Health Consultation

1529 WEST LASALLE STREET SITE,
GROUNDWATER

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

EPA FACILITY ID: FLN000409884

MARCH 5, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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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Prepared By:

Florida Department of Health
Bureau of Community Environmental Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

CONTENTS

Summary

In June 2006, the Florida Department of Environmental Protection (DEP) asked the Florida Department of Health (DOH) to evaluate soil and groundwater data on and near a West LaSalle Street (WLS) site in Tampa, Florida. This site is in a mixed residential and light industrial/ commercial area. Previous owners had stored oil and other chemicals.

Elevated levels of volatile organic compounds measured in groundwater from monitoring wells on and near the WLS site likely resulted from chemicals used at WLS or another chemical storage and processing facility 200 feet to the southwest. Because there are no irrigation or drinking water wells nearby, currently the only potential exposure pathway for chemicals in the shallow groundwater is vapor intrusion. Vapor intrusion occurs when chemicals in soil or groundwater migrate through cracks in concrete-slab foundations and collect inside buildings.

Since the extent of groundwater contamination in the neighborhood near the WLS property has not been fully determined, the public health risk from shallow groundwater is indeterminate.

Although it is not possible to evaluate the public health concerns fully without more groundwater testing, we did use a model to predict vapor intrusion from contaminated groundwater. We found significant vapor intrusion is possible on the site, and less so, off site. We found the predicted indoor air concentrations from vapor intrusion on a residential property are unlikely to cause noncancer illness and the predicted risk of cancer from vapor intrusion is “low” to “no apparent” for daily, long-term inhalation exposures. However, model results have been compared with actual indoor testing at other sites and have been shown to vary significantly (both higher and lower). Because of the potential for variance, ATSDR funded the laboratory costs for sampling indoor air at a potentially affected home, and at a home where vapor intrusion was not expected (called a background sample). FDOH and Hillsborough County Health Department staff coordinated three episodes of indoor air sampling at these two residences.

The FDOH Exposure Investigator will evaluate the results of this indoor air testing in a separate report when all test results are available.

Because we do not know the source, complete extent (area), or levels of groundwater contamination, FDOH is unable to evaluate whether vapor intrusion could be occurring at other nearby residences where indoor air was not tested. Therefore, we recommend the City of Tampa or DEP should collect additional shallow groundwater data and completely delineate the area of nearby groundwater contamination.

Purpose

The FDOH evaluates the public health significance of environmental contamination through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia. In June 2006, the Florida DEP asked the FDOH to evaluate the public health threat from chemicals found in groundwater under the West LaSalle Street (WLS) site in Tampa. This report evaluates the potential for vapor intrusion into homes based on the results of 2006 groundwater testing. FDOH assessed soil in a separate report (ATSDR 2007).

Background

The 0.22-acre West LaSalle Street (WLS) site is at 1529 West LaSalle Street in a mixed residential and light commercial/industrial area of Tampa two blocks south of Interstate 275 and one mile west of the Hillsborough River (Figures 1&2).

While various owners have used the WLS property for businesses and manufacturing since 1931, the specific sources of the contaminants of concern are not known at this time. According to aerial photos and maps compiled by DEP's contractor Ecology and Environment (E&E 2006), onsite operations included an oil warehouse (1931), Florida Orange Wood Corporation (1950) and Tarpon Chemical and Supply Company warehouse and distribution facility (circa 1950s to mid-1980s). The site remained vacant after Tarpon Chemical ceased operations. Other chemical companies may have owned the site between the mid-1980s and 2001. In 2001, a non-profit redevelopment corporation built a concrete-block house on the property that was never occupied. In 2002, the City of Tampa obtained the property and demolished this concrete-block house. The Florida Department of Transportation (DOT) is purchasing homes north of the alley behind the WLS property to expand Interstate 275 (these homes currently front Laurel Street).

Investigational History

In January 2001, Florida DOT contractor Post, Buckley, Shuh and Jernigan conducted a limited investigation on the WLS property. They field-screened 5 soil samples for volatile organic compounds (VOCs) and analyzed 1 groundwater sample from a shallow monitoring well (6 to 7 feet below the ground surface). They found volatile organic aromatics (VOAs), semi-volatile organic compounds (SVOCs), metals, and petroleum hydrocarbons above Florida drinking water standards.

In October 2003 and January 2005, City of Tampa contractor Gannett Fleming, Inc. investigated the property. They collected 25 soil samples and 6 groundwater samples (from 5 shallow and 1 deep monitoring well) and excavated two test pits (38' long, 3 feet wide and 3 feet deep). They found volatile organic chemicals (VOCs), SVOCs, petroleum compounds, and metals in the soil and groundwater. Soil in the test pits was dark-green. The test results indicted that contamination might not be confined to the property.

In early 2006, Florida DEP's contractor Ecology and Environment tested a number of soil samples from this and nearby properties (E&E 2006a). On May 22, 2006, Florida DEP hand-delivered test results to residents. Florida DEP cautioned residents to avoid contact with the contaminated soil and to avoid gardening or landscaping in dusty conditions.

On May 31, 2006, the US Environmental Protection Agency (EPA) attempted to test for arsenic in surface and subsurface soil on two nearby properties using x-ray fractionation (XRF). The XRF machine, however, malfunctioned due to the extremely hot and humid weather. EPA tested soil on one property using conventional laboratory analysis. EPA plans to remove contaminated soil from this property.

In August 2006, members of one nearby family had their urine tested for metals. The results were within normal ranges.

Area Population— In 2000, an estimated 1,397 persons lived within a 1/4-mile radius of the site. Approximately 88% were black, 9% were Latino/Hispanic, and 4% were white. American Indian/Alaska Native, Asian/Pacific Islander, and all other racial/ethnic groups made up less than 1% of the population (US Census Bureau 2000).

Other nearby sites on EPA's Envirofacts website http://www.epa.gov/enviro/ include:

- the Rechem Transport site, a Resource Conservation and Recovery Act (RCRA) facility, 3/10ths mile southwest,
- Tampa Housing Authority (a hazardous waste producer), ¼ mile northeast, and
- a former industrial and chemical supplies store (including acid tanks and a solvent staging area) located 200 feet southwest of the WLS (on the southeast corner of West La Salle and North Rome).

Carver Junior High School ¹/₈ mile southeast of the site, Dunbar Elementary ¼ mile northwest of the site across Interstate 275, and several nearby churches could be locations of sensitive younger or older subpopulations. All are on public water.

Soil Contamination **—** The following is a brief summary from a separate health consultation report regarding soil contamination (ATSDR 2007). Soil testing is limited and includes properties adjacent to the WLS site, road right-of-ways south of the site, and the alley north of the site. Because only 5 soil samples have been taken on residential properties and the extent of soil contamination is not known, fully evaluating the public health threat is not currently possible. However, some residential soil that was tested that could hve been a "public health hazard", if residents had daily contact with it for long periods that might have allowed them to ingest contaminated soil (also called chronic exposure), has been removed by the EPA. We recommended collecting additional surface and subsurface soil samples from the nearby neighborhood (ATSDR 2007). Until the full extent of soil contamination is determined, we recommended **as a protective precautions** that nearby residents should:

- refrain from mowing or landscaping in dry, dusty conditions,
- use safe gardening practices, and
- only grow edible fruits and vegetables using raised beds with clean soil or compost.

Community Health Concerns

The community near the WLS site is mainly concerned about contaminated soil. Some nearby residents were concerned about their children playing outside. Some residents, however, were not concerned about vapor intrusion and turned down free indoor air testing.

Discussion

Around the WLS property, all residents use municipal water supplies, and none use irrigation wells. Therefore consumption of, or direct contact with, contaminated groundwater is not an exposure pathway. We address contaminated soil issues in a separate report (ATSDR 2007). Tables 1a and 1b list completed and potential exposure pathways.

In this report, FDOH uses 2006 groundwater test data to model vapor intrusion. In March 2006, Florida DEP contractor E&E collected:

- 7 on-site groundwater samples (5 from wells 12' deep, 1 from a well 25' deep, and 1 from a well 35' deep), and

- 5 off-site groundwater samples (1 from a well 20’ deep and 4 from wells 12’ deep, including 1 background well).

E&E analyzed groundwater for metals, volatile organic chemicals (VOCs), semi-volatile organic chemicals (SVOCs), polycyclic aromatic hydrocarbons (PAHs), and total recoverable petroleum hydrocarbons (TRPHs). While they found the highest VOC levels under the WLS property , groundwater under an adjacent property also contained VOCs. Shallow groundwater under the site flows to the northeast (light-blue arrows on Figure 2, show groundwater flow direction).

Vapor intrusion occurs when volatile chemicals from subsurface soil or shallow groundwater migrate into overlying buildings. Heating within a building and/or mechanical ventilation can cause depressurization. Building depressurization can allow vapors from soil or groundwater to enter the home through cracks or holes in the foundation. Buildings constructed above-grade or having ventilated slabs are not at risk for vapor intrusion.

Characterization of the extent of groundwater contamination in this area is in the preliminary stages. Because the extent of groundwater contamination near the WLS property is unknown, we cannot completely address the environmental health risks.

Public Health Implications

Pathways Analysis

FDOH determines exposure to environmental contamination by identifying exposure pathways. An exposure pathway is generally classified by environmental medium (e.g., water, soil, air, food). A completed exposure pathway consists of five elements: a source of contamination; transport through an environmental medium, a point of exposure, a route of exposure, and a receptor population. A completed exposure pathway exists when people are actually exposed through ingestion or inhalation of, or by skin contact with a contaminated medium.

In completed exposure pathways, all five elements exist, and exposure to a contaminant has occurred in the past, is occurring, or will occur in the future. In potential exposure pathways, at least one of the five elements is not clearly defined, but could exist. Therefore, exposure seems possible. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring, or could occur in the future. However, key information regarding a potential pathway may not be available. It should be noted that the identification of a completed or potential exposure pathway does not necessarily result in human health effects. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

FDOH reviewed the site’s history, community concerns, and available environmental sampling data. In a prior evaluation, we determined that while current data does not indicate soil contamination on the site that was originally investigated, and off-site soil data is limited and incomplete, residents at one property should avoid chronic exposures to soil that might allow them to ingest it accidentally (ATSDR 2007, West La Salle Street Soil Contamination Health Consultation). Based on limited soil data, we recommended that others nearby should take precautions until more sampling is done and the extent of soil contamination (area and levels) are better defined. As discussed in the previous section, we identified the potential for exposures to chemicals in shallow groundwater to occur via indoor air vapor intrusion.

Evaluation Process

For the groundwater potential exposure pathway, FDOH used the Johnson-Ettinger model‡ to predict each chemical's indoor air concentration assuming it migrated from groundwater into the indoor air of on-slab housing. The predicted indoor air concentrations were relatively low. FDOH uses ATSDR comparison values and other established agencies' reference values to screen contaminant levels that may warrant further evaluation. Comparison values are concentrations of chemicals that can reasonably (and conservatively) be regarded as harmless, assuming the most likely conditions of exposure. The comparison values include ample safety factors to ensure protection of sensitive human populations. Because comparison values do not represent thresholds of toxicity, exposure to contaminant concentrations above comparison values will not necessarily lead to adverse health effects.

We found none of the predicted indoor air concentrations are likely to cause noncancer illness. In the following section, we discuss the relationships between predicted concentrations and concentrations with health effects known from long-term, daily exposures (chronic exposures).

We evaluated predicted air concentration chemical mixtures because many of the groundwater chemicals are solvents and can act similarly on the nerves, livers, and kidneys. In addition to predicting indoor air concentrations, the Johnson-Ettinger model also calculates a hazard index (HI) for each chemical. For chemicals mixtures, we added the HIs for the individual chemicals to obtain a total potential risk†.

Figure 3 shows monitoring well locations and groundwater concentrations used to predict vapor intrusion air concentrations and Hazard Indices (HIs) using the Johnson-Ettinger model. Table 2 shows the HIs calculated for each chemical and the resulting total HIs. Figure 4 shows the HI totals by well location. The highest HI (for MW-2) was 77 times the concentration at which no health risk is expected. However, MW-2 is located on the site and there are no buildings there (green dashes on Figures 3 and 4 show the foundation footprints of former buildings). Buildings north of the site are, or soon will be, removed for highway expansion. City staff report that buildings south of La Salle Street are constructed above-grade (not on a slab foundation), or are constructed on ventilated slab foundations and are not at risk for vapor intrusion.

Because the total HI for some wells was above 1 (the number at which no health effects are expected) FDOH in cooperation with the Hillsborough County Health Department and ATSDR tested indoor air at nearby residences on three separate occasions in late 2006 and early 2007. We present the results in a separate FDOH report, called an Exposure Investigation (ATSDR 2007).

Only the chemical levels measured in MW-9 resulted in a total HI greater than 1 on one of the three residential properties that was tested. **In the following sections, the air concentrations we compare with chemical concentrations *having known health effects* are the indoor air levels predicted by the Johnson-Ettinger Model for MW-9 groundwater concentrations.**

Chlorobenzene

At room temperature, chlorobenzene is a colorless liquid with an almond-like odor. It is used as a solvent and in the production of other chemicals.

‡ Available on-line at EPA's website: http://www.epa.gov/Athens/learn2model/part-two/onsite/JnE_lite.htm
† Risks posed by exposure to multiple chemicals with similar health effects are considered to be additive or "cumulative", meaning the total risk can be approximated by summing the risks posed by each individual chemical.

The predicted indoor air concentration of chlorobenzene (12 parts per billion by volume: ppbv) is not likely to cause illness. The predicted indoor air concentration was 6,800 times less than the lowest air concentration causing liver effects and kidney damage in rats (Dilley 1977). ATSDR did not locate any studies regarding cancer in humans or animals after inhalation exposure to chlorobenzene (ATSDR 1990).

1,1-Dichloroethane (1,1-DCA)
1,1-Dichloroethane has a sweet, ether-like smell. It is an oily liquid at room temperature. It is used as a solvent for paint, varnish and grease. 1,1-dichloroethane is a break down product of trichloroethene (TCE) and other chlorinated solvents.

The predicted indoor air concentration of 1,1-dichloroethane (38 ppbv) is not likely to cause illness. The predicted indoor air concentration was 166,000 times less than the lowest concentration causing changes in kidney enzymes and decreased body weight in cats (Hofmann et al. 1971).

Cancer studies of 1,1-dichloroethane are limited and inconclusive. Although EPA has classified 1,1-dichloroethane as a possible human carcinogen it is not possible to estimate accurately the human cancer risk. ATSDR did not locate any studies regarding cancer in humans or animals after inhalation exposure to 1,1-dichloroethane (ATSDR 1990).

1,1-Dichloroethene (1,1-DCE)
1,1-Dichloroethene has a mild, sweet smell. It is an oily liquid. It can be used to make plastics and flame-retardant coatings. 1,1-dichloroethene is a break down product of trichloroethene (TCE) and other chlorinated solvents.

The predicted indoor air concentration of 1,1-dichloroethene (167 ppbv) is not likely to cause noncancer illness. The predicted indoor air concentration was 1,300 times less than the concentration associated with adverse liver changes in rats exposed in intermediate and long-term studies, and kidney cancer in mice exposed in long-term studies (ATSDR 1994).

It is not known if breathing 1,1-dichloroethene increases the risk of cancer in humans. The US Department of Health and Human Services has not classified 1,1-dichloroethene with respect to its ability to cause cancer in humans. Two worker studies are inconclusive. Only one animal study out of several found any evidence that breathing 1,1-dichloroethene might cause cancer (ATSDR 1994).

Toluene
Toluene is a clear colorless liquid, and gives paint-thinner or fingernail polish their distinctive smells. It is a component of gasoline and is used as a solvent.

The predicted indoor air concentration of toluene (588 ppbv) is not likely to cause illness. The predicted concentration was 5,800 times less than the concentration that caused color vision loss in workers exposed over an average of 17 years (Zavalic et al. 1998a, c). The predicted indoor air concentration of toluene is 1,300 times less than the lowest level people can smell (ATSDR 2000).

The National Toxicology Program has not listed toluene as a known or anticipated human carcinogen. The EPA determined that toluene is not classifiable as to carcinogenicity because human data are lacking and the animal data are inadequate.

Trichloroethene (TCE)
Trichloroethene is a colorless liquid with a sweet odor. It is mainly used as a solvent to remove grease from metal parts. It is also used to make other chemicals.

The predicted indoor air concentration of trichloroethene (480 ppbv) is not likely to cause illness. The predicted concentration of trichloroethene was 2,000 times less than the concentration that caused immune system depression in mice (Aranyi et al. 1986), 10,000 times less than the concentration that caused decrease heart rates in rats (Arito et al. 1994a), and 12,000 time less than the concentration that caused nerve damage in gerbils (Haglid et al. 1981). The predicted indoor air concentration trichloroethene was 20,000 times less than the lowest level people can smell (ATSDR 1997).

Trichloroethene inhalation exposures at 100,000 ppbv, approximately 200 times the modeled concentration (480 ppbv), were associated with testis cancer in rats (Maltoni et al. 1986) and lymphomas in mice (Henschler et al. 1980). Higher inhalation concentrations (150,000 – 600,000 ppbv) in chronic studies were associated with lung and liver cancers in mice (ATSDR 1997). The National Research Council has estimated 410 parts per billion volume (ppbv) TCE might increase cancer risk by 1 in 100,000. From this level, we estimated a low increased cancer risk[†] for the modeled level of exposure (480 ppbv). Ongoing testing of the indoor air at a nearby residence will allow a more accurate estimate of the health risk.

Vinyl Chloride
Vinyl Chloride is a gas at room temperatures; it has a mild sweet odor. Vinyl chloride can form as a breakdown product of trichloroethene and other solvents. It is used to manufacture polyvinyl chloride (PVC) for pipes, wire and cable coatings, packaging materials, automobile upholstery and other products (ATSDR 2006).

The predicted indoor air concentration of vinyl chloride (19 ppbv) is not likely to cause noncancer illness. The predicted concentration of vinyl chloride was 16,000 times less than the concentration that caused increased heart/spleen weight in rats (Bi et al. 1985), centrilobular hypertrophy liver changes in rats (Thornton et al. 2002), and increased white blood cell production in mice (Sharma and Gehring, 1979). The predicted indoor air concentration of vinyl chloride was 5-million times less than the lowest level people can smell (ATSDR 2006

Vinyl chloride exposures at approximately 3,000 times the modeled level (5,000 ppbv) were associated with mammary gland cancer in rats (Maltoni et al. 1981). Higher inhalation concentrations (50,000 – 250,000 ppbv) in chronic and intermediate studies were associated with mammary and other cancers in rats, mice, and hamsters (ATSDR 2006). Other cancers included cancers of the liver (hemangiosarcoma, angiosarcoma, carcinoma, angioma), spleen (hemangiosarcoma), mammary (fibroadenoma, carcinoma, fibroma, adenoma), lung (pulmonary adenoma), skin and peritoneum (hemangiosarcoma). The EPA has set a cancer slope of 8.8 x 10^{-6} micrograms per cubic meter (µg/m^3) from which we estimated "no apparent increased cancer risk"[‡] for the modeled level of exposure (1.4 µg/m^3). Ongoing testing of the indoor air at a nearby residence will allow a more accurate estimate of the health risk.

Quality Assurance and Quality Control
The completeness and reliability of the referenced environmental data determine the validity of

† We estimated a risk of 1.7 increased cancers in 10,000 persons, over the expected rate.
‡ We estimated risk of 1.3 increased cancers in 100,000 persons, over the expected rate.

the analyses and conclusions drawn for this health consultation. FDOH used existing environmental data. We assume these data are valid: Florida DEP's contractor and the laboratory they used have approved comprehensive quality assurance project plans.

Child Health Considerations

ATSDR and FDOH recognize that the unique vulnerabilities of infants and children demand special attention (ATSDR 2005a). Children are at a greater risk than are adults, for some hazardous substance exposures. Because children are smaller than adults are, their exposures can result in higher exposure concentrations of chemical per body weight. If toxic exposures occur during critical growth stages, the developing body systems of children can sustain permanent damage. Probably most important, however, is that children depend on adults for risk identification and risk management, hygiene awareness, and access to medical care. Thus, adults should be aware of public health risks in their community, so they can guide their children accordingly. In recognition of these concerns, ATSDR developed the chemical screening values for children's exposures that FDOH used in preparing this report.

Other susceptible populations may have different or enhanced responses to toxic chemicals than will most persons exposed to the same levels of that chemical in the environment. Reasons may include genetic makeup, age, health, nutritional status, and exposure to other toxic substances (like cigarette smoke or alcohol). These factors may limit a susceptible persons' ability to detoxify or excrete harmful chemicals or may increase the effects of damage to their organs or systems.

Conclusions

Florida DOH evaluated the potential for residential exposures to vapor intrusion by chemicals from the shallow groundwater on and near the WLS former chemical processing and handling facility. We concluded:

1. The extent of groundwater contamination in the neighborhood near the WLS property has not been fully determined; therefore, the public health risk from shallow groundwater is **indeterminate**.
2. Vapor intrusion (migration of chemicals from shallow groundwater to indoor air through concrete-slab foundations) may be a completed exposure pathway in buildings near the site. As there are currently no buildings on the site, vapor intrusion is not likely to be a completed exposure pathway there.
3. Ongoing testing of air in two nearby residences will allow a more accurate estimate of the health risk.

FDOH assesses the public health threat from contaminated soil in a separate report. The EPA has removed soil at one residence based on our recommendation, and we have asked DEP to perform additional offsite soil testing.

Recommendations

Our recommendations correspond to the same-numbered conclusions:

1. The City of Tampa or DEP should collect additional shallow groundwater data and completely delineate the area of WLS groundwater contamination.

2. The City of Tampa should consider groundwater remediation, above-grade construction, or slab venting, prior to construction of any on-site buildings.

3. While the Florida DOH will evaluate the results of ongoing indoor air testing in an Exposure Investigation report, either this testing or future groundwater plume delineation may indicate chemical levels that need to be evaluated with respect to potential for public health concern.

Public Health Action Plan

FDOH and the Hillsborough County Health Department evaluate any addition groundwater, soil, or air data for this site, whether it is a refinement or data that is currently available, or it is additional data that characterizes areas of soil or groundwater contamination.

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Appendix A—Figures

Figure 1: Location of the West La Salle Street site in Tampa, Hillsborough County, Florida

Figure 2: 1999 site aerial photograph.

16.2 Groundwater elevation

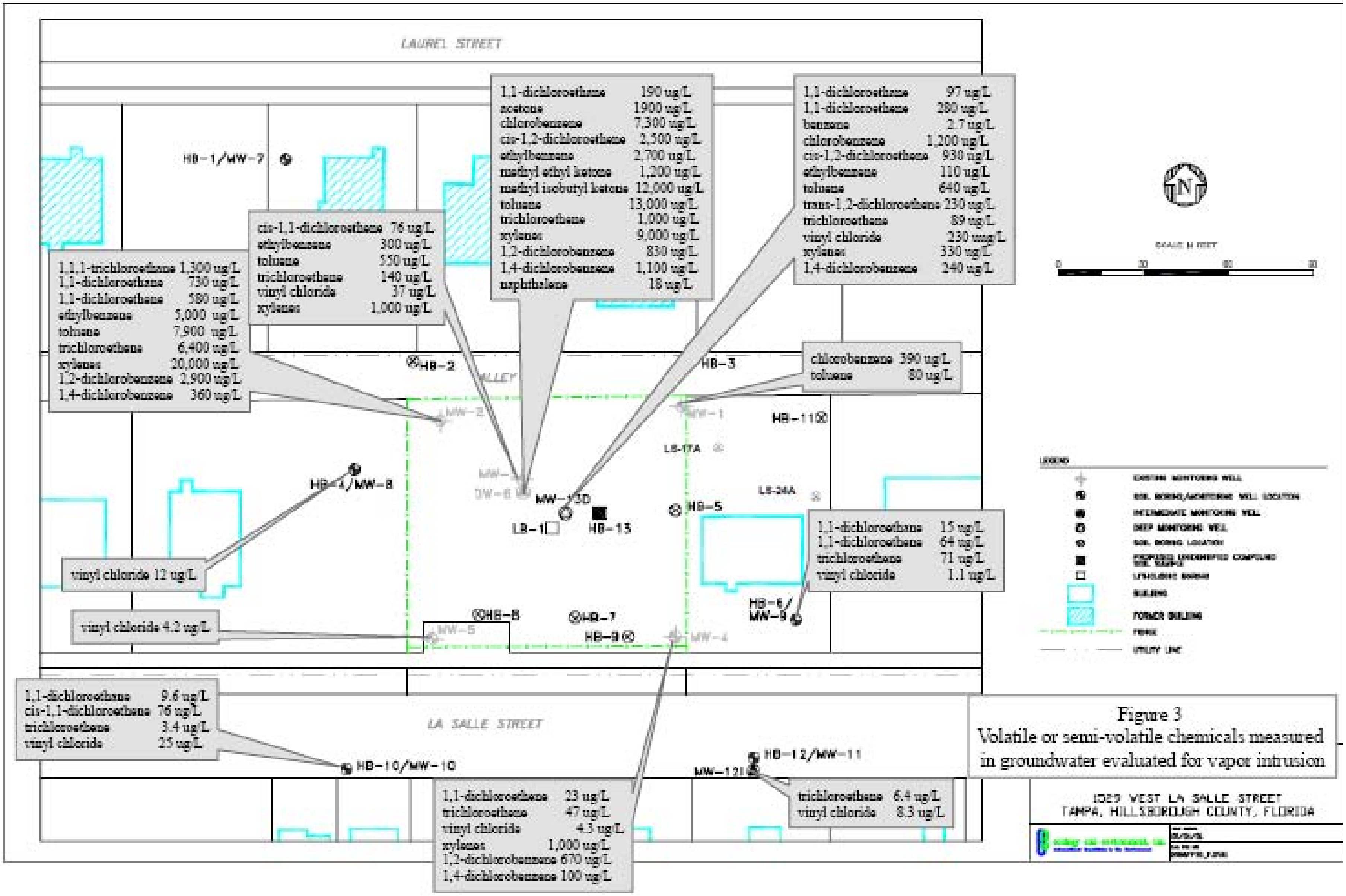

Figure 3
Volatile or semi-volatile chemicals measured in groundwater evaluated for vapor intrusion

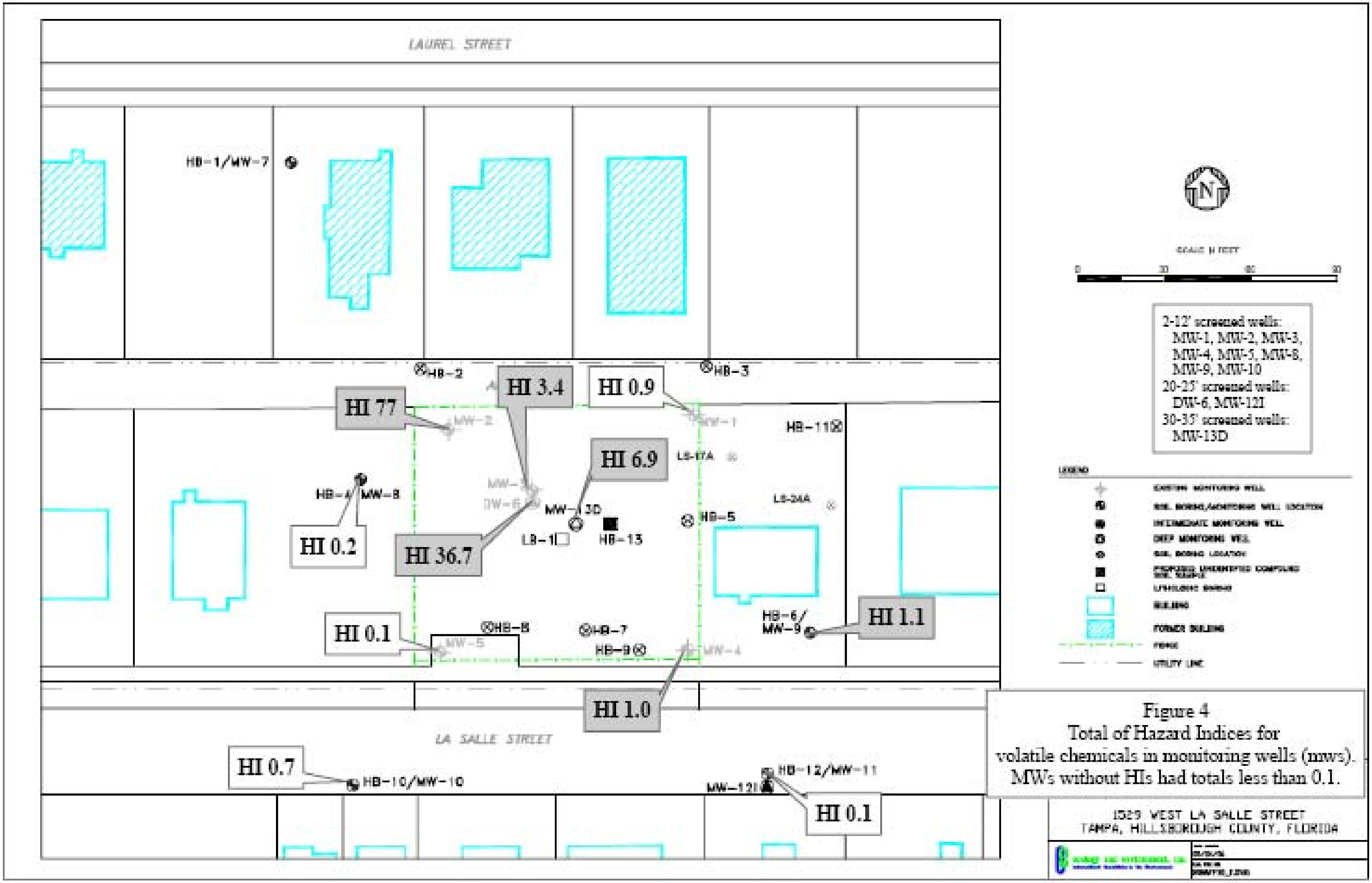

Figure 4
Total of Hazard Indices for
volatile chemicals in monitoring wells (mws).
MWs without HIs had totals less than 0.1.

Appendix B—Tables

Table 1a. Potential exposure pathway (evaluated in this report)

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental/ Exposure Media	Point of Exposure	Route of Exposure	Exposed Population and land use	
Shallow groundwater	Contaminated groundwater on the site	Shallow groundwater	Vapors inside homes constructed on non-vented slabs	Inhalation	Residents live over the contaminated shallow groundwater plume	Past Current Future

Table 1b. Exposure pathways (evaluated in a previous report)

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental/ Exposure Media	Point of Exposure	Route of Exposure	Exposed Population and land use	
Contaminated off-site surface soil, dust	Residential soil and soil on other properties	Wastes, surface and subsurface soil	Off-site properties	Incidental ingestion and inhalation	Off-site residents/owners, workers	Past Current Future

Pathway Name	Exposure Pathway Elements					Time
	Source	Environmental/ Exposure Media	Point of Exposure	Route of Exposure	Exposed Population and land use	
Contaminated off-site subsurface soil, dust	Residential soil and soil on other properties	Wastes, surface and subsurface soil	Off-site properties	Incidental ingestion and inhalation	Off-site residents/owners, workers	Past Current Future

Table 2a. Predicted Hazard Indices and Indoor Air Concentrations for chemicals measured in <u>shallow monitoring wells on the site</u>, should on-slab buildings be built.

Chemical	ATSDR Screening Values* µg/m³	ppbv	MW-1 HI	MW-1 conc. µg/m³ ppbv	MW-2 HI	MW-2 conc. µg/m³ ppbv	MW-3 HI	MW-3 conc. µg/m³ ppbv	MW-4 HI	MW-4 conc. µg/m³ ppbv	MW-5 HI	MW-5 conc. µg/m³ ppbv
1,1,1-trichloroethane	4,000	700			0.394300	867.4/159.1						
1,1-dichloroethane	-	500,00			0.306900	153.5/37.94						
cis-1,2-dichloroethene	-	-					0.954000	33.39/8.4				
1,1-dichloroethene	80	20			3.300000	**660.0/166.6**			0.130900	26.7/6.606		
ethylbenzene	4,000	1,000			1.473000	1,473/339.4	0.088370	88.37/20.36				
tetrachloroethene	300	40								37.28/5.5		
toluene	300	80	0.0560400	22.4/5.95	5.534000	**2,214/587.8**	0.385300	154.1/40.92				
trichloroethene	500	100			64.510000	**2,580/480.5**	1.411000	56.44/10.51	0.473700	18.95/3.5		
xylenes-o		50			0.187300	1,311/**302.1**	0.031210	218.5/50.35				
xylenes-m		50			0.259400	1,816/**418.4**						
1,2-dichlorobenzene		64,000			0.964800	193.0/32.12			0.222900	44.58/7.4		
1,4-dichlorobenzene	100	30,000			0.037800	30.2/5.033	0.010500	8.4/1.39	0.010500	8.4/1.398		
vinyl chloride	0.1	30					0.495700	49.57/19.4	0.057600	5.7/2.25		
chlorobenzene	-	50,000	0.8903000	52.97/11.51							0.056270	5.6/2.2
acetone	30,000	13,000										
methyl ethyl benzene	5,000	100,000										
methylisobutylketone	3,000	10,000										
naphthalene	3	700										
hexachloroethane	0.3	6,000										
trans-1,2-dichloroethene	800	200										
Total of Hazard Indices			0.9		77.0		3.4		1.0		0.1	

Screening Values: First column = lowest ATSDR Air Comparison Values in micrograms per cubic meter (µg/m³);
Second column = inhalation minimum risk level or lowest dose for adverse health effects in parts per billion per volume (ppbv).

Table 2b. Predicted Hazard Indices and Indoor Air Concentrations for chemicals measured in deep monitoring wells on the site, should on-slab buildings be built.

Chemical	Screening Values* µg/m³	Screening Values* ppbv	DW-6 HI	DW-6 conc. µg/m³ ppbv	MW-13D HI	MW-13D conc. µg/m³ ppbv
1,1,1-trichloroethane	4,000	700				
1,1-dichloroethane	-	500,00	0.054880	39.95/9.876	0.486200	19.45/3.621
cis-1,2-dichloroethene	-	-	10.840000	379.5/95.77	1.988000	69.57/17.56
1,1-dichloroethene	80	20	0.079890	27.44/6.784	0.8036	160.7/40.56
ethylbenzene	4,000	1,000	0.547000	547.0/126.0	0.016030	16.03/3.694
tetrachloroethene	300	40				
toluene	300	80	6.322000	**2,529/671.4**	0.225100	90.06/23.91
trichloroethene	500	100	6.955000	278.2/51.8	0.446100	17.84//3.323
xylenes-o		50	0.194900	1,365/**314.4**	0.001504	10.53/2.426
xylenes-m		50			0.004188	29.32/6.756
1,2-dichlorobenzene		64,000	0.188600	37.7/6.277		
1,4-dichlorobenzene	100	30,000	0.078920	63.13/10.51	0.012340	9.868/1.642
vinyl chloride	0.1	30			1.584000	**158.4/62.00**
chlorobenzene	-	50,000	11.430000	680.2/147.9	1.350000	80.30/17.45
acetone	30,000	13,000	0.014340	5.02/2.11		
methyl ethyl benzene	5,000	100,000		3.33/1.13	0.003300	
methylisobutylketone	3,000	10,000	0.568500	45.48/11.11		
naphthalene	3	700	0.064360	0.18/0.035		
hexachloroethane	0.3	6,000				
trans-1,2-dichloroethene	800	200			0.545000	38.15/9.628
Total of Hazard Indices			36.7		7.0	

Screening Values: First column = lowest ATSDR Air Comparison Values in micrograms per cubic meter (µg/m³);
Second column = inhalation minimum risk level or lowest dose for adverse health effects in parts per billion per volume (ppbv).

Table 2c. Predicted Hazard Indices for chemicals measured in monitoring wells on off-site non-residential properties, should slab-based buildings be built.

Chemical	Screening Values* µg/m3/ppbv		MW-7		MW-10		MW-11		MW-12I	
			HI	conc. µg/m3 ppbv	HI	conc. µg/m3 ppbv	HI	conc. µg/m3 ppbv	HI	conc. µg/m3 ppbv
1,1,1-trichloroethane	4,000	700								
1,1-dichloroethane	-	500,00			0.004037	2.018/0.4990				
cis-1,2-dichloroethene	-	-			0.329600	11.54/2.911				
1,1-dichloroethene	80	20								
ethylbenzene	4,000	1,000								
tetrachloroethene	300	40								
toluene	300	80								
trichloroethene	500	100			0.034270	1.371/0.2553			0.044510	1.78/0.3315
xylenes-o		50								
xylenes-m		50								
1,2-dichlorobenzene		64,000								
1,4-dichlorobenzene	100	30,000								
vinyl chloride	0.1	30			0.334900	33.49/13.11			0.078290	7.829/3.065
chlorobenzene	-	50,000								
acetone	30,000	13,000								
methyl ethyl benzene	5,000	100,000								
methylisobutylketone	3,000	10,000								
naphthalene	3	700								
hexachloroethane	0.3	6,000								
trans-1,2-dichloroethene	800	200								
Total of Hazard Indices			0.0		0.7		0.0		0.1	

Screening Values: First column = lowest ATSDR Air Comparison Values in micrograms per cubic meter ($\mu g/m^3$);
Second column = inhalation minimum risk level or lowest dose for adverse health effects in parts per billion per volume (ppbv).

Table 2d. Predicted Hazard Indices for chemicals measured in monitoring wells on off-site residential properties, for slab-based buildings.

Chemical	Screening Values* µg/m3/ppbv		MW-8	conc. µg/m3 ppbv	MW-9	conc. µg/m3 ppbv
1,1,1-trichloroethane	4,000	700				
1,1-dichloroethane	-	500,00			0.046250	23.13/5.717
cis-1,2-dichloroethene	-	-				
1,1-dichloroethene	80	20			0.364200	72.83/18.38
ethylbenzene	4,000	1,000				
tetrachloroethene	300	40				42.61/6.287
toluene	300	80				
trichloroethene	500	100			0.715600	28.63/5.33
xylenes-o		50				
xylenes-m		50				
1,2-dichlorobenzene		64,000				
1,4-dichlorobenzene	100	30,000				
vinyl chloride	0.1	30	0.160800	16.08/6.29	0.014740	1.474/0.5769
chlorobenzene	-	50,000				
acetone	30,000	13,000				
methyl ethyl benzene	5,000	100,000				
methylisobutylketone	3,000	10,000				
naphthalene	3	700				
hexachloroethane	0.3	6,000			0.026500	0.09/0.009585
trans-1,2-dichloroethene	800	200				
Total of Hazard Indices			0.1608000		1.1407900	

Screening Values: First column = lowest ATSDR Air Comparison Values in micrograms per cubic meter (µg/m^3);
Second column = inhalation minimum risk level or lowest dose for adverse health effects in parts per billion per volume (ppbv).

Certification

The Florida Department of Health, Bureau of Community Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. FDOH followed approved methodologies and procedures existing at the time the health consultation was begun. The Cooperative Agreement Partner completed editorial review.

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

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