

Health Consultation

Technical Document Review
Fruit Valley Neighborhood Indoor Air Evaluation Work Plan
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Clark County, Washington

March 5, 2002

Prepared by

**The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**



Foreword

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This health consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of a health consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on specific health issues so that DOH can respond quickly to requests from concerned residents or agencies for health information on hazardous substances. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health.

For additional information or questions regarding DOH, ATSDR or the contents of this Health Consultation, please call the health advisor who prepared this document:

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Glossary

Acute	Occurring over a short period of time. An acute exposure is one which lasts for less than 2 weeks.
Agency for Toxic Substances and Disease Registry (ATSDR)	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
Aquifer	An underground formation composed of materials such as sand, soil, or gravel that can store and/or supply groundwater to wells and springs.
Chronic	A long period of time. A chronic exposure is one which lasts for a year or longer.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Dose	A dose is the amount of a substance that gets into the body through ingestion, skin absorption or inhalation. It is calculated per kilogram of body weight per day.
Epidemiology	The study of the occurrence and causes of health effects in human populations. An epidemiological study often compares two groups of people who are alike except for one factor, such as exposure to a chemical or the presence of a health effect. The investigators try to determine if any factor (i.e., age, sex, occupation, economic status) is associated with the health effect.

Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short-term (acute) or long-term (chronic).
Groundwater	Water found underground that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater often occurs in quantities where it can be used for drinking water, irrigation, and other purposes.
Hazardous substance	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Indeterminate public health hazard	Sites for which no conclusions about public health hazard can be made because data are lacking.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
Model Toxics Control Act (MTCA)	The hazardous waste cleanup law for Washington State.
Monitoring wells	Special wells drilled at locations on or off a hazardous waste site so water can be sampled at selected depths and studied to determine the movement of groundwater and the amount, distribution, and type of contaminant.
No apparent public health hazard	Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.

No public health hazard	Sites for which data indicate no current or past exposure or no potential for exposure and therefore no health hazard.
Organic	Compounds composed of carbon, including materials such as solvents, oils, and pesticides which are not easily dissolved in water.
Parts per billion (ppb)/Parts per million (ppm)	Units commonly used to express low concentrations of contaminants. For example, 1 ounce of trichloroethylene (TCE) in 1 million ounces of water is 1 ppm. 1 ounce of TCE in 1 billion ounces of water is 1 ppb. If one drop of TCE is mixed in a competition size swimming pool, the water will contain about 1 ppb of TCE.
Plume	An area of contaminants in a specific media such as groundwater.
Route of exposure	The way in which a person may contact a chemical substance that includes ingestion, skin contact and breathing.
Volatile organic compound (VOC)	An organic (carbon-containing) compound that evaporates (volatilizes) easily at room temperature. A significant number of the VOCs are commonly used as solvents.

Background and Statement of Issues

The Washington State Department of Health (DOH) conducted this health consultation in response to a request from the Washington State Department of Ecology (Ecology) to review the *Fruit Valley Neighborhood Indoor Air Evaluation Work Plan* prepared by Cadet Manufacturing Company (Cadet).¹ DOH prepares health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

Cadet is located at 2500 W. Fourth Plain Boulevard in a mixed industrial, commercial, and residential area of Vancouver, Clark County, Washington (Figure 1). Historic releases of chlorinated solvents from the facility have resulted in elevated concentrations of trichloroethylene (TCE), perchloroethylene (PCE) and other chlorinated volatile organic compounds (VOCs) in soil gas and groundwater below the facility and portions of the adjacent Fruit Valley Neighborhood (FVN). The highest concentrations of VOCs in soil gas and groundwater were found below the Cadet facility.² These elevated concentrations suggest that residual levels or pools of chlorinated solvents may exist beneath the building. Significantly lower concentrations of VOCs were observed in soil gas and groundwater in the FVN.²

When VOCs volatilize from the groundwater, they can move through the soil column and into indoor air where people may be exposed to them. Based on predictive modeling conducted by DOH, the VOCs detected in the soil gas and groundwater below the FVN may pose a slight health risk if the chemicals migrate into indoor air.²

Cadet will be collecting indoor air samples to determine whether VOCs are migrating into buildings in the FVN. This data will be used to evaluate the risk posed to building occupants. Their work plan, the focus of this health consultation, describes how they intend to conduct this investigation.

Discussion

The proposed indoor air evaluation work plan describes background information, project objectives, sampling and analytical procedures, and data quality objectives that will be used by Cadet to evaluate indoor air quality at a school, day care facility, homes, and businesses in the FVN in January 2002. The following items summarize DOH's questions and concerns regarding that plan:

1. The work plan provides some general data quality objectives for the indoor air sampling event, which will be used to document the presence of chlorinated VOCs in indoor air in the FVN and provide data to support a risk assessment.¹ However, it is not clear how all these objectives will be met using the data obtained from the proposed one time sampling event.

For example, the data are proposed to be used to evaluate contaminant fate and transport as well as the potential risks posed by the indoor air contaminants.¹ The Cadet facility and the FVN, however, are underlain by a VOC plume whose composition may change in the future as result of plume movement and degradation. Degradation of the plume could result in the creation of daughter products that pose more of a health risk to the FVN in the future than the chemicals currently detected. These types of issues should be considered and addressed in the work plan to ensure that an appropriate sampling strategy is planned for this site. Sampling strategies should consider the need for future sampling.

2. Buildings were generally selected for indoor air sampling based on their proximity to the chlorinated VOC contaminated soil gas and groundwater and foundation type.¹ A map showing the foundation type identified for each property is provided in the work plan. However, no soil gas or groundwater analytical result summary tables or contaminant distribution maps are provided to support the proposed locations. Soil gas and groundwater contaminant data summary tables and distribution maps for the Cadet property and the FVN are necessary for evaluating the proposed locations.

Residual levels or pools of chlorinated solvent appear to be located below the Cadet building based on elevated levels of these contaminants observed in soil gas and groundwater samples collected below the building.² These residual levels or pools of chemicals are another potential source of indoor air contaminants for the FVN. Buildings along Wiegel Avenue and those adjacent to utility lines would have the greatest potential to be affected by these residual levels or pools. A map showing all subsurface utility locations at and adjacent to the Cadet facility should be developed to support sampling locations.

3. Foundation type is an important factor when selecting buildings underlain by subsurface VOCs for indoor air sampling. The condition of the foundation is also an important factor. Buildings constructed directly on the ground surface (i.e., no crawl space) would appear to be the most vulnerable to the migration of subsurface VOCs. Buildings with basements or slab-on-grade construction where cracks, sumps, and utility lines with poor seals exist are also quite vulnerable to the migration of subsurface VOCs because the VOCs tend to pool or collect below these structures and migrate into the building through these preferential pathways. Buildings with dirt basements or crawl spaces that have inadequate ventilation also appear to be at an increased risk for VOCs migrating into indoor air at elevated concentrations.

It appears that Cadet will be conducting indoor air sampling at all homes with basements and slab-on-grade construction that are potentially affected by the migration of subsurface VOCs. Homes constructed directly on the ground surface, if they exist, should also be sampled. It is unknown whether the homes with crawl spaces that are proposed to be sampled represent potentially worst case conditions. Additional information should be provided to support the selection of homes with crawl spaces.

4. Tier I sampling locations were provided on a map included in the work plan. No Tier II or III locations, however, were provided. There is not enough information provided in the plan to confirm that the properties selected for these two tiers are reasonable.
5. Chlorinated VOCs appear to be the chemicals of concern for this site. However, some of the chlorinated VOC breakdowns products (1,1 dichloroethane; trans-1,2 dichloroethene; 1,2 dichloroethane; and chloroethane) were not included in the analytical parameter list. DOH recommends that these chemicals be included in the analysis using the selected ion mode (SIM) as described in the work plan.
6. Significant rainfall events and/or barometric changes may have a significant effect on the indoor air sampling results. The work plan should address this issue and describe how it will be handled during the upcoming sampling event.

Child Health Initiative

The Fruit Valley Neighborhood is a residential neighborhood where children potentially could be exposed to chlorinated VOCs through the indoor air pathway. Children can be uniquely vulnerable to the hazardous effects of environmental contaminants. When compared to adults, pound for pound of body weight, children drink more water, eat more food, and breathe more air. These facts lead to an increased exposure to contaminants in various environmental media. Additionally, the fetus is highly sensitive to many chemicals, particularly with respect to potential impacts on childhood development. For these reasons, it is important to consider the specific impacts that contaminants may have on children, as well as other sensitive populations.

Conclusions

The chlorinated VOC contaminated groundwater located in the vicinity of the Fruit Valley Neighborhood (FVN) and the residual levels or pools of chlorinated solvents detected at the Cadet facility pose an indeterminate health risk to the FVN. Indoor air sampling, if conducted appropriately, can be used to evaluate potential risks.

Recommendations/Public Health Action Plan

1. Cadet should address the issues and concerns raised by DOH about the proposed indoor air sampling in the Fruit Valley Neighborhood (FVN) that are summarized in the discussion section of this report.
2. Cadet should provide future plans and reports regarding the FVN to DOH for review.

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References

1. AMEC Earth & Environmental, Inc., Fruit Valley Neighborhood Indoor Air Evaluation Work Plan, January 7, 2002.
2. Washington State Department of Health, Draft Health Consultation, Cadet Manufacturing, Vancouver, Clark County, Washington., December 2001.

Certification

This Health Consultation was prepared by the Washington State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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

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