Health Consultation

EVALUATION OF POTENTIAL SOIL GAS MIGRATION IN RESIDENCES ADJACENT TO THE PEMACO SUPERFUND SITE

MAYWOOD, LOS ANGELES COUNTY, CALIFORNIA

EPA FACILITY ID: CAD980737092

APRIL 29, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation 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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Prepared by:
California Department of Health Services
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
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PUBLIC HEALTH CONSULTATION

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Background and Statement of Issue

The Department of Health Services (DHS), under cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), released a public health assessment (PHA) related to the Pemaco Maywood Superfund Site in 2003 (1). The PHA summarizes a review of existing environmental data and evaluates potential health impact from exposures to site-related contaminants. This is done, in part, by identifying exposure pathways (means by which people could be exposed) and determining whether people are coming into contact with site-related contaminants. DHS determined the most likely way for nearby residents to be coming into contact with site-related contaminants is through breathing the air in their homes, which could be affected by soil vapor/gas[1] rising from shallow groundwater beneath the site (1). No other completed exposure pathways were identified in the PHA. The purpose of this health consultation is to evaluate indoor and outdoor air sampling to determine whether migration of soil gas from contaminated groundwater under residences is impacting the indoor air quality.

Pemaco Maywood is a 1.4 acre site located at 5050 Slauson Avenue in Maywood, Los Angeles County, California (Figure 1). The Pemaco facility is a former chemical blending facility that operated from the late 1940s until 1991. A number of chemicals were used at this facility, including chlorinated solvents, non-chlorinated solvents, petroleum hydrocarbons, and other volatile organic compounds (VOCs). The chemicals were stored in above ground storage tanks, underground storage tanks, and 55-gallon drums. The owners abandoned the site in 1991. In 1993, the facility burned to the ground; a number of drums and above and underground storage tanks were unaffected by the fire. The U.S. Environmental Protection Agency (USEPA) was asked to conduct an emergency assessment and to stabilize the site. Ultimately, control of the site was turned over to USEPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Since that time, USEPA has been conducting investigations at the site. In 1999, Pemaco was placed on the National Priorities List (NPL) of hazardous waste sites due to groundwater contamination known to be present beneath the site. Pemaco is only one possible source of contamination in the area. For example, the adjacent W.W. Henry site, is also under investigation for contamination of soil and groundwater (3).

Since the release of the PHA, USEPA has conducted additional sampling of off-site soil vapor, outdoor ambient air, and indoor air in residences/homes adjacent to the site. The sampling area falls within census tract 533703 and is bounded by 59th Place (north), 60th Place (south), Woodland Avenue (east), and Walker Avenue (west) (2). Based on the 2000 census data, approximately 4,213 people live in the area, with 96% of the population being Hispanic in origin (2). Additional demographics information is as follows: median age is 24; median income is $30,360; and the average family size is five people (2).

USEPA requested consultation from DHS staff in reviewing air sampling data collected from 19 homes during four sampling events conducted between July 2001 and August 2003 (3).

[1] Soil vapor/gas: in some cases when the groundwater is close to the surface (within 30 feet), vapors/gases from volatile organic chemicals (VOCs) in the groundwater can be pulled or migrate through the soil into buildings.

DHS evaluated the data based on the geographic distribution (different areas of groundwater contamination), rather than by individual household[2]. DHS divided the homes into four groups based on their location relative to the different groundwater zones with known contamination and an area where groundwater contamination has not been identified (discussed in more detail in the Groundwater section below) (Figure 2). This approach was taken to see if there are trends between the groundwater contamination and the levels of contaminants measured indoors, which would indicate potential impacts on indoor air from soil vapor. Each household will need to be evaluated individually to determine the potential need for sub-slab remediation.

To assess whether the contaminants in the groundwater are impacting the indoor air quality of the homes sitting above contaminated groundwater, in this health consultation DHS will:

1. Compare the chemicals identified in the groundwater with the chemicals detected in residential indoor air samples and outdoor air.

2. Discuss the overall quality of indoor air.

3. Compare the concentrations of the contaminants detected in the homes with ranges the same chemical detected in other indoor residential studies.

4. Compare the concentrations detected in the homes with appropriate health comparison values.

There is a summary of the extent of groundwater contamination, general information about indoor air, and a description of the indoor air sampling that was conducted near the Pemaco site in 2001 – 2003.

Groundwater

Several environmental investigations have characterized the groundwater beneath the facility. The groundwater beneath the site occurs in several layers (3). The shallowest groundwater is present in the perched groundwater zone. The perched zone exists approximately 25 feet below the ground surface (bgs) and varies in thickness from a range of 5 inches to 5 feet (Figure 3) (3). Soil vapor rising from groundwater in this zone has the greatest potential of impacting residences because it is the closest to the surface. The other groundwater zones exist further beneath the perched zone and have been informally named from top to bottom the “A” through “E” zones. These zones are of less concern because of the depth to contamination. The A zone begins at 65 feet and varies in depth from a few inches to 10 feet. Ground water in the region tends to flow from the south to southwest (3).

In 1997, USEPA sampled groundwater from several monitoring wells installed in the perched groundwater zone under the site (3). Tetrachoroethene (PCE), trichloroethene (TCE), and vinyl chloride (VC) were the most common and widespread chemicals detected in the perched groundwater zone (Figure 3) (Table 1) (3). Additional contaminants detected in the perched zone

[2] The USEPA evaluated the data by individual households and communicated the results to homeowners (R. Caraway, USEPA, personal communication, October 25, 2004).

include 1,1-dichloroethene (1,1-DCE) and cis-1,2-dichloroethene (1,2-DCE) (Table 1). Two of the wells in the perched zone, one on the Pemaco property, and one on an adjacent industrial property, were found to contain floating free product when they were sampled in May 1997. The free product determined to be 20%-30% gasoline range hydrocarbons. Gasoline contains over 110 different hydrocarbons, with the highest percentage typically being benzene, toluene, ethylbenzene, and xylene (4).

Thirty-six monitoring wells have been installed in the A through E zones. The monitoring wells are sampled quarterly to monitor the extent and migration of the contaminants. The largest contaminant plumes were found in the A and B zones and contain primarily TCE and its breakdown products, 1,1-DCE, 1,2-DCE, and vinyl chloride (Table 2) (3). The highest detected TCE concentrations in the zones that are directly beneath the southwest corner of the facility. TCE in this area has been detected in concentration in excess of 20,000 parts per billion (ppb) (Table 2) (3).

Soil Vapor from Groundwater Contamination

The groundwater flows from the south to the southwest and contaminants have migrated off site under a residential neighborhood. There are a number of residences located directly above the contaminated groundwater (Figure 2). Soil vapor intrusion can often be the most significant exposure pathway when houses are located over plumes of VOCs. VOCs refer to chemicals with vapor pressures greater than that of the ambient atmosphere. As a reference standard, the ambient atmosphere is assumed to have a pressure of 1 atmosphere (atm). Therefore, any chemicals with vapor pressures over 1 will have a tendency to volatilize from a liquid state to a vapor state when exposed to ambient atmospheres. In the case of groundwater contaminated by VOCs, the vapors can rise through the soil and enter the residence through cracks in the foundation and conduits for plumbing and electrical hookups. Furthermore, because of the low air exchange rates present in most homes, the chemical can accumulate and result in higher indoor concentrations of the VOC than would be typically expected.

Indoor Air Quality in General

Evaluating the impact of contaminated groundwater on indoor air quality is made more difficult because indoor air typically contains many chemicals.Several studies over the years have compared the overall quality of indoor versus outdoor air (5, 6). The findings have consistently shown that the overall air quality indoors is generally worse than the outdoor air quality. There are numerous reasons for the marked difference between indoor and outdoor air quality. Many houses have very poor air circulation and air turnover rates. This means that any chemical released into the air of the house will remain in the house. If chemicals are consistently released into the house, the total concentration of that chemical will increase. Many of the construction materials used in home construction contain various substances that continue to release chemicals into the air. Plywood, insulation, foam, and resins are examples of construction materials that have been shown to release, or offgas, chemicals into the indoor air. Many common cleaning and beauty products, in addition to other activities such as cooking, dry-cleaned garments, fireplaces, and smoking add to the total quantity of chemicals in indoor air. Many of these products/activities contain and/or release many of the chemicals

found at the Pemaco site. Though indoor air is recognized as a potential health problem, there are no laws or regulations addressing the issue. (See Table 3 for a limited list of chemicals known be associated with household products.)

Air Sampling

During four sampling events conducted between July 2001 and August 2003, contractors for the USEPA collected indoor and outdoor air samples from the surrounding residential neighborhood adjacent to the Pemaco property (Table 4) (3). The air samples were collected using evacuated steel canisters fitted with 24-hour flow controllers. The samples were taken at levels between 3 and 5 feet above the floor to replicate the breathing zones of children and adults, respectively. Nineteen residences were sampled in total. Some residences were only sampled during one sampling event. In three residences, samples were collected in locations both upstairs and downstairs. Soil vapor samples were collected at 5 and 15 feet bgs at various locations in the neighborhood (Table 5) (3).

The samples were analyzed using USEPA Method TO-15. A total of 34 VOCs were detected in the indoor samples, among which 28 were detected in outdoor air samples. Some chemicals present in the groundwater beneath the site were also detected in the indoor air and in soil vapor. For example, acetone, benzene, chloromethane, cyclohexane, ethylbenzene, hexane, methyl tert-butyl ether (MTBE), PCE, 1,1-trichloroethane, TCE, 1,2,4-trimethylbenzene, toluene, and xylenes were all present in the groundwater, soil vapor, and at least one of the homes sampled (Tables 1, 4, and 5). Many of the chemicals detected in the indoor air samples are common contaminants found in residential indoor air (Table 3) (3).

In the following section, DHS discusses our evaluation of the indoor and outdoor air sampling and whether contaminants (VOCs) in the groundwater could be migrating into homes through soil vapor/gas. A discussion of the potential health implications is also provided.

Discussion

As discussed earlier, indoor air in general contains many chemicals, from a variety of sources. Therefore, to assess how similar the concentration of contaminants in residences near Pemaco are to the indoor air in general, DHS compared these results (median concentrations) with ranges of chemicals detected in previous indoor air studies (Tables 6 and 7) (5, 6). Not all chemicals detected in the homes adjacent to Pemaco were measured in the indoor air studies and therefore the levels of these chemicals cannot be compared. Of the 13 chemicals that were detected in indoor air, soil vapor and groundwater, 8 of those chemicals had a range of levels consistent with indoor air levels measured in the other studies. Only xylene, detected in one home at a level of 111.0 $\mu g/m^3$, was slightly above the 94.0 $\mu g/m^3$ identified as the high value of normal ranges.

In general, the indoor concentrations are consistent with the corresponding outdoor concentrations, with some exceptions where the indoor air levels are higher than outdoors (Table 4). In instances where an outdoor level is approaching the level in indoor air, or when the outdoor level is higher, it is possible that the outdoor air is influencing the indoor levels through

air exchange. This was seen in a few situations and suggests that there is an active source in the area that is emitting the vapors. Acetone and TCE were both detected outdoors at levels approaching 7 to 20 times that of the median indoor air levels (Table 6).

It is difficult to draw definitive conclusions as to whether the indoor air quality is being impacted by soil vapor intrusion for a number of reasons: 1) common indoor sources of contaminants; 2) limited sample numbers; 3) inconsistent data collection between residences and sampling events; and 4) outdoor and/or regional sources of contaminants. In an effort to determine whether the chemicals in the groundwater are the source of the vapors in the residences, DHS divided the residences into four groups based upon their location over the contaminated groundwater plumes (Figure 2). If soil vapor migration from contaminated groundwater is the source of contaminants measured indoors, we would expect to see the concentrations of the contaminants in the homes to vary based upon their location. Homes located over the perched zone where the contaminants are closest to the surface would be expected to have the greatest chance for soil vapor intrusion, especially in areas where "hot spots" (VOC concentrations exceeding 1000 µg/L) of contamination have been identified (Table 1). Homes over the deeper "A" zone would be less impacted by soil vapor intrusion, due to the depth and distance the vapors would have to travel. Finally, soil vapor intrusion would not be expected in homes where groundwater is not contaminated. It is important to recognize that data for this category is limited, as testing was conducted at only one location.

Because of variations in local geography, it was difficult to determine whether some residences were directly over the perched zone. These homes, referred to the "homes on the fringe of the perched zone," may be just beyond the border of the perched zone, but due to variations in the local geography, could be influenced by vapors migrating from the perched zone.

It does not appear that the concentration of indoor contaminants varies based upon their location, relative to the depth of the contaminated groundwater plume(s) (Table 6). Homes directly over the perched zone do not have higher levels of site-related contaminants than the homes in the other three groups. For example, median indoor concentrations for trichloroethene for the homes over the perched zone was 0.17 µg/m^3, compared to 0.11 µg/m^3 for homes on the fringe, 0.14 µg/m^3 for the homes over the A zone, and 0.10 µg/m^3 for homes not over a contaminated zone. These small changes in trichloroethene levels in homes in all four groups are representative of sampling variation, and would be considered "statistically alike." Median indoor air concentrations of acetone, benzene, ethylbenzene, PCE, and toluene showed similar patterns indicating no correlation between the indoor concentration of these contaminants and their respective location above the contaminated groundwater plume (Table 6). This suggests that sources other than the soil gas are primarily contributing to the levels measured indoors.

As indicated earlier, DHS included results from one home located in an area (designated "not over a plume") where groundwater contamination has not been identified. The indoor air results are generally consistent with the results from the other three locations. However, a number of VOCs, in particular PCE, were measured in soil vapor samples collected from this area, indicating a source of contamination in either the groundwater, soil column, or both (Tables 1 and 5). Because the data in this area are limited, it is not possible to determine the source of the

VOCs measured in soil vapor. DHS recommends that USEPA work with the appropriate agency to identify the source and characterize the soil and groundwater in this area. These activities should include communication and involvement with the affected community.

Additionally, it appears there may be an active source releasing contaminants into the neighborhood as seen by the unusually high concentrations of acetone in outdoor air (Table 4). Acetone was measured at levels 2 to 800 times the "background level" in the Los Angeles area (7). In addition to acetone, other site-related contaminants such as benzene, ethylbenzene, PCE, and TCE, were measured at levels above "background" for the Los Angeles area (7). Based on air monitoring conducted by the California Air Resources Board, the average "background level" in the Los Angeles area for acetone, benzene, ethylbenzene PCE, and TCE is 19.5 $\mu g/m^3$, 2.7 $\mu g/m^3$, 1.5 $\mu g/m^3$, 0.7 $\mu g/m^3$, 0.2 $\mu g/m^3$, respectively (7). Further, these contaminants exceed the USEPA "ambient air" Preliminary Remedial Goal (PRG) in at least two, if not all three of the exposure groups evaluated (outdoor air samples were not collected for homes on the "fringe zone" group) (Table 4). Based upon these findings, DHS recommends that the USEPA work with the appropriate agency (South Coast Air Quality Management District) to identify and mitigate (if possible) the current source of acetone, benzene, ethylbenzene, PCE, and TCE in outdoor air in the neighborhood adjacent to the Pemaco site.

Public Health Implications

In a toxicological evaluation, we evaluate the exposures that have occurred to specific contaminants based on the most current studies we can find in the scientific literature. There is not enough available information to completely evaluate exposure to multiple chemicals or possible cancer and noncancer effects of exposure to very low levels of contaminants over long periods of time. Some introductory information follows to help clarify how we evaluate the possible health effects that may occur from exposure to the contaminants identified for follow-up.

When individuals are exposed to a hazardous substance, several factors determine whether harmful effects will occur and the type and severity of those health effects. These factors include the dose (how much), the duration (how long), the route by which they are exposed (breathing, eating, drinking, or skin contact), the other contaminants to which they may be exposed, and their individual characteristics such as age, sex, nutrition, family traits, life style, and state of health. The scientific discipline that evaluates these factors and the potential for a chemical exposure to adversely impact health is called toxicology.

To assess the potential noncancer adverse health risks associated with contaminants in indoor air, we compared contaminant concentrations to health comparison values. Health comparison values are media specific contaminant concentrations that are used to screen contaminants for further evaluation. Noncancer health comparison values used to evaluate air include the following: ATSDR's minimal risk levels (MRLs); California Environmental Protection Agency (Cal/EPA) Reference Exposure Levels (RELs); andUSEPA's Reference Concentration (RfC) and USEPA Region IX Preliminary Remedial Goals (PRGs). MRLs, RfCs, PRGs[3], and RELs are estimates of

[3] USEPA have also developed PRGs for chemicals considered carcinogenic (cancer causing), which are set at a level correlating to an increased cancer risk of 1 in 1,000,000.

a daily human exposure to a contaminant that is unlikely to cause adverse noncancer health effects. Exceeding a health comparison value does not imply that a contaminant represents a public health threat, but suggests that the contaminant warrants further consideration.

DHS compared noncancer health comparison values (health effects other than cancer) to the levels of VOCs measured in the indoor air between July 2001 and August 2003. None of the contaminants detected in the indoor air exceed health comparison values for noncancer health effects (Table 7). Thus, currently these contaminants are not at a level likely to cause adverse noncancer health effects.

Cancer health effects are evaluated in terms of a possible increased cancer risk. Cancer risk is the theoretical chance of getting cancer. In California, 41.5% of women and 45.4% of men (about 43% combined) will be diagnosed with cancer in their lifetime (7). This is referred to as the "background cancer risk." The term "excess cancer risk" represents the risk above and beyond the "background cancer risk." A "one-in-a-million" excess cancer risk from a given exposure to a contaminant means that if one million people are chronically exposed to a carcinogen at a certain level over a lifetime, then one cancer above the background risk may appear in those million persons from that particular exposure.

Health comparison values for chemicals considered potentially carcinogenic (cancer-causing) are set at a level correlating to a "one-in-a-million" theoretical increased cancer risk. A number of contaminants (benzene, bromoform, chlororform, chloromethane, dichlorodifluoromethane, ethylbenze, methylene chloride, PCE, TCE, 1,2-dichloroethane (DCA), cis-1,2-DCE, and 1,4-dichlorobenzene) exceed health comparison values (Table 7). Thus, breathing these compounds in indoor air over a long period of time increases the cancer risk for those residents.

DHS did not attempt to quantify the cancer risk for each chemical for the following reasons: 1) limited data to assume long-term (chronic) exposure level; 2) inconsistent sampling between households; 3) variation in data within individual households and; 4) inability to differentiate between theoretical increased risk from exposure to contaminants through soil vapor intrusion (if any) and exposure to contaminants typically found indoors. Additional data is needed to understand and/or quantify chronic exposure levels and to better define the potential for soil vapor migration to be influencing the indoor air quality in homes near Pemaco. Thus, DHS recommends that USEPA conduct additional indoor air monitoring in areas where soil vapor data exceed USEPA screening values (ambient air PRG x 100) and site-related contaminants have been detected indoors, to better assess the potential need for sub-slab remediation (8).

Children's Health Considerations

DHS and ATSDR recognize that, in communities with contaminated water, soil, air, or food—or all of these combined (depending on the substance and the exposure situation)—infants and children can be more sensitive than adults to chemical exposures. This sensitivity results from several factors: 1) children might have higher exposures to environmental toxins than adults because, pound for pound of body weight, children drink more water, eat more food, and breathe more air than adults; 2) children play outdoors close to the ground, which increases their exposure to toxins in dust, soil, surface water, and ambient air; 3) children have a tendency to put

their hands in their mouths, thus potentially ingesting contaminated soil particles at higher rates than adults (some children even exhibit an abnormal behavior trait known as “pica,” which causes them to ingest non-food items such as soil); 4) children are shorter than adults, which means they can breathe dust, soil, and vapors close to the ground; 5) children’s bodies are rapidly growing and developing, thus they can sustain permanent damage if toxic exposures occur during critical growth stages; and 6) children and teenagers more readily than adults can disregard no trespassing signs and wander onto restricted property. We believe that it is important to search for additional information that will increase our understanding of the contaminants, and ensure that the children’s health is protected. Finally, because most children depend completely on adults for risk identification and management decisions, DHS and ATSDR are committed to evaluating their special interest at applicable sites. We recognize that many children live near the Pemaco site. The health comparison values used to evaluate the potential for health impacts are set to be protective of children and other sensitive populations.

Conclusions

Based on a review of data collected between July 2001 and August 2003, it does not appear that the groundwater contamination beneath the residences is impacting the quality of the indoor air at levels discernable from levels commonly found indoors. The concentration of indoor contaminants (VOCs) does not vary based upon their location relative to the depth of the contaminated groundwater plume(s). VOCs measured in indoor air are consistent with levels typically found in indoor air.

None of the VOCs measured in indoor air exceed health comparison values for noncancer adverse health effects. Thus, these contaminants are not likely to cause noncancer adverse health effects.

A number of contaminants exceed health comparison values for cancer health effects. Limited data, variation in the data between and within households limit the ability to adequately characterize chronic exposure levels from site-related contamination for the purpose of estimating increased cancer risks.

There appears to be an active source releasing contaminants into the neighborhood as seen by the unusually high concentrations of acetone in outdoor air. A number of other contaminants exceed USEPA ambient air PRGs and background levels for the area.

Limited soil vapor data collected in areas where contamination has not been identified/investigated indicate the presence of VOCs in the subsurface.

In conclusion, on the basis of available data, DHS and ATSDR classify the Pemaco site as posing no apparent public health hazard from soil gas migration. Additional indoor sampling and remediation of the site will increase the confidence of this conclusion.

Recommendations

On the basis of limited data, DHS and ATSDR recommend the following:

1. USEPA work with the appropriate agency to identify the source of contaminants in soil vapor in the area identified as "not over a plume" and characterize the soil and groundwater.

2. USEPA work with the South Coast Air Quality Management District to identify and take appropriate measures to address the current source of acetone, benzene, methylbenzene, PCE, and TCE in outdoor air in the neighborhood adjacent to the Pemaco site.

3. USEPA conduct additional indoor air monitoring in areas where soil vapor data exceed USEPA screening values (ambient air PRG multiplied by 100) and site-related contaminants have been detected indoors, to better assess the potential need for sub-slab remediation.

Public Health Action Plan

The Public Health Action Plan (PHAP) for this site contains a description of actions taken, to be taken, or under consideration by ATSDR and DHS or others at and near the site. The purpose of the PHAP is to ensure that this health consultation not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment.

The first section of the PHAP contains a description of actions completed. The second section is a list of additional public health actions that are planned for the future.

Actions Completed

1. DHS conducted community interviews and outreach activities in the neighborhood adjacent to the Pemaco site (May 1999).

2. DHS/ATSDR released a public health assessment evaluating potential exposures from the Pemaco Maywood Superfund Site (February 2003).

3. DHS/ATSDR, USEPA, Los Angeles County Department of Health Services, Pro Uno (local community group) attended a meeting held by the National Association of County and City Health Officers focused on increasing collaboration between stakeholders at Superfund and other hazardous waste sites (October 2004).

4. DHS requested that the Los Angeles County Department of Health Services assist in responding to community concerns and be a liaison for the community on issues relating to activities at the Pemaco site.

Actions Planned

1. Provide technical assistance as needed to the Los Angeles County Department of Health Services in addressing community concerns relating to Pemaco site.

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Certification

This Public Health Consultation, Evaluation of Potential Soil Gas Migration in Residences Adjacent to the Pemaco Superfund Site, Maywood, California was prepared by the California Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the public health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

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

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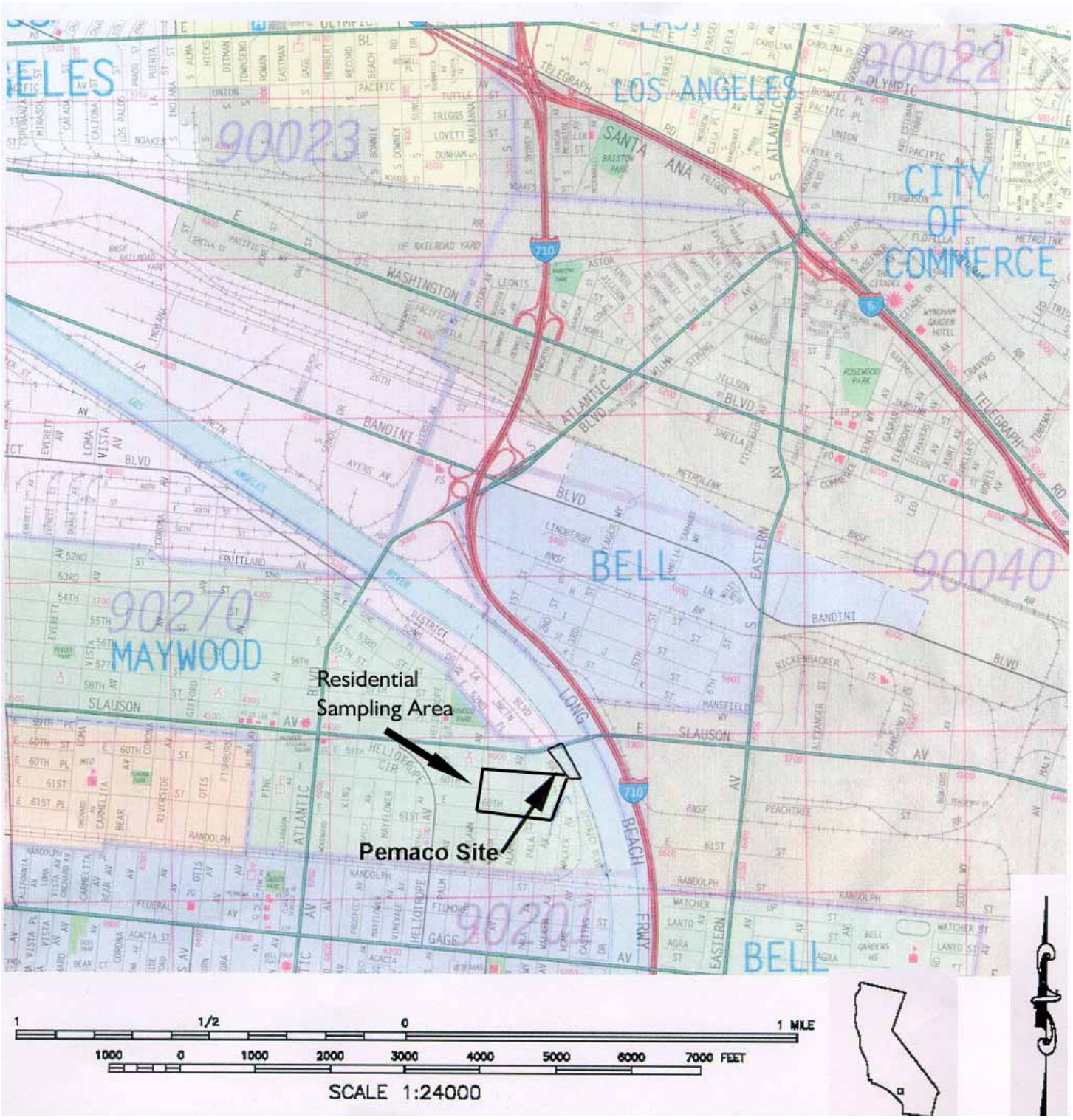
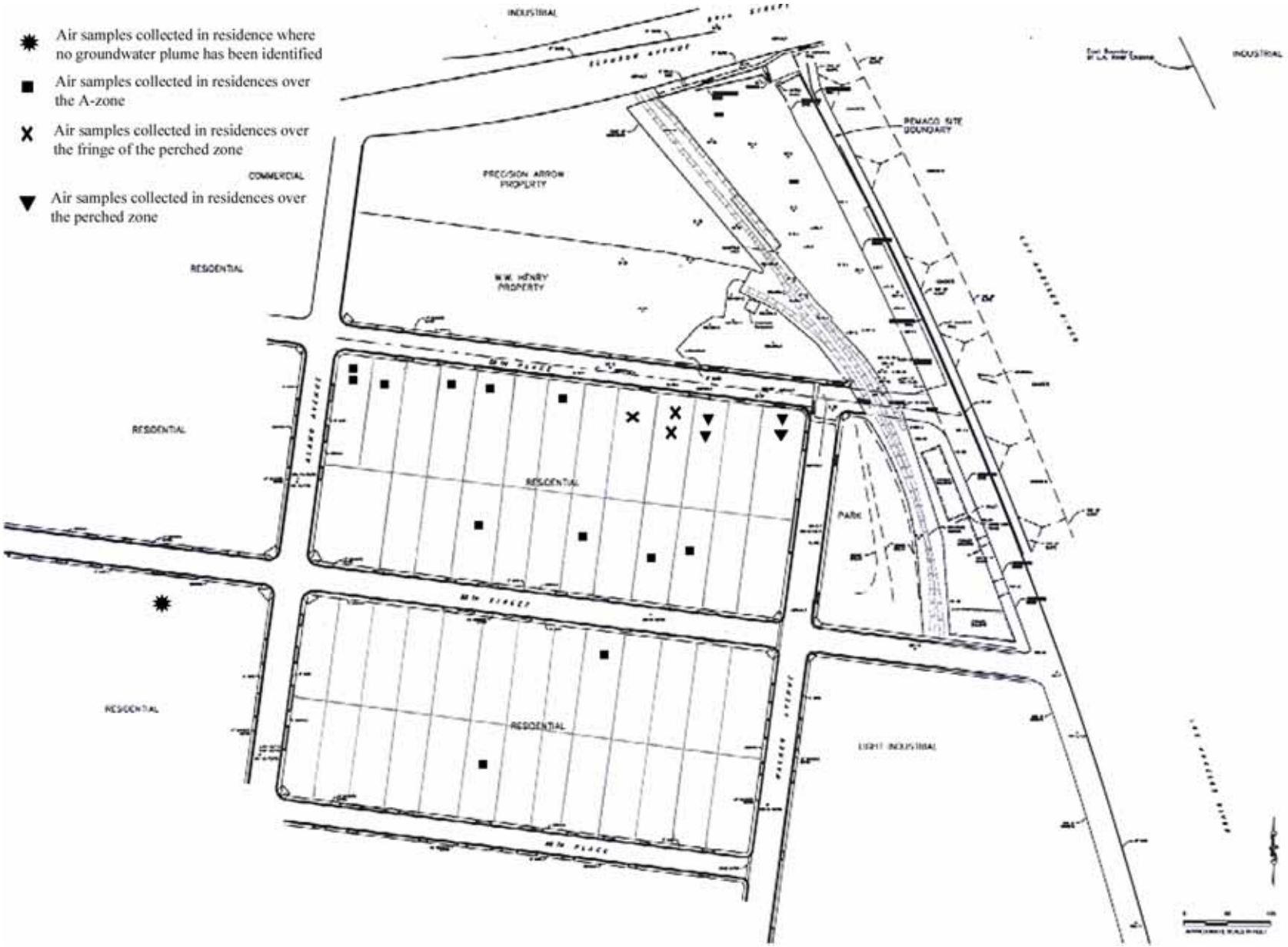
Figures and Tables

Figure 1. Location of Pemaco Superfund Site and Adjacent Residential Sampling Area, Maywood, California



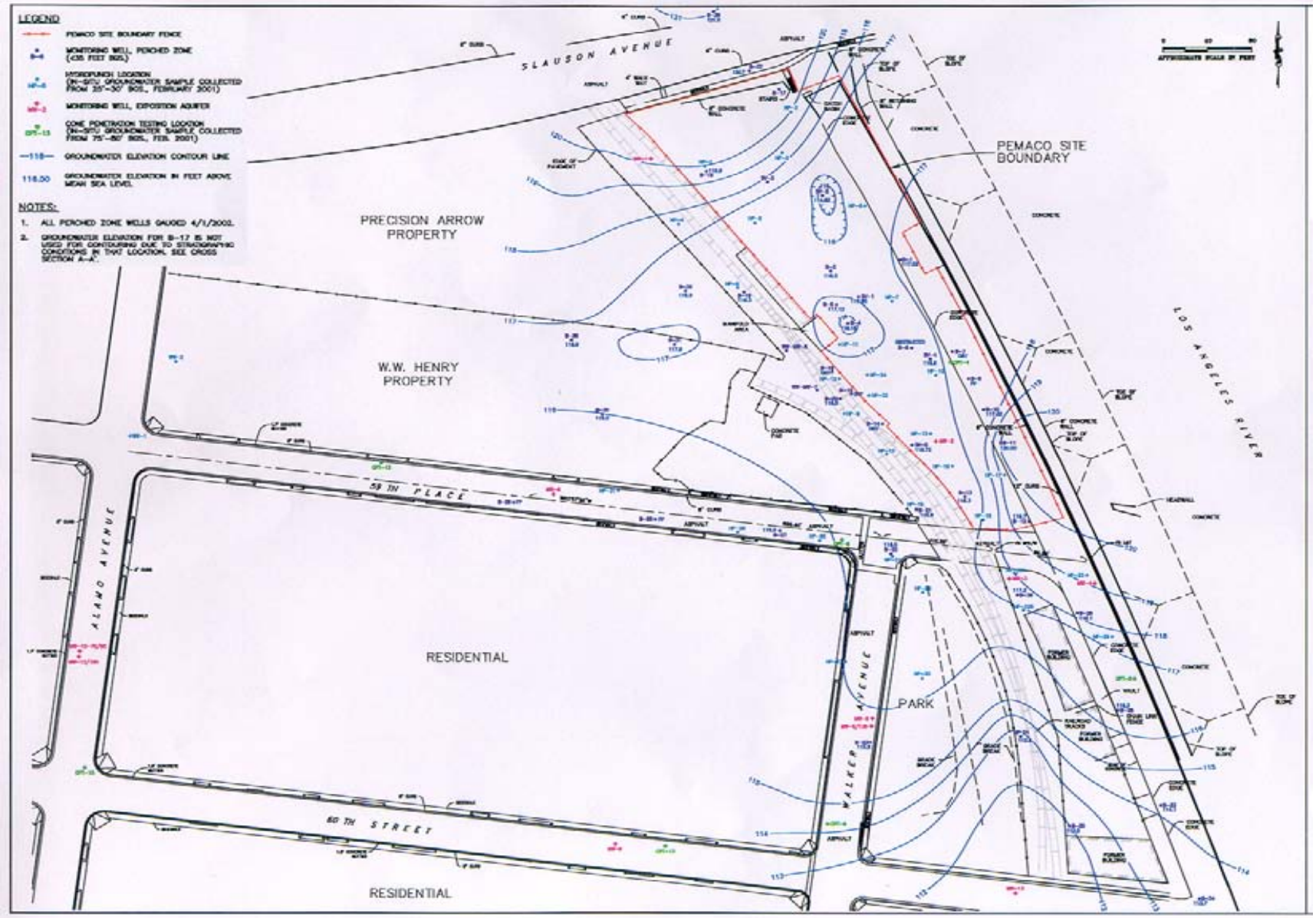
Data source (3)

Figure 2. Approximate Location of Residential Air Sampling Relative to Groundwater Zones, Pemaco Superfund Site, Maywood, California



Data source (3)

Figure 3. Groundwater Gradient Map of Perched Zone and Location of Monitoring Wells, Pemaco Superfund Site, Maywood, California



Data source (3)

Table 1. Prevalent Chemicals detected in the Perched Aquifer/Zone at the Pemaco Superfund Site, Maywood, California

Chemical	Minimum Concentration in ppb (Well ID)	Maximum Concentration in ppb (Well ID)
Acetone	3.6 (B-38)	1,500 (B-22)
Benzene	0.1 (SV-05)	1,600 (B-30)
Chlorobenzene	0.32 (SV-01)	5.0 (B-05)
Chloroethane	0.1 (B-11)	50 (B-21)
Chloroform	0.27 (B-24)	41 (B-23)
Cyclohexane	0.3 (B-13)	290 (B-30)
1,1-Dichloroethane (1,1-DCA)	0.1 (B-23)	730 (B-01)
1,1-Dichloroethene (1,1-DCE)	0.6 (B-27)	2,000 (B-01)
cis-1,2-Dichloroethene (cis-1,2-DCE)	0.3 (B-04)	780 (B-21)
trans-1,2-Dichloroethene (trans-1,2-DCE)	0.2 (SV-04)	59 (B-21)
Ethylbenzene	0.2 (B-01)	1,200 (B-08)
Hexane	2.2 (B-21)	57 (B-27)
Isopropylbenzene	0.18 (B-01)	5.0 (B-05)
Methyl tert-butyl ether (MTBE)	0.1 (SV-04)	30 (B-04)
Methylcyclohexane	0.16 (B-17)	34 (SV-04)
Naphthalene	1.0 (B-20)	25 (B-04)
Tetrachloroethene (PCE)	0.18 (B-23)	1,100 (B-01)
Toluene	0.06 (B-25)	2,000 (B-13)
1,1,1-Trichloroethane (1,1,1-TCA)	0.27 (B-32)	150 (SV-02)
Trichloroethene (TCE)	0.2 (B-04)	680 (B-22)
1,2,4-Trimethylbenzene	0.23 (B-21)	0.89 (B-13)
Vinyl chloride	0.4 (B-04)	240 (B-08 and B-21)
Xylenes	0.28 (B-22)	320 (B-13)

Data source (3)
ppb—parts per billion

Table 2. Prevalent Chemicals detected in the "A" Aquifer/Zone at the Pemaco Superfund Site, Maywood, California

Chemical	Minimum Concentration in ppb (Monitoring Well ID)	Maximum Concentration in ppb (Monitoring Well ID)
Cyclohexane	46 (MW-18-70)	3,155 (MW-03-85)
1,1-Dichloroethene (1,1-DCE)	1.0 (MW-05-85)	13 (MW-04-85)
cis-1,2-Dichloroethene (cis-1,2-DCE)	0.4 (MW-07-75)	2,600 (MW-17-70)
trans-1,2-Dichloroethene (trans-1,2-DCE)	3.8 (MW-04-85)	53 (MW-17-70)
Hexane	19.5 (MW-03-85)	311 (MW-17-70)
Tetrachloroethene (PCE)	3.0 (MW-5-85)	8.1 (MW-3-85)
Trichloroethene (TCE)	0.8 (MW-01-80)	22,000 (MW-17-70)
Vinyl chloride	0.7 (MW-01-80)	100 (MW-17-70)

Data source (3)
ppb—parts per billion

Table 3. Common Sources of Indoor Chemicals, Pemaco Superfund Site, Maywood, California

Chemical Name	Sources
Acetone	Used as a common solvent.
Acetonitrile	Found in certain lithium batteries. Used to make plastics, synthetic rubber, and acrylic fibers. Used as a common solvent in laboratories.
Acrolein	Used in plastics, perfumes and aquatic herbicides. Also found in cigarette smoke and automobile exhaust.
Benzene	Found in cigarette smoke, gasoline, crude oil, and used as a solvent. May be an ingredient of household products such as glues, paints, furniture wax, and detergents.
tert-Butyl alcohol	Found as flavors, in perfumes, in paint remover, as a gasoline booster, and in solvents.
Carbon Disulfide	Used in the manufacturing of rayon, in soil disinfectants, and in solvents.
Chlorobenzene	Used as a solvent for paints and pesticides.
Chloroethane	Used as a refrigerant and solvent. Also used in making cellulose, dyes, and medicinal drugs.
Chloromethane	Byproduct of burning grasses, wood, cigarettes, charcoal, or plastic. Found in Styrofoam insulation, aerosol propellants, and chlorinated swimming pools.
Dichlorodifluoromethane	Used as a refrigerant, aerosol propellant, and solvent. Also known as Freon 12.
cis-1,2-Dichloroethene	Found in perfumes, dyes, lacquers, solvents, and products made from natural rubber
Ethylbenzene	Used as a common solvent, and found in gasoline, inks, insecticides, and paints. Also found in cigarette smoke.
4-Ethyltoluene	Used as a solvent, found in kerosene and light vapor oil.
Heptane/Hexane	Found in petroleum products, is often mixed with other solvents, and is used as a filling for thermometers.
Isooctane	Found in petroleum, gasoline, solvents, and thinners. A component of the “odor” of gasoline.
Methyl t-butyl ether	Used as an additive in unleaded gasoline.
Methyl ethyl ketone (MEK)	Found in paints, coatings, glues, cleaning agents, and cigarette smoke. It occurs naturally in some fruit and trees. Also known as Methyl Ethyl Ketone or MEK.
Pentane	Found in petroleum, gasoline.
Propene	A flammable propellant, produced from petroleum cracking.
Styrene	Found in synthetic rubbers, resins, insulators
Tetrachloroethene	Used in dry cleaning and as a degreaser. When clothes are brought home from the drycleaners, they often release small amounts of tetrachloroethene into the air.
Toluene	Used as a common solvent, and found in gasoline, paints and lacquers. Also found in cigarette smoke.
1,1,1-Trichloroethane	Used as a degreaser, in solvents, and as an aerosol propellant
Trichloroethene	Used as a degreasing agent. It is also a common ingredient in cleaning agents, paints, adhesives, varnishes, and inks.
Trichlorofluoromethane	Used as refrigerant, aerosol propellant, and solvent. Also known as Freon 11.
1,2,4-Trimethylbenzene	Used to make drugs and dyes, in gasoline, and certain paints and cleaners.
1,3,5-Trimethylbenzene	Component in diesel exhaust.
Xylenes	Used as a solvent, cleaning agent, and thinner for paints, and in fuels and gasoline.

Data source: Memo from Tammie McRae, Regional Representative, Agency for Toxic Substances and Disease Registry, Atlanta, GA on 5/20/04.
Gasoline components may be listed in the ingredients of household products as petroleum distillates or solvents.

Table 4. Summary of Results for Chemicals Detected in Residential Indoor Air and Outdoor Air Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	USEPA Ambient Air PRG (µg/m^3)	Indoor Levels "Perched Zone" (µg/m^3)	Indoor Levels "Fringe Zone" (µg/m^3)	Indoor Levels "Zone A" (µg/m^3)	Indoor Levels "Not Over Plume" (µg/m^3)	Outdoor Levels "Perched Zone" (µg/m^3)	Outdoor Levels "Zone A" (µg/m^3)	Outdoor Levels "Not Over Plume" (µg/m^3)
Acetone	365	20.0 – 85.5	21.0 – 116	13.0 – 380	28.0 – 38.0	18.0 – 1,600	16.0 – 1,200	25.0 – 420
Benzene	0.23	1.50 – 6.10	2.20 – 12.8	1.90 – 16.0	2.60 – 2.80	1.7 – 8.3	1.80 – 9.30	2.70 – 3.60
Bromomethane	5.2	0.30 – 3.90	0.35 – 3.90	0.30 – 0.42	0.35 – 0.87	0.31 – 1.40	0.35 – 1.00	0.37 – 0.37
Carbon tetrachloride	0.13	0.50 –0.	0.60 – 0.63	0.50 – 0.79	0.47 – 0.61	0.62 – 0.64	0.51 – 0.74	0.51 – 0.51
Chlorobenzene	62	0.34 - 0.34		0.13 – 0.44				
Chloroform	0.35	0.18 – 3.0	0.31 – 8.80	0.24 – 2.20	0.34 – 0.45	0.14 – 0.23	0.14 – 0.24	0.29 – 0.29
Chloromethane	1.1	1.20 – 4.13	1.40 – 3.	1.0– 6.20	1.0– 1.70	1.40 – 5.50	0.94 – 3.80	0.94 – 2.6
Cyclohexane	20,805		12.7 – 12.7					
1,2-Dichlorobenzene	208.6			39.0 – 39.0			3.90 – 3.90	2.50 – 2.50
1,3-Dichlorobenzene	3.3	6.0 – 6.0		0.17 – 6.0		6.0 – 6.0	4.00 – 4.20	2.70 – 2.70
1,4-Dichlorobenzene	0.31	0.54 – 1.0	0.80 - 6.0	0.35 – 541	15.0 – 220	0.60 – 0.89	0.37 – 3.50	2.1 – 3.8
Dichlorodifluoromethane	208.6	3.30 – 5.40	3.60 – 6.90	3.20 – 939	3.30 – 13.0	3.30 – 4.50	3.00 – 5.20	3.00 – 3.40
1,2-Dichloroethane	0.074	0.13 – 0.15		0.10 – 6.40	0.14 – 0.14		0.14 – 0.14	
1,1-Dichloroethene	208							
Ethylbenzene	1.7	1.20 – 15.0	1.20 – 6.90	1.10 – 15.0	1.20 – 1.60	1.20 – 31.0	1.10 – 24.0	1.50 – 2.30
4-Ethyltoluene	__		4.5 – 6.9	4.90 – 5.40			4.70 – 4.70	
Hexane	208.6	1.10 – 3.00	1.80 – 15.9	1.80 – 3.30	1.81 – 2.30	0.92 – 3.60	0.78 – 4.10	2.30 – 2.30
2-Hexanone	__			9.40 – 9.40				
Isopropanol	__	7.60 - 93.4	11.8 - 22.9	8.60 – 344				

Table 4. Summary of Results for Chemicals Detected in Residential Indoor Air and Outdoor Air Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	USEPA Ambient Air PRG (µg/m^3)	Indoor Levels "Perched Zone" (µg/m^3)	Indoor Levels "Fringe Zone" (µg/m^3)	Indoor Levels "Zone A" (µg/m^3)	Indoor Levels "Not Over Plume" (µg/m^3)	Outdoor Levels "Perched Zone" (µg/m^3)	Outdoor Levels "Zone A" (µg/m^3)	Outdoor Levels "Not Over Plume" (µg/m^3)
Methyl ethyl ketone (MEK)	1,042	4.10 – 74.0	4.4- - 22.0	3.60 – 96.0	5.10 – 16.0	5.10 – 60.	3.20 – 50.0	3.90 – 21.0
Methyl isobutyl ketone (MIBK)	83.4	8.20 – 8.20		16.4 – 16.4		12.3 – 12.3	8.20 – 8.20	
Methyl tert-butyl ether	3.7	0.76 – 14.4	1.40 – 22.7	1.40 – 72.1	1.60 – 2.60	0.99 – 11.5	0.79- 17.3	1.60 – 1.60
Methylene chloride	4.1	1.20 – 2.30	1.30 – 10.0	1.20 – 2.80	3.80 – 4.00	1.40 – 5.90	1.20 – 3.80	1.10 – 1.10
Styrene	1,100	0.38 – 1.80	0.46 - -0.49	0.34 – 3.60	0.49 – 0.76	0.37 – 3.20	0.24 – 2.70	0.34 – 5.60
Tetrachloroethene (PCE)	0.67	0.36 – 5.60	0.48 – 0.66	0.47 – 2.0	0.69 – 1.90	0.10 – 0.59	0.44 – 17.6	1.30 – 1.30
Toluene	401	7.50 – 45.2	9.10 – 56.5	7.50 – 75.4	10.0 – 11.0	7.50 – 200	7.50 – 140	11.0 – 11.0
1,1,2-Trichloro-1,2,2-trifluoroethane	31,000	0.43 – 0.64	0.42- 0.60	0.41 – 0.63	0.46 – 0.64	0.43 – 0.48	0.43 – 0.67	0.66 – 0.66
1,1,1-Trichloroethane	2,300	0.16 – 0.27	0.16 – 0.28	0.17 – 0.52	0.69 – 0.69	0.17 – 0.29	0.18 – 0.27	0.18 – 0.18
Trichloroethene (TCE)	1.1	0.10 – 0.60	0.10 – 0.16	0.08 – 0.70	0.09 – 0.11	0.10 – 0.52	0.10 – 1.40	0.40 – 3.7
Trichlorofluoromethane	730	0.69 – 6.2	0.88 – 5.10	0.85 – 16.9	1.50 – 5.00	0.90 – 1.40	1.10 – 1.50	1.60 – 1.60
1,2,4-Trimethylbenzene	6.2	4.50 – 4.90	4.90 – 11.8	1.20 – 17.2		4.50 – 4.50	0.63 – 18.7	
1,3,5-Trimethylbenzene	6.2		9.30 – 9.30	4.40 – 4.40			0.23 – 5.90	
Vinyl acetate	210	3.50 – 10.6	17.6 – 17.6	13.4 – 13.4				
Xylenes	105.9	4.90 – 62.0	5.60 – 37.3	4.30 – 111	5.70 – 6.80	5.90 – 182	3.99 – 154	6.80 – 7.40

Data source (3): Range of results reflects minimum and maximum detections. Blank spaces indicate sample not detected at laboratory detection limit; µg/m^3—micrograms per meter cubed; USEPA PRG = preliminary remedial goal; ND=not detected; No outdoor air samples were collected in areas referred to as the "fringe of the plume.

Table 5. Summary of Chemicals Detected in Soil Vapor Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	Range of Soil Vapor Levels "Perched Zone" (µg/m^3)	Range of Soil Vapor Levels "Fringe Zone" (µg/m^3)	Range of Soil Vapor Levels "Zone A" (µg/m^3)	Range of Soil Vapor Levels "Not Over Plume" (µg/m^3)
Acetone	35.0 – 3,088 (5 ft) 52.0 – 451 (15 ft)	97.0 – 2,375 (5 ft) 120 – 1,710 (15 ft)	25.0 – 2,375 (5 ft) 97.0 – 1,710 (15 ft)	35.0 – 39.0
Benzene	2.70 – 25.6 (5 ft) 10.0 – 63.9 (15 ft)	3.80 – 24.0 (5 ft) 3.40 – 24.0 (15 ft)	2.60 – 42.0 (5 ft) 3.50 – 111 (15 ft)	2.80 –2.80
Bromomethane	ND (5 ft) 2.90 – 2.90 (15 ft)		ND (5 ft) 21.0 – 21.0 (15 ft)	
Chloroform	4.70 – 23.0 (5 ft) ND (15 ft)	4.40 – 29.3 (5 ft) 3.60 – 146 (15 ft)	5.10 – 71.0 (5 ft) 7.60 – 92.8 (15 ft)	15.0 – 16.0
Chloromethane	8.30 –8.30 (5 ft) 24.8 – 24.8 (15 ft)	6.20 – 8.10 (5 ft) 3.10 – 28.9 (15 ft)	1.30 – 3.50 (5 ft) 1.80 – 169 (15 ft)	
Cyclohexane	6.50 – 113 (5 ft) 5.30 – 127 (15 ft)	75.7 – 75.7 (5 ft) 65.4 – 550 (15 ft)	2.60 – 82.6 (5 ft) 11.0 – 192 (15 ft)	4.6 – 4.6
1,3-Dichlorobenzene	7.2 – 7.2 (5 ft) 7.2 – 7.2 (15 ft)	4.3 – 4.3 (5 ft) 3.50 - 12.0 (125 ft)	4.00 – 5.60 (5 ft) 4.00 – 7.20 (15 ft)	
Dichlorodifluoromethane		6.9 – 6.9 (5 ft) 7.90 – 10.9 (15 ft)		
1,1-Dichloroethene			19.0 – 1,070 (5 ft) 140 – 2,379 (15 ft)	3.70 – 3.80
Ethylbenzene	7.80 – 84.0 (5 ft) 33.0 – 140 (15 ft)	4.0 – 21.7 (5 ft) 5.60 – 47.8 (15 ft)	3.40 – 130 (5 ft) 3.30 – 170 (15 ft)	5.40 – 8.20
4-Ethyltoluene	7.90 – 7.90 (5 ft) 10.8 – 10.8 (15 ft)	5.90 – 5.90 (5 ft) 6.90 – 9.80 (15 ft)	5.40 – 8.80 (5 ft) 6.90 – 13.3 (15 ft)	
Hexane	12.0 – 180 (5 ft) 10.0 – 52.9 (15 ft)	4.00 – 17.6 (5 ft) 4.70 – 56.4 (15 ft)	2.60 – 32.0 (5 ft) 5.0 – 59.9 (15 ft)	3.5 – 5.0
2-Hexanone			6.10 – 6.10 (5 ft) 5.70 – 5.70 (15 ft)	
Isopropanol	231 – 231 (5 ft) 187 – 187 (15 ft)	245 – 245 (5 ft) 233 – 958 9 (15 ft)	8.90 – 245 (5 ft) 6.90 – 270 (15 ft)	
Methyl ethyl ketone (MEK)	12.0 – 64.9 (5 ft) 20.0 –64.9 (15 ft)	20.1 – 59.0 (5 ft) 18.6 – 147 (15 ft)	10.3 – 79.6 (5 ft) 17.0 – 50.1 (51 ft)	11.0 – 13.0
Methyl isobutyl ketone (MIBK)		6.10 – 12.3 (5 ft) 5.70 – 34.4 (15 ft)	5.70 – 5.70 (5 ft) 6.60 – 32.4 (15 ft)	
Methyl tert-butyl ether	3.60 – 15.5 (5 ft) 22.7 – 22.7 (15 ft)	11.2 – 11.2 (5 ft) 13.3 – 183 (15 ft)	11.9 – 320 (5 ft) 7.21 – 46.9 (15 ft)	
Methylene chloride	2.50 – 4.80 (5 ft) 8.0 – 8.0 (15 ft)	10.1 – 10.1 (5 ft) ND (15 ft)	3.80 – 3.80 (5 ft) 3.40 – 34.7 (15 ft)	
Styrene	5.50 – 8.52 (5 ft) 10.2 – 10.2 (15 ft)	3.20 – 12. 8 (5 ft) 4.30 – 6.40 (15 ft)	4.30 – 21.3 (5 ft) 7.20 – 21.3 (15 ft)	
Tetrachloroethene (PCE)	8.90 –291 (5 ft) 244 – 244 (15 ft)	27.1 – 264 (5 ft) 6.50 – 949 (15 ft)	8.40 – 298 (5 ft) 7.80 – 434 (15 ft)	690 - 700
Toluene	30.0 – 350 (5 ft) 130 – 530 (15 ft)	16.0 – 376 (5 ft) 12.0 – 335 (15 ft)	8.00 – 565 (5 ft) 14.0 – 660 (15 ft)	33.0 –46.0
1,1,1-Trichloroethane			2.80 – 8,730 (5 ft) 4.10 – 19,643 (15 ft)	35.0 – 36.0
Trichloroethene (TCE)	7.0 – 7.0 (5 ft) 0.83 – 18.3 (15 ft)		0.87 – 64.4 (5 ft) 0.80 – 91.3 (15 ft)	0.33 – 1.1
Trichlorofluoromethane			3.0 – 3.0 (5 ft) ND (15 ft)	
1,2,4-Trimethylbenzene	9.83 – 36.4 (5 ft) 49.2 – 49.2 (15 ft)	21.6 – 29.5 (5 ft) 26.5 – 33.4 (15 ft)		
1,3,5-Trimethylbenzene	9.3 – 9.3 (5 ft) 13.8 – 13.8 (15 ft)	5.90 – 5.90 (5 ft) 6.90 – 10.3 (15 ft)	5.90 – 8.40 (5 ft) 6.40 – 14.3 (15 ft)	

Table 5. Summary of Chemicals Detected in Soil Vapor Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	Range of Soil Vapor Levels "Perched Zone" (µg/m^3)	Range of Soil Vapor Levels "Fringe Zone" (µg/m^3)	Range of Soil Vapor Levels "Zone A" (µg/m^3)	Range of Soil Vapor Levels "Not Over Plume" (µg/m^3)
Vinyl Acetate		12.0 – 12.0 (5 ft)	ND (5 ft) 21.3 – 21.3	
Xylenes	55.0 – 580 (5 ft) 225 – 940 (15 ft)	17.2 – 284 (5 ft) 15.1 – 286 (15 ft)	11.1 – 890 (5 ft) 20.9 – 1,080 (15 ft)	29.3 – 46.0

Data source (3): Blank spaces indicate sample not detected at laboratory detection limit; µg/m^3—micrograms per meter cubed; ND=not detected; Soil vapor samples were not collected at 15 feet depth in area referred to as "Not over plume."

Table 6. Median Levels of Chemicals Detected in Indoor Air and Outdoor Air Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	Median Indoor Level Perched Zone (µg/m^3)	Median Indoor Level Fringe Zone (µg/m^3)	Median Indoor Level Zone A (µg/m^3)	Median Indoor Level Not Over Plume (µg/m^3)	Median Outdoor Level Perched Zone (µg/m^3)	Median Outdoor Level Zone A (µg/m^3)	Median Outdoor Level Not Over Plume (µg/m^3)
Acetone	32.0	50.9	35.7	32.0	35.6	52.3	222
Benzene	2.50	2.80	2.75	2.60	3.90	2.20	3.15
Bromomethane	0.47	0.43	0.37	0.61	0.66	0.40	0.37
Carbon tetrachloride	0.64	0.62	0.56	0.59	0.63	0.61	0.51
Chlorobenzene	0.34		0.21				
Chloroform	0.67	0.76	0.37	0.42	0.21	0.19	0.29
Chloromethane	1.50	1.79	1.75	1.60	2.0	1.60	1.77
Cyclohexane		12.7					
1,2-Dichlorobenzene			39.0			3.90	2.50
1,3-Dichlorobenzene	6.00		3.09		6.00	4.2	2.70
1,4-Dichlorobenzene	0.93	1.00	0.92	15.0	0.71	0.67	2.95
Dichlorodifluoromethane (Freon 12)	4.10	4.90	4.50	12.0	4.0	3.65	3.20
1,2-Dichloroethane	0.14		0.66	0.14		0.14	
1,1-Dichloroethene							
Ethylbenzene	3.00	1.40	1.70	1.30	3.05	1.35	1.90
4-Ethyltoluene		5.7	5.15			4.70	
Hexane	1.65	4.20	2.25	2.0	2.15	2.05	2.30
2-Hexanone			9.40				
Isopropanol	50.5	17.4	49.2				
Methyl ethyl ketone (MEK)	5.90	13.6	8.30	5.20	5.90	8.60	12.5
Methyl isobutyl ketone (MIBK)	8.20		16.4		12.3	8.20	
Methyl tert-butyl ether	1.45	5.01	2.20	2.40	6.35	1.55	1.60
Methylene chloride	1.45	2.64	1.70	3.90	1.60	1.40	1.10
Styrene	0.59	0.49	0.48	0.58	0.39	0.33	2.97

Table 6. Median Levels of Chemicals Detected in Indoor Air and Outdoor Air Samples Collected in the Vicinity of the Pemaco Superfund Site, Maywood, California

Chemical	Median Indoor Level Perched Zone (µg/m^3)	Median Indoor Level Fringe Zone (µg/m^3)	Median Indoor Level Zone A (µg/m^3)	Median Indoor Level Not Over Plume (µg/m^3)	Median Outdoor Level Perched Zone (µg/m^3)	Median Outdoor Level Zone A (µg/m^3)	Median Outdoor Level Not Over Plume (µg/m^3)
Tetrachloroethene (PCE)	0.87	0.56	0.67	0.80	0.53	0.56	1.30
Toluene	15.5	14.0	12.0	10.0	12.00	10.0	11.0
1,1,2-Trichloro-1,2,2-trifluoroethane	0.46	0.44	0.55	0.60	0.44	0.561	0.66
1,1,1-Trichloroethane (1,1,1-TCA)	0.22	0.16	0.20	0.69	0.18	0.19	0.18
Trichloroethene (TCE)	0.17	0.11	0.14	0.10	0.12	0.12	2.05
Trichlorofluoromethane (Freon 11)	1.50	1.20	1.65	5.00	1.18	1.40	1.60
1,2,4-Trimethylbenzene	4.70	7.40	5.66		4.50	4.90	
1,3,5-Trimethylbenzene		9.30	4.40			3.07	
Vinyl Acetate	7.05	17.6	13.4				
Xylenes	10.5	9.70	7.55	6.00	16.5	6.00	7.10

Data source (3): Blank spaces indicate sample not detected at laboratory detection limit; µg/m^3—micrograms per meter cubed; ND=not detected; No outdoor air samples were collected in areas referred to as the “fringe of the plume”; Median values are presented rather than the “mean” in an effort to show a more representative distribution of concentrations in a geographical area as defined by the various groundwater zones. The mean values (not shown) for some samples/zones are much higher than the median, due in large, to a single detection.

Table 7. Comparison of Indoor Air Concentrations Detected in Residences Near Pemaco with Ranges of Chemicals Identified in Other Indoor Air Studies and Health Comparison Values: Pemaco Superfund Site, Maywood, California

Chemical	Range of Chemicals Detected in Indoor Air Near Pemaco (All Houses Combined) (µg/m^3)	Range of Chemicals Identified in Other Residential Indoor Air Studies (µg/m^3)	Health Comparison Value (source) (µg/m^3)
Acetone	13 –380		365 (PRG) 30,881 (MRL)
Benzene	1.5 – 16	4.8 – 29 2.0 – 20	60 (REL) 0.10 CREG 159.5 (MRL)
Bromomethane	0.3 – 3.9		5.2 (PRG) 19.4 (MRL)
Carbon tetrachloride	0.48 – 0.84	0.71 – 1.0	0.13 (PRG*) 19.4 (MRL)
Chlorobenzene	0.13 – 0.44	<0.5 – 10	1,000 (REL)
Chloroform	0.18 – 8.8	0.82 – 20 1.0– 15	300 (REL) 0.084 (PRG*)
Chloromethane	1.0 – 6.2		1.1 (PRG*)
Cyclohexane	ND – 12.7[§]	2.0 – 100	21,000 (PRG) 6,000 (RFC)
1,2-Dichlorobenzene	ND – 39.0[§]		210 (PRG) 0.04 (CREG)
1,3-Dichlorobenzene	0.17 – 6.0		3.3 (PRG)
1,4-Dichlorobenzene	0.35 – 541		800 (REL) 601.2 (MRL)
Dichlorodifluoromethane	3.2 – 940		210 (PRG*)
1,2-Dichloroethane	0.10 – 6.4		0.074 (PRG*) 2,429 (MRL)
Ethylbenzene	1.2 – 15	2.2 – 35	1.7 (PRG*) 2,000 (REL) 4,335 (MRL)
4-Ethyltoluene	4.5 – 6.9		not available
Hexane	1.1 – 15.9	2.0 – 20	7,000 (REL) 208.6 (PRG) 2,115 (MRL)
2-Hexanone	ND – 9.4[§]		
Isopropanol	7.6 – 344		7,000 (REL)
Methyl ethyl ketone (MEK)	3.6 – 96		1,000 (PRG)
Methyl isobutyl ketone (MIBK)	8.2 – 16.4		83 (PRG) 3,000 (RFC)

Table 7. Comparison of Indoor Air Concentrations Detected in Residences Near Pemaco with Ranges of Chemicals Identified in Other Indoor Air Studies and Health Comparison Values: Pemaco Superfund Site, Maywood, California

Chemical	Range of Chemicals Detected in Indoor Air Near Pemaco (All Houses Combined) (µg/m^3)	Range of Chemicals Identified in Other Residential Indoor Air Studies (µg/m^3)	Health Comparison Value (source) (µg/m^3)
Methyl tert-butyl ether	0.76 – 72.1		3.7 (PRG*) 8,000 (REL) 2,523 (MRL)
Methylene chloride	1.2 – 10	2.6 - 170	4.1 (PRG*) 3.0 (CREG)
Styrene	0.34 – 3.6	0.60 – 5.3 2 – 5	900 (REL) 1,100 (PRG) 255 (MRL)
Tetrachloroethene (PCE)	0.36 – 5.6	1.7 – 56	3.3 (PRG*) 35 (REL) 271 (MRL)
Toluene	7.5 – 75.4	2 – 150	300 (REL) 400 (PRG) 301 (MRL)
1,1,2-Trichloro-1,2,2-trifluoroethane	0.41 – 0.64		not available
1,1,1-Trichloroethane	0.16 – 0.69	2 – 20	1,000 (PRG)
Trichloroethene (TCE)	0.09 – 0.70	1 – 20	1.1 (PRG*) 538 (MRL)
Trichlorofluoromethane	0.69 – 16.9		730 (PRG)
1,2,4-Trimethylbenzene	1.2 – 17.2	1.0 – 71.4	6.2 (PRG)
1,3,5-Trimethylbenzene	4.4 – 9.3	<1.1 – 111	6.2 (PRG)
Vinyl acetate	3.5 – 17.6		210 (PRG) 35.2 (MRL)
Xylenes (total)	4.3 – 111	2.6 – 94	700 (REL)

Data source: (3, 5, 6, 9-13)
RfC—Reference Concentration taken from USEPA IRIS database (www.epa.gov)
REL—Recommended Exposure Limit from Office of Environmental Health Hazard Assessment (OEHHA) (www.oehha.ca.gov)
MRL—Minimal Risk Level from ATSDR (www.atsdr.cdc.mrls.html)
PRG—Preliminary Remediation Goals (USEPA)(http://www.epa.gov/region09/waste/sfund/prg/index.htm)
PRG*- PRG is based upon cancer endpoint (level reflects 1 in 1,000,000 increased cancer risk – considered no apparent increased risk)
CREG—cancer risk evaluation guideline from ATSDR (level reflects 1 in 1,000,000 increased cancer risk – considered no apparent increased risk)
ppbv—parts per billion volume
§—contaminant detected in only one sample