporting limit, the reporting limit is listed. For this table, the quantification limit is calculated by multiplying the standard deviation of the blank filters by 3.
@ The following analytes were analyzed for but were not detected:

Antimony	Chromium	Gold	Molybdenum	Rubidium	Tin
Arsenic	Cobalt	Iodine	Nickel	Scandium	Tungsten
Barium	Copper	Lanthanum	Palladium	Selenium	Yttrium
Cadmium	Gallium	Lead	Phosphorus	Silver	Zirconium
Cesium	Germanium	Mercury	Rhodium	Tellurium	

Air Elemental Fine Particle Comparison Data
All Units in ng/m^3

ELEMENT	COMPARISON DATA				
	TESL[1]	TYPICAL[2]		HIGH VALUE[4]	
		Indoor	Outdoor	Indoor	Outdoor
Aluminum	20000	502	488	764	630
Bromine	2640	10	11	21	24
Calcium	20000	312	235	926	527
Cesium	8000	NA	NA	NA	NA
Chlorine	6000	128	140	473	553
Chromium[+]	400	NA	NA	NA	NA
Copper	4000	13	12	35	32
Gallium	40	NA	NA	NA	NA
Iron	20000	284	324	750	700
Lanthanum[+]	NA	NA	NA	NA	NA
Lead	1500[3]	23	24	65	54
Manganese	12000	12	13	24	24
Phosphorous	400	110	110	144	142
Potassium	8000	241	181	700	376
Silicon	20000	565	534	1500	1190
Strontium[+]	8000	8	8	11	11
Sulfur	2240	1292	1556	3425	4044
Titanium	20000	60	58	94	78
Vanadium	200	1	4	NA	NA
Zinc	20000	39	40	100	120

Air Elemental Fine Particle Comparison Data
All Units in ng/m^3

1 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a + sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some followup action (or further review) is warranted.

2 Typical value is the mean from H. Ozkaynak, J. Xue, R. Weker, D. Butler, and J. Spengler. "The Particle Team (PTEAM) Study: Analysis of the Data." Draft Final Report, Volume III; EPA Contract No. 68-02-4544, Harvard University School of Public Health, Boston, MA 02115 (September, 1993).

3 NAAQS, averaging time is 3-month average based on 24-hour samples.

4 The high value listed is the 95th percentile from H. Ozkaynak, J. Xue, R. Weker, D. Butler, and J. Spengler. "The Particle Team (PTEAM) Study: Analysis of the Data." Draft Final Report, Volume III; EPA Contract No. 68-02-4544, Harvard University School of Public Health, Boston, MA 02115 (September, 1993).

NA Denotes that there is no available data for comparison.

\+ See footnote 1 above.

Fixed Site Outdoor Air Elemental Fine Particle Results[1]
All Units in ng/m³

ELEMENT*	SPRING RESULTS		
	#Detects[3]	Detectable Results	
		Lowest[2]	Highest
Bromine	21	3.2	9.3
Calcium	22	28.4	190.0
Chlorine	22	30.3	1133.0
Chromium	1	1.3	1.3
Copper	4	1.8	9.6
Iron	22	7.3	164.4
Lead	14	3.9	15.5
Manganese	5	1.5	2.0
Potassium	22	30.1	193.2
Rubidium	1	1.6	1.6
Selenium	3	1.2	1.8
Silicon	20	52.6	336.1
Strontium	5	1.5	2.3
Sulfur	22	280.6	1783.0
Titanium	2	8.3	9.2
Vanadium	3	3.0	3.4
Zinc	21	1.8	87.8

Fixed Site Outdoor Air Elemental Fine Particle Results[1]
All Units in ng/m^3

1 Collected using VAPS; analyzed using XRF; 22 days monitored at fixed site.
2 If all measured results were below the reporting limit, the reporting limit is listed.
3 The maximum number of detects is 22 (days of monitoring).
@ The following analytes were analyzed for but were not detected:

Aluminum	Cadmium	Germanium	Mercury	Phosphorus	Tellurium
Antimony	Cesium	Gold	Molybdenum	Rhodium	Tin
Arsenic	Cobalt	Iodine	Nickel	Scandium	Tungsten
Barium	Gallium	Lanthanum	Palladium	Silver	Yttrium
					Zirconium

Fixed Site Outdoor Air Elemental Fine Particle Results[1]
All Units in ng/m³

ELEMENT*	SUMMER RESULTS		
	#Detects[3]	Detectable Results	
		Lowest[2]	Highest
Aluminum	12	429.8	1882.9
Bromine	10	2.0	3.9
Calcium	14	97.2	518.5
Chlorine	14	133.3	769.1
Chromium	2	2.1	2.5
Gold	1	4.3	4.3
Iodine	10	15.9	33.0
Iron	14	45.4	1136.4
Lead	4	4.5	7.8
Manganese	12	3.4	19.4
Potassium	14	31.5	376.9
Silicon	14	152.7	3717.4
Strontium	12	2.9	7.3
Sulfur	14	283.8	950.9
Tin	14	19.9	77.5
Titanium	13	12.1	128.3
Vanadium	7	4.2	6.7
Yttrium	2	13.1	13.6
Zinc	12	1.8	6.1
Zirconium	1	12.2	12.2

Fixed Site Outdoor Air Elemental Fine Particle Results[1]
All Units in ng/m^3

1 Collected using VAPS; analyzed using XRF; 14 days monitored at fixed site.
2 If all measured results were below the reporting limit, the reporting limit is listed.
3 The maximum number of detects is 14 (days of monitoring).
@ The following analytes were analyzed for but were not detected:

Antimony	Cesium	Germanium	Nickel	Rubidium	Tellurium
Arsenic	Cobalt	Lanthanum	Palladium	Scandium	Tungsten
Barium	Copper	Mercury	Phosphorus	Selenium	
Cadmium	Gallium	Molybdenum	Rhodium	Silver	

Fixed Site Outdoor Air Elemental Fine Particle Comparison Data
All Units in ng/m^3

ELEMENT	COMPARISON DATA		
	TESL[1]	TYPICAL[2]	MAXIMUM[4]
Bromine	2640	11	24
Calcium	20000	235	527
Chlorine	6000	140	553
Chromium	400	NA	NA
Copper	4000	12	32
Iron	20000	324	700
Lead	1500[3]	24	61
Manganese	12000	13	54
Potassium	8000	181	376
Rubidium	--	--	--
Selenium	800	1	NA
Silicon	20000	534	1190
Strontium	8000	8	11
Sulfur	2240	1556	4044
Titanium	20000	58	78
Vanadium	200	4	NA
Zinc	20000	40	120
Aluminum[5]	20000	NA	NA
Gold[5]	NA	NA	NA
Iodine[5]	NA	NA	NA
Tin[5]	NA	NA	NA

Fixed Site Outdoor Air Elemental Fine Particle Comparison Data
All Units in ng/m^3

ELEMENT	COMPARISON DATA		
	TESL[1]	TYPICAL[2]	MAXIMUM[4]
Yttrium[5]	NA	NA	NA
Zirconium[5]	NA	NA	NA

1 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a + sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some followup action (or further review) is warranted.

2 Typical values are the mean from H. Ozkaynak, J. Xue, R. Weker, D. Butler, and J. Spengler. "The Particle Team (PTEAM) Study: Analysis of the Data." Draft Final Report, Volume III; EPA Contract No. 68-02-4544, Harvard University School of Public Health, Boston, MA 02115 (September, 1993).

3 NAAQS, averaging time is 3-month average based on 24-hour samples.

4 The high value listed is the 95th percentile from H. Ozkaynak, J. Xue, R. Weker, D. Butler, and J. Spengler. "The Particle Team (PTEAM) Study: Analysis of the Data." Draft Final Report, Volume III; EPA Contract No. 68-02-4544, Harvard University School of Public Health, Boston, MA 02115 (September, 1993).

5 This element was measured only during the summer monitoring period.

NA Denotes that there is no available data for comparison.

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[a]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
cis-2-Butene	6	0.3	199.0	9	0.1	1.5
cis-2-Hexene	0	≤0.1	--	1	0.3	0.3
cis-2-Pentene	5	0.3	1.0	9	0.1	0.8
i-Butane	9	2.6	850.9	9	0.8	9.4
i-Butene	6	0.7	439.0	9	0.2	2.6
i-Pentane	9	1.6	22.2	9	1.3	12.6
i-Propylbenzene	1	0.2	0.2	2	0.1	0.3
m-Ethyltoluene	5	0.5	1.7	9	0.1	0.8
m-Xylene & p-Xylene	9	1.0	8.3	9	0.5	5.5
n-Butane	9	10.6	1379.0	9	2.0	17.8
n-Decane	8	0.5	5.2	9	0.3	1.2
n-Heptane	9	0.4	2.4	9	0.8	1.5
n-Hexane	9	0.7	3.5	9	0.2	2.3
n-Nonane	9	0.3	1.6	9	0.2	0.5
n-Octane	7	0.5	1.6	9	0.2	0.9
n-Pentane	9	1.4	545.1	9	0.6	4.5
n-Propylbenzene	5	0.4	1.2	8	0.2	1.0
o-Ethyltoluene	5	0.4	2.5	7	0.2	1.5
o-Xylene	9	0.5	3.4	9	0.3	2.3
p-Ethyltoluene	7	0.4	4.1	9	0.2	2.0
trans-2-Butene	6	0.4	296.5	9	0.1	2.0

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[a]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
trans-2-Pentene	4	0.5	1.9	7	0.1	1.9
Acetylene	9	1.3	48.9	9	0.7	4.0
Benzene	9	1.3	5.0	9	0.5	2.7
Carbon Tetrachloride[2]	9	0.7	0.7	9	0.7	0.7
Chloroform[2]	7	0.2	2.1	1	0.2	0.2
Cyclohexane	3	0.4	1.1	9	0.1	0.7
Cyclopentane	6	0.2	0.5	9	0.1	0.5
Cyclopentene	3	0.2	0.6	6	0.1	0.4
Ethane	9	3.4	80.2	9	0.7	8.7
Ethylbenzene	9	0.4	2.3	9	0.2	1.6
Ethylene	9	0.5	34.6	9	0.4	2.8
Isoprene	0	≤0.1	--	6	0.1	0.6
Methane	9	1094.0	1278.0	9	1078.0	1178.0
Methylcyclohexane	9	0.5	7.7	9	1.0	4.9
Methylcyclopentane	9	0.4	2.7	9	0.2	1.7
Propane	9	2.3	3384.0	9	2.0	25.6
Propene	9	0.9	1916.0	9	0.2	7.8
Styrene	1	0.7	0.7	2	0.7	0.8
Tetrachloroethene[2]	9	0.0	0.7	8	0.1	0.3
Toluene	9	1.7	8.1	9	1.1	6.0
Trichloroethene[2]	6	0.3	3.5	1	0.4	0.4

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[a]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
1-Butene	6	0.4	335.6	7	0.4	2.2
1-Hexene	2	0.2	0.4	1	0.2	0.2
1-Pentene	6	0.4	1.3	9	0.1	0.8
1,1,1-Trichloroethane[2]	9	1.0	18.1	9	0.9	1.6
1,2,4-Trimethylbenzene & sec-Butylbenzene	8	0.8	7.3	9	0.4	2.9
1,3-Butadiene	6	0.2	12.0	7	0.2	0.4
1,3,5-Trimethylbenzene	6	0.5	2.6	9	0.1	1.1
2-Methyl-1-butene	7	0.2	1.6	9	0.2	1.3
2-Methyl-2-butene	6	0.7	2.5	9	0.1	2.0
2-Methyl-1-pentene	2	0.2	0.5	1	0.4	0.4
2-Methylheptane	5	0.5	1.4	9	0.1	0.6
2-Methylhexane	4	0.8	4.4	9	0.5	2.8
2-Methylpentane	9	0.8	2.8	9	0.4	4.3
2,2-Dimethylbutane	4	0.7	1.9	9	0.2	1.3
2,3-Dimethylbutane	6	0.5	0.8	9	0.1	1.1
2,3-Dimethylhexane	4	0.3	1.1	9	0.1	0.7
2,3-Dimethylpentane	2	0.8	1.3	8	0.4	0.8
2,3,4-Trimethylpentane	6	0.3	2.2	7	0.4	1.4
2,4-Dimethylhexane	3	0.7	1.7	9	0.4	1.1
2,4-Dimethylpentane	3	0.4	1.2	9	0.1	0.8
3-Ethylhexane	5	0.4	1.4	9	0.1	1.1

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[@]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
3-Methyl-1-butene	5	0.2	2.8	7	0.1	0.3
3-Methylhexane	4	1.3	4.5	9	1.4	2.5
3-Methylpentane	6	0.8	4.0	9	0.2	2.3
4-Methyl-1-pentene	1	0.1	0.1	1	0.2	0.2

1 Collected with steel canisters and analyzed using an FI Detector by Biospherics Research.
2 For this compound, electron capture detector used in the analysis by Biospherics Research.
3 If all measured results were below the reporting limit, the reporting limit is listed.
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

alpha-Pinene	1,2,3-Trimethylbenzene
beta-Pinene	1,3-Diethylbenzene
cis-4-Methyl-2-pentene	1,4-Diethylbenzene
trans-2-Hexene	2-Methyl-2-pentene
Ethylcyclohexane	2,2-Dimethylpropane
Methylstyrene	

The following analytes were not measured in the Spring:

2,2-Dimethylheptane
2,2,4-Trimethylhexane
2,2,4-Trimethylpentane
2,4,4-Trimethyl-1-pentene
2,4,4-Trimethyl-2-pentene
2,5-Dimethylhexane

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[e]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
cis-2-Butene	3	0.5	1.2	3	0.2	0.4
cis-2-Hexene	1	0.7	0.7	0	$\leq$0.1	--
cis-2-Pentene	3	0.3	6.8	2	0.2	0.4
i-Butane	6	2.7	629.0	6	0.3	2.3
i-Butene	2	0.3	1.7	1	0.4	0.4
i-Pentane	6	0.7	43.2	6	0.6	5.6
m-Ethyltoluene	4	0.8	7.7	3	0.2	0.5
m-Xylene & p-Xylene	6	0.3	53.8	6	0.4	2.2
n-Butane	6	1.1	180.0	6	0.5	2.9
n-Decane	5	0.2	34.4	5	0.1	0.8
n-Heptane	4	0.4	1.9	6	0.1	0.5
n-Hexane	6	0.2	5.0	6	0.2	1.0
n-Nonane	5	0.1	12.1	5	0.2	0.5
n-Octane	4	0.4	5.9	5	0.2	0.6
n-Pentane	6	0.4	16.3	6	0.5	2.1
n-Propylbenzene	4	1.4	5.1	2	0.2	0.4
o-Ethyltoluene	4	0.8	10.0	2	0.6	0.6
o-Xylene	6	0.2	17.1	6	0.2	1.0
p-Ethyltoluene	5	0.5	15.0	3	0.5	1.0
trans-2-Butene	4	0.4	1.6	3	0.3	0.4
trans-2-Pentene	3	0.3	2.6	3	0.2	0.8

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[@]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
Acetylene	6	0.3	46.0	6	0.2	1.3
Benzene	6	0.5	4.0	6	0.6	1.1
Carbon Tetrachloride[2]	6	0.7	0.7	6	0.6	0.7
Chloroform[2]	4	0.7	54.6	0	≤0.02	--
Cyclohexane	3	0.2	0.9	1	0.3	0.3
Cyclopentane	3	0.3	1.6	3	0.2	0.2
Cyclopentene	1	0.2	0.2	0	≤0.1	--
Ethane	6	0.9	86.0	6	0.6	2.2
Ethylbenzene	5	0.2	17.7	4	0.2	0.7
Ethylene	6	1.1	46.0	6	0.5	1.4
Isoprene	3	0.7	4.0	3	0.2	1.3
Methane	6	1043.0	1798.0	6	1030.0	1052.0
Methylcyclohexane	4	0.3	5.9	4	0.2	0.4
Methylcyclopentane	6	0.2	3.1	5	0.1	0.5
Propane	6	10.9	12132.0	6	1.1	9.6
Propene	6	0.5	26.0	6	0.2	1.7
Styrene	2	1.3	2.2	3	0.8	1.1
Toluene	6	1.1	15.0	6	0.6	2.3
Trichloroethene[2]	2	0.6	5.9	0	≤0.03	--
1-Butene	1	1.1	1.1	0	≤0.1	--
1-Pentene	2	0.4	2.0	2	0.2	0.4

Air VOC Results[1] for Residential Monitoring
All Units in $\mu g/m^3$

VOC[e]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
1,1,1-Trichloroethane[2]	6	0.8	5.3	6	0.8	1.3
1,2,4-Trimethylbenzene & sec-Butylbenzene	5	0.3	28.0	6	0.2	1.5
1,3-Butadiene	1	1.4	1.4	0	≤0.1	--
1,3,5-Trimethylbenzene	4	1.1	8.1	3	0.2	0.5
2-Methyl-1-butene	3	0.1	4.4	2	0.4	0.5
2-Methyl-2-butene	3	1.0	2.9	4	0.2	0.8
2-Methylheptane	4	0.3	0.9	3	0.2	0.6
2-Methylhexane	5	0.2	2.5	6	0.3	1.1
2-Methylpentane	6	0.3	11.0	6	0.2	1.7
2,2-Dimethylbutane	3	0.2	0.9	4	0.2	0.6
2,2,4-Trimethylpentane	4	0.4	2.5	5	0.3	1.0
2,3-Dimethylbutane	4	0.3	2.9	4	0.2	0.5
2,3-Dimethylhexane	2	0.4	0.4	2	0.1	0.3
2,3-Dimethylpentane	3	0.6	1.1	0	≤0.1	--
2,3,4-Trimethylpentane	3	0.4	0.9	2	0.3	0.3
2,4-Dimethylhexane	2	0.2	0.8	1	0.3	0.3
2,4-Dimethylpentane	2	0.3	0.7	2	0.2	0.2
2,4,4-Trimethyl-1-pentene	3	0.2	1.0	4	0.2	0.7
2,5-Dimethylhexane	1	0.8	0.8	1	0.2	0.2
3-Ethylhexane	3	0.7	1.8	2	0.2	0.3
3-Methyl-1-butene	2	0.4	1.0	1	0.1	0.1

Air VOC Results[1] for Residential Monitoring
All Units in μg/m³

VOC[@]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[3]	Highest		Lowest[3]	Highest
3-Methylhexane	5	0.9	3.4	6	0.7	1.3
3-Methylpentane	5	0.2	6.4	4	0.4	1.0

1 Collected with steel canisters and analyzed using an FI Detector by Biospherics Research.
2 For this table, electron capture detector used by Biospherics Research.
3 If all measured results were below the reporting limit, the reporting limit is listed.
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

cis-4-Methyl-2-pentene
i-Propylbenzene
trans-2-Hexene
Ethylcyclohexane
Tetrachloroethene
1-Hexene
2-Methyl-1-pentene
2-Methyl-2-pentene
2,2-Dimethylheptane
2,2-Dimethylpropane
2,2,4-Trimethylhexane
2,4,4-Trimethyl-2-pentene
4-Methyl-1-pentene

The following were not measured in the Summer:

1,3-Diethylbenzene
1,4-Diethylbenzene
Methylstyrene
alpha-Pinene
beta-Pinene
1,2,3-Trimethylbenzene

Air VOC Comparison Data
All Units in $\mu g/m^3$

VOC	COMPARISON DATA				
	TESL[a]	TYPICAL		HIGH VALUE	
		Indoor	Outdoor	Indoor	Outdoor
cis-2-Butene[2]	NA	NA	0.3	NA	5.7
cis-2-Hexene[2]	NA	NA	0.2	NA	35.8
cis-2-Pentene[2]	NA	NA	0.4	NA	0.5
i-Butane[3]	7600	25.6	5.4	114.4	11.9
i-Butene[4]	NA	NA	1.5	NA	236.9
i-Pentane[4]	1400	24.6	17.3	55.1	3202
i-Propylbenzene[4]	NA	NA	0.2	NA	138.9
m-Ethyltoluene[4]	500	NA	3.2	NA	504.9
m-Xylene & p-Xylene[1]	1480	30	18	170	90
n-Butane[3]	7600	25.0	20.3	182.8	43.5
n-Decane[1]	NA	7	1.8	66	8.3
n-Heptane[3]	1400	1.8	2.9	4.7	5.3
n-Hexane[3]	704	120.7	6.5	1139	14.1
n-Nonane[1]	4200	5.7	2.0	55	5.6
n-Octane[1]	1400	5.4	2.4	24	10
n-Pentane[3]	1400	2.4	9.5	6.5	18.9
n-Propylbenzene[4]	NA	0.0	0.8	0.6	912
o-Ethyltoluene[4]	500	NA	1.7	NA	479
o-Xylene[1]	1480	12	6.5	68	29
p-Ethyltoluene[4]	500	3.9	2.1	7.4	505
trans-2-Butene[2]	NA	NA	0.6	NA	13.0
trans-2-Pentene[2]	NA	NA	0.4	NA	8.7

Air VOC Comparison Data
All Units in $\mu g/m^3$

VOC	COMPARISON DATA				
	TESL[6]	TYPICAL		HIGH VALUE	
		Indoor	Outdoor	Indoor	Outdoor
Acetylene[5]	10648	18.7	8.0	83.8	11.7
Benzene[1]	12	13	7.1	97	25
Carbon Tetrachloride[1]	50	0.8	0.7	2.2	1.8
Chloroform[1]	40	1.4	0.5	12	7.5
Cyclohexane[5]	574	1.1	2.3	5.7	4.0
Cyclopentane[2]	1360	NA	6.0	NA	279.4
Cyclopentene[2]	NA	NA	0.5	NA	15.3
Ethane[3]	NA	15.4	8.6	57.9	12.9
Ethylbenzene[1]	800	5.8	3.2	40	16
Ethylene[5]	468	1.1	14.4	2.3	28.2
Isoprene[2]	NA	NA	4.0	NA	33.8
Methane[4]	NA	NA	1084	NA	7937
Methylcyclohexane[5]	NA	4.0	1.7	13.2	3.4
Methylcyclopentane[5]	NA	26.4	2.9	251.8	5.7
Propane[3]	7200	25.9	7.2	138.6	13.3
Propene[2]	NA	NA	1.6	NA	13.2
Styrene[1]	172	2.9	1.7	23	13
Tetrachloroethene[1]	136	6.8	4.3	53	18
Toluene[5]	752	21.6	16.7	58.8	32.4
Trichloroethene[1]	540	1.2	0.2	15	1.6
1-Butene[2]	NA	NA	1.7	NA	16.4
1-Hexene[4]	NA	NA	0.0	NA	1275

Air VOC Comparison Data
All Units in $\mu g/m^3$

VOC	COMPARISON DATA				
	TESL[6]	TYPICAL		HIGH VALUE	
		Indoor	Outdoor	Indoor	Outdoor
1-Pentene[2]	36	NA	0.6	NA	11.2
1,1,1-Trichloroethane[1]	4320	19	11	90	40
1,2,4-Trimethylbenzene & sec-Butylbenzene	--	--	--	--	--
1,3-Butadiene[4]	44	NA	0.4	NA	525
1,3,5-Trimethylbenzene[4]	500	1.4	1.0	39.3	608
2-Methyl-1-butene[4]	NA	NA	0.5	NA	3186
2-Methyl-2-butene[2]	NA	NA	1.0	NA	12.3
2-Methyl-1-pentene[2]	NA	NA	0.3	NA	6.8
2-Methylheptane[4]	1400	NA	1.6	NA	125
2-Methylhexane[3]	1228	1.2	5.9	2.9	12.9
2-Methylpentane[5]	NA	15.9	6.5	131.9	13.5
2,2-Dimethylbutane[2]	NA	NA	1.3	NA	42.7
2,3-Dimethylbutane[2]	1400	NA	6.2	NA	286.1
2,3-Dimethylhexane[4]	NA	NA	0.0	NA	294
2,3-Dimethylpentane[2]	NA	NA	1.0	NA	14.1
2,3,4-Trimethylpentane[5]	NA	0	1.8	1.2	3.5
2,4-Dimethylhexane[4]	NA	NA	0	NA	294
2,4-Dimethylpentane[3]	NA	1.8	1.8	4.1	4.1
3-Ethylhexane[4]	NA	NA	0	NA	266
3-Methyl-1-butene[2]	NA	NA	0.2	NA	12.6
3-Methylhexane[5]	NA	2.3	4.1	3.5	7.0
3-Methylpentane[3]	NA	24.7	4.7	193.7	9.4

Air VOC Comparison Data
All Units in $\mu g/m^3$

VOC	COMPARISON DATA				
	TESL[6]	TYPICAL		HIGH VALUE	
		Indoor	Outdoor	Indoor	Outdoor
4-Methyl-1-pentene	NA	NA	NA	NA	NA
2,2,4-Trimethylpentane[4,7]	NA	NA	2.0	NA	824.7
2,4,4-Trimethyl-1-pentene[7]	NA	NA	NA	NA	NA
2,5-Dimethylhexane[4,7]	NA	NA	0	NA	8.8

1 The typical value is the arithmetic average and the high value is the 12-hour maximum from L. Wallace, et al. "The Los Angeles TEAM Study: Personal Exposures, Indoor-Outdoor Air Concentrations, and Breath Concentrations of 25 Volatile Organic Compounds." J. Exposure Analysis and Environmental Epidemiology 1:157-192.

2 The typical value is the average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from Atlanta Ozone Precursor Monitoring Study Data Reporting, EPA/600/R-92/157, pp 62-64. AREAL, ORD, USEPA, RTP, NC 27711 Sept 1992.

3 The typical value is the arithmetic average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from C. Lewis and R.B. Zweidinger. "Apportionment of Residential Indoor Aerosol, VOC and Aldehyde Species to Indoor and Outdoor Sources, and their Source Strengths." Atmospheric Environment, 26A:2179-2184 (1992). NOTE: Data collected at 10 homes during the winter.

4 The typical value is the median, and the high is the maximum value; units in ppb converted to $\mu g/m^3$ from J. Shah, D. Joseph. "National Ambient VOC Data Base Update: 3.0" prepared for USEPA, AREAL (Contract No. 68-D80082) AREAL Mail Drop 77, RTP NC 27711, May 1993.

5 The typical value is the arithmetic average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from C. Lewis. "Sources of Air Pollutants Indoors: VOC and Fine Particulate Species." J. of Exp. Anal. & Env. Epi. 1, p. 42 (1991).

6 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a $^+$ sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some followup action (or further review) is warranted.

7 This VOC was measured only during the summer monitoring period.

NA Not available.

-- Not applicable.

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC[a]	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[2]	Highest
cis-2-Butene	20	0.1	6.8
cis-2-Pentene	20	0.1	0.8
i-Butane	22	1.0	6.6
i-Butene	20	0.1	1.7
i-Pentane	22	1.3	17.9
m-Ethyltoluene	17	0.1	1.0
m-Xylene & p-Xylene	22	0.5	6.3
n-Butane	22	1.4	19.9
n-Decane	22	0.2	1.3
n-Heptane	22	0.1	1.4
n-Hexane	22	0.4	3.7
n-Nonane	21	0.1	1.0
n-Octane	22	0.2	3.5
n-Pentane	22	0.8	10.8
n-Propylbenzene	17	0.1	0.7
o-Ethyltoluene	13	0.2	1.4
o-Xylene	22	0.2	2.4
p-Ethyltoluene	18	0.2	2.2
trans-2-Butene	20	0.1	1.1
trans-2-Pentene	17	0.1	1.7
Acetylene	22	0.4	6.3

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC*	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
Benzene	22	0.6	3.2
Carbon Tetrachloride[2]	22	0.7	2.2
Chloroform[2]	10	0.3	8.8
Cyclohexane	19	0.1	0.9
Cyclopentane	20	0.1	0.6
Cyclopentene	15	0.1	0.3
Ethane	22	1.7	10.6
Ethylbenzene	22	0.2	1.7
Ethylene	22	0.4	5.4
Isoprene	4	0.2	0.4
Methane	22	1068	1326
Methylcyclohexane	21	0.1	1.1
Methylcyclopentane	22	0.2	1.7
Propane	22	0.8	10.4
Propene	22	0.2	2.6
Styrene	11	0.4	2.5
Tetrachloroethene[2]	20	0.1	1.6
Toluene	22	0.8	7.8
Trichloroethene[2]	2	0.3	3.7
1-Butene	14	0.1	1.1
1-Hexene	8	0.1	0.5

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC[a]	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
1-Pentene	19	0.1	0.8
1,1,1-Trichloroethane[2]	22	1.1	5.0
1,2,4-Trimethylbenzene & sec-Butylbenzene	19	0.3	3.5
1,3-Butadiene	15	0.1	0.7
1,3,5-Trimethylbenzene	17	0.2	1.9
2-Methyl-1-butene	20	0.1	1.4
2-Methyl-1-pentene	8	0.1	0.5
2-Methyl-2-butene	21	0.1	2.0
2-Methylheptane	22	0.1	2.3
2-Methylhexane	22	0.2	1.7
2-Methylpentane	22	0.4	4.9
2,2-Dimethylbutane	22	0.1	1.6
2,3-Dimethylbutane	22	0.1	1.3
2,3-Dimethylhexane	20	0.1	1.1
2,3-Dimethylpentane	15	0.1	0.9
2,3,4-Trimethylpentane	18	0.1	1.6
2,4-Dimethylhexane	12	0.3	1.0
2,4-Dimethylpentane	19	0.1	0.7
3-Ethylhexane	21	0.1	3.2
3-Methyl-1-butene	15	0.1	0.3
3-Methylhexane	22	0.5	2.3

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC[@]	SPRING RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
'3-Methylpentane	22	0.3	3.3

1 Collected with Summa polished stainless-steel canisters and analyzed using gas chromatography/flame ionization detector by Biospherics Research.
2 Electron Capture Detector used to analyze this compound by Biospherics Research.
3 If all measured results were below the reporting limit, the reporting limit is listed.
4 The maximum number of detects is 22 (days of monitoring).
@ The following analytes were analyzed for but were not detected:

alpha-Pinene	i-Propylbenzene	1,2,3-Trimethylbenzene	2,2-Dimethylpropane
beta-Pinene	trans-2-Hexene	1,3-Diethylbenzene	4-Methyl-1-pentene
cis-2-Hexene	Ethylcyclohexane	1,4-Diethylbenzene	
cis-4-Methyl-2-pentene	Methylstyrene	2-Methyl-2-pentene	

The following analytes were not measured in the Spring:

2,2-Dimethylheptane
2,2,4-Trimethylhexane
2,2,4-Trimethylpentane
2,4,4-Trimethyl-1-pentene
2,4,4-Trimethyl-2-pentene
2,5-Dimethylhexane

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC	SUMMER RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
cis-2-Butene	13	0.1	0.2
cis-2-Pentene	14	0.1	0.2
i-Butane	14	0.5	1.4
i-Butene	14	0.2	0.5
i-Pentane	14	1.2	3.7
m-Ethyltoluene	10	0.1	0.4
m-Xylene & p-Xylene	14	0.6	4.1
n-Butane	14	1.3	2.6
n-Decane	14	0.2	1.4
n-Heptane	14	0.2	0.5
n-Hexane	14	0.4	0.9
n-Nonane	14	0.1	0.9
n-Octane	14	0.2	6.2
n-Pentane	14	1.0	1.9
n-Propylbenzene	10	0.1	0.4
o-Ethyltoluene	4	0.2	0.4
o-Xylene	14	0.2	1.3
p-Ethyltoluene	14	0.3	0.9
trans-2-Butene	14	0.1	0.4
trans-2-Pentene	14	0.1	0.4
Acetylene	14	0.8	2.2

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC	SUMMER RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
Benzene	14	0.5	1.0
Carbon Tetrachloride[2]	3	0.7	0.7
Cyclohexane	7	0.1	0.5
Cyclopentane	14	0.1	0.2
Cyclopentene	2	0.1	0.1
Ethane	14	0.6	1.6
Ethylbenzene	14	0.2	1.0
Ethylene	14	0.8	1.6
Isoprene	14	0.3	0.7
Methane	14	1022.0	1058.0
Methylcyclohexane	14	0.2	0.5
Methylcyclopentane	14	0.2	0.5
Propane	14	1.6	4.6
Propene	14	0.5	1.1
Styrene	8	0.4	0.9
Tetrachloroethene[2]	2	0.3	0.4
Toluene	13	1.0	2.2
1-Butene	14	0.1	0.5
1-Hexene	6	0.1	0.2
1-Pentene	14	0.1	0.3
1,1,1-Trichloroethane[2]	3	0.9	1.5

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC	SUMMER RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
1,2,4-Trimethylbenzene & sec-Butylbenzene	14	0.3	1.0
1,3-Butadiene	14	0.1	0.2
1,3,5-Trimethylbenzene	10	0.1	0.4
2-Methyl-1-butene	14	0.1	0.4
2-Methyl-1-pentene	6	0.1	0.2
2-Methyl-2-butene	14	0.1	0.5
2-Methylheptane	14	0.1	2.5
2-Methylhexane	14	0.5	0.9
2-Methylpentane	14	0.6	1.6
2,2-Dimethylbutane	12	0.1	0.3
2,2,4-Trimethylpentane	14	0.2	0.9
2,3-Dimethylbutane	14	0.1	0.4
2,3-Dimethylhexane	10	0.1	0.5
2,3-Dimethylpentane	2	0.2	0.2
2,3,4-Trimethylpentane	8	0.1	0.2
2,4-Dimethylhexane	5	0.2	0.3
2,4-Dimethylpentane	3	0.1	0.2
2,4,4-Trimethyl-1-pentene	12	0.1	0.4
2,5-Dimethylhexane	4	0.1	0.2
3-Ethylhexane	14	0.1	4.6
3-Methyl-1-butene	10	0.1	0.1

Fixed Site Outdoor Air VOC Results[1]
All Units in $\mu g/m^3$

VOC	SUMMER RESULTS		
	#Detects[4]	Detectable Results	
		Lowest[3]	Highest
3-Methylhexane	14	0.7	1.2
3-Methylpentane	14	0.2	0.8

1 Collected with Summa polished stainless-steel canisters and analyzed using gas chromatography/flame ionization detector analysis by Biospherics Research.
2 Electron Capture Detector used to analyze this compound by Biospherics Research.
3 If all measured results were below the reporting limit, the reporting limit is listed.
4 The maximum number of detects is 14 (days of monitoring).
@ The following analytes were analyzed for but were not detected:

cis-2-Hexene	Chloroform	2,2-Dimethylheptane	4-Methyl-1-pentene
ci[illegible]thyl-2-pentene	Ethylcyclohexane	2,2-Dimethylpropane	
i-Propylbenzene	Trichloroethene	2,2,4-Trimethylhexane	
trans-2-Hexene	2-Methyl-2-pentene	2,4,4-Trimethyl-2-pentene	

The following analytes were not measured in the Summer:

alpha-Pinene	1,3-Diethylbenzene
beta-Pinene	1,4-Diethylbenzene
Methylstyrene	
1,2,3-Trimethylbenzene	

Fixed Site Outdoor Air VOC Comparison Data
Units in $\mu g/m^3$

VOC	COMPARISON DATA		
	TESL[6]	TYPICAL	HIGH VALUE
		Outdoor	Outdoor
cis-2-Butene[2]	NA	0.3	5.7
cis-2-Pentene[2]	NA	0.4	0.5
i-Butane[3]	7600	5.4	11.9
i-Butene[4]	NA	1.5	236.9
i-Pentane[4]	1400	17.3	3202
m-Ethyltoluene[4]	500	3.2	504.9
m-Xylene & p-Xylene[1]	1480	18	90
n-Butane[3]	7600	20.3	43.5
n-Decane[1]	NA	1.8	8.3
n-Heptane[3]	1400	2.9	5.3
n-Hexane[3]	704	6.5	14.1
n-Nonane[1]	4200	2.0	5.6
n-Octane[1]	1400	2.4	10
n-Pentane[3]	1400	9.5	18.9
n-Propylbenzene[4]	NA	0.8	912
o-Ethyltoluene[4]	500	1.7	479
o-Xylene[1]	1480	6.5	29
p-Ethyltoluene[4]	500	2.1	505
trans-2-Butene[2]	NA	0.6	13.0
trans-2-Pentene[2]	NA	0.4	8.7
Acetylene[5]	10648	8.0	11.7

Fixed Site Outdoor Air VOC Comparison Data
Units in $\mu g/m^3$

VOC	COMPARISON DATA		
	TESL[6]	TYPICAL	HIGH VALUE
		Outdoor	Outdoor
Benzene[1]	12	7.1	25
Carbon Tetrachloride[1]	50	0.7	1.8
Chloroform[1]	40	0.5	7.5
Cyclohexane[5]	574	2.3	4.0
Cyclopentane[2]	1360	6.0	279.4
Cyclopentene[2]	NA	0.5	15.3
Ethane[3]	NA	8.6	12.9
Ethylbenzene[1]	800	3.2	16
Ethylene[5]	468	14.4	28.2
Isoprene[2]	NA	4.0	33.8
Methane[4]	NA	1084	7937
Methylcyclohexane[5]	NA	1.7	3.4
Methylcyclopentane[5]	NA	2.9	5.7
Propane[3]	7200	7.2	13.3
Propene[2]	NA	1.6	13.2
Styrene[1]	172	1.7	13
Tetrachloroethene[1]	136	4.3	18
Toluene[5]	752	16.7	32.4
Trichloroethene[1]	540	0.2	1.6
1-Butene[2]	NA	1.7	16.4
1-Hexene[4]	NA	0.0	1275

Fixed Site Outdoor Air VOC Comparison Data
Units in $\mu g/m^3$

VOC	COMPARISON DATA		
	TESL[6]	TYPICAL	HIGH VALUE
		Outdoor	Outdoor
1-Pentene[2]	36	0.6	11.2
1,1,1-Trichloroethane[1]	4320	11	40
1,2,4-Trimethylbenzene & sec-Butylbenzene[4]	500	3.5	33617
1,3-Butadiene[4]	44	0.4	525
1,3,5-Trimethylbenzene[4]	500	1.0	608
2-Methyl-1-butene[4]	NA	0.5	3186
2-Methyl-2-butene[2]	NA	1.0	12.3
2-Methyl-1-pentene[2]	NA	0.3	6.8
2-Methylheptane[4]	1400	1.6	125
2-Methylhexane[3]	1228	5.9	12.9
2-Methylpentane[5]	NA	6.5	13.5
2,2-Dimethylbutane[2]	NA	1.3	42.7
2,3-Dimethylbutane[2]	1400	6.2	286.1
2,3-Dimethylhexane[4]	NA	0.0	294
2,3-Dimethylpentane[2]	NA	1.0	14.1
2,3,4-Trimethylpentane[5]	NA	1.8	3.5
2,4-Dimethylhexane[4]	NA	0.0	294
2,4-Dimethylpentane[3]	NA	1.8	4.1
3-Ethylhexane[4]	NA	0.0	266
3-Methyl-1-butene[2]	NA	0.2	12.6
3-Methylhexane[5]	NA	4.1	7.0

Fixed Site Outdoor Air VOC Comparison Data
Units in $\mu g/m^3$

VOC	COMPARISON DATA		
	TESL[6]	TYPICAL	HIGH VALUE
		Outdoor	Outdoor
3-Methylpentane[3]	NA	4.7	9.4
4-Methyl-1-pentene	NA	NA	NA
2,2,4-Trimethylpentane[4,7]	NA	2.0	824.7
2,4,4-Trimethyl-1-pentene[7]	NA	NA	NA
2,5-Dimethylhexane[4,7]	NA	0.0	8.8

1 The typical value is the arithmetic average and the high value is the 12-hour maximum from L. Wallace, et al. "The Los Angeles TEAM Study: Personal Exposures, Indoor-Outdoor Air oncentrations, and Breath Concentrations of 25 Volatile Organic Compounds." J. Exposure Analysis and Environmental Epidemiology 1:157-192.

2 The typical value is the average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from Atlanta Ozone Precursor Monitoring Study Data Report, EPA/600/R-92/157, pp 62-64. AREAL, ORD, USEPA, RTP, NC 27711 Sept 1992.

3 The typical value is the arithmetic average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from C. Lewis and R.B. Zweidlinger. "Apportionment of Residential Indoor Aerosol, VOC and Aldehyde Species to Indoor and Outdoor Sources, and their Source Strengths." Atmospheric Environment, 26A:2179-2184 (1992). **NOTE: Data collected at 10 homes during the winter.**

4 The typical value is the median, and the high is the maximum value; units in ppb converted to $\mu g/m^3$ from J. Shah, D. Joseph. "National Ambient VOC Data Base Update: 3.0" prepared for USEPA, AREAL (Contract No. 68-D80082) AREAL Mail Drop 77, RTP NC 27711, May 1993.

5 The typical value is the arithmetic average, and the high is the maximum value; units in ppbC converted to $\mu g/m^3$ from C. Lewis. "Sources of Air Pollutants Indoors: VOC and Fine Particulate Species." J. of Exp. Anal. & Env. Epi. 1, p. 42 (1991).

6 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a + sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some followup action (or further review) is warranted.

7 This VOC was measured only during the summer monitoring period.

NA Not available.

Air Pesticide Results[1] from Residential Monitoring (9 Households)
All Units in ng/m^3

PESTICIDE[a]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Acephate	0	≤5.6	--	1	30.9	30.9
Atrazine	6	1.8	6.6	4	1.8	9.8
alpha-Chlordane	3	1.0	24.5	2	1.0	3.5
gamma-Chlordane	5	0.8	31.1	2	0.9	3.1
Chlorpyrifos	8	2.5	115.0	2	2.3	2.9
4,4'-DDD	1	1.3	1.3	1	1.0	1.0
4,4'-DDE	2	1.9	1.9	1	8.0	8.0
4,4'-DDT	3	2.0	4.0	0	≤1.5	--
Diazinon	4	1.6	60.4	0	≤0.4	--
Dieldrin	1	3.4	3.4	0	≤1.0	--
Heptachlor	4	2.1	8.4	0	≤0.7	--
Lindane	5	7.1	21.8	1	3.9	3.9
Malathion	2	1.5	5.6	2	2.8	9.6
Methyl Parathion	0	≤0.4	--	1	6.2	6.2
Pendimethalin	4	1.3	10.6	2	1.7	23.7
cis-Permethrin	0	≤1.2	--	1	4.6	4.6
Propoxur	8	5.1	125.0	0	≤0.4	--
Simazine	1	8.8	8.8	0	≤0.3	--
Trifluralin	6	2.4	43.6	5	5.2	82.7

Air Pesticide Results[1] from Residential Monitoring (9 Households)
All Units in ng/m^3

1 Collected with a Low Volume Sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed. For this table, the reporting limit is based upon a volume of 5.5 m^3 and the detection limit.
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

Azinphos-methyl	Metolachlor
Captan	trans-Permethrin
Carbaryl	
Carbofuran	
Ethyl Parathion	

Air Pesticide Results[1] from Residential Monitoring (6 Households)
All Units in ng/m³

PESTICIDE[a]	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Atrazine	2	7.2	52.4	0	≤1.0	--
Azinphos-methyl	0	≤1.1	--	1	1.2	1.2
Captan	1	7.0	7.0	1	1.7	1.7
Carbaryl	2	5.3	24.6	0	≤1.1	--
alpha-Chlordane	1	25.9	25.9	1	5.1	5.1
gamma-Chlordane	1	33.9	33.9	1	5.3	5.3
Chlorpyrifos	6	5.7	66.7	4	1.5	4.3
4,4'-DDE	2	1.4	2.8	2	1.3	1.3
4,4'-DDT	3	1.8	3.1	0	≤1.0	--
Diazinon	4	2.5	78.1	1	1.8	1.8
Dieldrin	2	2.1	5.4	1	2.1	2.1
Ethyl Parathion	1	2.2	2.2	0	≤1.3	--
Heptachlor	3	1.4	3.8	2	1.1	2.1
Lindane	3	20.5	769.0	1	2.2	2.2
Malathion	2	10.0	379.0	2	6.6	733.0
Methyl Parathion	5	1.4	49.1	2	24.4	103.0
Pendimethalin	3	1.3	1.9	0	≤1.2	--
cis-Permethrin	1	70.9	70.9	2	6.6	7.2
trans-Permethrin	1	67.4	67.4	2	6.7	8.9
Propoxur	4	25.0	228.0	0	≤5.4	--

Air Pesticide Results[1] from Residential Monitoring (6 Households)
All Units in ng/m^3

PESTICIDE	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
Simazine	1	10.8	10.8	0	≤1.0	--
Trifluralin	3	1.8	6.2	2	1.0	5.9

1 Collected with a Low Volume Sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed. For this table, the reporting limit is based upon a volume of 5.5 m^3 and the detection limit.
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

Acephate
Carbofuran
4,4'DDD
Metolachlor

Air Pesticide Comparison Data
All Units in ng/m^3

PESTICIDE	COMPARISON DATA				
	TESL[1]	INDOOR		OUTDOOR	
		Typical[2]	High Value[3]	Typical[2]	High Value[3]
Acephate	NA	NA	NA	NA	NA
Atrazine	20000	NA	NA	NA	NA
alpha-Chlordane	2000[4]	84	3020	0	628
gamma-Chlordane	2000[4]	NA	NA	NA	NA
Chlorpyrifos	800	182	1600	9	206
4,4'-DDD[+]	400[4]	0	0	0	0
4,4'-DDE[+]	400[4]	0	15	0	0
4,4'-DDT[+]	400[4]	0	17	0	0
Diazinon	400	73	5400	0	292
Dieldrin	1000	6	177	0	8
Heptachlor	200	10	1560	0	627
Lindane	2000	0	245	0	23
Malathion	20000	0	38	0	6
Methyl Parathion	200[P]	NA	NA	NA	NA
Pendimethalin	NA	NA	NA	NA	NA
cis-Permethrin	20000[4]	0	33	0	0
Propoxur	2000	113	7920	0	686
Simazine	NA	NA	NA	NA	NA
Trifluralin	NA	NA	NA	NA	NA
Azinphos-methyl[5]	NA	NA	NA	NA	NA

Air Pesticide Comparison Data
All Units in ng/m^3

PESTICIDE	COMPARISON DATA				
	TESL[1]	INDOOR		OUTDOOR	
		Typical[2]	High Value[3]	Typical[2]	High Value[3]
Captan[5]	NA	NA	NA	NA	NA
Carbaryl[5]	NA	NA	NA	NA	NA
Carbofuran[5]	400	NA	NA	NA	NA
Ethyl Parathion[5]	NA	NA	NA	NA	NA
Metolachlor[5]	NA	NA	NA	NA	NA
trans-Permethrin[5]	20000[4]	0	0	0	0

1 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some follow-up action (or further review) is warranted.
2 Typical value is the median taken from Nonoccupational Pesticide Exposure Study (NOPES) Final Report. U.S. Environmental Protection Agency, EPA/600/3-90/003, Jan 1990, Washington DC 20460. Note that the comparison city is Jacksonville, Florida, Summer, 1987, with a sample size of 72.
3 The high value listed is the 95th percentile from Nonoccupational Pesticide Exposure Study (NOPES) Final Report. U.S. Environmental Protection Agency, EPA/600/3-90/003, Jan 1990, Washington DC 20460. Note that the comparison city is Jacksonville, Florida, Summer, 1987, with a sample size of 72.
4 Denotes reference information is for the sum of the concentrations across all compounds identified (e.g. DDT, DDE, and DDD or alpha and gamma chlordane or cis and trans permethrin).
5 This pesticide was measured only during the summer monitoring period.
P For parathion only (i.e., not specific to methyl parathion).
\+ For these compounds, the comparison data are from the Spring monitoring season.
NA Denotes that there are no available data for comparison.

Fixed Site Air Pesticide Results[1]
All Units in ng/m^3

PESTICIDE@	SPRING FIXED SITE		
	#Detects	Detectable Results	
		Lowest[2]	Highest
Atrazine	4	1.5	12.7
Carbofuran	2	1.4	2.1
Lindane	1	6.4	6.4
Malathion	1	3.0	3.0
Pendimethalin	1	1.4	1.4
Trifluralin	1	1.1	1.1

1 Collected with a Low Volume Sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analytes were analyzed for but were not detected:

Acephate	alpha-Chlordane	4,4'-DDE	Ethyl Parathion	cis-Permethrin
Azinphos-methyl	gamma-Chlordane	4,4'-DDT	Heptachlor	trans-Permethrin
Captan	Chlorpyrifos	Diazinon	Methyl Parathion	Propoxur
Carbaryl	4,4'-DDD	Dieldrin	Metolachlor	Simazine

Fixed Site Air Pesticide Results[1]
All Units in ng/m^3

PESTICIDE[@]	SUMMER FIXED SITE		
	#Detects	Detectable Results	
		Lowest[2]	Highest
Atrazine	4	1.2	1.6
Carbaryl	1	0.1	0.1
alpha-Chlordane	1	0.1	0.1
gamma-Chlordane	2	0.2	0.2
Chlorpyrifos	6	0.7	1.9
4,4'-DDT	1	1.1	1.1
Diazinon	2	0.3	0.3
Dieldrin	1	0.2	0.2
Ethyl Parathion	1	0.2	0.2
Lindane	3	1.2	1.2
Malathion	1	0.4	0.4
Methyl Parathion	4	0.1	3.4

1 Collected Low Volume Sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analytes were analyzed for but were not detected:

Acephate	4,4'-DDD	Pendimethalin	Simazine
Azinphos-methyl	4,4'-DDE	cis-Permethrin	Trifluralin
Captan	Heptachlor	trans-Permethrin	
Carbofuran	Metolachlor	Propoxur	

Fixed Site Air Pesticide Comparison Data
All Units in ng/m^3

PESTICIDE	COMPARISON DATA		
	TESL[1]	TYPICAL[2]	HIGH VALUE[3]
Atrazine	20000	0	0
Carbofuran	400	NA	NA
Lindane	2000	0	23
Malathion	20000	0	6
Pendimethalin	NA	NA	NA
Trifluralin	NA	NA	NA
Carbaryl[5]	NA	NA	NA
alpha-Chlordane[5]	2000[4]	0	628
gamma-Chlordane[5]	2000[4]	9	206
Chlorpyrifos[5]	800	0	17
4,4'-DDT[5]	400[4]	0	0
Diazinon[5]	400	0	292
Dieldrin[5]	1000	0	8
Ethyl Parathion[5]	NA	NA	NA
Methyl Parathion[5]	200[P]	NA	NA

Fixed Site Air Pesticide Comparison Data
All Units in ng/m^3

1 Texas Effects Screening Levels adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some followup action (or further review) is warranted.

2 Typical value listed is the median from Nonoccupational Pesticide Exposure Study (NOPES) Final Report.U.S. Environmental Protection Agency, EPA/600/3-90/003, Jan 1990, Washington DC 20460. Note that the comparison city is Jacksonville, Florida, Summer, 1987, with a sample size of 72.

3 The high value listed is the 99th percentile from from Nonoccupational Pesticide Exposure Study (NOPES) Final Report.U.S. Environmental Protection Agency, EPA/600/3-90/003, Jan 1990, Washington DC 20460. Note that the comparison city is Jacksonville, Florida, Summer, 1987, with a sample size of 72.

4 Denotes reference information is for the sum of the concentrations across all compounds identified (e.g., DDT, DDE, and DDD or alpha and gamma chlordane).

5 This pesticide was measured only during the summer monitoring period.

P For parathion only (i.e., not specific to methyl parathion).

NA Not available.

Air PAH Results[1] from Residential Monitoring (9 Households)
All Units in ng/m^3

PAH[@]	SPRING RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Acenaphthene	7	1.9	27.8	5	1.4	7.6
Anthracene	8	0.7	1.9	7	0.6	1.8
Benzo[a]anthracene	2	0.4	0.8	1	0.9	0.9
Benzo[k]fluoranthene	6	0.5	3.2	3	0.4	1.8
Benzo[g,h,i]perylene	3	1.6	5.6	1	1.0	1.0
Benzo[a]pyrene	4	0.3	1.1	1	0.3	0.3
Benzo[e]pyrene	4	0.4	1.3	1	0.7	0.7
Chrysene	5	0.4	1.0	2	0.4	1.4
Coronene	2	0.8	1.7	2	0.4	0.9
Fluoranthene	9	1.2	7.8	7	1.6	4.4
Fluorene	9	6.5	41.2	9	1.4	24.2
Indeno[123-cd]pyrene	4	0.2	1.9	1	0.4	0.4
Naphthalene	9	7.3	1115.6	8	3.7	23.6
Phenanthrene	9	8.2	49.6	9	2.7	29.8
Pyrene	8	1.6	20.3	6	1.9	4.6

1 Collected with a low volume sampler; analyzed by RTI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analytes were analyzed for but were not detected:

Cyclopenta[c,d]pyrene
Dibenz[a,h]anthracene

The following was not measured in the Spring:

Benzo[b]fluoranthene

Air PAH Results[1] from Residential Monitoring (6 Households)
All Units in ng/m^3

PAH@	SUMMER RESULTS					
	INDOOR			OUTDOOR		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Acenaphthene	5	2.4	52.3	2	2.8	4.5
Anthracene	6	0.8	24.9	4	0.6	1.9
Fluoranthene	6	1.2	6.2	4	0.7	3.4
Fluorene	6	4.1	402.0	4	3.1	9.8
Naphthalene	4	28.8	92.8	0	≤19.4	--
Phenanthrene	6	11.2	517.0	4	8.6	25.3
Pyrene	6	1.1	10.6	4	0.6	1.9

1 Collected with a low volume sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
-- Not applicable.
@ *The following analytes were analyzed for but were not detected:*

Benzo[a]anthracene	Benzo[a]pyrene
Benzo[b]fluoranthene	Chrysene
Benzo[k]fluoranthene	Dibenz[a,h]anthracene
Benzo[g,h,i]perylene	*Indeno[1,2,3,cd]pyrene*

The following were not measured in the Summer:

Benzo[e]pyrene
Coronene
Cyclopenta[c,d]pyrene

Air PAH Comparison Data
All Units in ng/m^3

PAH	COMPARISON DATA				
	TESL[1]	TYPICAL[2]		HIGH VALUE[3]	
		Indoor	Outdoor	Indoor	Outdoor
Acenaphthene	NA	36	4	120	10
Anthracene	200	6	1	15	2
Benzo[a]anthracene	NA	1	0.4	3	0.8
Benzo[a]pyrene	12	1	0.2	3	0.5
Benzo[e]pyrene	NA	3	0.5	10	0.9
Benzo[g,h,i]perylene	NA	1	0.5	2	1
Benzo[k]fluoranthene	NA	2	1	5	2
Chrysene	200	2	1	7	2
Coronene	NA	0.6	0.3	1.4	0.7
Fluoranthene	NA	11	6	23	9
Fluorene	800	NA	NA	NA	NA
Indeno[1,2,3-c,d]pyrene	NA	1	0.4	2	0.7
Naphthalene	176000	1600	170	4200	330
Phenanthrene	NA	110	31	210	54
Pyrene	200	8	4	17	9

1 Texas Effects Screening Level adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a $^{+}$ sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not necessarily mean there is a health problem, but rather an indication that some follow-up action (or further review) is warrented.

2 The typical value listed is the median from J.C. Chuang, G.A. Mack, M.R. Kuhlman, and N.K. Wilson. "Polycyclic Aromatic Hydrocarbons and their Derivatives in Indoor and Outdoor Air in an Eight-Home Study." Atmospheric Environment, 25B; 369-380 (1991).

3 The high value listed is the maximum from J.C. Chuang, G.A. Mack, M.R. Kuhlman, and N.K. Wilson. "Polycyclic Aromatic Hydrocarbons and their Derivatives in Indoor and Outdoor Air in an Eight-Home Study." Atmospheric Environment, 25B; 369-380 (1991).

NA Not available.

Fixed Site Outdoor Air Monitoring Results[1] for PAHs
Units in ng/m³

PAH[@]	SPRING RESULTS		
	#Detects[3]	Detectable Results	
		Lowest[2]	Highest
Acenaphthene	19	0.3	7.9
Anthracene	22	0.6	4.9
Benzo[a]anthracene	10	0.1	0.2
Benzo[k]fluoranthene	18	0.2	0.9
Benzo[g,h,i]perylene	18	0.1	1.1
Benzo[a]pyrene	9	0.1	0.1
Benzo[e]pyrene	18	0.1	0.5
Chrysene	22	0.2	0.9
Coronene	21	0.1	0.9
Fluoranthene	22	4.5	17.8
Fluorene	22	1.9	25.9
Ideno[1,2,3-c,d]pyrene	17	0.1	0.4
Naphthalene	22	1.3	36.3
Phenanthrene	22	17.1	83.9
Pyrene	22	2.2	11.5

1 Collected with a VAPS; analyzed by RTI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
3 Monitoring was conducted for 22 days; the maximum number of detects is 22.
@ The following analytes were analyzed for but were not detected:

Cyclopenta[c,d]pyrene
Dibenzo[a,h]anthracene

The following analyte was not measured in the Spring:

Benzo[b]fluoranthene

Fixed Site Outdoor Air Monitoring Results[1] for PAHs
Units in ng/m^3

PAH[@]	SUMMER RESULTS		
	#Detects[3]	Detectable Results	
		Lowest[2]	Highest
Acenaphthene	7	1.8	3.9
Anthracene	9	1.6	5.7
Benzo[a]anthracene	1	0.1	0.1
Benzo[b]fluoranthene	1	0.1	0.1
Benzo[k]fluoranthene	1	0.1	0.1
Benzo[g,h,i]perylene	2	0.1	0.1
Chrysene	2	0.3	0.5
Fluoranthene	9	4.2	15.3
Fluorene	9	3.3	13.0
Ideno[1,2,3-c,d]pyrene	1	0.1	0.1
Naphthalene	9	6.6	22.6
Phenanthrene	9	13.8	73.3
Pyrene	9	2.4	7.6

1 Collected with a low volume fine particle sampler; analyzed by SWRI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
3 Monitoring was conducted for PAH's on 9 of the 14 days; the maximum number of detects is 9.
@ The following analytes were analyzed for but were not detected:

Benzo[a]pyrene
Dibenzo[a,h]anthracene

The following analyte was not measured in the Summer:

Coronene

Fixed Site Outdoor Air for PAHs Comparison Data
Units in ng/m³

PAH	COMPARISON DATA		
	TESL[1]	TYPICAL[2]	HIGH VALUE[3]
Acenaphthene	NA	4	10
Anthracene	200	1	2
Benzo[a]anthracene	NA	0.4	0.8
Benzo[k]fluoranthene	NA	1	2
Benzo[g,h,i]perylene	NA	0.5	1
Benzo[a]pyrene	12	0.2	0.5
Benzo[e]pyrene	NA	0.5	0.9
Chrysene	200	1	2
Coronene	NA	0.3	0.7
Fluoranthene	NA	6	9
Fluorene	800	NA	NA
Ideno[1,2,3-c,d]pyrene	NA	0.4	0.7
Naphthalene	176000	170	330
Phenanthrene	NA	31	54
Pyrene	200	4	9
Benzo[b]fluoranthene[4]	NA	NA	NA

Fixed Site Outdoor Air for PAHs Comparison Data
Units in ng/m^3

1 Texas Effects Screening Level adjusted for 24-hour sampling interval as used by the Texas Natural Resource Conservation Commission Toxicology and Risk Assessment Section in its evaluation of the potential impacts of various air contaminants. These screening levels are based on health effects information unless the compound is followed by a $^{+}$ sign. If measured airborne levels of a certain chemical do not exceed the screening level, it is interpreted to mean that adverse health or welfare effects are not expected. If the measured level exceeds the screening level, it does not *necessarily mean there is a health problem*, but rather an indication that some follow-up action (or further review) iswarrented.

2 The typical value listed is the median from J.C. Chuang, G.A. Mack, M.R. Kuhlman, and N.K. Wilson. "Polycyclic Aromatic Hydrocarbons and their Derivatives in Indoor and Outdoor Air in an Eight-Home Study." Atmospheric Environment, 25B; 369-380 (1991).

3 The high value listed is the maximum from J.C. Chuang, G.A. Mack, M.R. Kuhlman, and N.K. Wilson. "Polycyclic Aromatic Hydrocarbons and their Derivatives in Indoor and Outdoor Air in an Eight-Home Study." Atmospheric Environment, 25B; 369-380 (1991).

4 This PAH was measured only during the summer monitoring period.

NA Not available.

House Dust Elemental Results[1] for Residential Monitoring (9 Households)
Units in $\mu g/g$

ELEMENT®	SPRING RESULTS		
	#Detects	Detectable Results	
		Lowest	Highest
Aluminum	7	9724	34803
Barium	5	549	1100
Bromine	1	123	123
Calcium	9	35693	95398
Chlorine	9	784	12390
Chromium	6	51	150
Copper	9	78	391
Iron	9	13136	31842
Lead	3	105	416
Manganese	9	242	477
Nickel	3	70	209
Potassium	9	5351	14274
Rubidium	8	44	100
Silicon	9	47687	141972
Strontium	9	265	526
Sulfur	9	1250	13347
Titanium	9	1499	3377
Vanadium	1	188	188
Zinc	9	325	2217
Zirconium	8	186	1044

House Dust Elemental Results[1] for Residential Monitoring (9 Households)
Units in $\mu g/g$

1 Collected via HVS3; analyzed by METI using XRF.

@ The following analytes were analyzed for but were not detected:

Antimony	Cobalt	Iodine	Palladium	Selenium	Tungsten
Arsenic	Gallium	Lanthanum	Phosphorus	Silver	Yttrium
Cadmium	Germanium	Mercury	Rhodium	Tellurium	
Cesium	Gold	Molybdenum	Scandium	Tin	

House Dust Elemental Results[1] for Residential Monitoring (6 Households)
Units in μg/g

ELEMENT[a]	SUMMER		
	#Detects	Detectable Results	
		Lowest	Highest
Aluminum	5	16576	29983
Barium	5	688	1395
Bromine	2	47	131
Calcium	6	46701	118543
Chlorine	6	1559	8511
Chromium	5	55	86
Copper	6	142	588
Iron	6	15522	30503
Lead	5	109	649
Manganese	6	239	521
Nickel	1	169	169
Potassium	6	7868	13890
Rubidium	5	39	101
Silicon	6	52128	131849
Strontium	6	325	576
Sulfur	6	1545	21438
Titanium	6	2140	3832
Zinc	6	383	2044
Zirconium	6	268	747

House Dust Elemental Results[1] for Residential Monitoring (6 Households)
Units in $\mu g/g$

1 Collected via HVS3; analyzed by METI using XRF.

@ The following analytes were analyzed for but were not detected:

Antimony	Cobalt	Iodine	Palladium	Selenium	Tungsten
Arsenic	Gallium	Lanthanum	Phosphorus	Silver	Vanadium
Cadmium	Germanium	Mercury	Rhodium	Tellurium	Yttrium
Cesium	Gold	Molybdenum	Scandium	Tin	

House Dust Elemental Comparison Data

Units in μg/g

ELEMENT	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Aluminum	NA	100,000[3]
Barium	NA	5000[3]
Bromine	NA	NA
Calcium	NA	320,000[3]
Chlorine	NA	NA
Chromium	NA	2000[3]
Copper	900[1]	7700[2]
Iron	NA	100,000[3]
Lead	1600[1]	3200[2]
Manganese	230[1]	2000[2]
Nickel	230[1]	1200[2]
Potassium	NA	3000[3]
Rubidium	NA	210[3]
Silicon	NA	440,000[3]
Strontium	NA	3000[3]
Sulfur	NA	4800[3]
Titanium	NA	20,000[3]
Vanadium	NA	500[3]
Zinc	1550[1]	5000[2]
Zirconium	NA	1500[3]

1 The typical value listed is the mean from Roberts, J.W., Camann, D.E., and Spittler, T.M. (1991). "Reducing lead exposure from remodeling and soil track-in in older homes." In: Proc. of the Annual Meeting of Air and Waste Management Assoc. Vancouver, BC. Paper No. 91-134.2.

2 The high value listed is the maximum value from Roberts, J.W., Camann, D.E., and Spittler, T.M. (1991). "Reducing lead exposure from remodeling and soil track-in in older homes." In: Proc. of the Annual Meeting of Air and Waste Management Assoc. Vancouver, BC. Paper No. 91-134.2.

3 The high value is the maximum value from range of metal concentration found in soil from the Western US; ATSDR Public Health Assessment Guidance Manual.

NA Not available.

Soil Elements Results[1] from Residential Monitoring (9 Households)
Units in $\mu g/g$

ELEMENT[a]	SPRING RESULTS					
	ROADWAY			YARD		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Aluminum	9	9461	40499	7	13224	36757
Barium	4	636	1415	4	852	1169
Calcium	9	40319	142751	9	18215	205373
Chromium	3	77	87	1	61	61
Copper	8	117	1303	7	160	6498
Iodine	1	1116	1116	0	≤570	--
Iron	9	11251	25302	9	3243	37635
Lead	2	117	171	1	125	125
Manganese	9	180	509	8	210	690
Nickel	1	124	124	0	≤110	--
Potassium	9	4071	12564	8	6153	18860
Rubidium	6	56	105	6	57	152
Silicon	9	45833	145385	9	67247	205346
Strontium	9	225	465	8	265	758
Sulfur	8	442	2051	9	542	15478
Tellurium	1	344	344	0	≤460	--
Titanium	9	1267	2750	8	1061	4828
Vanadium	1	123	123	0	≤200	--
Zinc	6	60	406	6	81	434
Zirconium	5	387	509	1	304	304

Soil Elements Results[1] from Residential Monitoring (9 Households)
Units in $\mu g/g$

1 Surface sample only, analyzed by METI.
2 If all measured results were below the reporting limit, the reporting limit is listed. (For this table, the reporting limit is defined as the median value of 3 times the sample uncertainty.)
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

Antimony	Cesium	Germanium	Molybdenum	Scandium	Tungsten
Arsenic	Chlorine	Gold	Palladium	Selenium	Yttrium
Bromine	Cobalt	Lanthanum	Phosphorus	Silver	
Cadmium	Gallium	Mercury	Rhodium	Tin	

Soil Elements Comparison Data
All Units in $\mu g/g$

ELEMENT	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Aluminum	74,000[2]	100,000[3]
Barium	670[2]	5000[3]
Calcium	33,000[2]	320,000[3]
Chromium	56[2]	2000[3]
Copper	27[2]	300[3]
Iodine	NA	NA
Iron	26,000[2]	100,000[3]
Lead	1000[1]	5000[1]
Manganese	300[1]	530[1]
Nickel	65[1]	150[1]
Potassium	1800[4]	3000[3]
Rubidium	74[2]	210[3]
Silicon	300,000[4]	440,000[3]
Strontium	270[2]	3000[3]
Sulfur	1900[2]	4800[3]
Tellurium	NA	NA
Titanium	2600[2]	20,000[3]
Vanadium	88[2]	500[3]
Zinc	300[1]	800[1]
Zirconium	190[2]	1500[3]

Soil Elements Comparison Data
All Units in $\mu g/g$

1 Comparison data from Roberts et al., Journal of Exposure Analysis and Environmental Epidemiology, Suppl. 1, 127-146 (1992); Typical = median; High = maximum.

2 The typical value is the estimated arithmetic mean concentration (unless otherwise noted) for background levels of metals in soils from the Western US; ATSDR Public Health Assessment Guidance Manual.

3 The high value is the maximum value from range of metal concentration found in soil from the Western US; ATSDR Public Health Assessment Guidance Manual.

4 The typical value is the geometric mean for background levels of metals in soils from the Western US; ATSDR Public Health Assessment Guidance Manual.

NA Not Available.

House Dust Pesticide Results[1] for Residential Monitoring (9 Households)
Units in $\mu g/g$

PESTICIDE[a]	SPRING RESULTS		
	#Detects	Detectable Results	
		Lowest	Highest
Atrazine	4	0.2	0.4
Captan	2	0.6	1.2
Carbaryl	5	0.1	0.2
alpha-Chlordane	1	1.7	1.7
gamma-Chlordane	1	1.9	1.9
Chlorpyrifos	9	0.1	1.7
2,4-D	1	0.1	0.1
4,4'-DDD	3	0.1	0.1
4,4'-DDE	5	0.1	0.5
4,4'-DDT	8	0.1	0.6
Diazinon	5	0.1	1.8
Dicamba	1	0.2	0.2
Dieldrin	3	0.1	0.2
Lindane	2	0.1	0.1
Malathion	4	0.1	1.0
Methyl Parathion	2	0.1	0.3
Pendimethalin	4	0.04	0.7
Pentachlorophenol	3	0.1	0.3
cis-Permethrin	5	0.5	3.2
trans-Permethrin	9	0.3	4.9
Propoxur	8	0.1	3.2
Trifluralin	2	0.1	0.2

House Dust Pesticide Results[1] for Residential Monitoring (9 Households)
Units in μg/g

1 Sample collected by HVS3 and analyzed by SWRI.
@ The following analytes were analyzed for but were not detected:

Acephate	Metolachlor
Azinphos-methyl	Simazine
Carbofuran	
Ethyl Parathion	
Heptachlor	

House Dust Pesticide Results[1] for Residential Monitoring (6 Households)
Units in $\mu g/g$

PESTICIDE	SUMMER RESULTS		
	#Detects	Detectable Results	
		Lowest	Highest
Azinphos-methyl	1	1.2	1.2
Carbaryl	3	0.1	6.6
Carbofuran	2	0.1	0.9
alpha-Chlordane	1	1.1	1.1
gamma-Chlordane	1	1.4	1.4
Chlorpyrifos	6	0.2	1.7
2,4-D	4	0.02	0.1
4,4'-DDD	1	0.2	0.2
4,4'-DDE	4	0.1	0.4
4,4'-DDT	5	0.1	0.3
Diazinon	4	0.1	0.8
Lindane	4	0.1	0.9
Malathion	2	0.1	0.4
Methyl Parathion	1	1.4	1.4
Pendimethalin	2	0.4	0.8
Pentachlorophenol	5	0.1	0.3
cis-Permethrin	6	0.4	96.9
trans-Permethrin	6	1.0	100.0
Propoxur	5	0.1	1.9
Trifluralin	1	0.2	0.2

House Dust Pesticide Results[1] for Residential Monitoring (6 Households)
Units in μg/g

1 Sample collected by HVS3 and analyzed by SWRI.

@ The following analytes were analyzed for but were not detected:

Acephate	Dieldrin	Simazine
Atrazine	Ethyl Parathion	
Captan	Heptachlor	
Dicamba	Metolachlor	

House Dust Pesticide Comparison Data
Units in $\mu g/g$

PESTICIDE	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Atrazine	0.7	0.9
Captan	0.57	1.2
Carbaryl	1.0	1.6
alpha-Chlordane	6.3[1,3]	98.6[2,3]
gamma-Chlordane	6.3[1,3]	98.6[2,3]
Chlorpyrifos	4.7[1]	22.0
2,4-D	NA	NA
4,4'-DDD	NA	1.2
4,4'-DDE	0.3[1]	1.2[2]
4,4'-DDT	0.4[1]	4.0[2]
Diazinon	0.4[1]	10.4[2]
Dicamba	NA	NA
Dieldrin	0.5[1]	18.2[2]
Lindane	≤0.1	1.9
Malathion	NA	NA
Methyl Parathion	NA	NA
Pendimethalin	NA	NA
Pentachlorophenol	NA	9.5
cis-Permethrin	NA	0.9
trans-Permethrin	NA	1.0
Propoxur	0.6[1]	7.6[2]
Trifluralin	NA	NA

House Dust Pesticide Comparison Data
Units in μg/g

PESTICIDE	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Acephate[4]	NA	NA
Azinphos-methyl[4]	NA	NA
Carbofuran[4]	NA	NA

1 The typical value listed is the median from Roberts, et al; Journal of Exposure Analysis, Vol. 1, No. 2, 150, (1991).
2 The high value listed is the maximum from Roberts, et al; Journal of Exposure Analysis, Vol. 1, No. 2, 150, (1991).
3 Denotes reference information is for the sum of all compounds indentified.
4 This pesticide was measured only during the summer monitoring period.
NA Not available.

House Dust Polycyclic Aromatic Hydrocarbon (PAH) Results[1] from Residential Monitoring (9 Households) All Units in ng/g

PAH[@]	SPRING RESULTS		
	#Detects	Detectable Results	
		Lowest[2]	Highest
Acenaphthene	1	99	99
Anthracene	9	4	79
Benzo[a]anthracene	9	29	606
Benzo[k]fluoranthene	9	105	1051
Benzo[g,h,i]perylene	9	56	489
Benzo[a]pyrene	9	34	470
Benzo[e]pyrene	9	39	426
Chrysene	9	69	586
Coronene	6	44	141
Cyclopenta[c,d]pyrene	7	22	204
Dibenzo[a,h]anthracene	4	80	265
Fluoranthene	9	63	814
Fluorene	1	81	81
Indeno[1,2,3,c,d]pyrene	5	71	515
Naphthalene	6	52	824
Phenanthrene	9	82	582
Pyrene	9	85	881

1 Sample collected via HVS3; analyzed by RTI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analyte was not measured in the Spring:

Benzo[b]fluoranthene

House Dust Polycyclic Aromatic Hydrocarbon (PAH) Results[1] from Residential Monitoring (6 Households) All Units in ng/g

PAH[@]	SUMMER RESULTS		
	#Detects	Detectable Results	
		Lowest[2]	Highest
Acenaphthene	1	98	98
Anthracene	1	125	125
Benzo[a]anthracene	4	74	560
Benzo[b]fluoranthene	6	40	619
Benzo[k]fluoranthene	4	82	493
Benzo[g,h,i]perylene	5	39	417
Benzo[a]pyrene	5	41	614
Chrysene	6	43	591
Dibenzo[a,h]anthracene	1	115	115
Fluoranthene	6	95	1330
Fluorene	2	40	159
Indeno[1,2,3,c,d]pyrene	5	43	468
Phenanthrene	6	142	1640
Pyrene	6	86	1480

1 Sample collected via HVS3; analyzed by RTI.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analyte was analyzed for but not detected:

Naphthalene

The following analytes were not measured in the Summer:

Benzo[e]pyrene
Coronene
Cyclopenta[c,d]pyrene

House Dust Polycyclic Aromatic Hydrocarbon (PAH) Comparison Data
All Units in ng/g

PAH	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Acenaphthene	NA	NA
Anthracene	120[1]	400[2]
Benzo[a]anthracene	540[1]	1500[2]
Benzo[b]fluoranthene	NA	NA
Benzo[k]fluoranthene	1500[1]	3500[2]
Benzo[g,h,i]perylene	670[1]	1300[2]
Benzo[a]pyrene	730[1]	1700[2]
Benzo[e]pyrene	700[1]	1500[2]
Chrysene	960[1]	2400[2]
Coronene	200[1]	480[2]
Cyclopenta[c,d]pyrene	12	60[2]
Dibenzo[a,h]anthracene	210[1]	510[2]
Fluoranthene	1400[1]	3900[2]
Fluorene	90[1]	280[2]
Indeno[1,2,3,c,d]pyrene	630[1]	1400[2]
Naphthalene	NA	NA
Phenanthrene	1200[1]	3100[2]
Pyrene	1200[1]	3000[2]

1 The typical value listed is the mean from J.C. Chuang, P.J. Callahan, S. Gordon, "Evaluation of HVS3 Sampler for Sampling Polycyclic Aromatic Hydrocarbons and Polychlorinated Biphenyls", EPA Contract 68-DU-007, AREAL RTP NC 27711.

2 The high value listed is the maximum from J.C. Chuang, P.J. Callahan, S. Gordon, "Evaluation of HVS3 Sampler for Sampling Polycyclic Aromatic Hydrocarbons and Polychlorinated Biphenyls", EPA Contract 68-DU-007, AREAL RTP NC 27711.

NA Not available.

Urine Element Results[1] from Residential Monitoring
(9 Primary and 9 Secondary Participants)
Units in $\mu g/l$

ELEMENT	SPRING RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Arsenic	8	8.0	41.0	3	8.0	26.0
Cadmium	7	0.1	0.7	5	0.2	0.8
Mercury	9	0.2	6.9	9	0.3	2.1

1 Samples analyzed by the Centers for Disease Control.

2 If all measured results were below the reporting limit, the reporting limit is listed.

Urine Element Results[1] from Residential Monitoring
(6 Primary and 6 Secondary Participants)
All Units in $\mu g/l$

ELEMENT	SUMMER RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Arsenic	6	20.3	106.5	6	16.8	427.4
Cadmium	6	0.7	1.3	6	0.1	2.3
Mercury	6	2.5	5.1	6	2.4	8.6

1 Samples analyzed by the Centers for Disease Control; Primary Participant = 24 hour composite; Secondary Participant = first morning void.
2 If all measured results were below the reporting limit, the reporting limit is listed.

Urine Element Comparison Data
All Units in μg/l

ELEMENT	COMPARISON DATA	
	TYPICAL	HIGH VALUE
Arsenic	7.5[1]	24.2
Cadmium	0.5[2]	2.4[5]
Mercury	≤0.5[3]	20.0[6]

1 The typical value listed is the median from Kalman, D., Hughes, J. et al., "The effect of variable environmental arsenic contamination on urinary concentrations of arsenic species," Environmental Health Perspectives 89: 145-151 (1990). Values given are for individuals who did not consume seafood; median for those who did consume seafood is 10.8 μg/l; the high value is 36.9 μg/l for those who did consume seafood.
2 The typical value listed is the median from NHANES III study (1988-present); N=9669 participants age 30-70.
3 The typical value listed is from Clarkson, T., Friberg, L., et al. (Eds.) Biological Monitoring of Toxic Metals, New York: Plenum Press (1988).
4 The high value listed is the 95th percentile from NHANES III study (1988-present); N=9669 participants age 30-70.
5 The high value listed is the 95th percentile from Clarkson, T., Friberg, L., et al. (Eds.) Biological Monitoring of Toxic Metals, New York: Plenum Press (1988).
NA Not available.

Urine Pesticide Results[1] from Residential Monitoring
(9 Primary and 9 Secondary Participants)
Units in $\mu g/l$

PESTICIDE METABOLITES[a]	PARENT COMPOUND	SPRING RESULTS					
		PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
		#Detects	Detectable Results		#Detects	Detectable Results	
			Lowest[2]	Highest		Lowest[2]	Highest
Pentachlorophenol	Pentachlorophenol	3	1.0	1.2	2	1.6	3.2
1-Naphthol	Naphthalene Carbaryl	9	1.2	6.6	7	1.9	38.0
2-Isopropoxyphenol	Propoxur	0	1.0	--	1	1.1	1.1
2-Naphthol	Naphthalene	9	1.0	14.0	7	1.6	38.0
2,4-Dichlorophenol	1,3-Dichlorobenzene Dichlofenthion Prothiofos Phosdiphen	5	1.0	3.3	3	1.2	2.7
2,4-Dichlorophenoxy-acetic Acid	2,4-D	3	1.1	1.3	2	1.5	2.8
2,4,5-Trichlorophenol	1,2,4-Trichlorobenzene Fenchlorphos Trichloronate	4	1.0	1.6	3	2.5	4.2
2,4,6-Trichlorophenol	1,3,5-Trichlorobenzene Hexachlorobenzene Lindane	0	2.0	--	1	2.2	2.2
2,5-Dichlorophenol	1,4-Dichlorobenzene	9	5.1	92.0	8	4.4	50.0
3,5,6-Trichloro-2-pyridinol	Chlorpyrifos Chlorpyrifos-methyl	7	1.0	4.7	6	1.0	6.4
4-Nitrophenol	Parathion Methyl Parathion Nitrobenzene EPN	6	1.4	2.7	6	1.1	5.5

Urine Pesticide Results[1] from Residential Monitoring
(9 Primary and 9 Secondary Participants)
Units in $\mu g/l$

1 Samples analyzed by the Centers for Disease Control.
2 If all measured results were below the reporting limit, the reporting limit is listed.
-- Not applicable.
@ The following analyte was analyzed for but was not detected:

7-Carbofuranphenol

Urine Pesticide Results[1] from Residential Monitoring
(6 Primary and 6 Secondary Participants)
All Units in $\mu g/l$

PESTICIDE METABOLITES	PARENT COMPOUND	SUMMER RESULTS					
		PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
		#Detects	Detectable Results		#Detects	Detectable Results	
			Lowest[2]	Highest		Lowest[2]	Highest
Pentachlorophenol	Pentachlorophenol	5	1.1	3.8	3	2.5	7.0
1-Naphthol	Naphthalene Carbaryl	6	1.2	12.0	5	1.7	22.0
2-Naphthol	Naphthalene	6	1.5	12.0	6	1.1	11.0
2,4-Dichlorophenol	1,3-Dichlorobenzene Dichlofenthion Prothiofos Phosdiphen	5	1.5	4.3	5	2.1	6.8
2,4-Dichlorophenoxy-acetic Acid	2,4-D	2	1.3	1.4	2	1.4	1.6
2,4,5-Trichlorophenol	1,2,4-Trichlorobenzene Fenchlorphos Trichloronate	2	1.1	3.9	1	1.3	1.3
2,5-Dichlorophenol	1,4-Dichlorobenzene	6	8.4	260.0	6	2.0	240.0
3,5,6-Trichloro-2-pyridinol	Chlorpyrifos Chlorpyrifos-methyl	6	2.0	11.0	5	1.8	8.4
4-Nitrophenol	Parathion Methyl Parathion Nitrobenzene EPN	6	1.1	8.6	6	1.3	13.0

1 Samples analyzed by the Centers for Disease Control.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analytes were analyzed for but were not detected:

2-Isopropoxyphenol
2,4,6-Trichlorophenol

Urine Pesticide Comparison Data
All Units in $\mu g/l$

PESTICIDE METABOLITES	PARENT COMPOUND	COMPARISON DATA		
		TYPICAL[1]	HIGH VALUE[2]	%FOUND[3]
Pentachlorophenol	Pentachlorophenol	1.3	7.7	57
1-Naphthol	Naphthalene Carbaryl	4.2	37	91
2-Isopropoxyphenol	Propoxur	ND	1.6	7
2-Naphthol	Naphthalene	3.0	30	75
2,4-Dichlorophenol	1,3-Dichlorobenzene Dichlofenthion Prothiofos Phosdiphen	1.7	47	61
2,4-Dichlorophenoxy-acetic Acid	2,4-D	ND	1.8	9.6
2,4,5-Trichlorophenol	1,2,4-Trichlorobenzene Fenchlorphos Trichloronate	ND	3.0	18
2,4,6-Trichlorophenol	1,3,5-Trichlorobenzene Hexachlorobenzene Lindane	ND	3.6	12
2,5-Dichlorophenol	1,4-Dichlorobenzene	28	760	97
3,5,6-Trichloro-2-pyridinol	Chlorpyrifos Chlorpyrifos-methyl	2.1	11	70
4-Nitrophenol	Parathion Methyl Parathion Nitrobenzene EPN	ND	3.0	34

1 The typical value listed is the median based upon NHANES III (1988-present) N= approx. 1000 participants.
2 The high value listed is the 95th percentile based upon NHANES III (1988-present) N= approx. 1000 participants.
3 Percent samples analyzed in NHANES III that had a quantifiable level of the analyte.
ND Not detected above reporting limit.

Blood Element Results[1] from Residential Monitoring
(9 Primary Participants, 7 Secondary Participants)
Units as Noted

ELEMENT	SPRING RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest	Highest		Lowest	Highest
Cadmium (µg/l)	5	0.2	0.4	3	0.3	0.5
Lead (µg/dl)	9	1.3	5.0	7	2.4	6.4
Mercury (µg/l)	8	0.2	6.6	6	0.4	7.3

1 Samples analyzed by the Centers for Disease Control.

Blood Element Results[1] from Residential Monitoring
(6 Primary Participants, 6 Secondary Participants)
Units as Noted

ELEMENT@	SUMMER RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest	Highest		Lowest	Highest
Lead (µg/dl)	6	1.6	4.9	6	2.0	8.0

1 Samples analyzed by the Centers for Disease Control.
@ The following metals were not measured in the Summer.

Cadmium
Mercury

Blood Element Comparison Data
Units as Noted

ELEMENT	COMPARISON DATA		
	TYPICAL	HIGH VALUE	% FOUND[1]
Cadmium (µg/l)[2]	S = 3.0 NS = 0.4	S = 6.9 NS = 4.2	NA
Lead (µg/dl)[3]	3.5	12.7	98
Mercury (µg/l)[4]	<5.0	30.0	NA

1 Percent samples analyzed in NHANES III with quantifiable level of analyte.
2 Median and 95th percentile from Wysowaks, D., Landrigan, P., et al. "Cadmium Exposure in a Community Near a Shelter". Amer. J. Epid. 107:27-35, (1978).
3 Median and 95th percentile for NHANES III (1988-Present) N = 10629 participants age 30-70 years.
4 Median and 95th percentile from Clarkson, T., Friberg L., et al (eds) Biological Monitoring of Toxic Metals, New York: Plenum Press (1988).
NA Not Available.
S = among smokers
NS = among nonsmokers

Blood Pesticide and Polychlorinated Biphenyl Results[1] from Residential Monitoring
(9 Primary Participants and 7 Secondary Participants)
Units in ppb

PESTICIDE@	SPRING RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
(p,p'-DDT)	2	0.97	2.28	1	0.60	0.60
trans-Nonachlor	8	0.20	1.70	5	0.37	3.49
beta-Hexachlorocyclohexane	6	0.47	1.42	5	0.40	1.88
DDE	9	1.76	137.00	7	3.37	48.40
gamma-Hexachlorocyclohexane	0	≤0.12	--	2	0.19	0.24
Heptachlor Epoxide	7	0.19	0.84	5	0.15	0.68
Hexachlorobenzene	2	0.12	0.19	1	0.14	0.14
Oxychlordane	3	0.24	0.45	3	0.19	1.32
PCB (as Aroclor 1260)	3	1.81	99.30	3	2.40	72.30

1 Samples analyzed by the Centers for Disease Control.
2 If all measured results were below the reporting limit, the reporting limit is listed.
-- Not applicable.
@ The following analyte was analyzed for but was not detected:

(o,p'-DDT)

Blood Pesticide and Polychlorinated Biphenyl Results[1] from Residential Monitoring
(6 Primary Participants and 6 Secondary Participants)
Units in ppb

PESTICIDE	SUMMER RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
(p,p'-DDT)	1	1.25	1.25	1	1.09	1.09
trans-Nonachlor	6	0.20	2.03	5	0.22	1.21
beta-Hexachlorocyclohexane	4	0.36	0.98	3	0.34	1.43
DDE	6	3.17	109.00	6	1.83	75.70
Heptachlor Epoxide	3	0.20	1.05	3	0.14	0.34
Hexachlorobenzene	6	0.04	0.30	6	0.10	0.16
Oxychlordane	2	0.19	0.55	3	0.18	0.42
PCB (as Aroclor 1260)	2	1.66	93.40	3	1.19	99.40

1 Samples analyzed by the Centers for Disease Control.
2 If all measured results were below the reporting limit, the reporting limit is listed.
@ The following analytes were analyzed for but were not detected:

(o,p'-DDT)
gamma-Hexachlorocyclohexane

Blood Pesticide and Polychlorinated Biphenyl Comparison Data
Units in ppb

PESTICIDE	COMPARISON DATA		
	TYPICAL[1]	HIGH VALUE[2]	%FOUND[3]
(o,p'-DDT)	ND	T	0.4
(p,p'-DDT)	T	2.7	35.7
trans-Nonachlor	T	1.2	7.1
beta-Hexachlorocyclohexane	T	2.4	17.2
DDE	12.6	52.9	99.5
gamma-Hexachlorocyclohexane	ND	ND	0.2
Heptachlor Epoxide	T	T	4.3
Hexachlorobenzene	T	T	4.9
Oxychlordane	ND	ND	2.5
PCB (as Aroclor 1260)	4.2[4]	30[4]	NA

1 The typical value is the median from NHANES II (1976-1980) N = 7265 participants, age 12-74 years.
2 The high value is the 95th percentile from NHANES II (1976-1980) N = 7265 participants, age 12-74 years.
3 Percent of samples analyzed in NHANES II with quantifiable level of analyte.
4 For PCBs, the typical value is the median and the high value is the maximum from Stehr-Green, "Demographic and Seasonal Influences on Human Serum Pesticides Residue Levels," J. Tox. and Environ. Hlth., 1989, 27:405-421 (N= 990 for the study).
T Trace detected.
ND Not detected.
NA Not available.

Blood Volatile Organic Compound Results[1] from Residential Monitoring
(9 Primary Participants and 7 Secondary Participants)
Units in ppb

VOC[5]	SPRING RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects[3]	Detectable Results	
		Lowest[2]	Highest		Lowest[2]	Highest
Acetone	8[4]	535.00	2560.00	7	330.00	4420.00
Benzene	9	0.09	0.21	7	0.10	0.16
Bromodichloromethane	1	0.03	0.03	2	0.02	0.02
Bromoform	2	0.05	0.08	1	0.03	0.03
2-Butanone	8[4]	3.10	12.60	7	1.80	11.00
Carbon Tetrachloride	1	0.03	0.03	1	0.02	0.02
Chloroform	5	0.02	0.03	3	0.03	0.04
Dibromochloromethane	3	0.02	0.05	3	0.02	0.04
1,4-Dichlorobenzene	3	0.41	1.80	4	0.09	1.50
1,1-Dichloroethane	0	≤0.01	--	1	0.01	0.01
Ethylbenzene	6	0.02	0.17	5	0.02	0.19
Hexachloroethane	1	0.14	0.14	0	≤0.08	--
m&p-Xylene	8	0.12	0.69	7	0.09	0.60
o-Xylene	8	0.04	0.18	7	0.07	0.34
Styrene	3	0.02	0.04	4	0.02	0.08
Tetrachloroethene	2	0.07	0.19	2	0.04	0.98
Toluene	7	0.14	0.50	6	0.10	0.90
trans-1,2-Dichloroethene	1	0.03	0.03	0	≤0.01	--

Blood Volatile Organic Compound Results[1] from Residential Monitoring
(9 Primary Participants and 7 Secondary Participants)
Units in ppb

VOC[@]	SPRING RESULTS					
	PRIMARY PARTICIPANT			SECONDARY PARTICIPANT		
	#Detects	Detectable Results		#Detects[3]	Detectable Results	
1,1,1-Trichloroethane	5	0.09	0.46	4	0.12	0.40

1 Samples analyzed by the Centers for Disease Control according to methods used in NHANES III.
2 If all measured results were below the reporting limit, the reporting limit is listed.
3 Blood samples only taken from seven (7) secondary participants.
4 One sample had an unvalidated value.
-- Not applicable.
@ The following analytes were analyzed for but were not detected:

Chlorobenzene	1,3-Dichlorobenzene	Methylene Chloride
cis-1,2-Dichloroethene	1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
Dibromomethane	1,1-Dichloroethene	1,1,2-Trichloroethane
1,2-Dichlorobenzene	1,2-Dichloropropane	Trichloroethene

Blood Volatile Organic Compound Comparison Data
Units in ppb

VOC	COMPARISON DATA	
	TYPICAL[1]	HIGH VALUE[2]
Acetone	1800	>6000
Benzene	0.1	0.5
Bromodichloromethane	ND	0.021
Bromoform	ND	0.034
2-Butanone	5.4	16.9
Carbon Tetrachloride	ND	+
Chloroform	0.0	0.1
Dibromochloromethane	ND	0.024
1,4-Dichlorobenzene	0.3	9.2
1,1-Dichloroethane	ND	+
Ethylbenzene	0.1	0.3
Hexachloroethane	ND	+
m&p-Xylene	0.2	0.8
o-Xylene	0.1	0.3
Styrene	0.0	0.2
Tetrachloroethene	0.1	0.6
Toluene	0.3	1.5
trans-1,2-Dichloroethene	ND	+
1,1,1-Trichloroethane	0.1	0.8

Blood Volatile Organic Compound Comparison Data
Units in ppb

1 The typical value listed is the median from NHANES III 1988-present, subsample of 1100 participants.
2 The high value listed is the 95th percentile from NHANES III 1988-present, subsample of 1100 participants.
+ Detected in less than 5% of the comparison population.
ND Not detected.

NOTE: There were no samples analyzed for Summer.