Letter Health Consultation

LAWRENCE AVIATION

PORT JEFFERSON STATION, SUFFOLK COUNTY, NEW YORK

EPA FACILITY ID: NYD002041531

Prepared by
New York State Department of Health

MAY 16, 2014

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
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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LETTER HEALTH CONSULTATION

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NEW YORK
state department of
HEALTH

Howard A. Zucker, M.D., J.D.
Acting Commissioner of Health

Sue Kelly
Executive Deputy Commissioner

May 16, 2014

Maria Jon
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US Environmental Protection Agency
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RE: **Letter Health Consultation**
Lawrence Aviation
Port Jefferson Station,
Suffolk County
EPA ID#: NYD002041531
DEC Site#: 152016

Dear Ms. Jon:

The United States Environmental Protection Agency (EPA) submitted recent data from the soil vapor intrusion sampling performed near the Lawrence Aviation site to the New York State Departments of Environmental Conservation and Health. The EPA conducted the soil vapor intrusion sampling during the 2010, 2011, and 2012 heating seasons. This Letter Health Consultation (LHC) summarizes the progress made on recommendations presented in the 2005 Public Health Assessment (PHA) and the 2010 Health Consultation (HC) on the Lawrence Aviation site, and includes an evaluation of the additional site data collected in March/April 2010, April 2011, and March 2012.

Site Background

The Lawrence Aviation Industries, Inc. (Lawrence Aviation) site is south of Sheep Pasture Road in the hamlet of Port Jefferson Station, Town of Brookhaven, Suffolk County, New York (Figure 1). Private homes are present to the north of the site, in the general direction of groundwater flow. Lawrence Aviation began operations as Ledkote Products in Port Jefferson Station in 1951. The name was changed to Lawrence Aviation Industries in 1959.

The Town of Brookhaven Department of Environmental Protection tested water from private wells near Lawrence Aviation for volatile organic compounds in 1979. These tests found elevated levels of trichloroethene (TCE) and *cis*-1,2-dichloroethene (DCE). The source of contamination was unknown at the time. In 1987, the Suffolk County Department of Health Services (SCDHS) sampled four private wells downgradient of Lawrence Aviation. The well samples contained high levels of TCE contamination as well as lower levels of tetrachloroethene (PCE) and DCE. The EPA supplied bottled

water until the homes were connected to the public water supply. Since then, additional contaminated private wells have been discovered and subsequently connected to the public water supply by the EPA.

In May 1980, the SCDHS conducted a site visit to Lawrence Aviation Industries site. This visit identified many areas of concern, including an accumulation of many improperly stored and deteriorating drums in seven separate areas within the site. The SCDHS also noted unpermitted discharges of liquid waste and unlined cesspools and lagoons used to store liquid waste.

EPA added the site to the National Priorities list in February 2000. Remedial investigations determined TCE, PCE and 1,1,1-trichloroethane (TCA) to be the primary contaminants of concern in groundwater downgradient (to the north) of the Lawrence Aviation site. These and other VOCs can evaporate from groundwater, enter soil vapor (air spaces between soil particles) and migrate up through building foundations into indoor air, through a process called soil vapor intrusion.

The 2005 PHA (ATSDR, 2005) for the Lawrence Aviation site recommended that:

> "The potential for soil vapor contamination related to contaminated soil or groundwater at and near the site should be addressed. If soil vapor is contaminated, the possibility of exposures related to vapor intrusion into buildings must then be evaluated and, if necessary, actions should be taken to mitigate exposures."

The 2010 HC (ATSDR, 2010) concluded that "contaminants associated with the Lawrence Aviation site are not significantly affecting the indoor air quality of buildings downgradient from the site." However, "Elevated concentrations of TCE or PCE were detected beneath four residential buildings and the wrestling room of the Port Jefferson High School." Therefore, the 2010 HC recommended that:

> EPA "…continue to monitor the potential for soil vapor intrusion to occur in downgradient buildings, should environmental or building use or conditions change. As necessary, additional samples should be collected to further delineate the off-site soil vapor plume and evaluate the potential for soil vapor intrusion to occur."

Soil Vapor Intrusion Investigation

In February 2006, the EPA began SVI investigations at the Lawrence Aviation Industries site. The EPA's general approach for evaluating soil vapor intrusion was to first screen using only sub-slab vapor sample results. Where values exceed the EPA's sub-slab screening criteria, the EPA followed up with indoor and outdoor air and sub-slab vapor sampling. During the course of this investigation, the EPA collected sub-slab vapor (below building) samples from 56 nearby buildings and indoor air (basement and first floor) samples from the Port Jefferson High School, a daycare, and six residences. These data are reported in the 2010 HC (ATSDR, 2010).

In March and April 2010, the EPA sampled 16 properties (Appendix A, Table 1). Of the 16 locations sampled, the EPA sampled six for only sub-slab vapor; the EPA

sampled the other 10 locations for sub-slab vapor, basement, first floor and outdoor air. These 10 locations are monitored on a periodic basis based on data presented in the 2010 HC (ATSDR, 2010).

In April 2011, the EPA sampled 12 properties for sub-slab vapor, basement, first floor, and outdoor air (Appendix A, Table 2). The EPA periodically sampled nine of these properties before 2010; four of these nine locations have active sub-slab depressurization systems. Two locations had been sampled before, however, EPA expanded sampling at these locations to include indoor and outdoor air samples; and three were new sample locations.

In March 2012, the EPA sampled 13 properties for sub-slab vapor, basement, first floor and outdoor air (Appendix A, Table 3). The EPA periodically sampled seven of these properties before 2010, and expanded the sampling at two locations to include indoor and outdoor air based on the 2010 sampling event results. The EPA added two new sample locations.

TCE, PCE, and TCA were not detected in any of the outdoor air samples collected during the three sampling events.

Discussion

The EPA soil vapor intrusion investigations sampled the indoor air of 19 total properties, including the Port Jefferson High School, during March and April of 2010, April of 2011 and March of 2012. Fifteen of the sampled properties had detectable levels of the VOCs (TCE, TCA or PCE) in indoor air (Table A), and four did not have any detectable levels of these volatile organic compounds. For properties with detectable levels DOH first compared the levels of TCE, TCA, and PCE in the indoor air to levels DOH would expect to find in buildings in the absence of a local environmental source of contamination (i.e., background air levels [Table A]). The measured levels of TCE, TCA and PCE were within the range of background air levels at nine of the 15 properties. The measured levels of TCE, TCA or PCE exceeded the range of air background levels at six of the properties (Table A).

Some of the sampled properties have an active mitigation system (sub-slab depressurization) currently in operation. Mitigation is an interim measure designed to reduce contaminant levels in the indoor air or subslab environment until contaminated environmental media are remediated, or until mitigation is no longer needed to address exposures related to soil vapor intrusion.

Table A
Lawrence Aviation Industries Site
Comparison of Indoor Air Sampling Results to Indoor Air Background Levels.
(All values in micrograms per cubic meter (mcg/m^3)).

Location	Chemical (Background Level)		
	TCE (< 1 mcg/m^3)[a]	**TCA (≤ 3 mcg/m^3)**[b]	**PCE (< 10 mcg/m^3)**[c]
Property A (High School)	ND	ND	ND – 0.37
Property B	ND – 1.98[d]	ND	ND – 1.59
Property C	ND – 0.41	ND – 6.76[d]	ND – 1.41
Property D	ND	ND – 1.34	ND – 1.86
Property F	ND	ND	ND – 0.88
Property G	ND – 1.05[d]	ND – 0.61	ND – 1.63
Property J	ND – 1.2[d]	ND – 0.83	ND – 2.07
Property K	0.21 – 0.23	ND	ND – 0.88
Property L	ND	ND	ND – 0.28
Property N	ND – 2.8[d]	ND – 0.22	ND – 1.97
Property O	ND	ND – 1.93	0.74 – 11.1[d]
Property Q	ND	ND – 1.96	ND
Property S	ND	ND	ND – 0.64
Property T	ND	ND – 0.43	ND
Property U	ND	ND	ND – 0.31

TCE = trichloroethene; TCA = 1,1,1-trichloroethane, PCE = tetrachloroethene; ND = not detected
[a] Background concentrations of TCE in indoor air are less than 1 mcg/m^3 in most cases (DOH 2005; 2009a)
[b] Levels of 1,1,1-TCA are typically around 3 mcg/m^3 in the indoor air of homes (DOH 2009b)
[c] Data show that background levels of PCE in air are seldom above 10 mcg/m^3 (DOH 2013)
[d]Exceeds background levels (shaded).

The air levels of TCE, TCA and PCE at the six properties where background indoor levels were exceeded (Properties B, C, G, J, N and O) were further evaluated using available New York State air guidelines (DOH 2006; 2013), health-based air comparison values, and ATSDR air comparison values (ATSDR, 2012) (see Table B). Both the comparison values and the air guidelines are air concentrations at which we do not expect adverse health effects to occur. The comparison values are based solely on health-based criteria, while the air guidelines consider other factors including the ability to reliably detect the chemicals, background levels, and gaps in the toxicologic databases.

Table B. Lawrence Aviation Site
Air Guidelines and Comparison Values for Contaminants Detected in Indoor Air.
(All values in micrograms per cubic meter (mcg/m^3)).

Chemical	New York State Air Guidelines[a]	Health-Based Comparison Values				ATSDR Comparison Values[c]
		Cancer[b]	Basis	Noncancer[b]	Basis	
TCE	5	0.57	US EPA UR	2	US EPA RfC	0.24[d]
TCA	---	---	---	5000	US EPA RfC	3800[e]
PCE	30	9.0	US EPA UR	40	US EPA RfC	3.8[d]

[a] DOH,2006; 2013. An air guideline for TCA is not available.
[b] Cancer comparison values are based on the air concentration associated with an increased cancer risk of one in one million (calculated from the EPA inhalation unit risks (EPA, 2011a; 2012)) and assume continuous exposure for 30 years of a 70 year lifetime (EPA, 2011b). Noncancer comparison values assume continuous exposure and are equivalent to the chemical's reference concentration (EPA, 2007; 2011a; 2012), which is an air concentration at which noncancer health effects are not expected to occur assuming exposure up to a lifetime.
[c] ATSDR, 2012. ATSDR comparison values assume continuous exposure.
TCE = trichloroethene; TCA = 1,1,1-trichloroethane, PCE = tetrachloroethene; US EPA UR = US EPA unit risk (EPA, 2011a; 2012); US EPA RfC = US EPA reference concentration (EPA, 2007; 2011a; 2012).
[d]Air concentration corresponding to an increased lifetime cancer risk of one-in-one million, based on the US EPA unit risk for TCE (EPA, 2011a) or PCE (EPA, 2012).
[e]ATSDR intermediate minimal risk level based on noncancer effects (ATSDR, 2006)

The levels of TCE at Properties B, C, G and J did not exceed the New York State TCE air guideline (5 mcg/m^3) or the noncancer comparison value (2 mcg/m^3). The level of TCE at Property N (2.8 mcg/m^3) slightly exceeded the noncancer comparison value but not the air guideline. The levels at all five of these properties exceeded one or both comparison values based on carcinogenic effects (0.57 mcg/m^3 and 0.24 mcg/m^3). Since the measured levels exceeded comparison values as well as background levels, we further characterized the health risks for exposure to TCE at these properties. Similarly, the level of PCE at Property O (11.1 mcg/m^3) did not exceed its New York State air guideline (100 mcg/m^3) or its noncancer comparison value (40 mcg/m^3), but did exceed the comparison values based on carcinogenic effects (9.0 mcg/m^3 and 3.8 mcg/m^3). We further characterized the PCE risks at this residence because the comparison values and background levels are exceeded. We did not further evaluate the level of TCA at Property C (6.76 mcg/m^3), because although the level is above background, the level does not exceed either TCA comparison values.

Trichloroethene (TCE)

Studies of people exposed for long periods of time to high levels of TCE provide convincing evidence of a link between TCE exposure and increased risks for certain types of cancer (ATSDR, 1997a; US EPA, 2011a). Lifetime exposure to high levels of TCE causes cancer in laboratory animals. The EPA concluded that TCE is carcinogenic to humans by all routes of exposure (EPA, 2011a). Long-term exposure to high levels of TCE in workplace air has also caused effects on the central nervous system and irritation of the mucous membranes in humans (ATSDR, 1997a). Some studies reported an increased risk for adverse effects on human fetal development in the offspring of women who lived in areas with elevated levels of TCE in air or drinking water (Goldberg et al., 1990; Forand et al., 2012). Due to limitations in the studies, we do not know if the observed effects on fetal development are due to TCE or some other factor. In laboratory animals, exposure to high levels of TCE has damaged the central nervous system, immune system, liver and kidneys, and adversely affected reproduction and development of offspring (DOH, 2006; EPA, 2011a). Taken together, the studies of humans and animals exposed to high levels of TCE suggest that there is an increased risk of cancer and noncancer health effects in people who are exposed to lower levels over long periods of time.

The levels above background for TCE in indoor air at Properties B, C, G, J and N range from 0.41 mcg/m^3 to 2.8 mcg/m^3. All of these levels are higher than one or both of the cancer comparison values (0.24 mcg/m^3 and 0.57 mcg/m^3), which are set at an increased lifetime cancer risk of one-in-one million. Long-term exposure (i.e., 30 years) to the levels of TCE at these properties is estimated to pose a low increased risk for cancer, which is the descriptor we use for estimated increased cancer risks between one-in-one million and one-in-ten thousand. The level of 2.8 mcg/m^3 at Property N also exceeds the noncancer inhalation comparison value for TCE, which is the EPA reference concentration (2 mcg/m^3)[1]. The reference concentration is set by EPA at a level that is unlikely to pose an appreciable risk of adverse noncancer health effects assuming up to a lifetime of exposure (EPA, 2011a). The level of TCE detected at Property N (2.8 mcg/m^3) is slightly higher than the reference concentration and below levels at which health effects have been observed. Therefore, exposure to this level (as well as lower TCE levels that did not exceed the reference concentration) is not expected to result in TCE-related noncancer health effects. Sample calculations for cancer risk estimates and the noncancer hazard quotient for TCE are found in Appendix B.

Tetrachloroethene (PCE)

There is evidence that people exposed to high levels of PCE in the workplace have an increased risk for some types of cancer. In laboratory studies, inhalation of high levels of PCE almost daily for a lifetime has caused cancer in rats and mice. Based on these human and animal studies, the EPA considers PCE to be a “likely” human carcinogen (EPA, 2012). People exposed to high levels of PCE for long periods may experience subtle effects in the nervous system such as changes in test performance or vision.

[1] ATSDR has adopted the EPA reference concentration for TCE as its chronic duration inhalation minimal risk level.

Long term exposure to high levels of PCE may also affect the kidneys, liver, immune system, and may cause reproductive and developmental effects in humans or animals (ATSDR, 1997b). As with TCE, the studies of humans and animals exposed to high levels of PCE taken together suggest that there is an increased risk of cancer and noncancer health effects in people who are exposed to lower levels over long periods of time.

The level of PCE at Property O (11.1 mcg/m^3) exceeded background levels (i.e. data show that background levels of PCE in air are seldom above 10 mcg/m^3, [DOH, 2013]) and exceeded the PCE comparison values based on carcinogenic effects. Long-term exposure (i.e., 30 years) to this level of PCE is estimated to pose a low increased risk for cancer, which is the descriptor we use for increased cancer risks between one-in-one million and one-in-ten thousand. A sample calculation for the PCE cancer risk estimate is found in Appendix B.

Noncancer health effects are not expected since the level of 11.1 mcg/m^3 did not exceed the DOH PCE air guideline nor the noncancer PCE comparison value (equivalent to the EPA reference concentration).

Conclusions

Based on the data from the EPA soil vapor intrusion investigations conducted in March and April of 2010, April of 2011 and March of 2012, breathing TCE, PCE, and TCA in the indoor air at properties sampled near the Lawrence Aviation site is not expected to harm people's health because these chemicals were either not detected or detected at levels below typical indoor air levels and levels associated with an increased risk for adverse health effects.

Recommendations

DOH and ATSDR recommend that those properties at which TCE or PCE were detected at levels above background be further evaluated to determine whether reasonable and practical actions can be taken to reduce exposure to TCE and PCE in indoor air.

DOH and ATSDR recommend the EPA continue to maintain and service the active sub-slab depressurization systems as needed and follow the recommended service schedule provided by each manufacturer. DOH and ATSDR recommend that proposals for newly constructed buildings and housing developments near the Lawrence Aviation Industries site be evaluated for the potential for soil vapor intrusion and whether monitoring or mitigative actions are needed. DOH and ATSDR also recommend that the potential for soil vapor intrusion be evaluated within the study area, if environmental conditions or building use change.

If you have any questions, please call me at (518) 402-7860.

Sincerely,

Anthony Perretta
Public Health Specialist II
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Investigation Area
Long Island
Lawrence Aviation Site
Figure 1
Lawrence Aviation Site
and
Soil Vapor Intrusion
Investigation Area

Appendix A.
Tables.

Table 1

LAWRENCE AVIATION INDUSTRIES SITE

Summary of Sub-Slab Vapor and Indoor Air Sampling Results

March/April 2010 sampling event. All Units are in (mcg/m3)

Location Type		Slab[1]/Air[2]	TCE[3]	TCA[3]	PCE[3]	Sampling Frequency	Former Building Number[4]
High School	Property A*	Slab	ND	ND	ND	Continued Monitoring	Building 2
		Basement	ND	ND	ND		
Residential	Property B	Slab	ND	ND	ND	Continued Monitoring	Building 28
		Basement	ND	ND	0.28		
		First Floor	ND	ND	ND		
Residential	Property C*	Slab	ND	2.60	ND	Continued Monitoring	Building 4
		Basement	0.36	1.87	0.47		
		First Floor	0.41	2.37	0.53		
Residential	Property D	Slab	ND	ND	4.60	Continued Monitoring	Building 9
		Basement	ND	1.34	1.86		
		First Floor	ND	0.95	1.65		
Residential	Property E	Slab	ND	44	ND	Continued Monitoring	Building 30
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property F	Slab	12	12	6.50	Continued Monitoring	NA
		Basement	ND	ND	ND		
		First Floor	ND	ND	0.88		
Residential	Property G	Slab	ND	2	1.80	Continued Monitoring	NA
		Basement	ND	ND	ND		
		First Floor	0.20	0.43	0.32		
Residential	Property H	Slab	ND	ND	8.30	First Sampling Event	NA
Residential	Property I	Slab	ND	ND	9.30	Continued Monitoring	Building 52
Residential	Property J*	Slab	100	1.60	3.90	Continued Monitoring	Building 13
		Basement	0.86	0.76	1.20		
		First Floor	0.33	0.27	ND		
Residential	Property K	Slab	13	ND	37	Continued Monitoring	Building 20
		Basement	0.21	ND	ND		
		First Floor	0.23	ND	0.88		
Residential	Property L	Slab	ND	ND	19	Continued Monitoring	Building 8
		Basement	ND	ND	ND		
		First Floor	ND	ND	0.28		
Residential	Property M	Slab	ND	ND	4.30	First Sampling Event	Building 48
Residential	Property N	Slab	ND	ND	12.6	First Sampling Event	Building 51
Residential	Property O	Slab	ND	ND	4.60	First Sampling Event	Building 49
Residential	Property P*	Slab	ND	ND	41.4	Continued Monitoring	Building 7

1 = Sub-slab vapor

2 = Basement air and first floor air

3 = TCE is trichloroethene, TCA is 1,1,1-trichloroethane, and PCE is tetrachloroethene.

4 = Building Identification number from previous letter health consultation

* = property has a mitigation system

ND = Not detected above laboratory detection limit

NA = Not Available

Table 2

LAWRENCE AVIATION INDUSTRIES SITE

Summary of Sub-Slab Vapor and Indoor Air Sampling Results

April 2011 sampling event. All Units are in (mcg/m3)

Location Type		Slab[1]/Air[2]	TCE[3]	TCA[3]	PCE[3]	Sampling Frequency	Former Building Number[4]
High School	Property A*	Slab	ND	ND	ND	Continued Monitoring	Building 2
		First Floor	ND	ND	ND		
Residential	Property B	Slab	ND	ND	ND	Continued Monitoring	Building 28
		Basement	ND	ND	ND		
		First Floor	1.98	ND	1.59		
Residential	Property C*	Slab	ND	5.98	ND	Continued Monitoring	Building 4
		Basement	ND	6.76	1.41		
		First Floor	0.40	1.97	ND		
Residential	Property F	Slab	14.5	16.8	8.52	Continued Monitoring	NA
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property G	Slab	ND	ND	ND	Continued Monitoring	NA
		Basement	0.62	0.47	1.63		
		First Floor	1.05	0.61	1.63		
Residential	Property J*	Slab	205	2.82	6.10	Continued Monitoring	Building 13
		Basement	0.99	ND	2.07		
		First Floor	0.42	ND	1.39		
		First Floor	ND	ND	1.51		
Residential	Property N	Slab	ND	ND	10.1	Continued Monitoring	Building 51
		Basement	ND	ND	ND		
		First Floor	2.34	ND	1.97		
Residential	Property O	Slab	ND	ND	5.57	Continued Monitoring	Building 49
		Basement	ND	0.48	0.74		
		First Floor	ND	1.93	11.1		
Residential	Property Q	Slab	ND	18.6	ND	Continued Monitoring	Building 30
		Basement	ND	ND	ND		
		First Floor	ND	1.80	ND		
		First Floor	ND	1.96	ND		
Residential	Property R*	Slab	4.20	ND	ND	Continued Monitoring	Building 5
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property S	Slab	ND	ND	ND	Continued Monitoring	Building 37
		Basement	ND	ND	0.64		
		First Floor	ND	ND	ND		
Residential	Property T	Slab	ND	5.42	ND	First Sampling Event	NA
		Basement	ND	0.43	ND		
		First Floor	ND	ND	ND		

1 = Sub-slab vapor

2 = Basement air and first floor air

3 = TCE is trichloroethene, TCA is 1,1,1-trichloroethane, and PCE is tetrachloroethene.

4 = Building Identification number from previous letter health consultation

* = property has a mitigation system

ND = Not detected above laboratory detection limit

NA = Not Available

Table 3

LAWRENCE AVIATION INDUSTRIES SITE

Summary of Sub-Slab Vapor and Indoor Air Sampling Results

March 2012 sampling event. All Units are in (mcg/m3)

Location Type		Slab[1]/Air[2]	TCE[3]	TCA[3]	PCE[3]	Sampling Frequency	Former Building Number[4]
High School	Property A*	Slab	ND	ND	ND	Continued Monitoring	Building 2
		First Floor	ND	ND	0.37		
		First Floor	ND	ND	0.37		
Residential	Property C*	Slab	ND	1.40	ND	Continued Monitoring	Building 4
		Basement	0.36	2.0	0.28		
		Basement	0.41	2.10	0.30		
		First Floor	ND	ND	ND		
Residential	Property D	Slab	ND	330	4.20	Continued Monitoring	Building 9
		Slab	ND	310	4.40		
		Basement	ND	ND	ND		
		Basement	ND	ND	0.34		
Residential	Property E	Slab	ND	8.90	ND	Continued Monitoring	Building 30
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property F	Slab	9.60	14	7.60	Continued Monitoring	NA
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property G	Slab	ND	1.60	1.50	Continued Monitoring	NA
		Basement	ND	0.52	ND		
		First Floor	ND	0.34	ND		
Residential	Property J*	Slab	200	3.50	7.80	Continued Monitoring	Building 13
		Basement	1.20	0.83	0.42		
		First Floor	0.38	0.37	ND		
Residential	Property N	Slab	ND	ND	8.60	Continued Monitoring	Building 51
		Basement	2.80	0.22	1.30		
		First Floor	ND	ND	ND		
Residential	Property O	Slab	ND	ND	5.60	Continued Monitoring	Building 49
		Basement	ND	ND	1.20		
		First Floor	ND	ND	0.89		
Residential	Property P*	Slab	ND	ND	39	Continued Monitoring	Building 7
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property R*	Slab	ND	ND	ND	Continued Monitoring	Building 5
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		
Residential	Property U	Slab	ND	3.0	8.60	First Sampling Event	NA
		Basement	ND	ND	0.31		
		First Floor	ND	ND	ND		
Residential	Property V	Slab	ND	ND	9.20	First Sampling Event	NA
		Basement	ND	ND	ND		
		First Floor	ND	ND	ND		

1 = Sub-slab vapor

2 = Basement air and first floor air

3 = TCE is trichloroethene, TCA is 1,1,1-trichloroethane, and PCE is tetrachloroethene.

4 = Building Identification number from previous letter health consultation

* = property has a mitigation system

ND = Not detected above laboratory detection limit

NA = Not Available

Appendix B

Sample Risk Calculations

TCE Cancer Risk

We calculated the cancer risk estimates using the guidance provided in Section 5.2.3.3.1 of EPA (2011c), using age-dependent adjustment factors of 10 for 0 to <2 years, 3 for ages 2 to <16 years, and 1 for ages > 16 years. For a TCE air concentration of 2.8 mcg/m^3, and assuming a person is exposed continuously every day and lives in a residence for 30 years of a 70 year lifetime (EPA, 2011b):

Age group	Air Concentration (mcg/m^3)	Duration (years)	Fraction of Lifetime	Unadjusted Kidney Unit Risk (mcg/m^3)$^{-1}$	ADAF	Adjusted Kidney Risk	NHL and Liver Unit Risk (mcg/m^3)$^{-1}$	NHL and Liver Risk	Adjusted Kidney and Unadjusted NHL and Liver Risk
Birth to <1 month	2.8	0.083	0.0012	1.0E-06	10	3.3E-08	3.1E-06	1.0E-08	4.4E-08
1 to <3 months	2.8	0.167	0.0024	1.0E-06	10	6.7E-08	3.1E-06	2.1E-08	8.7E-08
3 to <6 months	2.8	0.250	0.0036	1.0E-06	10	1.0E-07	3.1E-06	3.1E-08	1.3E-07
6 to <12 months	2.8	0.500	0.0071	1.0E-06	10	2.0E-07	3.1E-06	6.2E-08	2.6E-07
1 to <2 years	2.8	1.000	0.0143	1.0E-06	10	4.0E-07	3.1E-06	1.2E-07	5.2E-07
2 to <3 years	2.8	1.000	0.0143	1.0E-06	3	1.2E-07	3.1E-06	1.2E-07	2.4E-07
3 to <6 years	2.8	3.000	0.0429	1.0E-06	3	3.6E-07	3.1E-06	3.7E-07	7.3E-07
6 to <11 years	2.8	5.000	0.0714	1.0E-06	3	6.0E-07	3.1E-06	6.2E-07	1.2E-06
11 to <16 years	2.8	5.000	0.0714	1.0E-06	3	6.0E-07	3.1E-06	6.2E-07	1.2E-06
16 to <18 years	2.8	2.000	0.0286	1.0E-06	1	8.0E-08	3.1E-06	2.5E-07	3.3E-07
18 to <21 years	2.8	3.000	0.0429	1.0E-06	1	1.2E-07	3.1E-06	3.7E-07	4.9E-07
21 to <30 years	2.8	9.000	0.1286	1.0E-06	1	3.6E-07	3.1E-06	1.1E-06	1.5E-06
30 to 70 years	0.0	40.000	0.5714	1.0E-06	1	0.0E+00	3.1E-06	0.0E+00	0.0E+00
									6.8E-06
									Total Cancer Risk (low)

ADAF = age-dependent adjustment factor; NHL = non-Hodgkin lymphoma; mcg/m^3 = micrograms per cubic meter.

TCE Noncancer Hazard Quotient

We calculated the TCE hazard quotient using the EPA reference concentration for TCE (EPA, 2011a). For a TCE air concentration of 2.8 mcg/m^3, and assuming a person is exposed continuously every day:

2.8 mcg/m^3/2.0 mcg/m^3 = 1.4 (low)

PCE Cancer Risk

We calculated the cancer risk estimates using the US EPA unit risk for PCE (EPA, 2012). For a PCE air concentration and assuming a person is exposed continuously every day and lives in a residence for 30 years of a 70 year lifetime (EPA, 2011b):

11.0 mcg/m^3 x 30 years/70 years x 2.6E-7 per mcg/m^3 = 1.2E-6 (low)

REPORT PREPARATION

This Health Consultation for the Lawrence Aviation site was prepared by the New York State Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented. ATSDR's approval of this document has been captured in an electronic database.

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