

Health Consultation

Tetrachloroethylene (PCE) Release
Caribou Realty Group Site
Vancouver, Clark County, Washington

April 26, 2006

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 this 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 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. The findings in this report are relevant to conditions at the site during the time of this health consultation, and should not necessarily be relied upon if site conditions or land use changes in the future.

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For more information about ATSDR, contact the ATSDR Information Center at 1-888-422-8737 or visit the agency's Web site: www.atsdr.cdc.gov/.

Glossary

Acute	Occurring over a short time [compare with chronic].
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.
Carcinogen	Any substance that causes cancer.
Chronic	Occurring over a long time (more than 1 year) [compare with acute].
Contaminant	A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.
Environmental Protection Agency (EPA)	United States Environmental Protection Agency.
Exposure	Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].
Groundwater	Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].
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	The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.
Maximum Contaminant Level (MCL)	A drinking water regulation established by the federal Safe Drinking Water Act. It is the maximum permissible concentration of a contaminant in water that is delivered to the free flowing outlet of the ultimate user of a public water system. MCLs are enforceable standards.
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.

Organic	Compounds composed of carbon, including materials such as solvents, oils, and pesticides that are not easily dissolved in water.
Volatile organic compound (VOC)	Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Summary and Statement of Issues

The Washington State Department of Health (DOH) conducted a health consultation for the Caribou Realty Group site after being contacted by the Washington State Department of Ecology (Ecology) about elevated levels of tetrachloroethylene (PCE) discovered in shallow groundwater below the property (personal communication, e-mail message from Michael Spencer, Ecology to Wayne Clifford, DOH, November 1, 2005). DOH conducts health consultations in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR).

The PCE contaminated groundwater discovered at the Caribou site poses a potential threat to drinking water because groundwater in the area is used as a drinking water source. The contaminated groundwater also poses an indoor air health risk because PCE can volatilize from the groundwater, move through the overlying soil, and enter indoor air in nearby buildings. DOH discussed these two potential exposure pathways with Ecology and Clark County Health Department (CCHD) shortly after being made aware of the groundwater contamination in November 2005 and recommended that the agencies identify whether any drinking water wells are at risk or indoor air at the Caribou or nearby properties is affected by the PCE contaminated groundwater (Personal communication. Telephone conversations between Barbara Trejo, DOH; Bryan DeDoncker, CCHD; and Cris Matthews, Ecology, November 2, 2005).

Background

The Caribou Realty Group (Caribou) site is located at 8914 NE St. Johns Road in Vancouver, Clark County, Washington (Figure 1). The site is bounded by NE St. Johns Road to the southeast and commercial property with various businesses to the north, west, and southwest. Residential properties, some new, are located beyond the commercial properties to the north, northwest, and west.

A single story, concrete-block building occupies a portion of the Caribou site. No foundation vents were visible at the base of the building during a DOH site visit on December 28, 2005. An unpaved driveway/parking area surrounds the building. A dry cleaning business operated at the Caribou site from approximately 1957 to 1981.¹ The building is currently occupied by a gift shop and barber shop.

The Caribou site was added to Ecology's Confirmed and Suspected Contaminated Sites list in January 2001 because the site was the suspected source of PCE discovered by Clark Public Utilities (CPU) in 1998 in two shallow groundwater monitoring wells (CPU MW1 and CPU MW2) installed at the Zinda property (9014 NE St. Johns Road), which is located directly north/northwest of the Caribou site (Figure 2).¹ CPU installed these two monitoring wells because of the property's proximity to CPU production wells and concern about the septic system located on the property.²

The closest CPU public drinking water well (CPU#24 (Beck Well)) is located approximately 2,600 feet northwest of the Caribou site (Personal communication. E-mail from John Louderback, CPU, to Barbara Trejo, DOH. January 4, 2006). CPU#24 is reportedly screened from 400 to 458 feet below ground surface (bgs). (Personal communication. E-mail from John

Louderback, CPU, to Barbara Trejo, DOH. January 4, 2006). Additional CPU public drinking water wells are located north and southwest of the site. However, these wells are further away than CPU #24 (Personal communication. Telephone messages from John Louderback, CPU, to Barbara Trejo, DOH. January 3 and January 4, 2006). The City of Vancouver also has some public wells in the area but the closest wells are located south and hydraulically upgradient of the Caribou site (Personal communication. Telephone message from Norm Kramm, City of Vancouver, to Barbara Trejo, DOH. February 1, 2006). Private water supply wells also exist within a half-mile radius of the site.³ It appears that the PCE contaminated groundwater does not pose a threat to the City of Vancouver wells. However, it is unknown whether the PCE contaminated groundwater poses a threat to either the CPU public wells or private wells.

Environmental Investigations

CPU periodically collected groundwater samples from its two monitoring wells located on the Zinda property through December 2004. The samples were analyzed for nitrogen and volatile organic compounds (VOCs). PCE was the only VOC detected at CPU MW1, and it was only detected once, in May 1998, at 0.5 micrograms per liter (ug/l). CPU MW2, located in the northwest corner of the Zinda property, was only sampled twice, once in 1998 and again in 1999, because the well was dry during subsequent monitoring events. PCE was also the only VOC detected in CPU MW2 in May 1998 (9.2 ug/l) and January 1999 (9.0 ug/l).⁴ The CPU MW2 levels exceed the U.S. Environmental Protection Agency (EPA) 5 ug/l maximum contaminant level (MCL) for PCE.⁵

CPU's chain of custody form that accompanied the May 1998 groundwater samples indicates that the samples had elevated turbidity levels.² This suggests that the wells might not have been properly developed and/or the groundwater was agitated during sampling. Either situation could result in the underestimation of the levels of VOCs in groundwater. It was also noted on CPU's chain of custody form that the laboratory might want to filter, where applicable.² The analytical report does not indicate that filtering occurred, but it should be noted that filtering groundwater where VOCs are chemicals of concern is inappropriate because the chemicals will volatilize resulting in an underestimation of the VOC levels in groundwater.

Clark County Health Department (CCHD), on behalf of Ecology, conducted a site hazard assessment (SHA) at the Caribou site in 2005, which included a limited environmental investigation on October 17, 2005. The SHA was conducted to rank the Caribou site relative to other contaminated sites in Washington. Six borings (B1 through B6) were installed around the site during the SHA investigation (Figure 2). However, no monitoring wells were installed.

Subsurface soil samples were collected at 5, 10, and 15 feet bgs and at the top of the water table at borings B3 and B5 only. Groundwater samples were collected from each boring at the top of the groundwater table, which was reported to be approximately 18 to 21 feet bgs. (Personal communication. Telephone conversation between Barbara Trejo, DOH and Bryan DeDoncker, CCHD. January 19, 2006.) The samples were analyzed for VOCs using EPA method 8260B, which is a standard VOC analysis. No sampling or data quality problems were reported.

No VOCs were detected in soil samples collected from borings B3 or B5. The only VOC detected in groundwater was PCE with the highest concentration (116,000 ug/l) occurring at boring B3, which is located just outside the back door of the former dry cleaning business. This groundwater PCE level is significantly above the EPA MCL for PCE (5 ug/l). Lower concentrations of PCE were found in groundwater samples collected from borings B4, B5, and B6 (76 ug/l, 299 ug/l, and 9.84 ug/l, respectively). These levels also exceed EPA's PCE MCL.

No groundwater elevation data exist for the Caribou site. However, data obtained during an investigation at the service station located southwest of the Caribou site indicates that shallow groundwater flows toward the northwest.⁶ Based on groundwater sampling results, it appears that groundwater at the Caribou site could be flowing toward the northwest too, because PCE was only detected in the shallow groundwater samples collected northwest of the former dry cleaning building. This suggests that the Caribou site is a possible source of the shallow PCE contaminated groundwater found at the Zinda property. It should be noted, however, that up to 19 ug/l of PCE was periodically detected in groundwater at the gas station site from 2000 to 2002 along with low levels of trichloroethylene (up to 6 ug/l), 1,2-dichloroethylene (up to 15 ug/l), and petroleum related contaminants.⁶

Discussion

The Ecology SHA investigation indicates a PCE release has occurred to shallow groundwater at the Caribou site. The data collected during the SHA, however, are not extensive enough to determine the nature and extent of the soil or groundwater contamination associated with the release or identify whether completed exposure pathways exist. Additional investigation will be needed to fill these data gaps.

Soil and groundwater samples will need to be analyzed for VOCs as well as other chemicals that have been used by dry cleaning businesses. The types of solvents used by dry cleaners during the period when the Caribou site was occupied by a dry cleaning business include Stoddard solvent, a petroleum distillate that was reportedly the predominant dry cleaning fluid used in the United States from the late 1920s until the late 1950s. PCE was introduced as a dry cleaning fluid in the mid-1930 and became widely used throughout the United States by the early 1960s. Other chemicals, in addition to dry cleaning solvents, are used in drying cleaning businesses, including chemicals used in the dry cleaning machine, pre-cleaning/spotting agents, garment treatment chemicals, and chemicals used in solvent and equipment maintenance.⁷ Many of the dry cleaning chemicals associated with these broad categories are VOCs and would be detected using the standard VOC analysis conducted by Ecology (EPA method 8260B)⁷ However, some chemicals, like Stoddard solvent, would not be detected.

In addition to the broad categories of chemicals associated with drying cleaning businesses, a variety of contaminated waste streams (e.g., waste water, spent filter cartridges) are created during dry cleaning operations. These waste streams can also be a source of contaminants that can enter the environment and pose a possible health risk particularly if the building is not connected to a public sewer line (i.e., waste discharge to a septic system) or if breaks exist in the sewer line. Dry cleaning chemicals could also be found under buildings if chemicals were disposed through floor drains or sumps or spilled and seeped through cracks in the floor. Dry

cleaning chemicals could also be found in outside areas where waste storage occurred or trash containers were located.

Dry cleaning chemicals, like PCE, can pose a health risk if they enter drinking water or indoor air. PCE, for example, is a probable carcinogen, and has been shown to cause health effects such as kidney or liver damage in animals exposed at much higher concentrations than encountered by most people.⁸ Further investigation of the Caribou site is necessary to determine whether contaminants released at this site pose a health risk.

Children's Health Concerns

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, which can lead to an increased exposure to contaminants. Additionally, the fetus is highly sensitive to many chemicals, particularly with respect to potential impacts on childhood development. For these reasons, DOH considers the specific impacts that contaminants, like PCE, might have on children, as well as other sensitive populations.

Conclusions

The Caribou site poses a potential health risk to nearby drinking water wells and indoor air at nearby buildings because elevated levels of PCE were discovered in shallow groundwater below the site. However, there is not enough information available to determine the nature and the extent of contamination or determine whether completed exposure pathways exist. The site, therefore, poses an indeterminate health risk.

Recommendations

DOH recommends that the following actions be taken to begin assessing whether the Caribou site poses a health risk to the current occupants of the property as well as the nearby residential and commercial community:

- Conduct indoor air sampling at the Caribou building within the next 30 days to determine whether the current building occupants are being exposed to PCE or other dry cleaning chemicals migrating from groundwater into indoor air.
- Determine within the next 30 days whether any public or private drinking water wells are at risk from the release of dry cleaning chemicals at the site. Drinking water wells at risk from the contaminated groundwater discovered at the Caribou site, if any, should be sampled and tested immediately.
- Develop and implement a site investigation plan within 180 days to begin determining the nature and extent of contamination and completed exposure pathways associated with this former dry cleaning site so health risks can be determined. Historic information about the site (e.g., solvent use, waste disposal practices, drain field locations, chemical storage areas) should be obtained prior to developing an investigation work plan or sampling and analysis plan to help focus the investigation.

Public Health Action Plan

1. DOH is available to review investigation plans and evaluate health risks posed by the site when future investigation data become available.
2. The property owner confirmed that no drinking water wells exist within the immediate vicinity of the site and started an investigation in March 2006 to begin evaluating the nature and extent of the site contamination (Personal communication. E-mail message from Tom Neal to Barbara Trejo, Washington Department of Health. March 29, 2006). The property owner's consultant submitted an indoor air work plan for DOH review in early April 2006.⁹ DOH completed its review and submitted comments to the property owner and consultant on April 10, 2006.
3. DOH will post this health consultation report on its web site to make it available to the general public and will provide copies of the report to Ecology, Clark County Health Department, Clark Public Utilities, and the Caribou property owners.

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References

- 1 Clark County Health District. Site hazard assessment worksheet 1 summary score sheet. December 9, 2005.
- 2 Letter from Robert Livick, Clark Public Utilities, to Lin Bernhardt, Washington Department of Ecology, regarding wellhead protection monitoring on the Zinda property. July 14, 1998.
- 3 Washington State Department of Ecology, Water Resources Program. Well log report search and review. December 23, 2005
- 4 Letter from John Louderback, Clark Public Utilities, to Bryan Dedoncker, Clark County Health Department, regarding Zinda monitoring wells. April 5, 2005.
- 5 U.S. Environmental Protection Agency. Maximum contaminant levels. February 2, 2005.
- 6 Robert Miller Consulting. Compliance groundwater monitoring report. West Linn, Oregon: Robert Miller Consulting. December 30, 2002.
- 7 State Coalition for the Remediation of Drycleaners, Chemicals used in dry cleaning operations. January 2002.
- 8 Agency for Toxic Substances and Disease Registry. Toxicological profile for tetrachloroethylene. Atlanta, Georgia: Agency for Toxic Substances and Disease Registry. September 1997.
- 9 3 Kings Environmental. Work plan for investigation of perchloroethylene in indoor air, Caribou Realty Site, 8914 NE St Johns Road, Vancouver, Washington. Vancouver, Washington: 3 Kings Environmental. April 6, 2006.




**Figure 1: Vicinity Map
Caribou Realty Group Site
Vancouver, Washington**



**Figure 2: Site Map
Caribou Realty Group Site
Vancouver, Washington**

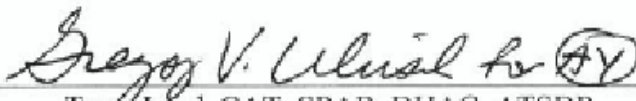
Certification

This Caribou Realty Group site health consultation report was prepared by the Washington State Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner



Technical Project Officer, CAT, SPAB, DHAC

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



Team Lead, CAT, SPAB, DHAC, ATSDR