January 29, 2016

Mr. Tom Higginbotham
Environmental Health Director
Florida Department of Health in Sarasota County
1001 Sarasota Center Blvd.
Sarasota, Florida 34240

Re: Individual Exposed to Contamination at the Cherokee Street Solvent Site

Dear Mr. Higginbotham:

At your request, the Florida Department of Health (DOH), Public Health Toxicology reviewed environmental data from the Cherokee Street Solvent Site (FDEP Site No. 392, COM_132484) in Sarasota, Florida. This assessment addresses health concerns of an individual who reported dermal exposure to contamination in the shallow groundwater at the Site (Figure 1). This individual reported wading up to his waist in a ditch filled with groundwater 8 hours a day for 5 to 7 days. The individual was exposed during a March 2013 stormwater drainage construction project. The individual is concerned exposure caused persistent headache, lumbago, poor peripheral circulation, dermatitis, and "shakes" (tremors).

Due to the low levels of contamination and the short exposure period, DOH does not expect that dermal exposure was sufficient to have caused the reported illnesses or symptoms.

This assessment requires the use of assumptions, judgments, and incomplete data. These factors contribute to uncertainty in evaluating the health threat. Assumptions and judgments in this assessment err on the side of protecting health and may therefore overestimate the risk.

The following paragraphs explain how Florida DOH arrived at this conclusion.

Site Description and Background

The Site is in a mixed residential and commercial section of Englewood, Florida near the intersection of Cherokee Street and Green Street (Figure 1). Cherokee Street runs northeast to southwest and dead-ends into Lemon Bay approximately 400 feet from the Site. Groundwater levels at the Site are approximately 3 feet below land surface (ft bls) and groundwater flow is southwest [PSI 2010].

Benzene, toluene, total xylenes, trichloroethene (TCE), *cis*-1,2-dichloroethylene (cDCE) and vinyl chloride have historically been present in groundwater at the Site. Florida Department of Environmental Protection (FDEP) also found these contaminants in groundwater along West Dearborn Street north of

Cherokee Street. FDEP recorded concentrations at both locations above state Groundwater Cleanup Target Levels (GCTLs) [PSI 2012].

Demographics

Approximately 2,800 people live within one mile of the site. Ninety-one percent (91%) are white, 7% are Hispanic origin, 1% is African-American, and 3% report more than one race or some other race. Nine percent (9%) are less than 18 years old. Fifty percent (50%) over 25 years old have a high school diploma or less and 75% make less than $50,000 a year [EPA 2015a].

Exposure Pathway

Complete Exposure Pathway

Dermal contact with cDCE and vinyl chloride in shallow groundwater is a complete exposure pathway (Table 1). At this site, solvent disposal is the source of contaminants. Groundwater is the environmental media. The point of exposure was a temporary ditch along Cherokee Street. Dermal contact is the route of exposure and the exposed population was the individual worker who waded in groundwater in the ditch.

Environmental Data

Florida DOH estimated exposure using the highest concentrations of cDCE and vinyl chloride measured October 2013 in monitor well MW-4A (Table 2) [Geosyntec 2013]. This well is approximately 200 feet west of where the individual was exposed in March 2013 (Figure 3).

Public Health Implications

DOH provides site-specific public health recommendations based on levels of environmental contaminants, evaluation of potential exposure pathways, duration of exposure, findings from the toxicological literature, and characteristics of the exposed population. Whether a person will be harmed depends on the type/amount of contaminant, how they are exposed, how long they are exposed, how much contaminant is absorbed, genetics, and individual lifestyle.

Identifying Contaminants of Concern

DOH selects contaminants with maximum concentrations above comparison values for further evaluation. Comparison values, however, are not thresholds of toxicity. We do not use them to predict health effects or to establish clean-up levels. A concentration above a comparison value does not necessarily mean harm will occur. It does indicate, however, the need for further evaluation. We do not evaluate further contaminants with maximum concentrations below comparison values. It is unlikely these lower contaminant concentrations would cause illness.

Because DOH did not have measurements of contaminant levels in the groundwater the individual was actually exposed to, it assumed the individual was exposed to the highest concentrations of contaminants from the nearest well tested in October 2013. This is a data gap. The October 2013 sampling was also the closest to the time of the individual's March 2013 exposure. Because levels of cDCE and vinyl chloride exceeded comparison values, DOH considered them contaminants of concern.

cis-1,2-dichloroethylene (cDCE)

The solvent cDCE is an odorless organic liquid. It also exists in a "*trans*" form. Both the *cis* and *trans* forms — usually as a mixture — are used as a solvent for waxes and resins; in the extraction of rubber; as a refrigerant; in the manufacture of pharmaceuticals and artificial pearls; in the extraction of oils and fats from fish and meat; and in making other organics [EPA 2015b].

DOH could not find studies on the effects of short-term (less than 30 days) dermal exposure to water with low levels of cDCE. The cancer risks from long-term exposure to cDCE has not been assessed [ATSDR 1996].

In general, volatile organic compounds (VOCs) like cDCE are used as solvents because they dissolve grease. When you get highly concentrated VOCs on your skin, they dissolve the grease in your skin leaving it dry and irritated. DOH would not expect this to happen, however, at the very low levels found in the Cherokee Street groundwater since they were near or below groundwater cleanup target levels (GCTL) used for drinking water standards [DEP 2005].

Vinyl Chloride

Vinyl chloride is a colorless gas. It can also exist as a liquid and dissolve in water. It burns easily and it is not stable at high temperatures. It has a mild, sweet odor. It is a manufactured substance that does not occur naturally. Vinyl chloride forms when other substances such as trichloroethene and tetrachloroethylene are broken down. Vinyl chloride is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and packaging materials [ATSDR 2006].

People who work at facilities that make vinyl chloride or PVC usually are exposed to higher levels than the general population. Work exposure occurs primarily from breathing air that contains vinyl chloride, but workers also are exposed when vinyl chloride contacts the skin or eyes. Based on studies using animals, it is possible that if vinyl chloride comes into contact with your skin or eyes, extremely small amounts could enter your body [ATSDR 2006]. The U.S. Department of Health and Human Services has determined that vinyl chloride is a known carcinogen. Studies in workers who have breathed vinyl chloride over many years showed an increased risk of liver, brain, lung cancer, and some cancers of the blood.

DOH could not find studies on the effects of short-term (less than 30 days) dermal exposure to water with low levels of vinyl chloride. However, Florida DOH does not expect health effects from the very low levels found in the Cherokee Street groundwater since they were near or below GCTLs used for drinking water standards [DEP 2005].

Evaluation of Health Concerns

The individual who worked up to his waist in groundwater for 5 to 7 days during installation of a stormwater system, complained of the following symptoms within the year following exposure: persistent headache, lumbago, poor peripheral circulation, dermatitis, and “shakes.”

Headache

Headaches are very common. Seven out of 10 Americans are affected. Pain can be anywhere in the head and can go down into the neck. Tension headaches and migraines are the two most common types. A dull pain characterizes tension headaches. Stress, worry, too much caffeine, alcohol, eyestrain, and overexertion can also trigger headaches. Sinus headaches (common with sinusitis or when the membrane lining the sinus is inflamed), rebound headaches, and cluster headaches are some less common types [AMA 1989].

Headaches are not known to be associated with dermal exposure to either cDCE or vinyl chloride.

Lumbago (low back pain)

Most people suffer from back pain at some time in their lives. In many cases it is labeled as “nonspecific back pain” and no exact diagnosis is made. Nonspecific back pain is one of the largest

single causes of lost working days in the United States. People most likely to suffer from back pain are those whose jobs require heavy lifting. Nonspecific back pain is thought to be due to a mechanical disorder affecting one or more structures. The disorder may be a ligament strain, a muscle tear, or damage to a spinal joint [AMA 1989].

Lumbago is not known to be associated with dermal exposure to either cDCE or vinyl chloride.

Poor Peripheral Circulation

Poor peripheral circulation can be due to narrowing of blood vessels in the legs, restricting blood flow and causing pain in the affected area. In most cases, it is caused by atherosclerosis, in which fatty plaques form on the walls of the arteries. The greatest risk factor is smoking; more than 90% of patients are, or were, moderate to heavy smokers.

The first symptom is usually an aching, tired feeling in the leg muscles when walking. It occurs most often in the calf but may be felt anywhere in the leg. As the disease worsens, the amount of activity possible before symptoms develop decreases, until eventually pain is present at rest. The affected limb may become cold and either pale or blue [AMA 1989].

Poor peripheral circulation is not known to be associated with dermal exposure to either cDCE or vinyl chloride.

Erythema, dermatitis, or skin rash

Inflammation of the skin is sometimes due to an allergy but in many cases occurs without any known cause. Contact dermatitis is a rash due to some substance coming in contact to the skin. The reaction may result from a direct toxic effect of the substance or may be an allergic response. The type of rash varies considerably according to the substance causing it, but it is often itchy and may flake or blister [AMA 1989].

Highly concentrated solutions of *cis*-1,2-dichloroehtylene and vinyl chloride can remove the oil from skin leaving it dry and irritated. It is unlikely, however, that the low concentrations found in the Cherokee Street groundwater could have caused this effect since they were near or below GCTLs used for drinking water standards [DEP 2005].

“Shakes” (aka tremor)

Tremor is an involuntary, rhythmic, oscillating movement in the muscles of part of the body, most commonly the hands, feet, or head. Occasional temporary tremors are experienced in almost everyone. Tremor may be caused by amphetamine drugs, antidepressant drugs, caffeine, and lithium. Tremor is also a feature of alcohol withdrawal [AMA 1989].

Tremor is not known to be associated with dermal exposure to either cDCE or vinyl chloride.

Summary

Due to the low contaminant levels and a short exposure period, dermal contact with the groundwater did not likely cause the reported symptoms or illnesses.

Please contact me at 877-798-2772 if I can answer any questions about this assessment.

Sincerely,

Alan Willett
Health Assessor

AW/aw
Attachments

This report was supported in part by funds provided through a cooperative agreement with the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. The findings and conclusions in these reports are those of the Florida Department of Health and do not necessarily represent the views of the Agency for Toxic Substances and Disease Registry or the U.S. Department of Health and Human Services. This document has not been revised or edited to conform to ATSDR standards.

References

[AMA 1989] American Medical Association. Encyclopedia of Medicine. Dorling Kidersley Limited and the American Medical Association. 1989.

[ATSDR 1996] U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Toxicological Profile for 1,2-Dichloroethene. August 1996. http://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=464&tid=82#bookmark03

[ATSDR 2006] U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Toxicological Profile for Vinyl Chloride. July 2006. http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=282&tid=51

[DEP 2005] Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C. Prepared for the Division of Waste Management, Florida Department of Environmental Protection by Center of Environmental & Human Toxicology, University of Florida, Gainesville, Florida. February 2005.

[EPA 2010] U.S. Environmental Protection Agency. Toxicological Review of *cis*-1,2-Dichloroethylene and *trans*-1,2-Dichloroethylene. September 2010. http://www.epa.gov/iris

[EPA 2015a] U.S. Environmental Protection Agency. EJSCREEN: Environmental Justice Screening and Mapping Tool website. Available online: http://www2.epa.gov/ejscreen . Accessed October 21, 2015.

[EPA 2015b] Basic Information about cis-1,2-Dichloroethylene in Drinking Water: http://water.epa.gov/drink/contaminants/basicinformation/cis-1-2-dichloroethylene.cfm

[Geosyntec 2013] Status Report (Dewatering) Cherokee Street Solvent Study, Englewood, Sarasota County, Florida. FDEP Site No. 392 and COM_132484. October 29, 2013.

[PSI 2010] Professional Service Industries, Inc. Groundwater Sampling and Analysis, Cherokee Street Solvent Study, Englewood, Sarasota County, Florida, FDEP Site No. 392 - PSI Project No. 0552322. May 18, 2010.

[PSI 2012] Professional Service Industries, Inc. Site Investigation – 446-454 West Dearborn Street and 505 West Dearborn Street, Cherokee Street Solvent Study, Englewood, Sarasota County, Florida, FDEP Site No. 392 - PSI Project No. 0552322. June 12, 2012

Table 1. Complete Human Exposure Pathway – Cherokee Street Solvent Site

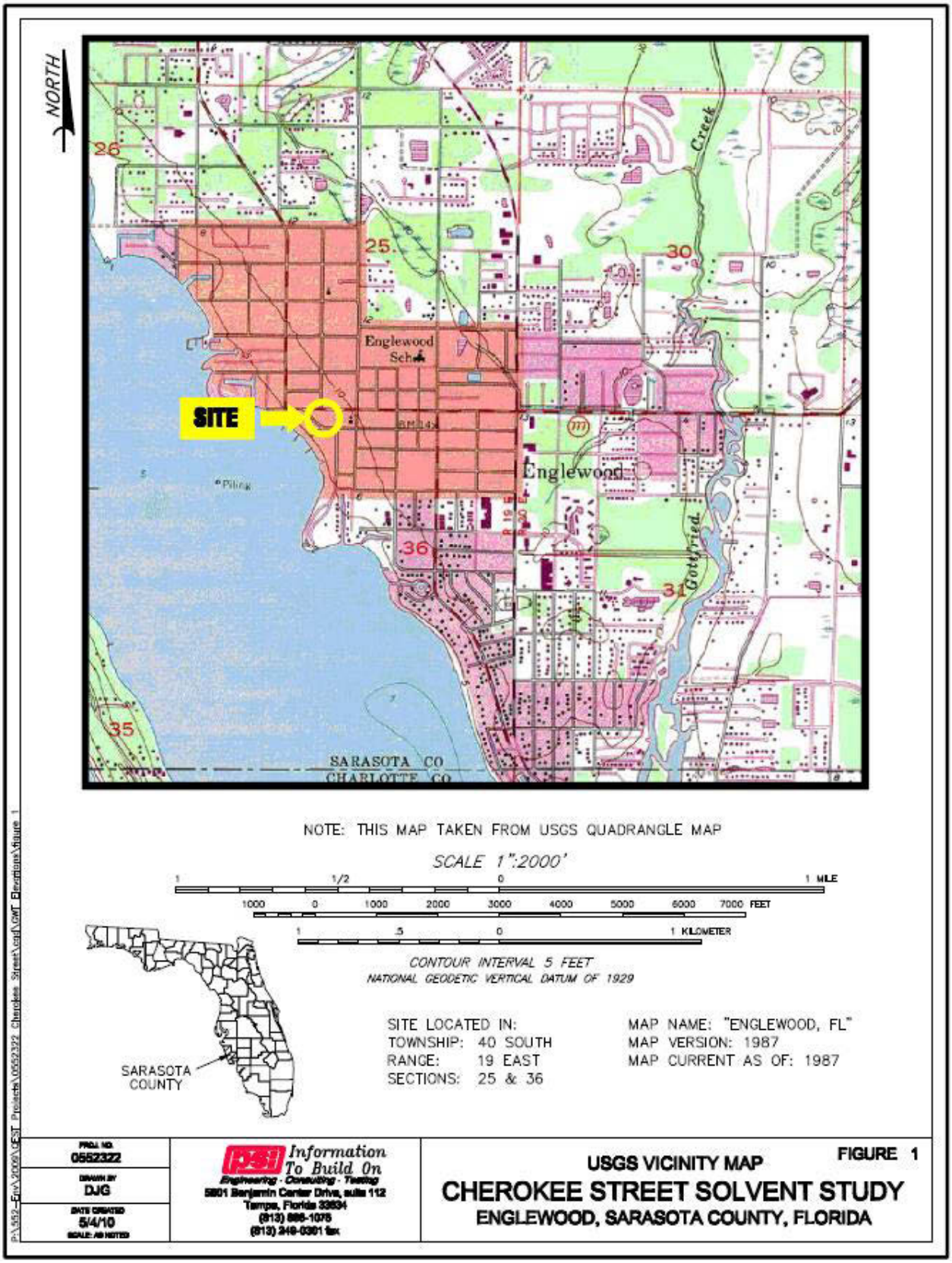
COMPLETE PATHWAY NAME	COMPLETE EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Dermal Contact with Groundwater	Solvent Disposal	Groundwater	Temporary ditch near Cherokee Street	Dermal contact	Individual worker	5-7 days around March 27, 2013

Table 2. Contaminants of Concern in Groundwater – Cherokee Street Solvent Site

Contaminants of Concern	Concentration Range (µg/L)	Groundwater Screening Level** (µg/L)	Source of Screening Guideline	Number of Samples Above Screening Guideline/Total Number
cis-1,2-Dichloroethylene	BDL – 77	70	DEP GCTL	1/4
Vinyl chloride	BDL – 40	1	DEP GCTL	2/4

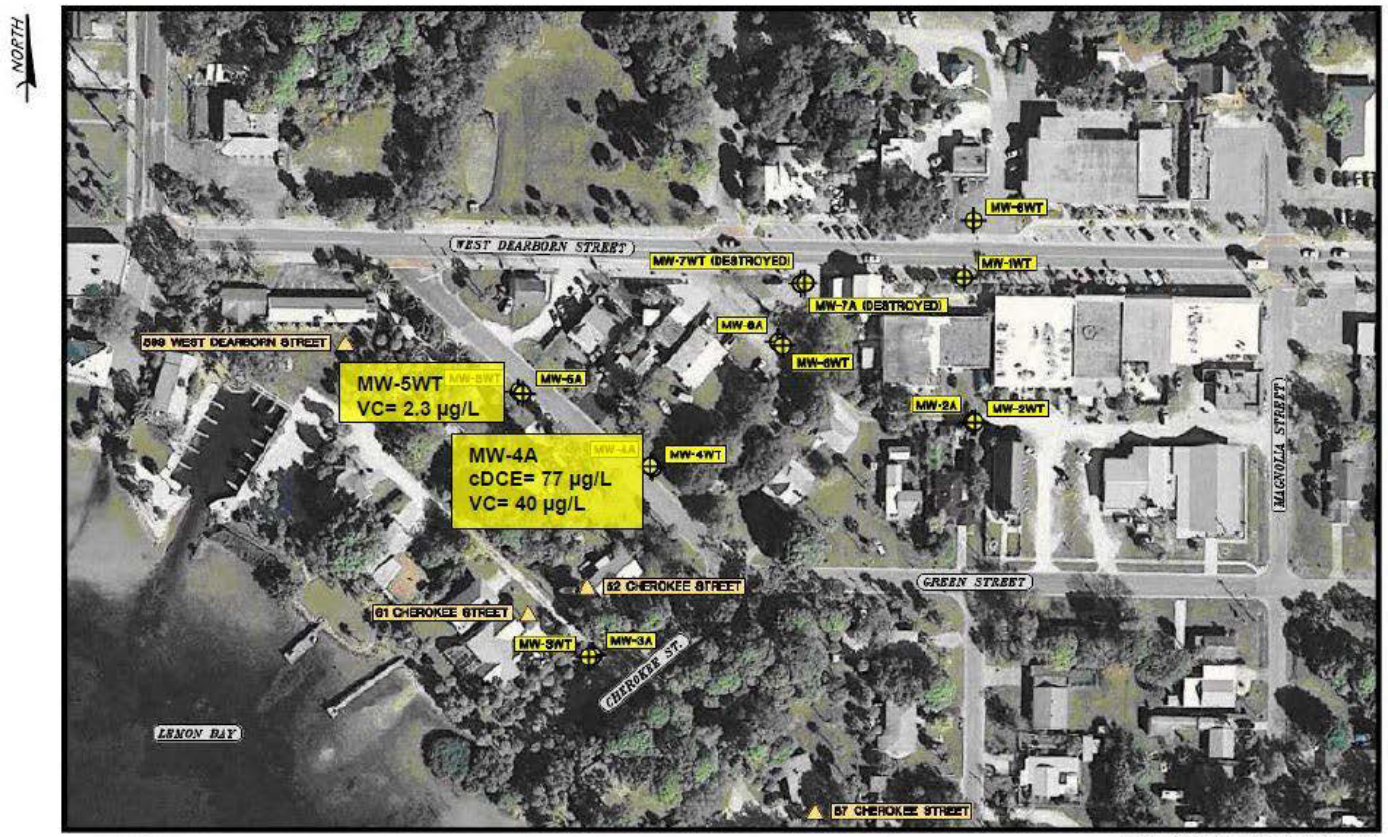
Source of data: [Geosyntec 2013]
ATSDR = Agency for Toxic Substances and Disease Registry
BDL = below detection limits
DEP = Florida Department of Environmental Protection
GCTL = groundwater cleanup target level [FDEP 2005]
µg/L = micrograms per litter
** Guidelines only used to select chemicals for further scrutiny, not to the judge the risk of illness.

Figure 1. Site Location – Cherokee Street Solvent Site



Source: [PSI 2010]

Figure 2. Monitoring Well Locations with October 2013 Sample Results – Cherokee Street Solvent Site



Notes:

1. Site layout map is an excerpt from May 2010 Groundwater Sampling and Analysis Report provided by Professional Service Industries, Inc.
2. Only exceedances of the Groundwater Cleanup Target Level (GCTL), as defined in Chapter 62-77, Florida Administrative Code (FAC) during the October 2013 groundwater sampling event are illustrated.
3. VC = vinyl chloride
4. cDCE = cis-1,2 dichloroethene
5. µg/L = micrograms per liter (parts per billion)

Monitoring Well Layout Map
Cherokee Street Solvent Study
Englewood, Sarasota County, Florida
FDEP Site No. 392 and COM_132484

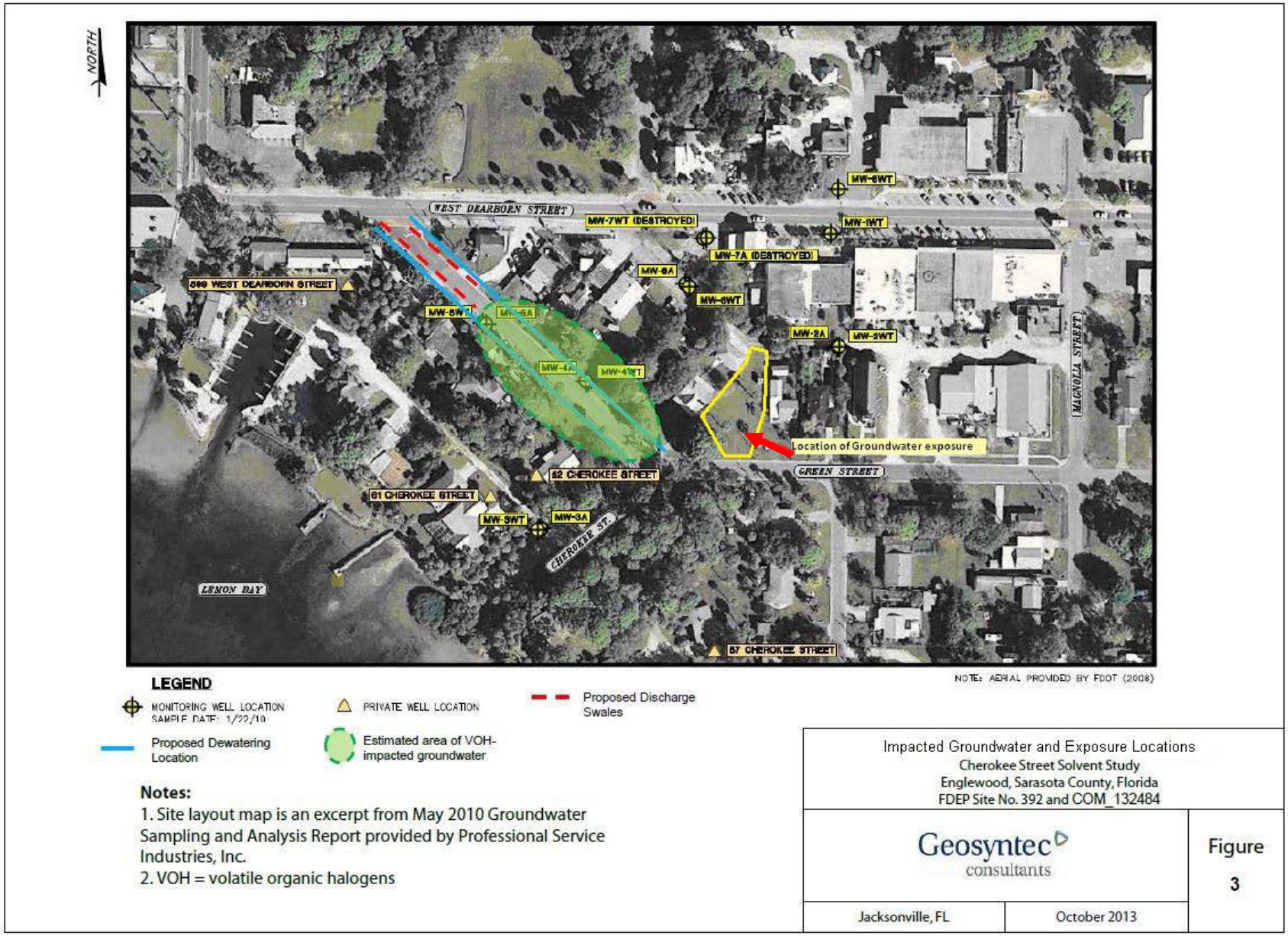
Geosyntec consultants

Figure 2

Jacksonville, FL | October 2013

Source: [Geosyntec 2013]

Figure 3. Impacted Groundwater and Exposure Locations – Cherokee Street Solvent Site



Source: [Geosyntec 2013]