

Letter Health Consultation

Indoor Air Data Assessment Residential Unit on the U- Lock- It Property Milton's Dry Cleaner Site Vancouver, Clark County, Washington

May 28, 2015

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) prepared this health consultation in accordance with the Agency for Toxic Substances and Disease Registry (ATSDR) methodologies and guidelines. Health consultations are initiated in response to health concerns raised by community members or agencies about exposure to hazardous substances released into the environment. The health consultation summarizes our health findings and if needed, provides steps or actions to protect public health.

The findings in this report are relevant to conditions at the site during the time the report was written. It should not be relied upon if site conditions or land use changes in the future.

This report was supported by funds provided through a cooperative agreement with the ATSDR, U.S. Department of Health and Human Services. The findings and conclusions in these reports are those of the author(s) and do not necessarily represent the views of the ATSDR or the U.S. Department of Health and Human Services. This document has not been revised or edited to conform to agency standards.

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May 28, 2015

Steve Teel
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Toxics Cleanup Program
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Re: Letter Health Consultation
Milton's Dry Cleaner Site
Indoor Air Data Assessment
Residential Unit on the U- Lock- It Property
Vancouver, Clark County, Washington

Dear Mr. Teel:

The Washington Department of Health (DOH) conducted this health consultation at the request of the Washington Department of Ecology (Ecology). The purpose of the health consultation is to evaluate whether the levels of the dry cleaning chemical tetrachloroethylene (PCE) and some of its breakdown products found in indoor air at the U-Lock-It residence in February 2015 might pose an inhalation health threat. The U-Lock-It facility is located on the Milton's Dry Cleaners site where, in the past, PCE was released to soil and groundwater.

DOH concludes that breathing in the contaminants detected in indoor air is not expected to harm people's health. The reason for this is because the levels found in indoor air are below levels considered to be an acute (14 days or less), intermediate (15 to 365 days), or chronic (more than 365 days) health concern. DOH recommends conducting additional indoor air testing in the residence beginning in early summer 2015 and then quarterly until the vapor mitigation system has been installed to confirm that levels remain below levels of health concern. DOH also recommends conducting indoor air testing at an appropriate frequency prior to and during the vapor mitigation system start-up as well as during long-term operation of the system.

DOH conducts health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).^a

Background

The U-Lock-It facility is located at 6807 NE Fourth Plain Boulevard in Vancouver, Clark County, Washington (Figure 1). It is adjacent to the former Milton's Dry Cleaners where, in the past, PCE was released to soil and groundwater. Soil gas below the U-Lock-It residence and indoor air appear to be affected by those releases.

The U-Lock-It property was reportedly developed for its current use between 1974 and 1984 (1). It includes a mixed use building with a customer service lobby, company storage areas and a two-bedroom residence in the northern portion of the property (Figure 2). Seven self-storage buildings are located on the southern portion of the property. The facility manager is the only current occupant of the residence (2). Past residential occupancy is unknown.

PCE contaminated groundwater was found on the U-Lock-It property in early December 2014 (2). Soil gas testing was conducted below the building sub-slab in mid-December and again in February 2015. PCE and some of the PCE breakdown products were found in the soil gas samples. The highest PCE soil gas concentration (2,180 micrograms per cubic meter (ug/m³)) was detected in December. Twenty-four hour indoor air samples were also collected at five locations within the residence in February. The indoor air samples were collected using Summa canisters and were analyzed using EPA Method TO-15 in selected ion monitoring (SIM) mode.

Ecology is requiring the potentially liable party to install a vapor mitigation system to reduce the residential exposures to the chemicals that were detected above the Model Toxics Control Act (MTCA) air cleanup levels (3). These are regulatory levels set by Ecology to be protective of human health. When that system will be installed is uncertain; however, planning for this work has begun.

Discussion

The February 2015 indoor air samples collected at the residence were analyzed for PCE and nine PCE breakdown products (Table 1). PCE and two of the possible breakdown products (trichloroethylene (TCE) and 1,2-Dichloroethane (1,2-DCA)) were found in all samples, while others were detected less frequently, or not at all (2).

Exposure Pathway

^a ATSDR's health consultation process, which is used by DOH, differs from the risk assessment approach used by regulatory agencies, such as Ecology, when making site cleanup decisions. While both types of assessments attempt to address the potential human health effects of low-level environmental exposures, they are approached differently and are used for different purposes. Risk assessment is used by Ecology as part of site remedial investigations to determine how much site cleanup is needed, while DOH's assessment is intend to provide a more qualitative, less theoretical evaluation of possible public health hazards.

Inhalation of PCE and its breakdown products is the only expected route of exposure for the occupant in the U-Lock-It residence.

Contaminants of Potential Health Concern

DOH used a multi-step process to determine which of the ten contaminants tested for in indoor air might pose a possible health threat to the children and adults who might occupy the residence.

DOH first compared the highest concentrations of each contaminant found in the air in the residence to health comparison values. *Health comparison values are concentrations of contaminants that are unlikely to cause people to get sick. This is done to be protective of the most sensitive individuals (i.e., children and older adults). It is also done to account for our lack of certainty regarding the adverse health effects of low levels of contaminant exposure.* If a contaminant was noted as being less than a reporting limit, DOH compared the reporting limit to the health comparison values.

The primary air health comparison values used by DOH were ATSDR's cancer risk evaluation guides (CREGs) and environmental media evaluation guides (EMEGs) (4). The air CREG is the concentration of a contaminant in air that is expected to cause no more than one additional cancer in a million persons exposed over a lifetime. An EMEG is a concentration in air below which adverse non-cancer health effects are not expected to occur. When no ATSDR health comparison values were available, DOH used an Environmental Protection Agency (EPA) reference concentration (RfC) or regional screening level (RSL) for residential air (5). An EPA RfC is an estimate of a continuous human inhalation exposure (including sensitive subgroups) that is likely to be without significant risk of harmful non-cancer effects during a lifetime (6).

If a contaminant did not exceed the health comparison value, no further evaluation of that contaminant is necessary. This is because we do not expect those contaminants will pose a health threat. When a contaminant is found to be above a health comparison value, further evaluation is needed. *However, just because a contaminant was found above the comparison value does not necessarily mean it will cause people to get sick.* When a contaminant does not have a health comparison value available, a health comparison value for a contaminant similar in structure may be used as a substitute. If no substitute is available, the contaminant is further evaluated.

Results

As shown in Table 1, none of the contaminants exceeded the non-cancer health comparison values. As a result, no further assessment of the non-cancer health effects associated with these contaminants is necessary. However, the maximum amounts of PCE and 1,2-DCA found in indoor air in the residence exceeded the cancer health comparison values. Therefore, further assessment of the carcinogenic health threat posed by those two contaminants is needed. *It is important to understand that exceeding the cancer comparison value does not imply that people will develop cancer when exposed to these levels.* Further discussion of the cancer risk associated with these contaminants follows.

Evaluating Cancer Risk

Some contaminants have the ability to increase a person's risk of developing cancer. Because current risk assessment practice assumes there is no "safe dose" of a carcinogen, any dose of a carcinogen will result in some additional increased cancer risk. Cancer risk estimates are not yes/no answers but measures of chance (probability). Such measures, however uncertain, are useful in determining the magnitude of a cancer threat.

Cancer is a common illness and its occurrence in a population increases with the age of the population. There are many different forms of cancer resulting from a variety of causes; not all are fatal. Approximately 1 in 3 to 1 in 2 people living in the United States will develop cancer at some point in their lives (7).

Cancer risk that is attributable to site-related contaminants can be described in quantitative and qualitative terms by considering the population size required for such an estimate to result in a single cancer case. Contaminants are considered to pose an increased cancer risk when the estimated cancer risk is greater than or equal to one additional cancer case per ten thousand persons exposed over a lifetime ($\geq 1E-04$). One additional cancer case per million persons exposed over a lifetime to nine additional cancer cases per hundred thousand persons exposed over a lifetime ($1E-06$ to $9E-05$) is considered a low cancer risk. A cancer risk is considered insignificant or indiscernible from background when the cancer risk estimate is less than one additional cancer per one million persons exposed over a lifetime ($< 1E-06$).

For known or suspected carcinogens, EPA generally strives to achieve the lowest risk possible. EPA regulatory actions generally seek to keep exposure levels at concentrations that represent an upper-bound excess lifetime cancer risk to an individual between a target risk range of $1E-04$ to $1E-06$ using information on the relationship between dose and response.

To evaluate the inhalation cancer risk associated with PCE and 1,2-DCA found in indoor air at the U-Lock-It residence, DOH conservatively used the maximum detected concentration of each contaminant and estimated the risk using reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. DOH also conservatively assumed that both children and adult exposures have occurred and that exposures would occur 52 weeks out of the year, 7 days per week, and 24 hours per day. Table 2 contains the formula for calculating the inhaled dose along with the input parameters.

The results of DOH's estimated cancer risk evaluation for the PCE and 1,2-DCA found in indoor air at the U-Lock-It residence are provided in Table 3. As noted in Table 3, the total RME and CTE cancer risks for someone exposed over 33 years beginning in childhood are as follows:

- RME: 3 additional cancer cases per 1,000,000 similarly exposed people.
- CTE: 2 additional cancer cases per 1,000,000 similarly exposed people.

As noted above, these cancer risks are considered low and below a level DOH considers a health threat. It is important to note that these estimates are for excess cancers that might result, in addition to, those normally expected in an unexposed population. *It is also important to note that these are estimated risks based on using the maximum indoor air concentration. The actual risk is likely lower and could be as low as zero.*

Conclusions

DOH concludes that breathing in the contaminants detected in indoor air is not expected to harm people's health. The reason for this is because the levels found in indoor air are below levels considered to be an acute (14 days or less), intermediate (15 to 365 days), or chronic (more than 365 days) health concern.

Recommendations

DOH recommends conducting additional indoor air testing in the residence beginning in early summer 2015 and then quarterly until the vapor mitigation system has been installed to confirm that levels remain below levels of health concern.

DOH also recommends conducting indoor air testing at an appropriate frequency prior to and during the vapor mitigation system start-up as well as during long-term operation of the system.

DOH appreciates this opportunity to assist Ecology with these health issues. Please contact me at 360-236-3373 if you have any questions.

Sincerely,

Barbara Trejo
Health Assessor/Hydrogeologist LG/LHG
Site Assessments Section

Enclosures (6)

cc: Joanne Snarski, Department of Health

References

- (1) PNG Environmental Inc. U-Lock-It Customer Service Building Revised Sampling and Analysis Plan. 10-28-2014.
- (2) PNG Environmental Inc. U-Lock-It Figures_Tables_Appendices. 2015.
- (3) Washington Department of Ecology. Requirement for Vapor Intrusion Mitigation, U-Lock-It Customer Service Building, Milton's Dry Cleaner Site, 4-20-2015.
- (4) Agency for Toxic Substances and Disease Registry. Air Comparison Values. 3-2015
- (5) U.S. Environmental Protection Agency. Regional Screening Level for Residential Air, 1-2015. <http://www.epa.gov/region9/superfund/prg/>.
- (6) U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation (Part B, Development of Risk-based Preliminary Remediation Goals). 4-1991.
- (7) American Cancer Society. Cancer Facts & Figures 2012. <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-031941.pdf>

Table 1: Milton's Dry Cleaners, Vancouver, Washington, Comparison of Maximum Residential Indoor Air Levels to Health Comparison Values

Chemical	Maximum Concentration (ug/m ³)	Comparison Values					Notes
		Non-Cancer	Reference	Cancer	Reference	Possible Chemical of Concern	
Tetrachloroethylene	35	41	Chronic, Intermediate and Acute EMEG	3.8	CREG	NC - No C - Yes	Detected in all seven samples
Trichloroethylene	0.055 J	2.1	Chronic and Intermediate EMEG	0.24	CREG	NC - No C - No	
1,1-Dichloroethene	0.066 U	79	Intermediate EMEG	NA	NA	NC - No C - No	
Cis-1,2-Dichloroethene	0.14 U	790	Intermediate and Acute EMEG for trans-1,2-dichloroethene	NA	NA	NC - No C - No	
Trans-1,2-Dichloroethene	0.68 U	790	Intermediate and Acute EMEG	NA	NA	NC - No C - No	
Vinyl Chloride	0.044 U	77 1300	Intermediate EMEG Acute EMEG	0.11	CREG	NC - No C - No	
1,1,1-Trichloroethane	0.19 U	3800 11000	Intermediate EMEG Acute EMEG	NA	NA	NC - No C - No	
1,1-Dichloroethane	0.14 U	2400	Chronic EMEG for 1,2-Dichloroethane	1.8	EPA RSL(1)	NC - No C - No	
1,2-Dichloroethane	0.28	2400	Chronic EMEG	0.038	CREG	NC - No C - Yes	
Chloroethane	0.054 J	10000 40,000	EPA RfC (1) Acute EMEG	NA	NA	NC - No C - No	

(1) Environmental Protection Agency (EPA) Regional Screening Level for Residential Air (January 2015)

Acute (14 days or less), intermediate (15 to 365 days), chronic (more than 365 days)

EMEGs - environmental media evaluation guides (EMEGs), CREG - cancer risk evaluation guides (CREGs), RfC - reference concentration

NA - not available

Table 2: Milton's Dry Cleaners, Vancouver, Washington, Exposure Assumptions for U-Lock-It Building

$$ID = \frac{Ca \times IR \times EF \times ED}{BW \times AT}$$

RME - reasonable maximum exposure

CTE - central tendency exposure

		RME	CTE
ID = inhaled dose (mg/kg/day)		<i>calculated</i>	<i>calculated</i>
Ca = concentration in air (mg/m3)			
IR = inhalation rate (m3/day)	<i>Child Birth to < 1 yr</i> Child 1 to < 2 yr Child 2 to < 6 yr Child 6 to < 11 yr Child 11 to <16 yr Child 16 to <21 yr Adults ≥ 21 yr	12.8 9.2 13.8 16.6 21.9 24.6 19.4	8 5.4 10.1 12 15.2 16.3 14.7
EF = exposure frequency (days/year)		365	365
ED = exposure duration (years)	<i>Child Birth to < 1 yr</i> Child 1 to < 2 yr Child 2 to < 6 yr Child 6 to < 11 yr Child 11 to <16 yr Child 16 to <21 yr Adults ≥ 21 yr	1 1 4 5 5 5 12	1 1 4 5 5 5 12
BW = body weight (kg)	<i>Child Birth to < 1 yr</i> Child 1 to < 2 yr Child 2 to < 6 yr Child 6 to < 11 yr Child 11 to <16 yr Child 16 to <21 yr Adults ≥ 21 yr	7.8 11.4 17.4 31.8 56.8 71.6 80	7.8 11.4 17.4 31.8 56.8 71.6 80
AT = averaging time (days) cancer		28470	28470
Inhalation Cancer Slope Factor			

Chemical	Maximum Concentration (ug/m3)	Unit Risk ^a	Inhalation Cancer Slope Factor (mg/kg-day) ^b
Tetrachloroethylene	35	2.6E-07	0.00091
1,2-Dichloroethane	0.34	2.6E-05	0.091

^a air unit risk = risk per µg/m3 = slope factor x 1/70 kg x 20m3/day x 10⁻³

^b inhalation slope factor = unit risk x 70 kg x 1000/20m3 per day

Table 3: Milton's Dry Cleaners, Vancouver, Washington,
Cancer Risk Estimates

Total Risk for RME			
	PCE	1,2-DCA	Total
Cancer RME Risk			
Child 6 wks to < 1 yr	6.7E-07	5.4E-07	1.2E-06
Child 1 to < 2 yr	3.3E-07	2.6E-07	5.9E-07
Child 2 to < 6 yr	1.3E-06	1.0E-06	2.3E-06
Child 6 to < 11 yr	1.1E-06	8.5E-07	1.9E-06
Child 11 to <16 yr	7.9E-07	6.3E-07	1.4E-06
Child 16 to <21 yr	7.0E-07	5.6E-07	1.3E-06
Adults ≥ 21 yr	1.2E-06	9.5E-07	2.1E-06
			3.3E-06
	Total Risk for RME		3.3E-06

Total Risk for CTE			
	PCE	1,2-DCA	Total
Cancer RME Risk			
Child 6 wks to < 1 yr	4.2E-07	3.4E-07	7.5E-07
Child 1 to < 2 yr	1.9E-07	1.5E-07	3.5E-07
Child 2 to < 6 yr	9.5E-07	7.6E-07	1.7E-06
Child 6 to < 11 yr	7.7E-07	6.2E-07	1.4E-06
Child 11 to <16 yr	5.5E-07	4.4E-07	9.8E-07
Child 16 to <21 yr	4.6E-07	3.7E-07	8.4E-07
Adults ≥ 21 yr	9.0E-07	7.2E-07	1.6E-06
			2.4E-06
	Total Risk for CTE		2.4E-06

RME – reasonable maximum exposure; CTE – central tendency exposure

PCE – tetrachloroethylene; 1,2-DCA – 1,2-Dichloroethylene

< less than ; ≥ greater than or equal

Figure 1: Milton's Dry Cleaners Site, Vancouver, Washington. Location Map

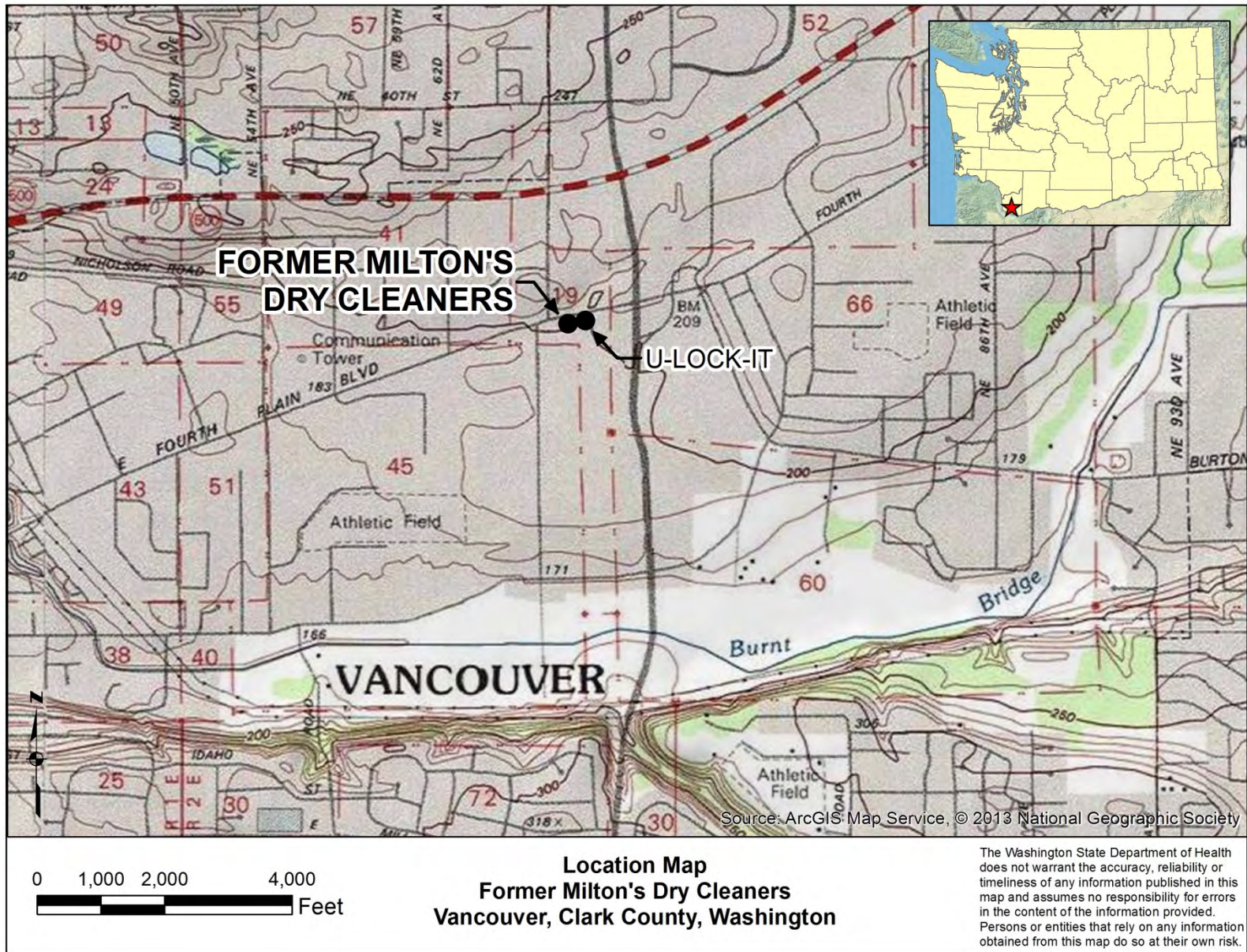


Figure 2: Milton's Dry Cleaners Site, Vancouver, Washington. Vicinity Map

