ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

JONES ROAD GROUNDWATER PLUME
HARRIS COUNTY, TEXAS
EPA FACILITY ID: TXN000605460
MAY 13, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

JONES ROAD GROUNDWATER PLUME
HARRIS COUNTY, TEXAS

EPA FACILITY ID: TXN000605460

Prepared by:

Texas Department of State Health Services
Under Cooperative Agreement With the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Foreword

The Agency for Toxic Substances and Disease Registry (ATSDR) was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The U.S. Environmental Protection Agency (EPA) and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or a compilation of several health consultation documents. The structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data; it reviews information provided by EPA, other governmental agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the potential health effects to children are considered first when evaluating the health threat to a community. The health effects to other high-risk groups within the community (such as the elderly, chronically ill, and people engaging in high-risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information to determine the health effects that may result from exposures. That information can include the results of medical, toxicological, and epidemiological studies and data collected from disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about any public health threat posed by the site. When health threats have been determined for high-risk groups (such as the elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so these reports usually identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. If there is an urgent health threat, however, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state, and federal agencies; the companies responsible for cleaning up the site; and the community. ATSDR then shares the conclusions with the community. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, the agencies sometimes will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its affect on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near the site. Those include residents of the area, civic leaders, health professionals, and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All written comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E60), Atlanta, Georgia 30333.

Table of Contents

Summary and Statement of Issues

The Jones Road Groundwater Plume site is located approximately ½ mile north of the intersection of Jones Road and Farm-to-Market Road 1960, outside the city limits of Houston in Harris County, Texas. The areas affected by the plume include residential neighborhoods and light industrial businesses.

In December 2000, tetrachloroethylene (also known as perchloroethylene, PCE, or perc) and other chemical contaminants were detected in a groundwater well. That well serves as a public drinking water supply for a gymnastics school and childcare facility. Tetrachloroethylene, a chemical that is widely used for the dry cleaning of fabrics and metal degreasing, has been associated with kidney tumors in male rats and liver tumors in mice. Data from human occupational studies of tetrachloroethylene are inconclusive; however, governmental and scientific agencies have concluded that tetrachloroethylene may be carcinogenic to humans.

Inspections of a dry cleaning business located at 11600 Jones Road found that leakage from the business's equipment was entering a storm drain. This business is located about 0.2 miles north of the gymnastics school/day-care facility. Analysis of area groundwater samples indicated some of the wells have tetrachloroethylene concentrations at or above the maximum contaminant level (MCL) of 5 parts per billion (ppb). Wells with concentrations at or above the MCL have had filtration systems installed. The Jones Road Groundwater Plume site was proposed to the National Priorities List (NPL) on April 30, 2003, and finalized on September 29, 2003.

The Texas Department of State Health Services (DSHS, formerly the Texas Department of Health), and the Agency for Toxic Substances and Disease Registry (ATSDR) reviewed the environmental information available for the site. Exposure pathways through which the public could contact contaminants from the site were evaluated.

Data for air, surface water, and sediment exposure pathways were not available; thus, those pathways currently pose an indeterminate public health hazard. Soil sampling data from the site indicate that exposure to contaminants would not be expected to result in adverse health effects. Therefore, exposure to soil at the site would pose no apparent public health hazard. With appropriate and properly installed and maintained filtration systems on the affected water wells, no completed groundwater exposure pathway exists. With the filtration system, the groundwater at this site poses no apparent public health hazard. Table S1 provides a detailed description of public health conclusion categories.

EPA is currently conducting a remedial investigation for the site. As data becomes available, DSHS and ATSDR will re-evaluate the public health significance of the air, surface water, and sediment pathways. If site conditions change in the future, a re-evaluation of the public health significance of this site would be necessary.

Table S1. ATSDR Public Health Conclusion Categories

CATEGORY A. URGENT PUBLIC HEALTH HAZARD•	CATEGORY B. PUBLIC HEALTH HAZARD•	CATEGORY C. INDETERMINATE PUBLIC HEALTH HAZARD	CATEGORY D. NO APPARENT PUBLIC HEALTH HAZARD•	CATEGORY E. NO PUBLIC HEALTH HAZARD
This category is used for sites where short-term exposures (<1 year) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.	This category is used for sites that pose a public health hazard due to the existence of long-term exposures (>1 year) to hazardous substances or conditions that could result in adverse health effects.	This category is used for sites in which critical data are *insufficient* with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.	This category is used for sites where human exposure to contaminated media might be occurring, might have occurred in the past, and/or might occur in the future, but the exposure is not expected to cause any adverse health effects.	This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.
Criteria: Evaluation of available information† indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future, an adverse effect on human health and requires immediate action or intervention. Such site-specific conditions or exposures might include the presence of serious physical or safety hazards, such as open mine shafts, poorly stored or maintained flammable/explosive substances, or medical devices which, upon rupture, could release radioactive materials.	**Criteria**: Evaluation of available relevant information† suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radionuclides) have had, are having, or are likely to have in the future, an adverse effect on human health that requires one or more public health interventions. Such site-specific exposures might include the presence of serious physical hazards, such as open mine shafts, poorly stored or maintained flammable/explosive substances, or medical devices, which, upon rupture, could release radioactive materials.	**Criteria**: The health assessor must determine, using professional judgment, the criticality of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.	**Criteria**: Evaluation of available information† indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse effects on human health.	**Criteria**: Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future.

• Each of these designations represents a professional judgment made on the basis of critical data that ATSDR regards as sufficient to support a decision. It does not imply, however, that the available data are necessarily complete. In some cases, additional data may be required to confirm or further support the decision.

† Examples include environmental and demographic data; health outcome data; community health concerns information; and toxicologic, medical, and epidemiologic data.

Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR) was established under the mandate of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This act, also known as the "Superfund" law, authorized the U.S. Environmental Protection Agency (EPA) to conduct clean-up activities at hazardous waste sites. EPA was directed to compile a list of sites considered hazardous to public health. This list is termed the National Priorities List (NPL). The 1986 Superfund Amendments and Reauthorization Act (SARA) directed ATSDR to prepare a public health assessment (PHA) for each NPL site. In 1990, federal facilities were included on the NPL. (Note: Appendix A provides a listing of abbreviations and acronyms used in this report.)

In conducting the PHA, three types of information are used: environmental data, community health concerns, and health outcome data. The environmental data are reviewed to determine whether people in the community might be exposed to hazardous materials from the NPL facility. If people are being exposed to these chemicals, ATSDR will determine whether the exposure is at levels that might cause harm. Community health concerns are collected to determine whether health concerns expressed by community members could be related to exposure to chemicals released from the facility. If the community raises concerns about specific diseases in the community, health outcome data (information from state and local databases or health care providers) can be used to address the community concerns. If ATSDR finds harmful exposures existed, health outcome data also can be used to determine if illnesses are occurring and whether they could be associated with the hazardous chemicals released from the NPL facility.

In accordance with the Interagency Cooperative Agreement between ATSDR and the Texas Department of State Health Services (DSHS), this PHA was prepared for the Jones Road Groundwater Plume site. This PHA presents conclusions about whether exposures are occurring, and whether a health threat is present. In some cases, it is possible to determine whether exposures occurred in the past. However, a lack of appropriate historical data often makes it difficult to quantify past exposures. If a threat to public health exists, recommendations are made to stop or reduce the threat to public health.

Background

Site Description

The Jones Road Groundwater Plume site is located approximately ½ mile north of the intersection of Jones Road and Farm-to-Market Road 1960 in Harris County, Texas (Figure 1). The site is located in a residential/light industrial area in the northwestern part of the county just outside the city limits of Houston [1]. In January 2003, a contaminated groundwater plume was documented to extend from the southern end of Echo Spring Lane to Tower Oaks Boulevard and to Timber Hollow on the eastern side of Jones Road [2].

Site History

In December 2000, tetrachloroethylene (also known as perchloroethylene, PCE, or perc) and other chemical contaminants were detected in a groundwater well that supplies drinking water to a gymnastics school and childcare facility. The water system has been in operation for

approximately 23 years. Additional sampling conducted in January and May 2001 confirmed the presence of contaminants in the drinking water. As a result of the contamination, the facility owners began supplying bottled water on-site to their customers in June 2001 [1].

Tetrachloroethylene is a chemical that is widely used for dry cleaning fabrics and degreasing metals [3]. A Phase I environmental site assessment (ESA) of a dry cleaning business located at 11600 Jones Road was performed in June 2001. This assessment found chemical leakage from the dry cleaning equipment, which entered a storm drain. This business is located approximately 0.2 miles north of the gymnastics school/daycare facility. In July 2001, three soil borings adjacent to the dry cleaning business were converted into temporary groundwater monitoring wells. The water samples collected from the wells contained tetrachloroethylene and other chemical contaminants. Additional groundwater samples collected by the business's environmental consultant also contained tetrachloroethylene [1].

The Texas Commission on Environmental Quality (TCEQ) collected water samples from 43 area water wells in March and April 2002. Eight of the wells contained concentrations of tetrachloroethylene at or above the EPA maximum contaminant level (MCL) of 5 parts per billion (ppb) [4].

A sample of liquid waste from a dry cleaning machine water separator was collected by TCEQ on April 18, 2002. Sample analysis indicated a concentration of 94.9 parts per million (ppm) of tetrachloroethylene. On May 1, 2002, TCEQ issued an emergency order for the dry cleaning business to

- maintain filtrations already in place,
- develop and implement a sampling plan,
- sample water wells within ½ mile of the dry cleaning business, and
- add filtration systems to any wells that had a tetrachloroethylene concentration at or above the MCL of 5 ppb.

Also in May 2002, representatives of the business volunteered to discontinue the use of tetrachloroethylene in their dry cleaning operations. This was confirmed by TCEQ inspections on June 21 and 25, 2002.

On the basis of site inspections and sample analyses, the contaminated groundwater plume is likely associated with the dry cleaning business and other potential sources [2].

The Jones Road Groundwater Plume site was proposed to the National Priorities List (NPL) on April 30, 2003, and added to the final list on September 29, 2003 [5]. Inclusion on the NPL allows federal funds and personnel to become available to further assess the nature and extent of the public health and environmental risks associated with the site.

Land Use and Natural Resource Use

The site is located in an urban area along the Gulf Coastal Plain of Texas [1]. The land usage is mainly residential and light commercial industry. DSHS is not aware of any commercial agricultural operations that use the groundwater for irrigation.

According to TCEQ's Hazard Ranking System (HRS) documentation record, an observed release of chemical contamination to the Chicot aquifer has been documented by chemical analysis. This aquifer may extend to approximately 300–400 feet below ground surface and contains an abundance of water due to the high percentage of sand [1].

Site Visit

DSHS personnel visited the area of the Jones Road plume on June 17, 2003, April 21, 2004, and October 20, 2004. They spent approximately 2 hours examining the area surrounding the plume site. They identified the likely source of the tetrachloroethylene as a dry cleaning business located at 11600 Jones Road. The area surrounding the dry cleaner, located in a shopping center, is paved. Exposed soil or sediment is in an area behind the building and in drainage ditches along Jones Road and Bareley Lane. These ditches are located to the west and south of the shopping center.

Residents of the neighborhoods above the groundwater plume appear to be in the mid-socioeconomic range. Some of the commercial industries are automotive repair and supply, gasoline stations, convenience stores, construction, hardware, childcare, storage, and general business.

Demographics

The 2000 U.S. Census reported a total population of 3,400,578 for Harris County [6]. Within 1 mile of the site (the approximate plume area), the census recorded 18,979 residents and 6,854 housing units (Figure 1). Exactly how many residents or people associated with local businesses may have been exposed to the contaminated groundwater plume is unknown. As of January 2005, thirty-two groundwater wells have filtration systems installed to prevent exposure to contaminants [7]. We estimate approximately 355 to 405 people may have been potentially exposed to the affected groundwater. That assumes there are 32 wells on filtration systems, times an average household size of 3 people per well [8], plus the gymnastics school/daycare facility employees and students [1].

Community Health Concerns

Community Concerns

As part of the public health assessment process, DSHS and ATSDR try to learn what concerns people in the area might have about site-related effects on their health. Consequently, attempts were made to actively gather information and comments from people who live or work near the site. To collect community health concerns related to the Jones Road Groundwater Plume site, the DSHS staff attended community meetings in October 2002, November 2003, and April and October 2004. People attending these community meetings were generally concerned about the safety of their drinking water. Other concerns related to health risks for pregnant and nursing women from ingesting water containing tetrachloroethylene and for sewer repair crews exposed to contaminated soil [9].

Health Outcome Data

Health outcome data record certain health conditions that occur in populations. These data can provide information on the general health of communities living near a hazardous waste site. They also can provide information on patterns of specified health conditions. Some examples of health outcome databases are tumor registries, birth defects registries, and vital statistics. Information

from local hospitals and other health care providers also can be used to investigate patterns of disease in a specific population. DSHS and ATSDR look at appropriate and available health outcome data when a completed exposure pathway or community concern exists.

Before filtration systems were installed on the affected wells, people may have been exposed to tetrachloroethylene at or above the MCL of 5 ppb. Tetrachloroethylene has been shown to cause kidney and liver tumors in animals. Consequently, the DSHS Cancer Registry Division reviewed the incidence of cancers for ZIP codes in the Jones Road area that include the contaminated groundwater plume. The DSHS Cancer Registry Division found the incidence and mortality of kidney and liver cancers were not unusual and were within the normal limits of cancer rates for the state of Texas [10**,** 11]. Additional information on the cancer occurrence investigations can be found in Appendix D.

Discussion

Introduction

The presence of chemical contaminants in the environment does not always result in exposure to or contact with the chemicals. Because chemicals have the potential to cause adverse health effects only when people actually come into contact with them, exposure (the contact that people have with the contaminants) drives the PHA process.

People can be exposed to contaminants by breathing, eating, drinking, or coming into direct contact with a substance containing the contaminant. This section reviews available information to determine whether people in the community have been, currently are, or could in the future be exposed to contaminants associated with this site.

To determine whether people are exposed to site-related contaminants, investigators evaluate the environmental and human components leading to human exposure. This analysis consists of evaluating the five elements of an exposure pathway:

1) source of contamination,
2) transport through an environmental medium,
3) point of exposure,
4) route through which the contaminant can enter the body, and
5) a receptor population.

Exposure pathways can be complete, potential, or eliminated. For a person to be exposed to a contaminant, the exposure pathway must be complete. An **exposure pathway** is considered complete when all five elements in the pathway are present and exposure has occurred, is occurring, or will occur in the future. A **potential pathway** is missing at least one of the five elements, but could be complete in the future. An **eliminated pathway** is missing one or more elements and will never be completed. Table 1 identifies pathways important to this site. The following discussion incorporates only those pathways relevant and important to the site.

Exposure does not always result in adverse health effects, so we must also evaluate whether the exposure could be sufficient to pose a hazard to people in the community. The factors that

influence whether exposure to a contaminant or contaminants could or would result in adverse health effects include

1) the toxicological properties of the contaminant,
2) how much of the contaminant the individual is exposed to,
3) how often and/or how long the exposure occurs,
4) the manner in which the contaminant enters or contacts the body (breathing, eating, drinking, or skin/eye contact), and
5) the number of contaminants to which an individual is exposed (combinations of contaminants).

Once exposure occurs, characteristics such as age, sex, nutritional status, genetics, lifestyle, and health status of the exposed person influence how that person absorbs, distributes, metabolizes, and excretes the contaminant.

When identifying plausible potential exposure scenarios, the first step is assessing the potential public health significance of the exposure. This is done by comparing contaminant concentrations to health assessment comparison (HAC) values for both noncarcinogenic and carcinogenic end points. HAC values are media-specific contaminant concentrations used to screen contaminants for further evaluation. Exceeding an HAC value does not necessarily mean that a contaminant represents a public health threat, but does suggest that the contaminant warrants further consideration.

Noncancer comparison values are also known as *environmental media evaluation guides* (EMEGs) or *reference dose media evaluation guides* (RMEGs). They are based on ATSDR's minimal risk levels (MRLs) and EPA's reference doses (RfDs), respectively. MRLs and RfDs are estimates of daily human exposure to a contaminant that is unlikely to cause adverse noncancer health effects over a lifetime. Cancer risk comparison values are also known as *carcinogenic risk evaluation guides* (CREGs). They are based on EPA's chemical-specific cancer slope factors and an estimated excess lifetime cancer risk of 1-in-1-million persons exposed for a lifetime. Standard assumptions are used to calculate appropriate HAC values [12].

The U.S. Department of Health and Human Services determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. On the basis of evidence from animal studies, tetrachloroethylene is thought to be capable of causing cancer in humans. Current available information is insufficient to determine whether tetrachloroethylene causes cancer in humans [13].

The environmental data used in this PHA were provided by TCEQ. Groundwater samples were collected from February 2003 to February 2004 and analyzed for volatile organic compounds (VOCs). Soil samples were collected in October 2003 and also analyzed for VOCs. In reviewing the sampling data, the information provided in the referenced documents was relied upon. It was assumed that adequate quality assurance/quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting.

Exposure Pathways

Air

Summary: We could not adequately evaluate past air exposures because of a lack of air sampling data for the dry cleaner, gymnastics school/day care facility, and residences. The air pathway currently poses no apparent public health hazard because the dry cleaning business has stopped using tetrachloroethylene and the affected water wells now have filtration systems to remove the contamination.

Before June 2002, workers and customers of the dry cleaners were likely exposed to tetrachloroethylene in the air due to the use of this substance in the dry cleaning process. Before the well water problem was discovered, children and adults at the gymnastics school and daycare center may have been exposed to tetrachloroethylene as it volatilized from the tap water into the indoor air. Residents with affected wells also may have been exposed to tetrachloroethylene released into the indoor air during showering, bathing, dishwashing, clothes washing, or other household uses. In June 2002, the dry cleaner voluntarily discontinued its use of tetrachloroethylene.

Due to the lack of air sampling data for the dry cleaner, gymnastics school/daycare center, and residences, we cannot adequately evaluate the air exposure pathway in the past. The air pathway currently poses no apparent public health hazard because the dry cleaner has stopped using tetrachloroethylene and the affected water wells have filtration systems to remove the contamination.

Groundwater

Summary: Groundwater near the site is currently used for drinking water, food preparation, bathing, and for commercial business purposes. Groundwater sampling data from the site and surrounding areas indicate that the water has become contaminated with tetrachloroethylene. Past exposure to contaminated groundwater may have posed a public health hazard. Due to lack of sampling data, past exposures could not be adequately evaluated. Currently, no completed exposure pathway exists with appropriate and properly installed and maintained filtration systems on the affected water wells. Thus, the groundwater at this site poses no apparent public health hazard.

The potentially exposed population would include anyone using untreated groundwater. Groundwater at and near the site is used for drinking, food preparation, bathing, and commercial purposes. We are not aware of any commercial agricultural operations that use the groundwater for irrigation. An observed release of chemical contamination to the area aquifer has been documented by chemical analysis. This aquifer, the Chicot, may extend to approximately 300 to 400 feet below ground surface and contains an abundance of water due to the high percentage of sand. The water wells in the area of the Jones Road plume are screened at varying depths, from approximately 185 to 250 feet below ground surface. Local groundwater flow is to the south and southwest [1]. The tetrachloroethylene plume travels at an estimated rate of 150 feet per year [14].

Since February 2002, TCEQ has sampled 231 area groundwater wells. Not all the wells sampled are used for human consumption. Approximately 150 wells, identified as being used for drinking

and other household purposes, have been sampled every 3 months [2]. From February 2003 to February 2004, concentrations of tetrachloroethylene in the area water wells ranged from not detected to 590 ppb before treatment by filtration systems.

In 1974, the U.S. Congress passed the Safe Drinking Water Act. This law required EPA to determine safe levels of chemicals in drinking water. EPA has set the maximum contaminant level goal (MCLG) for tetrachloroethylene at 0 ppb. It is at this level that EPA believes there are no potential health risks. On the basis of this MCLG, an enforceable standard called the *maximum contaminant level* (MCL) for tetrachloroethylene became effective in 1992. "The MCL has been set at 5 parts per billion (ppb) because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water [15]."

Wells with tetrachloroethylene concentrations exceeding the MCL of 5 ppb have been identified by TCEQ. The property owners with wells exceeding the MCL were offered installation of carbon filtration systems. Currently, 32 of the wells have the filtration system [7]. However, two well owners on Forest Valley Drive, whose wells exceeded the MCL, have refused the filtration systems. One well was sampled in August 2003 and had a tetrachloroethylene concentration of 6.3 ppb. The second well was sampled in May and August 2004 and had tetrachloroethylene concentrations of 5.5 and 7.3 ppb. These concentrations, although exceeding the MCL, do not exceed the ATSDR health assessment comparison (HAC) values of 10 ppb for lifetime health advisory (LTHA). They also do not exceed the reference dose media evaluation guide (RMEG) of 100 ppb for children and 400 ppb for adults. Therefore, we have concluded that this exposure is unlikely to pose a public health hazard. Because the owners refuse further sampling, we have no way to ensure that the contaminant levels are not higher in the future.

Past exposure to contaminated groundwater may have posed a public health hazard. At present, analysis of water samples collected after the filtration did not detect the contaminant. Wells containing the appropriate filtration system that is properly installed, operating, and maintained will not expose the public to tetrachloroethylene above the MCL. With these filtration systems in place, no completed pathway for exposure exists; therefore, the groundwater would pose no apparent public health hazard.

Soil

Summary: Soil sampling data from the site indicates that exposure to contaminants would not be expected to result in adverse health effects. We do not expect exposure soil contaminants at this site to be a significant exposure pathway because:

1) *the probability of regular ingestion or contact is low;*
2) *the frequency and duration of contact with contaminated material would likely be low, and;*
3) *the contaminant lacks sufficient concentration to be a health concern.*

Thus, exposure to soil at the site would pose no apparent public health hazard.

Chemical contamination of the soil surrounding the site may have resulted from equipment leakage or from the on-site wastewater system. In June 2001, chemical leakage from the dry cleaning equipment was found to have entered a storm drain [1]. Wastewater from the dry cleaning operation may have gone into the septic tank system. Soil contamination could then possibly have

occurred as a result of leakage from the septic tank or when the contaminant entered the drain field and spread to the surrounding underground soil.

In October 2003, Shaw Environmental conducted soil borings at 21 locations surrounding the dry cleaning business. A total of 97 samples were collected from depths of 1 foot to 35 feet below the ground surface. Contaminants in surface soil (≤ 3 inches in depth) have the greatest potential for human exposure. However, at this site the 1–2 foot depth would be the most likely pathway for exposure. Because the site is located at a shopping center, most of the surroundings are paved. Typically the soil borings had to penetrate through concrete at the surface, and then fill material, before entering soil at 1 foot below the ground surface.

A review of the 19 samples collected at the 1–2 foot depth indicated that the tetrachloroethylene concentrations ranged from nondetect to 0.057 parts per million (ppm). Of the 97 total samples collected, the highest analysis result of 260 ppm was found at 16–17 feet below the ground surface. All of the soil analysis concentrations were considerably less than the tetrachloroethylene HAC value of 500 ppm for a child and 7,000 ppm for an adult.

We do not expect exposure to soil contamination at this site to be a significant exposure pathway for the following reasons:

1) the probability of regular ingestion or contact is low;
2) the frequency and duration of contact with contaminated soil would likely be low, and
3) the contaminant lacks sufficient concentration to pose a health concern.

Therefore, we have classified exposure to surface soil around the dry cleaner site to pose no apparent public health hazard.

Surface Water and Sediment

Summary: Surface water and sediment sampling data were not available for review. We do not expect exposure to surface water and sediment from the drainage ditches at this site to be a significant exposure pathway because the probability of regular ingestion or contact is low, and the frequency and duration of contact with contaminated material would likely be low. However, due to the lack of information about potential runoff and the lack of sampling data, exposure to surface water and sediment pose an indeterminate public health hazard.

The occurrence of surface water and sediment near the site would be as a result of run off after a rainfall. In the shopping center area where the dry cleaner is located, storm drains are in the parking lot, and open drainage ditches are located to the south and west.

We do not consider exposure to contaminants in surface water and sediment to be significant exposure pathways because the probability of regular ingestion or contact is low and the frequency and duration with contaminated material would likely be low. From available information, DSHS could not assess the likelihood of the dry cleaning chemicals entering surface water runoff and/or ditch sediment from the dry cleaning operation. Therefore, we have classified exposure to surface water and sediment around the shopping center to pose an indeterminate public health hazard pending receipt of additional information.

Children's Health Considerations

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than are adults from certain kinds of exposures to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors found close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, housing decision, and access to medical care.

ATSDR evaluated the likelihood for children living near the Jones Road groundwater plume or attending the gymnastics school/daycare facility to be exposed to site contaminants at levels of health concern. Children can access the original source site, but the dry cleaner no longer uses tetrachloroethylene. Children probably would not spend much time near the area, as it is in a shopping center located in an urban area. Children are most likely to be exposed to the site contaminants via groundwater. They also may have been exposed to contaminants in the well water before the problem was recognized. However, if the children's water supply has a properly installed and maintained filtration system, no current pathway for exposure exists.

Conclusions

1. Available information confirms that properly installed, operating, and maintained filtration systems on water wells prevent exposure to contaminants above the MCL of 5 ppb. With no completed exposure pathways in homes with filtration systems, contaminants in the air and groundwater pose no apparent public health hazard.

2. We do not expect the soil exposure to be a significant pathway because
   - the probability of regular ingestion is low,
   - the frequency and duration of any contact is likely to be low, and
   - the surface area of the skin that would regularly come in contact with contaminants would be low.

   The analysis results indicate that tetrachloroethylene is not in sufficient concentrations to pose a health concern. Thus, contaminants in the soil pose no apparent public health hazard.

3. Surface water and sediment sampling data were not available for review. We do not consider these significant exposure pathways because
   - the probability of regular ingestion is low,
   - the frequency and duration of any contact is likely to be low, and
   - the surface area of the skin that would regularly come in contact with contaminants would be low.

   However, due to the lack of data, these pathways pose an indeterminate public health hazard.

Recommendations

1. Monitor and maintain water well filtration systems to ensure proper operation.

2. Continue to sample existing wells and install monitoring wells, as deemed necessary, to ensure that the public is not being exposed to the plume contaminants.

3. The Texas Department of State Health Services and the Agency for Toxic Substances and Disease Registry should review any additional environmental sampling results as they become available.

Public Health Action Plan

Actions Completed

1. The Texas Commission on Environmental Quality has sampled more than 230 area water wells.

2. Quarterly sampling of water wells was completed in February 2005 by the Texas Commission on Environmental Quality.

3. Filtration systems have been installed on 32 water wells to remove the contaminant.

Actions Planned

1. The Texas Commission on Environmental Quality began a remedial investigation (RI) on August 25, 2003, to determine the nature and extent of the contamination. On the basis of the results of the remedial investigation, a feasibility study will be conducted to evaluate alternatives for the cleanup [16].

2. The Texas Commission on Environmental Quality will conduct quarterly sampling of water wells in May 2005.

3. The U.S. Environmental Protection Agency will issue a proposed plan recommending a site remedy to the community for review and comment. After consideration of public comments, a Record of Decision will present and explain EPA's rationale regarding future remedial action at the site [17].

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Certification

This Public Health Assessment for the Jones Road Groundwater Plume site located in Houston, Texas, was prepared by the Texas Department of State Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the health assessment was initiated.

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Technical Project Officer, CAT, SPAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this public health assessment and concurs with the findings.

Team Lead, CAT, SPAB, DHAC, ATSDR

Appendices

Appendix A - Acronyms and Abbreviations

Appendix B - Evaluation of Potential Exposure Pathways for the Jones Road Groundwater Plume

Appendix C – Figure 1. General Location and Demographics Information

Appendix D - Cancer Occurrence Investigations

Appendix E - Public Comments Received and Responses

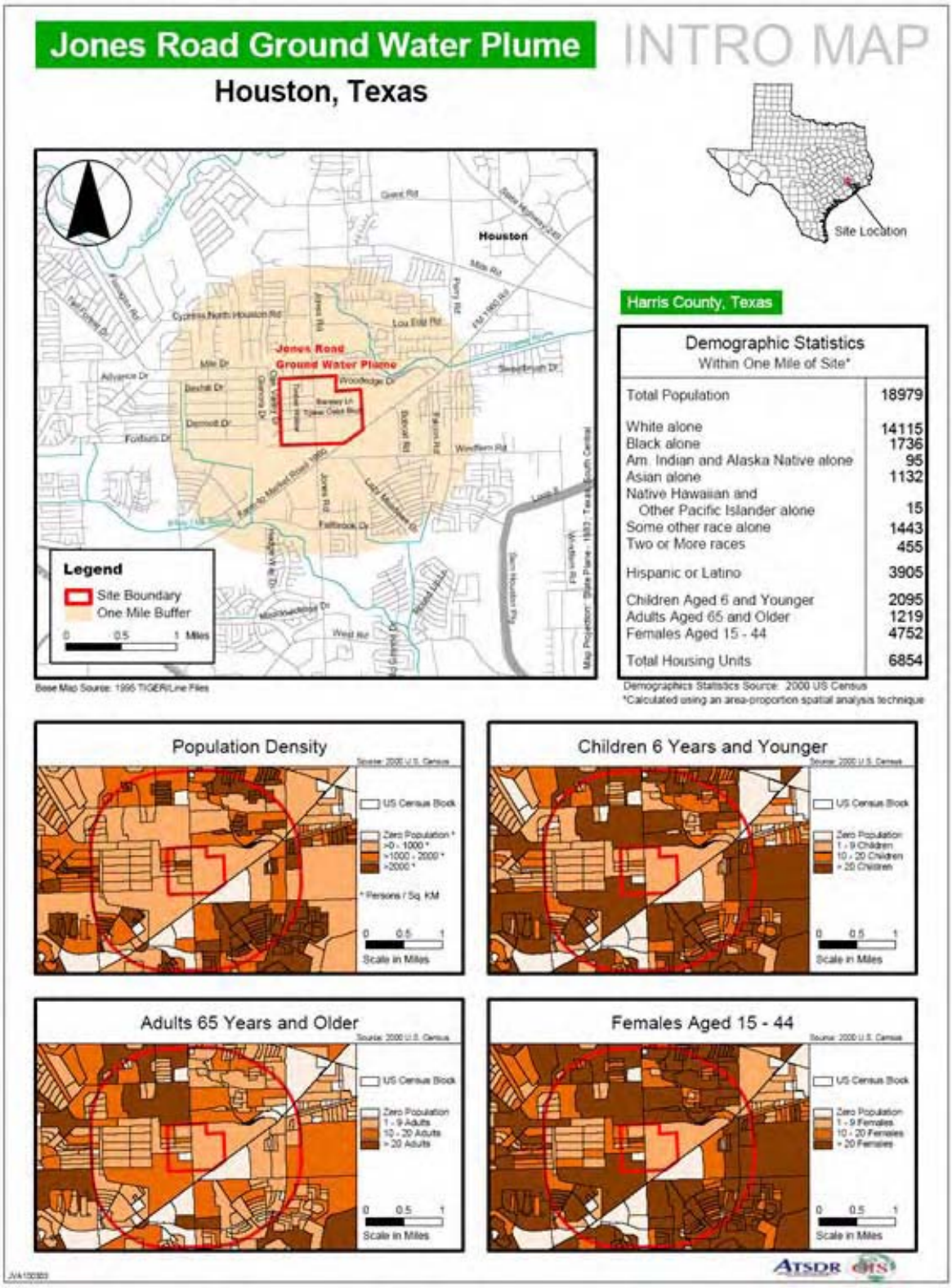
Appendix A — Acronyms and Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CREG	cancer risk evaluation guide
DSHS	Texas Department of State Health Services
EMEG	environmental media evaluation guide
EPA	Environmental Protection Agency
ESA	environmental site assessment
HAC	health assessment comparison value
HOD	health outcome data
HRS	Hazard Ranking System
IARC	International Agency for Research on Cancer
LTHA	life-time health advisory
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MRL	minimal risk level
NPL	National Priorities List
PCE	perchloroethylene, tetrachloroethylene
PHA	Public Health Assessment
ppb	parts per billion
ppm	parts per million
RfD	reference dose
RI	Remedial Investigation
RMEG	reference dose media evaluation guide
SARA	Superfund Amendments and Reauthorization Act of 1986
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
VOCs	volatile organic compounds

Appendix B. Evaluation of Potential Exposure Pathways for the Jones Road Groundwater Plume

Pathway Name	Contaminants of Concern	EXPOSURE PATHWAY ELEMENTS					Time	Conclusions
		Source	Transport Media	Point of Exposure	Route of Exposure	Exposed Population		
Air (no data)	no data	chemical release at dry cleaner volatilization during use of tap water	air	on site at dry cleaner, off site at residences and businesses using affected groundwater	inhalation	workers at dry cleaner area residents, and businesses	past present future	**Past** — Indeterminate public health hazard**;** due to the lack of sampling data. **No apparent public health hazard;** with the discontinued use of contaminant and properly installed filtration systems on affected water wells.
Groundwater (potential)	tetrachloroethylene	chemical release at dry cleaner	groundwater	On site at dry cleaner, off site at residences and businesses using affected groundwater	skin contact, ingestion	area residents and businesses using affected groundwater	past present future	**Past** — May have posed a public health hazard. **No apparent public health hazard;** with properly installed filtration systems in place, people would not be exposed to contaminants.
Soil	tetrachloroethylene	chemical release at dry cleaner	soil	on site	skin contact, incidental ingestion	area residents, workers	past present future	Not a significant pathway. **No apparent public health hazard;** exposure to contaminants would be infrequent and lack sufficient concentrations to present a health concern.
Surface Water (no data)	no data	chemical release at dry cleaner	surface water	on site	skin contact incidental ingestion,	area residents, workers	unknown	Not a significant pathway. **Indeterminate public health hazard;** due to the lack of sampling data.
Sediment (no data)	no data	chemical release at dry cleaner	surface water	off site	skin contact, incidental ingestion	area residents, workers	unknown	Not a significant pathway. **Indeterminate public health hazard;** due to the lack of sampling data.

Appendix C — Figure 1. General Location and Demographics Information



Appendix D — Cancer Occurrence Investigations

Private groundwater wells supply the drinking water for local residents and businesses in the Jones Road Groundwater Plume area. Usually, each residential and business property has its own water supply. Tetrachloroethylene has been found in the groundwater samples collected from the Jones Road area by the Texas Commission on Environmental Quality (TCEQ).

The groundwater exposure pathway is a potential source of health concerns among residents as tetrachloroethylene has been associated with kidney tumors in male rats and liver tumors in mice [3]. Scientific literature states, "Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage and liver and kidney cancers even though the relevance to people is unclear. Although it has not been shown to cause cancer in people, the U.S. Department of Health and Human Services has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. The International Agency for Research on Cancer (IARC) has determined that tetrachloroethylene is probably carcinogenic to humans." [13]

The Texas Department of State Health Services (DSHS), formerly Texas Department of Health, Cancer Registry Division reviewed data to determine if any excess cancers have occurred in the area. Overall, the occurrence of cancer is common, with approximately two out of every five persons alive today predicted to develop some type of cancer in their lifetime. In Texas, as in the United States, cancer is the second leading cause of death, exceeded only by heart disease. Cancer also is not one disease, but many different diseases. Different types of cancer are generally thought to have different causes. If a person develops cancer, it is probably not due to one factor, but to a combination of factors. Those can include heredity, diet, tobacco use, and other lifestyle factors; infectious agents; chemical exposures; and radiation exposures. Although cancer may affect individuals of all ages, it primarily is a disease of older persons. More than half of cancer cases and two-thirds of cancer deaths occur in persons 65 years of age and older. Finally, it takes time for cancer to develop, usually 20 to 40 years. Conditions that have prevailed for only the last 5 or 10 years are unlikely to be related to the current incidence of cancer in a community.

In October 2002, DSHS Cancer Registry Division investigated the occurrence of cancer among residents of ZIP codes 77065 and 77070. Cancer incidence data from 1995–1999 and mortality data from 1995–2000 were evaluated. Incidence data are the best indicators of the occurrence of cancer in an area because they show how many cancers were diagnosed each year. However, at that time, the only available data were for 1992 and 1995–1999. Therefore, as a supplemental measure, cancer mortality data were also reviewed.

The October 2002 investigation found no statistically significant excess occurrences of cancers kidney and renal pelvis or liver and intrahepatic bile duct cancers, total leukemia, or acute lymphocytic leukemia. Significantly less than expected liver and intrahepatic bile duct cancer deaths were found among males in ZIP code 77070. The investigation found the cancer incidence and mortality, "… were within normal limits expected based on cancer rates for the entire state of Texas." [10]

In March 2004, the DSHS Cancer Registry Division re-examined the occurrence of cancer in ZIP codes 77065 and 77070, at the request of the DSHS Exposure Assessment & Surveillance Group. This investigation evaluated 1995–2001 incidence data and 1992–2001 mortality data for cancers of the kidney and renal pelvis, liver and intrahepatic bile duct, total leukemia, and selected leukemia subtypes. The analysis of incidence and mortality data indicated that the cancers were, "… within the ranges expected for both males and females." [11].

Appendix E — Public Comments Received and Responses

The original public comment period was August 31 through October 30, 2004. During a public meeting held on October 20, some citizens requested and received an extension of the comment period, to November 30, 2004. Comments on the draft of the public health assessment (PHA) were received from three parties during the comment period.

Commentator #1:
1A. "In the last line of Community Concerns on page 6 is a listed concern for sewer repair crews exposed to the contaminated soils. Would this exposure be to the septic system serving the shopping center where the dry cleaner is located, or are there other locations contemplated?"

[*RESPONSE*] A community member had a concern about potential health risks to city sewer repair crews working in the vicinity of the site. The soil concentrations of tetrachloroethylene in the vicinity of the shopping center are below health risk values.

1B. "In the surface water and sediment exposure pathways, there is a conclusion of indeterminate public health hazard. Are there any plans to sample these pathways and thus render a firmer conclusion? If not, would the justification be that this is not a significant pathway?"

[*RESPONSE*] The drainage ditches along Jones Road and Barely Lane (west and south of the shopping center) are locations for potential exposure from surface water and sediment. Potentially contaminated surface water and sediment could be encountered in these ditches as a result of rainfall. Plans to sample the drainage ditches would be determined by the Texas Commission on Environmental Quality (TCEQ). We do not consider these pathways to be significant because it is unlikely that someone would regularly ingest and contact the runoff and sediment in these ditches.

Commentator #2:
2A. "Are any degradation products of PCE (ex. vinyl chloride) found in the groundwater plume? Are these contaminants more mobile or more toxic? Should the PHA address or comment on these?"

[*RESPONSE*] The degradation (or breakdown) of PCE (perchloroethylene or tetrachloroethylene, sometimes referred to as perc) will result in the formation of trichloroethylene (TCE). Further degradation produces dichloroethylene (DCE) and finally, vinyl chloride.

Some of these degradation products of PCE are found in the groundwater at varying concentrations. PCE, TCE, and DCE are heavier than water and relatively immobile. Vinyl chloride is lighter than water and therefore more mobile. The *maximum contaminant level* (MCL) for vinyl chloride in drinking water is 2 parts per billion (ppb). This is less than the MCL for tetrachloroethylene (5 ppb), which indicates that vinyl chloride is more toxic. Due to its lower

molecular weight and boiling point, vinyl chloride has a shorter life and is more biodegradable than PCE, TCE, and DCE [18].

As time goes by, the concentrations of TCE, DCE, and vinyl chloride may possibly increase as more PCE degrades (or breaks down). Recommendation #2 (on page 12) states that wells should continue to be sampled to ensure the public is not exposed to groundwater contaminants.

2B. "Public health concerns are addressed in the PHA. Has there been any review of ecological concerns, exposure pathways, or pet and migratory bird hazards."

[*RESPONSE*] As indicated in this comment, the public health assessment (PHA) for the Jones Road Groundwater Plume only addresses public (human) health. Ecological concerns and exposure pathways for pet and migratory bird hazards, if reviewed, would be conducted by environmental or wildlife agencies.

2C. "Has the June 2004 benzene detection been further delineated near the service station? Will this finding affect the PHA conclusions as to additional contaminants or cumulative contaminant effects?"

[*RESPONSE*] According to the Texas Commission on Environmental Quality (TCEQ), benzene was detected in shallow groundwater at a service station located north of the site. As a result, TCEQ sampled private water wells near the service station; benzene was not detected. The service station and the benzene contamination have been referred to the TCEQ Petroleum Storage Tank Program for further investigation [18]. The PHA conclusions will not be affected, as benzene was not detected in the sampling.

2D. "Although exposure pathways may not exist, will the soil and groundwater be remediated such that the GAC filters will not be required? What is the timing for feasibility study recommendation reviews?"

[*RESPONSE*] Decisions concerning remediation of the soil and groundwater are determined by TCEQ and the U.S. Environmental Protection Agency (EPA). On the basis of information presented in the feasibility study, a remedy will be selected for the site. The public, the state, and local officials are given an opportunity to comment on the site remedy. According to TCEQ, the remedy selection for the site will begin in the winter of 2006 [18]. Whether the soil and groundwater will be remediated so that GAC filters are no longer required may be known at that time.

2E. "At what concentration above the MCL of 5 ppb would a sensitive receptor such as a child have to ingest to cause health concerns? For what duration of ingestion? What cancer risk does this imply? Non-cancer risk?"

[*RESPONSE*] As there are no water quality standards for private water supplies, we compared private well contaminant concentrations to the MCLs set by EPA for public water supplies.

Given present water treatment technology and resources, the MCL for tetrachloroethylene (PCE) has been established as 5 parts per billion (ppb). This is the lowest level to which EPA believes public drinking water systems can reasonably be required to remove tetrachloroethylene, should it occur in public drinking water.

Currently, PCE is under review to determine if it is a human carcinogen. The *lifetime health advisory* (LTHA) for PCE is 10 ppb. The LTHA estimates the amount of PCE in water that an individual can drink daily over the course of a lifetime without experiencing any adverse noncancer health effects. The LTHA values contain a margin of safety to protect sensitive members of the population.

Commentator #3:
3A. ". . . we would like to request that your report summarize the findings in clear, laymen's terms for our residents."

[*RESPONSE*] Soil analysis results show that the amount of tetrachloroethylene detected in the ground is not enough to pose a health concern. Surface water and sediment sampling data were not available for review. However, exposure to tetrachloroethylene in contaminated surface water or sediment (storm water runoff in drainage ditches) would be insignificant. It is not likely that anyone would swallow or otherwise ingest the ditch water and sediment.

Water wells that have properly installed, properly operating and properly maintained filtration systems will prevent exposure to tetrachloroethylene groundwater contamination above levels considered to be a health risk.

3B. "We would like to see a table summarizing the best available data/conclusions regarding the known health impacts of PCE relative to concentration levels and time of exposure. At what exposure level(s) over what length(s) of time would a person develop liver or kidney damage, other effects from PCE?"

[*RESPONSE*] In animal studies, PCE concentrations at much higher doses than those to which most people are exposed caused liver or kidney damage and cancer. However, the current information is not sufficient to determine whether exposures to PCE can cause cancer in humans. The liver has not been shown to be a target organ in humans exposed to PCE, except for one case. There are no studies regarding renal (kidney) effects in humans from oral exposure to PCE.

Oral (ingestion)

Concentration	Exposure Time	Health Effects
300 ppb (in water)	unknown	some people able to smell tetrachloroethylene odor*
1,400 ppb (in drinking water)	long term	no adverse effects in children (EPA)†
2,000 ppb (in drinking water)	short term	no adverse effects in children (EPA)†
5,000 ppb (in drinking water)	long term	no adverse effects in adults (EPA) †

* Public health statement for tetrachloroethylene. http://www.atsdr.cdc.gov/toxprofiles. March 22, 2004.
† ECO-USA.net. Tetrachloroethene. http://www.eco-usa.net/toxics/pce.shtml. April 4, 2005.

Acute Exposure (14 days or less)

Concentration*	Exposure Time*	Health Effect*
100 mg/kg/day	11 days	liver cell swelling (mouse)
108 mg/kg/day	once	unconsciousness (human)
116 mg/kg/day	one time (capsule)	amnesia, dizziness, hallucinations (human)
1,000 mg/kg/day	5 days	significant increase in liver weight (rat)
1,000 mg/kg/day	10 days/once/day	increased liver to body weight ratio (mouse & rat)
1,000 mg/kg/day	11 days	no observed liver effects (mouse)
1,500 mg/kg/day	14 days	no observed kidney effects (rat)
1,500 mg/kg/day	14 days	increase in relative liver weights (rat)

* Toxicological profile for tetrachloroethylene. Atlanta: US Department of Health & Human Services; 1997.

Intermediate Exposure (15–364 days)

Concentration*	Exposure Time*	Health Effect*
200 mg/kg/day	6 weeks/5 days/week	liver tissue death (mouse)
400 mg/kg/day	90 days	increased kidney to body weight ratio (rat)
1,400 mg/kg/day	90 days	increased liver to body weight ratio (rat)

* Toxicological profile for tetrachloroethylene. Atlanta: US Department of Health & Human Services; 1997.

Chronic Exposure (365 days or greater)

Concentration*	Exposure Time*	Health Effect*
386–536 mg/kg/day	78 weeks/5 days/week	liver cancer(mouse)
386–536 mg/kg/day	78 weeks/5 days/week	kidney abnormality (mouse)
471–474 mg/kg/day	78 weeks/5 days/week	kidney abnormality (rat)
941 mg/kg/day	78 weeks/5 days/week	no observed hepatic effect (rat)
1,072 mg/kg/day	78 weeks/5 days/week	no observed hepatic effect (mouse)

* Toxicological profile for tetrachloroethylene. Atlanta: US Department of Health & Human Services; 1997.

3C. "On page 4 of the report, the plume boundaries are not correct, as we understand them. What is the basis for these boundaries?"

[*RESPONSE*] The plume boundaries are used in this report to give a generalized location of the area. At the time of publication of this PHA, information concerning the plume boundaries was obtained from the TCEQ Jones Road Groundwater Plume Web site (Reference 2). Recent information obtained from the Jones Road Web site (updated January 7, 2005) states that the plume boundaries mentioned in this report were for January 2003. Page 4 of this PHA has been updated to include this information.

3D. "Per page 4 of your report, in December 2000, PCE and other chemical contaminants were detected in a groundwater well that serves as a public drinking supply for the Finch gymnastics school and childcare facility. The facility owners did not begin supplying bottled water until June 2001, some 6 months later. How do you determine what the time of exposure was for the adults and the children prior to their being furnished bottled water? We know it was longer than 6 months—how do you know it was not much longer?"

"We know that because Finch's gymnastics school is a public facility, that the water there was tested every year by the health department. Did that yearly testing include testing for PCE during the 1990s? We would like to know what year the annual water testing began to include testing for PCE. If there was no testing for PCE before 2000, how do we know long the water may have been contaminated?"

"Bell operated the cleaners for 14 years before the contamination was found."

[*RESPONSE*] The information concerning the dates of PCE detection and when the gymnastics school and daycare facility began supplying bottled was obtained from the TCEQ Hazard Ranking System documentation record (Reference 1).

As indicated on page 9 of the document, the MCL for PCE tetrachloroethylene became effective in 1992. The earliest water analysis information we have is from the December 2000 results. Exposure could have been occurring for 6 months (December 2000 to June 2001) or longer (before December 2000). ATSDR would welcome additional information on exposure times, if the commentator or others can provide it.

"And what about the other area residents? How do you know how long residents were exposed to the contamination prior to the state's testing and fitting of filters? The state did not install filters on private wells until some 14 months after the contamination was found at the daycare center. There is no evidence to support a finding that the daycare center was the first contamination site."

[*RESPONSE*] We do not know how long the residents may have been exposed before the water well filtration systems were installed. We do not know of any evidence to indicate which business or residence was actually the first site contaminated. However, to our knowledge, the daycare facility's water supply was the first identified in the area to be contaminated with PCE.

"We feel that the assessment document should acknowledge that there was a potential exposure to residents prior to the period covered in the draft health assessment period."

[*RESPONSE*] The assessment document acknowledges potential exposure to the residents. The groundwater summary on page 8 states, "Past exposure to contaminated groundwater may have posed a public health hazard. Due to lack of sampling data, past exposures could not be adequately evaluated."

"What about long-term exposure? A good many of this area's residents have lived here for more than 20 years and will continue to live here. The exposure studies discussed at the public meeting covered high exposure levels for short (1 to 2 years) periods of time. Is there information available on long-term exposure at lower levels? If so, we believe that information should be included."

[*RESPONSE*] The potential long-term health effects to humans from ingesting water with low concentrations of PCE have not been identified. The information available for the health effects for ingesting PCE are primarily from short-term, high dose exposure in animal studies.

3E. "In the testing of PCE to determine when it becomes a carcinogen, what exposure level(s) were used? This information should be included in your report."

[*RESPONSE*] PCE at much higher concentrations than those most people are exposed to resulted in liver and kidney damage to laboratory animals. PCE has not been shown to cause cancer in humans and is currently under review by EPA. The lowest concentrations that caused liver cancer in mice were 386–536 milligrams per kilogram per day (mg/kg/day) of PCE for 5 days a week for 1 ½ years.

3F. "On page 9 of the report you talk about one well owner who refuses a filter on his well with a PCE concentration of 6.3 ppb. You further state that this concentration, although exceeding the MCL, does not exceed the ATSDR health assessment comparison values of 10 ppb for lifetime health advisory, or the reference dose media evaluation guide of 100 ppb for children and 400 ppb for adults."

"Please explain these health advisory comparison and reference dose media evaluation guide concepts more fully."

[*RESPONSE*] The *lifetime health advisory* (LTHA) estimates the amount of a contaminant concentration *in water* that an individual can drink daily over the course of a lifetime without experiencing any adverse health effects. The LTHA is based on a 70-kilogram (155-pound) adult consuming 2 liters (1/2 gallon) of water per day for 70 years. The LTHA values contain a margin of safety to protect people who may be more sensitive to the contaminant.

Reference dose media evaluation guide (RMEG) values are estimated daily oral or inhalation contaminant concentrations at which noncarcinogenic health effects are unlikely to develop over a lifetime of exposure. RMEGs are derived from EPA standards. They are conservative values designed to protect people who may be more sensitive to the contaminant.

"What is the current number of wells that are above the 5 ppb, and how many of these have filters?"

[*RESPONSE*] As of the November 2004 sampling period, 23 wells had PCE concentration above 5 parts per billion (ppb). All of these wells have filtration systems.

"What is the number of wells that have exceeded 100 ppb for children and 400 ppb for adults?"

[*RESPONSE*] As of the November 2004 sampling period, three wells exceeded the tetrachloroethylene concentration of 100 ppb for children. None of these wells exceeded 400 ppb.

"To our knowledge, there are more than one resident who are refusing to have a filter placed on their well. We believe that this information should be included in the report."

[*RESPONSE*] At the time of the report only one resident had refused the filtration system. Information from the August 2004 sampling period indicated that an additional resident refused. This brings the total number of residents to two who have refused to install the filtration system. This information will be included in the final report.

3G. "On page 5 and 6, you discuss the demographics of the area and the health outcome data. You conclude that the incidence and mortality of kidney and liver cancers were not unusual and were within the normal limits of cancer rates for the state of Texas. In the related information in Appendix D—Cancer Occurrence Investigations, you state, "Finally, it takes time for cancer to develop, usually 20 to 40 years. Conditions that have prevailed for only the last 5 or 10 years are unlikely to be related to the current incidence of cancer in a community". This seems to lead to the conclusion that although you are not sure of the relevance of the current occurrence of cancer to the PCE contamination, there may well be higher incidences of cancer from the contamination that will not begin to be diagnosed until 5 or 10 years from now—the 20 to 40 years time period. Would this not dispute your finding of 'no statistically significant excess of cancers'?"

[*RESPONSE*] No. In public health assessments, health outcome data are one resource to evaluate whether people living near hazardous wastes sites are experiencing health effects at a rate higher than would be expected in the general population. The finding of no statistically significant excesses is valid for the cancer incidence within the period 1995 to 2001.

"We believe that the report should unequivocally state that the cancer data contained therein is completely without merit, since you stated at the meeting and the report implies that there is not enough data to make a finding. Otherwise, one might draw the conclusion that there has been no cancer increase in the area, when, in fact, this is unknown."

[*RESPONSE*] The data merit the conclusion that there is no evidence of excess cancers relative to the contaminant of concern. The October 2002 and March 2004 cancer investigations indicate that

there was not an excess of kidney and liver cancers among residents of ZIP codes 77065 and 77070.

"We would like the report to include a full explanation of the records, data, and statistics that your department relied on in presenting the cancer statistics as a comparison with the Jones Road site. The information presented at the public meeting was very confusing."

[*RESPONSE*] The information this report addressed in regards to the cancer occurrence investigations are noted as References 10 and 11. Pages 21 and 22 of this report discuss the findings of the cancer occurrence investigations (Cluster Request #03006 and Investigation #04030) for the Jones Road area, ZIP codes 77065 and 77070. Full records, data, and statistics can be obtained from the Texas Department of State Health Services, Cancer Registry, 1100 W. 49th Street, Austin, Texas 78756, or by calling 1-800-252-8059.