Health Consultation

JIM'S DRY CLEANING

MILLINOCKET, PENOBSCOT COUNTY, MAINE

JULY 27, 2010

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

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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Prepared By:

U. S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Summary

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal agency within the U.S. Department of Health and Human Services and is headquartered in Atlanta, Georgia. At sites with sufficient environmental data, ATSDR performs health assessment activities to identify chemicals of potential concern and explain whether exposures to those chemicals are likely to be harmful under site-specific conditions.

The U.S. Environmental Protection Agency (EPA) requested ATSDR review information regarding the Jim's Dry Cleaner site in Millinocket, ME on May 27, 2010. This EPA request is being managed by ATSDR under its "Strike" process, which is a rapid-response, focused effort, limited in scope that does not include a comprehensive review of technical documents, site contaminants, and exposure pathways.

EPA posed the following specific concerns and health questions to ATSDR:

1. Are the data sufficient to determine whether there is a current threat to public health?
2. If the data are not sufficient to make a health call, what additional environmental sampling is recommended?
3. If the data are sufficient for assessment, does this contaminated site currently pose an unacceptable risk to public health?

EPA provided ATSDR with available indoor air, sub-slab and near-slab soil gas data. This health consultation focuses on evaluating whether the available environmental data are sufficient to make a health call regarding current exposures, as well as evaluating whether the available data indicate a potential public health concern. The primary contaminant of interest is tetrachloroethene (PCE). The presence of other volatile organic compounds (VOCs) detected at the site are also mentioned as additional considerations.

Overall, ATSDR cannot conclude whether currently breathing PCE in indoor air at Jim's Dry Cleaning site is expected to harm people's health. PCE was detected in indoor air at levels of potential concern and soil gas levels were elevated prior to the installation of sub-slab depressurization systems. However, only limited confirmation sampling following installation of these systems is available. Overall, multiple indoor air sampling events in different seasons are generally required to evaluate fluctuations in indoor air due to vapor intrusion but data are available for only one season. Delineation of the groundwater contamination is also an important step in characterizing the potential for future exposures.

ATDR recommends (1) confirmatory indoor air sampling of the buildings to ensure indoor air levels are not of public health concern (multiple sampling rounds and locations should be included and should not be limited to PCE along, but at the minimum include trichloroethene (TCE) and 1,2-dichloroethene (additional VOC sampling may also be prudent, i.e. 1,4-dichlorobenzene, 1,2-dichloroethane, methylene chloride, chloroform, benzene and 1,3-butadiene)), (2) groundwater sampling and flow measurements to delineate the extent of the groundwater plume, (3) additional soil gas sampling to further characterize the potential for vapor intrusion into buildings during different seasons and to project future migration of the

groundwater plume, (4) institutional controls restricting occupancy for the apartment above Jim's Dry Cleaning facility with elevated PCE levels in indoor air, and (5) a well survey to verify that individuals are not inappropriately using contaminated groundwater for drinking or household purposes.

Background

Site Description

Discovery of the Jim's Dry Cleaning site occurred during a routine inspection by the Maine Department of Environmental Protection. Improperly stored PCE-containing waste was found on-site that prompted soil gas and indoor air sampling. Groundwater was not sampled. The depth to groundwater is undetermined for the site, but sump pumps are frequently needed in the area residences. The facility is now believed to be inactive.

The three residential structures found to have indoor air concentrations above Maine's screening values were equipped with sub-slab depressurization systems. While sub-slab depressurization systems tend to be highly effective systems for deterring vapor intrusion, some conditions, such as low permeability and wet soils, may limit performance (ITRC 2007). The presence of sump pumps in the buildings indicates that wet soils are likely below the residences. So although such systems are generally effective, post-installation indoor air sampling during different seasons (including the heating season) has not been performed at the site to determine whether wet soils are impacting system performance.

Migration of the contamination through groundwater could impact the surrounding area. Future groundwater sampling should be designed to delineate groundwater contamination. The presence of potential preferential pathways as underground utility lines in the area is likely, due to the number of residential buildings. Manholes, sewers, hydrants, catch basins and other utilities are indicated on immediately surrounding streets (ATSDR 2010). Gravity draining utility corridors may serve as rising and falling conduits for vapors heavier and lighter than air.

Demographic Information

According to the 2000 Census, the population within one mile of the site is 3,792, with about 98% being Caucasian (Appendix A). About 5% are children, age 6 or younger, however, no children were found in the blocks immediately surrounding the site in the 2000 Census. About 17% are women of child-bearing age and about 21% are age 65 or older, though a larger portion of the women of child-bearing age and elderly live farther out from the site in the one mile radius. The census also shows the area's largest minority community is American Indian & Alaska Native Alone (<1%).

Discussion

ATSDR Health Consultations evaluate whether or not exposures to environmental contaminants are expected to cause a health hazard. ATSDR's approach to evaluating a potential health concern has two components. The first component involves a screening process that could

indicate the need for further analysis of selected contaminants. Screening is a process of comparing appropriate environmental concentrations and doses to ATSDR or EPA comparison values. These comparison values (CVs) include ATSDR's Environmental Media Evaluation Guides (EMEGs). EMEGs are the concentrations of a chemical in air, water, or soil below which non-cancer adverse health effects are not expected to occur in people. The second component involves comparing the levels that people may breathe at the site to those shown to cause health effects in epidemiological (human) and experimental (animal) studies. These studies are considered for evaluating the potential for health effects and are summarized in the ATSDR Toxicological Profiles. The extent of exposure is important in determining the potential for contamination to result in health effects for specific toxic substances as discussed below (ATSDR 2005).

Indoor air, soil gas and outdoor air data for the site were reviewed by ATSDR. Indoor air samples showed PCE and related contaminants (TCE and cis-1,2-dichloroethene, which are degradation products of PCE) exceeding Maine's Indoor Air Targets (see Table 1). Additionally, PCE and TCE are reasonably anticipated to be carcinogens, though EPA has not finalized a cancer slope factor for calculating excess theoretical risk. No PCE related compounds were detected in outdoor air.

Table 1: Indoor Air Contaminant in Jim's Dry Cleaners and Surrounding Structures*

Indoor Air	Maximum Concentration ($\mu g/m^3$)	ATSDR Comparison Value (basis) ($\mu g/m^3$)	Maine Indoor Air Target ($\mu g/m^3$)
PCE	211	300 (Chronic EMEG)	0.41
TCE	4.81	500 (Intermediate EMEG)	1.2
cis-1,2-Dichloroethene	13.4	No value	13

$\mu g/m^3$ microgram per cubic meter
EMEG environmental media evaluation guide
PCE tetrachloroethene
TCE trichloroethene
* Information compiled from data submitted to ATSDR (ATSDR 2010a, 2010b)

Soil vapor samples showed PCE and related contaminants exceeding Maine's Indoor Air Targets (see Table 2). Elevated levels of soil vapors may pose a risk of vapor intrusion into buildings, even though indoor air levels were lower during this sampling event. Multiple seasonal sampling events are typically necessary to capture the range of fluctuation in air contaminant levels in characterizing a site.

Table 2: Soil Vapor Contaminants in Jim's Dry Cleaners and Surrounding Structures*

Soil Vapor Contaminants	Maximum Concentration ($\mu g/m^3$)	ATSDR Comparison Value (basis) ($\mu g/m^3$)	Maine Indoor Air Target ($\mu g/m^3$)
PCE	400,000	300 (Chronic EMEG)	0.41
TCE	7,700	500 (Intermediate EMEG)	1.2
cis-1,2-Dichloroethene	270	No value	13

$\mu g/m^3$ microgram per cubic meter
EMEG environmental media evaluation guide
PCE tetrachloroethene
TCE trichloroethene
* Information compiled from data submitted to ATSDR (ATSDR 2010a, 2010b)

One apartment above Jim's Dry Cleaning is unoccupied with 211 microgram per cubic meter ($\mu g/m^3$) PCE in indoor air. The indoor air PCE also exceeded Maine's 90th percentile background concentration of 4.1 $\mu g/m^3$. Background levels of PCE in indoor air are seldom above 10 $\mu g/m^3$ (NYSDOH 2003). Though the maximum site indoor air value is below ATSDR's screening level (300 $\mu g/m^3$) for non-cancer effects, it is above Maine's indoor air target (0.41 $\mu g/m^3$). Further, ATSDR does not have a cancer CV for PCE. PCE in soil gas (400,000 $\mu g/m^3$) exceeded both Maine's and ATSDR's *indoor air* screening levels, though attenuation upon migration to indoor air is likely. *The New York State Department of Health recommends that the average air level in a residential community not exceed 100 $\mu g/m^3$ of PCE, considering continuous lifetime exposure and sensitive people* (NYSDOH 2003). Additionally, there is considerable research into the carcinogenic properties of PCE. It is classified as Reasonably Anticipated to be Carcinogenic by the U.S. Department of Health and Human Services (ATSDR 1997).

TCE was also detected above Maine's indoor air target (1.2 $\mu g/m^3$) in indoor air (4.81 $\mu g/m^3$) and ATSDR's intermediate environmental media evaluation guide (500 $\mu g/m^3$) in soil gas (7,700 $\mu g/m^3$). Maine's 90th percentile background concentration for TCE is 0.8 $\mu g/m^3$.

Cis-1,2-dichloroethene (13.4 $\mu g/m^3$) was also found to slightly exceed Maine's indoor air target (13 $\mu g/m^3$), with soil gas levels up to (270 $\mu g/m^3$).

Screening values are not health effect levels, but levels which indicate that a more detailed analysis of exposure should be considered. Discussion of PCE and related contaminants is presented below because ATSDR considers these contaminants to be of potential health concern if the sub-slab depressurization systems are not operating efficiently.

Tetrachloroethene (PCE)

Most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of PCE are not well-characterized. Results from some studies suggest that women who work in dry cleaning

industries where exposures to PCE can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that PCE can cause liver and kidney damage. Exposure to very high levels of PCE can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant. Children may be more susceptible to health effects from PCE.

PCE has been observed to concentrate in breast milk (Schreiber 2002). Inhalation and ingestion absorption are estimated at about 75% and 80%, respectively. PCE metabolism is thought to occur by the cytochrome P450 pathway (metabolites cause liver toxicity) and the glutathione conjugation pathway (metabolites cause kidney toxicity). Breath and blood tests are available for PCE, and the chemical is stored in fat and detectable weeks after heavy exposure. Urine tests available for PCE metabolites may have confounders.

ATSDR's chronic inhalation minimal risk level (MRL) of 300 $\mu g/m^3$ is based on an occupational study of 60 women exposed to a median concentration of 102,000 $\mu g/m^3$ over an average duration of 10 yrs (Ferroni et al. 1992). The resulting health effects were neurological: significantly prolonged reaction times. The level of exposure, 102,000 $\mu g/m^3$, was expanded to continuous exposure and divided by an uncertainty factor of 100 (10 for use of a lowest-observed effect level (LOAEL) and 10 for human variability). Table 3 summarizes PCE chronic inhalation health effects.

Table 3: PCE Chronic Inhalation Health Effects*

Conc† ($\mu g/m^3$)	Conc (ppm)	Chronic Exposure Health Effect	Study Type	Year of Study
47,500	7	Color vision loss	Human	1994
67,800	10	Renal effects	Human	1983
102,000	15	Increased reaction times	Human	1992
109,000	16	Hepatic effects	Human	1995
136,000	20	Dizziness	Human	1991
678,000	100	Liver cancer‡	Mouse	1994
1,360,000	200	Leukemia‡	Rat	1983

$\mu g/m^3$ microgram per cubic meter
ppm parts per million
Conc concentration
* Information compiled from ATSDR Tox Profile (1997 update)
† Odor threshhold is about 7000 $\mu g/m^3$ or 1 ppm
‡ PCE is classified as reasonably anticipated to be a carcinogen

Trichloroethene (TCE)

TCE was commonly uses as an industrial degreaser and solvent in the past. It was used to extract oils from vegetables and spices and decaffeinate coffee starting in the 1920's. In the mid-1900's TCE was used as a common anesthetic/analgesic and replaced chloroform and ether. Deaths have been documented from working and sniffing TCE. TCE is reasonably anticipated to be a human carcinogen, and causes mild neurological effects in psychomotor performance from chronic low exposure. TCE use was phased out after discovering heart arrhythmias and elevated hepatic enzymes following exposures. TCE is stored in body fat and metabolized by cytochrome P450 (metabolites cause liver toxicity) and glutathione conjugation (metabolites cause kidney toxicity). A blood test is available for TCE, and urine tests for metabolites (trichloroacetic acid, tricholoroethanol) are available, but not routine and may have confounders. Alcohol use increases TCE's effect on the central nervous system, resulting in "degreaser's flush." Suspected birth defects associated with TCE exposure include impaired fetal growth and cardiac teratogenisis, as well as infertility. TCE bioconcentrates in breast milk and readily crosses the placenta and blood-brain barrier.

A rat study is the source of ATSDR's intermediate MRL (500 $\mu g/m^3$) based on an average exposure of 10 years. Decreased wakefulness and sleeping heart rate were observed. The intermediate inhalation MRL of 500 $\mu g/m^3$ is based on a study with exposures to 268,000 $\mu g/m^3$ and divided by an uncertainty factor of 300 (10 for use of a LOAEL, 3 for extrapolation from animals to humans and 10 for human variability). Table 4 summarizes TCE chronic inhalation health effects.

Table 4: TCE Chronic Inhalation Health Effects*

Conc† ($\mu g/m^3$)	Conc (ppm)	Chronic Exposure Health Effect	Study Type	Year of Study
537,000	100	Leydig cell tumors‡	Rat	1986
537,000	100	Lymphomas‡	Mouse	1980
806,000	150	Lung adenomas‡	Mouse	1983
1,610,000	300	Renal effects	Human	1988
3,220,000	600	Pulmonary and liver tumors‡	Mouse	1986

$\mu g/m^3$ microgram per cubic meter
ppm parts per million
Conc concentration
* Information compiled from ATSDR Tox Profile (1997 update)
† Odor threshhold is about 537,000 $\mu g/m^3$ or 100 ppm
‡ TCE is classified as reasonably anticipated to be a carcinogen

1,2-Dichloroethene

Low oral doses of cis-1,2-dichloroethene cause effects on the blood, such as decreased numbers of red blood cells, and effects on the liver. The long-term human health effects after exposure to low concentrations of 1,2-dichloroethene are not known. Results of a recent animal study suggest that an exposed fetus may not grow as quickly as one that is not exposed. No studies have been done to see whether cancer in people or animals is caused by exposure to 1,2-dichloroethene; exposure has not been shown to affect fertility in people or animals. The ATSDR intermediate inhalation MRL of 791 $\mu g/m^3$ includes an uncertainty factor of 1,000 (10 for use of a LOAEL, 10 for extrapolation from animals to humans and 10 for human variability). No National Toxicology Program cancer classification exists for 1,2-dichloroethene. Table 5 summarizes 1,2-Dichloroethene chronic inhalation health effects.

Table 5: 1,2-Dichloroethene Chronic Inhalation Health Effects*‡

Conc† ($\mu g/m^3$)	Conc (ppm)	Chronic Exposure Health Effect	Study Type	Year of Study
791,000	200	Capillary hyperemia and alveolar system distention	Rat	1977
791,000	200	Fatty accumulation in liver	Rat	1977
791,000	200	Fatty accumulation in Kupffer cells	Rat	1977

$\mu g/m^3$ microgram per cubic meter
ppm parts per million
Conc concentration
* Information compiled from ATSDR Tox Profile (August 1996)
† Odor threshhold is about 67,235 $\mu g/m^3$ or 17 ppm
‡ 1,2-Dichloroethene is not classified for carcinogenicity

EPA Site-specific Concerns

EPA posed specific concerns and health questions to ATSDR regarding this site that are answered below:

EPA Question 1: Are the data sufficient to determine whether there is a current threat to public health?

Answer to EPA Question 1: No, not conclusively. (See response to Question 2 for further explanation).

EPA Question 2: If the data are not sufficient to make a health call, what additional environmental sampling is recommended?

Answer to EPA Question 2: Confirmatory concurrent indoor air, sub-slab gas, near-slab soil gas and outdoor air sampling should be performed in the affected buildings during different

seasons (including the heating season) to evaluate the effectiveness of the sub-slab depressurization systems. Sampling should not be limited to PCE alone, but at the minimum include TCE and 1,2-dicholoroethene (additional VOC sampling may be prudent, i.e. 1,4-dichlorobenzene, 1,2-dichloroethane, methylene chloride chloroform, benzene and 1,3-butadiene). Additionally, the source and groundwater contamination plume should be characterized and delineated to determine the extent of potential impact on structures surrounding the site. A well survey should be performed to verify that individuals are not inappropriately using contaminated groundwater from the site for drinking or household purposes. EPA or other regional, state or local environmental or health agencies may be able to play a role in sampling and addressing such issues.

EPA Question 3: If the data are sufficient to make a public health assessment, does this contaminated site currently pose an unacceptable risk to public health?

> **Answer to EPA Question 3:** ATSDR cannot conclude whether currently breathing volatile chemicals such as PCE from vapor intrusion into onsite buildings' indoor air is expected to harm people's health, due to the lack of confirmatory sampling during different seasons (including the heating season) since the sub-slab depressurization system was installed.

Additional Considerations

Maps supplied from EPA show that public water is available to the area (ATSDR 2010a). However, no information was provided to ATSDR indicating that a well survey was performed to rule out the presence of private wells in the area. Therefore, ATSDR cannot determine whether inappropriate drinking or household use of private well water is occurring. A well survey should be performed to rule out this possibility.

The presence of VOCs other than PCE and its degradation products in site air and soil vapor samples are documented in the data set (see Appendix B). For example, 1,4-dichlorobenzene is over 100 times Maine's carcinogenic screening value, thus exceeding the usual upper limit of theoretical excess cancer risk. Chloroform, benzene, 1,2-dichloroethane, 1,3-butadiene and methylene chloride were between 1 and 2 orders of magnitude higher than their cancer risk evaluation guides (CREGs), thus approaching EPA's upper limit of theoretical excess cancer risk. However, indoor air background concentrations of 1,4 dichlorobenzene, benzene and chloroform frequently exceed Maine's screening values (MDEP 2010). A full review of contaminant sources and exposures from activities other than the dry cleaning operations is not within the scope of this focused Strike Team evaluation. However, the levels of these VOCs indicate that further characterization and evaluation of contaminant sources, including background sources should be considered. Additionally, further assessment and possibly health education may be warranted for people exposed to these chemicals above screening levels, regardless of source.

Child Health Considerations

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of water and air. Children are at a greater risk than adults from certain kinds of exposures to hazardous substances emitted from waste sites. Children receive higher doses of chemical exposure due to lower body weights and elevated breathing rates. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages.

The possibility of health effects in children due to exposures to site contaminants was carefully considered in this health consultation. How and at what levels of exposure PCE may affect the developing brain in human babies is not known. If the sub-slab depressurization systems, public water supply and institutional controls are effectively utilized, young children are not expected to be exposed to contaminated air or water from the site. However, these controls inhibiting exposure should be maintained to prevent potentially harmful exposures.

Conclusion

Conclusion: ATSDR cannot conclude whether currently breathing volatile chemicals such as PCE from vapor intrusion into onsite buildings' indoor air is expected to harm people's health. PCE and its degradation products were found to exceed screening criteria prior to the installation of sub-slab depressurization systems. Sampling has not been performed during different seasons (including the heating season) since installation of the sub-slab depressurization systems to confirm that the indoor air levels are below levels of concern.

Basis for Conclusion: The three residential structures found to have indoor air concentrations above Maine's screening values were equipped with sub-slab depressurization systems. While sub-slab depressurization systems tend to be highly effective systems for deterring vapor intrusion, some conditions, such as low permeability and wet soils, may limit performance. The presence of sump pumps in the buildings indicates that wet soils are likely below the residences. So although such systems are generally effective, post-installation indoor air sampling during different seasons (including the heating season) has not been performed at the site to determine whether wet soils are impacting system performance.

Recommendations

1. Confirmatory indoor air sampling of buildings with sub-slab depressurization systems should be performed as multiple events. Winter sampling is particularly important. Sampling multiple locations within structures is also recommended. Effective characterization of the source and vapor migration pathways may be performed by sampling indoor air concurrently with sub-slab gas, near-slab soil gas and outdoor air. Should chemicals of unknown origin be found in the sampling, ATSDR can assess the chemical contamination of unknown origin and make recommendations to protect public health.

2. Groundwater sampling and flow measurements should be undertaken at the site to characterize the extent of groundwater contamination from Jim's Dry Cleaners and to assess the migration of the plume. EPA or other regional, state or local environmental or health agencies may be able to play a role in sampling and addressing such issues.

3. Soil gas and indoor air sampling should be undertaken to further characterize the potential for vapor intrusion into buildings along the extent of the plume. Continued sampling of gravity draining utility corridors that may serve as rising and falling conduits for vapors heavier and lighter than air could indicate preferential pathway migration. Performing such sampling in conduits on the up-gradient side of contamination could detect migration of contaminants lighter than air. Performing sampling in conduits on the down-gradient side of contamination could detect migration of contaminants heavier than air.

4. Institutional controls prohibiting unrestricted use of un-remediated buildings with elevated air contamination (such as the Dry Cleaning building with the unoccupied apartment upstairs) is important to prevent harm to people's health. EPA or other regional, state or local environmental or health agencies may be able to play a role in addressing this issue.

5. A well survey should be performed to verify that individuals are not inappropriately using contaminated groundwater from the site for drinking or household purposes. EPA or other regional, state or local environmental or health agencies may be able to play in performing the well survey.

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References

[ATSDR] Agency for Toxic Substances and Disease Registry. *Toxicological Profile for Tetrachloroethylene*. Atlanta: US Department of Health and Human Services, Sept 1997.

[ATSDR] Agency for Toxic Substances and Disease Registry. *Public Health Guidance Manual (update)*. Atlanta: US Department of Health and Human Services, 2005.

[ATSDR] Agency for Toxic Substances and Disease Registry. *Toxicological Profile for Benzene*. Atlanta: US Department of Health and Human Services, Aug 2007.

[ATSDR] Agency for Toxic Substances and Disease Registry. *Toxicological Profile for 1,3-Butadiene*. Atlanta: US Department of Health and Human Services, Sept 2009.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2010a. May 28th e-mail from William Sweet, ATSDR, to Danielle Langmann, ATSDR, regarding a Strike Team Request submitted by the US Environmental Protection Agency for Jim's Dry Cleaner site that included site maps and technical information. New England, MA.

[ATSDR] Agency for Toxic Substances and Disease Registry. 2010b. June 1st e-mail from William Sweet, ATSDR, to Danielle Langmann, ATSDR, regarding a Strike Team Request submitted by the US Environmental Protection Agency for Jim's Dry Cleaner site that included environmental data. New England, MA

Ferroni C, Selis L, Mutti A, et al. 1992. Neurobehavioral and neuroendocrine effects of occupational exposure to perchloroethylene. NeuroToxicology 13:243-247.

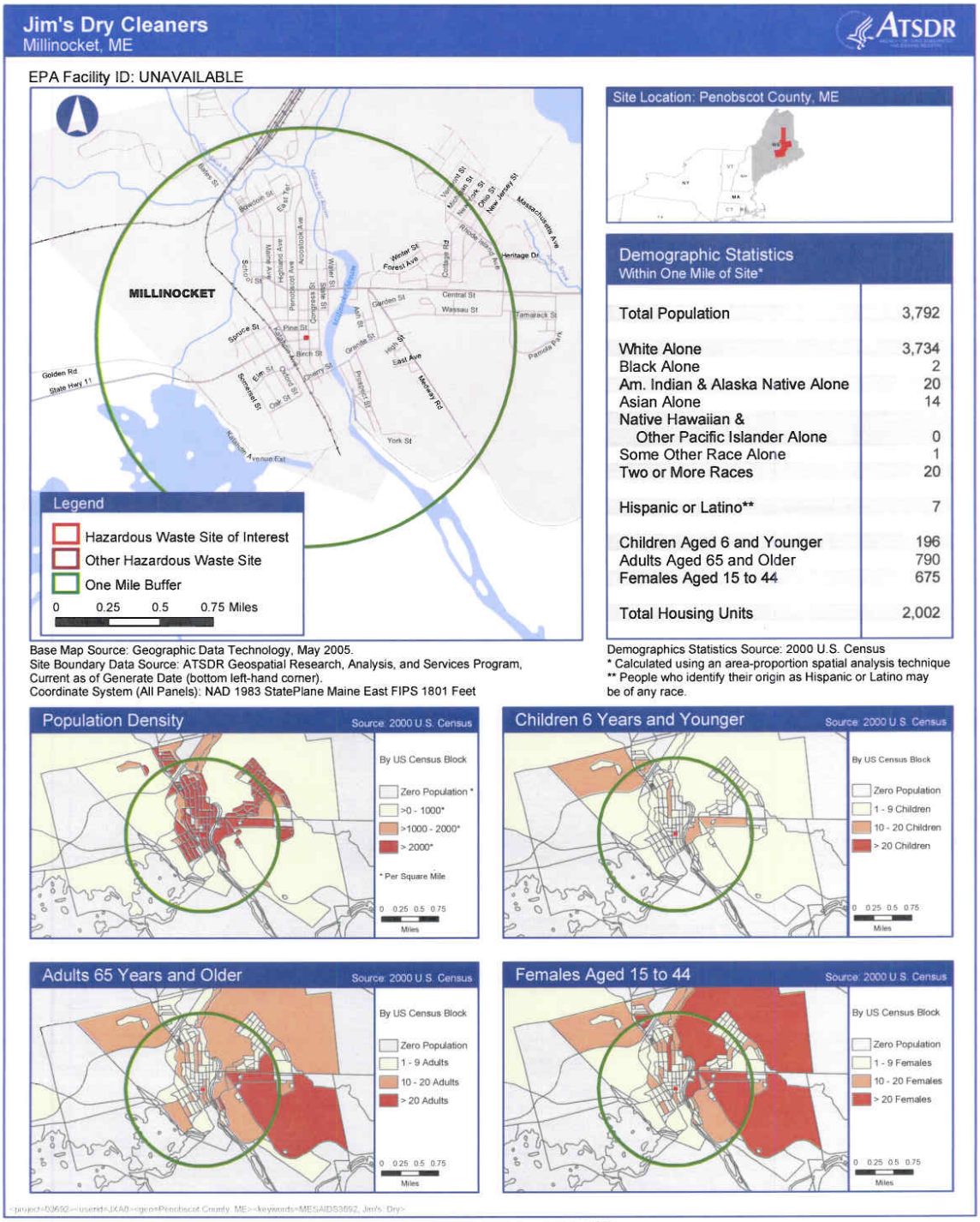
[ITRC] Interstate Technology and Regulatory Council: Technical and Regulatory Guidance. *Vapor Intrusion Pathway: A Practical Guideline* 2007. Accessed 29 Jun 2009: http://www.itrcweb.org/Documents/VI-1.pdf

[MDEP] Vapor Intrusion Evaluation Guidance. Bureau of Remediation, Maine Department of Environmental Protection. Jan 13, 2010.

[NYSDOH] *Fact Sheet: Tetrachloroethene (PERC) in Indoor and Outdoor Air*. 2003. New York State Department of Health. May 2003. Accessed June 10, 2010: http://www.health.state.ny.us/environmental/chemicals/tetrachloroethene/

Schreiber JS, Hudnell HK, Geller AM, House DE, Aldous KM, Force MS, Langguth K, Prohonic EJ, Parker JC. *Apartment Residents' and Day Care Workers' Exposures to Tetrachloroethylene and Deficits in Visual Contrast Sensitivity*. Environ Health Perspectives, July 2002. 110(7): 655-664.

Appendix A. Site Demographics Map



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Appendix B. Data Tables

Environmental data contained in these tables were compiled from information sent to ATSDR (ATSDR 2010a, 2010b). Acronyms used in these tables are defined at the end of this appendix. ATSDR comparison values and Maine indoor air target values are highlighted when exceeded by the maximum concentration.

Air Contaminant in 61 Penobscot	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
1,4-Dichlorobenzene	24.0	Chronic EMEG = 60	0.22
Benzene	4.61	CREG = 0.1	0.31
Ethylbenzene	1.58	Chronic EMEG = 1,000	0.97
Methylene chloride	26.1	CREG = 2	5.2
Tetrachloroethene	1.58	Chronic EMEG = 300	0.41

Air Contaminant in 100 Aroostook	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
Benzene	1.18	CREG = 0.1	0.31
Chloroform	3.58	CREG = 0.04	0.11
Methylene chloride	3.22	CREG = 2	5.2

Air Contaminant in 101 Aroostook	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
1,3-Butadiene	0.863	CREG = 0.03	0.081
Benzene	2.36	CREG = 0.1	0.31

Air Contaminant in 107 Aroostook	Maximum Concentration (µg/m^3)*	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
Benzene	2.28/0.82/2.52	CREG = 0.1	0.31
Chloroform	1.08/1.34/nd	CREG = 0.2	0.16

cis-1,2-Dichloroethene	13.4/nd/84.5	Intermediate EMEG = 791	13
Ethylbenzene	1.26/nd/nd	Chronic EMEG = 1,000	0.97
Tetrachloroethene	9.15/0.547/15.0	Chronic EMEG = 300	0.41
Trichloroethene	4.75/nd/21.8	Intermediate EMEG = 500	1.2

* pre-mitigation maximum / post-mitigation / sub-slab soil vapor

Air Contaminant in 110 Aroostook	**Maximum Concentration ($\mu g/m^3$)***	**Lowest Comparison Value (CV) ($\mu g/m^3$)**	**Maine Indoor Air Target (µg/m3)**
Benzene	1.48	CREG = 0.1	0.31
Tetrachloroethene	211	Chronic EMEG = 300	0.41

Air Contaminant in 113 Aroostook	**Maximum Concentration ($\mu g/m^3$)***	**Lowest Comparison Value (CV) ($\mu g/m^3$)**	**Maine Indoor Air Target (µg/m3)**
1,2-Dichloroethane	1.94/nd/nd	CREG = 0.04	0.094
1,3-Butadiene	0.934/nd/nd	CREG = 0.03	0.081
Benzene	6.2/nd/0.797	CREG = 0.1	0.31
Carbon tetrachloride	1.47/nd/1.52	CREG = 0.2	0.16
Tetrachloroethene	33.5/7.28/24.0	Chronic EMEG = 300	0.41
Trichloroethene	4.81/nd/3.47	Intermediate EMEG = 500	1.2

* pre-mitigation maximum / near foundation soil vapor / sub-slab soil vapor

Air Contaminant in 116 Aroostook	**Maximum Concentration ($\mu g/m^3$)***	**Lowest Comparison Value (CV) ($\mu g/m^3$)**	**Maine Indoor Air Target (µg/m3)**
Benzene	1.02/0.76/1.81/21.2	CREG = 0.1	0.31
Tetrachloroethene	12.3/nd/612/413	Chronic EMEG = 300	0.41

* pre-mitigation maximum / post-mitigation / near foundation soil vapor / sub-slab soil vapor

Air Contaminant in 119 Aroostook	Maximum Concentration (µg/m^3)*	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
1,4-Dichlorobenzene	4.94	Chronic EMEG = 60	0.22
Benzene	1.96	CREG = 0.1	0.31
Chloroform	1.08	CREG = 0.04	0.11
Dichlorodifluoromethane	25.4	RfC = 20	42
Ethylbenzene	2.01	Chronic EMEG = 1,000	0.97
Methylene chloride	3.58	CREG = 2	5.2

Air Contaminant in 209 Wassau	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
Benzene	1.15	CREG = 0.1	0.31
Chloroform	3.10	CREG = 0.04	0.11

Air Contaminant in 219 Wassau	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
Chloroform	1.64	CREG = 0.04	0.11

Air Contaminant in Ambient Air	Maximum Concentration (µg/m^3)	Lowest Comparison Value (CV) (µg/m^3)	Maine Indoor Air Target (µg/m3)
Benzene	0.651	CREG = 0.1	0.31

Acronyms:

µg/m^3	microgram per cubic meter
CREG	cancer risk evaluation guide
EMEG	environmental media evaluation guide
nd	not detected
RfC	reference concentration