

# **Letter Health Consultation**

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**Vapor Intrusion Investigation – September 2016 Sampling Event**  
**HEMPHILL ROAD TCE NATIONAL PRIORITY LIST (NPL) SITE**  
**GASTONIA, NORTH CAROLINA**  
**EPA FACILITY ID: NC0002374445**

**Prepared by:**  
**North Carolina Department of Health and Human Services**

**JUNE 21, 2017**

**Prepared under 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

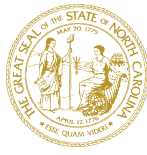
Vapor Intrusion Investigation – September 2016 Sampling Event

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North Carolina Department of Health and Human Services  
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June 21, 2017

Carolyn Callihan  
Remedial Project Manager  
Superfund Restoration and Site Evaluation Section  
EPA Region 4  
61 Forsyth Street, S.W.  
Atlanta, GA 30303

**Re: Hemphill Road TCE National Priority List (NPL) site (EPA ID NC0002374445) Vapor Intrusion Investigation – September 2016 sampling event**

Dear Ms. Callihan,

In August 2016, you contacted the Health Assessment, Consultation and Education (HACE) Program within the North Carolina Division of Public Health (DPH) to request a health consultation addressing the potential health impacts of exposure to chemicals from vapor intrusion at the Hemphill Road Trichloroethylene (TCE) NPL site (EPA ID NC0002374445). Groundwater and soil gas sampling that occurred between May 2014 and August 2016 indicated the potential for vapor intrusion at residences west of the site (Attachment A). EPA sampled indoor air, crawlspace air, and ambient air at three homes and crawlspace and ambient air at a fourth home in September 2016 (Attachment B). A DPH health assessor has examined the indoor air sample results from this sampling event to identify if there were possible health risks. DPH concludes breathing air with TCE and related chemicals at levels measured in this sampling event is not expected to harm people's health.

Per vapor intrusion guidance [ATSDR 2016], we recommend that EPA collect samples during multiple seasons (i.e. summer and winter) to better characterize seasonal variability. Additionally, we recommend that EPA continue to monitor the groundwater plume near this site at least yearly and conduct vapor intrusion investigations when concentrations of volatile organic compounds (such as TCE or tetrachloroethylene) exceed vapor intrusion screening levels near

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homes and businesses. We provided you with a factsheet to distribute to the public about TCE exposure and health risks (Attachment C).

There are uncertainties and limitations inherent in any health assessment process. For this evaluation, a significant limitation is the lack of data to demonstrate temporal variation for vapor intrusion. The vapor intrusion pathway can change based on many factors, including time of year and weather conditions during testing. Data collected during one sampling event over a short time span (24-hours) may not be indicative of the typical conditions found at the site. Risk of negative health effects would increase or decrease if the typical concentrations of chemicals in indoor air are higher or lower than those measured during the September 2016 sampling event. The following information provides a more detailed explanation of how we reached our conclusions and recommendations.

## **Background and Statement of Issues**

The Hemphill Road TCE National Priority List site is located at 5900 Hemphill Road (SR 2421) in Gastonia, North Carolina. Groundwater contamination was initially detected on the site in 1989. The principal contaminants of concern are the organic solvents TCE and tetrachloroethylene (also known as perchloroethylene, perc, or PCE). The suspected source of the TCE is related to chemical drum recycling operations that took place on the site by a former owner from approximately 1950-57. Contaminated groundwater has moved away from the site towards residential areas and is still migrating. Soil at the site is classified as clay and sandy clay loam. Bedrock beneath the site consists of granite with quartz veins. The North Carolina Department of Environmental Quality (DEQ) has stated that groundwater under the site is unconfined<sup>1</sup> and located primarily within fractured bedrock. Groundwater below the site moves from the southeast to the northwest toward the unnamed tributary flowing east to west on the northern property boundary. There have been previous VI investigations of the homes directly west of the NW corner of the property, but not vapor intrusion was indicated at those properties. Measured groundwater depths ranged from approximately 15 to 36 feet below ground surface.

EPA sampled indoor air, crawlspace air, and ambient air at three homes and crawlspace and ambient air at a fourth home in September 2016. Samples were analyzed for 1,1-dichloroethene, cis-1,2-dichloroethene, naphthalene, PCE, trans-1,2-dichloroethene, TCE, and vinyl chloride. HACE has reviewed these data to determine if residents are being exposed to chemicals at levels that may negatively impact their health.

## **Discussion**

### Exposure Pathways Examined

Previous investigations have evaluated exposure to TCE-contaminated groundwater near the site [ATSDR *in progress*]. This evaluation is focused on the vapor intrusion pathway at four residences west of the Hemphill Road NPL site.

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<sup>1</sup> An aquifer is an underground layer of water-bearing soil, gravel or rock from which groundwater can be extracted using a well. In an unconfined aquifer there is not a water-impermeable layer between the aquifer and the ground surface that prevents substances from the ground surface to make their way to the underground water supply.

## Environmental Sampling Data Analysis

### Previous Groundwater and Soil Gas Sampling

EPA collected groundwater samples in October 2015 that showed TCE at levels as high as 107 micrograms per liter ( $\mu\text{g/L}$ ) near homes west of the site (Attachment A; range 49.8-107  $\mu\text{g/L}$ ), exceeding the NC DEQ vapor intrusion screening level (VISL) of 1.04  $\mu\text{g/L}$  and ATSDR's comparison value (CV)<sup>2</sup> of 0.55  $\mu\text{g/L}$ . Soil gas vapor samples taken in August 2016 from this area had TCE levels as high as 1,180 micrograms per cubic meter ( $\mu\text{g/m}^3$ ) (Attachment A, Figure 1; range 1.2-1,180  $\mu\text{g/m}^3$ ), exceeding DEQ's VISL of 13.9  $\mu\text{g/m}^3$  and ATSDR's CV of 7.3  $\mu\text{g/m}^3$ .

EPA collected groundwater samples in October 2015 that did not have any PCE detected. Soil gas vapor samples taken in August 2016 from this area had PCE levels as high as 842  $\mu\text{g/m}^3$  (Attachment A, Figure 1; range 1.4-842  $\mu\text{g/m}^3$ ), exceeding DEQ's VISL of 278  $\mu\text{g/m}^3$  and ATSDR's CV of 127  $\mu\text{g/m}^3$ .

EPA collected groundwater samples in October 2015 that did not have any vinyl chloride detected. Soil gas vapor samples taken in August 2016 from this area detected vinyl chloride in one sample at 33.6  $\mu\text{g/m}^3$  (Attachment A, Figure 1), which is below DEQ's VISL of 55.9  $\mu\text{g/m}^3$  but above ATSDR's CV of 3.7  $\mu\text{g/m}^3$ .

### September 2016 Air Sampling

EPA collected samples from indoor air, crawlspace air, and ambient (outdoor) air at three homes and crawlspace and ambient air at a fourth home in September 2016 (Attachment B).

Naphthalene, PCE, and TCE were the only compounds detected (Table 1).

**Table 1.** September 2016 vapor intrusion investigation sample results.

Residence	Media	Naphthalene ( $\mu\text{g/m}^3$ )	Tetrachloroethylene ( $\mu\text{g/m}^3$ )	Trichloroethylene ( $\mu\text{g/m}^3$ )
HH27	Indoor air	1.7 J – 1.8 J	ND	ND
	Crawlspace air	ND	ND	0.34 J
	Ambient air	ND	ND	0.22 J
HH28	Indoor air	0.52 J	ND	ND
	Crawlspace air	ND	ND	ND
	Ambient air	ND	0.40 J	0.28 J
HH29	Indoor air	0.94 J – 1.3 J	5.5 – 5.9	ND
	Crawlspace air	ND	1.5	ND
	Ambient air	ND	ND	0.26 J
HH30	Indoor air	Sample Not Collected		
	Crawlspace air	ND	ND	0.19 J
	Ambient air	ND	ND	ND

Notes: ( $\mu\text{g/m}^3$ ) = micrograms of chemical per cubic meter of air; J = approximate value; ND = chemical was not detected in the sample

<sup>2</sup> ATSDR CVs for groundwater and soil gas data for TCE, PCE, and vinyl chloride were calculated using ATSDR's Cancer Risk Evaluation Guide (CREG) for each chemical with attenuation factors and Henry's Law constants applied.

Naphthalene was detected in the indoor air of all three homes at levels ranging from 0.52-1.8  $\mu\text{g}/\text{m}^3$ . All detections of naphthalene were below the ATSDR Minimal Risk Level (MRL)<sup>3</sup> of 3.7  $\mu\text{g}/\text{m}^3$  but above EPA's regional screening level (RSL)<sup>4</sup> of 0.083  $\mu\text{g}/\text{m}^3$ . Naphthalene was not detected in any crawlspace or ambient air samples, indicating a likely indoor source of the contaminant.

PCE was detected in the crawlspace of one home at 1.5  $\mu\text{g}/\text{m}^3$  and in the indoor air at the same home at an average level of 5.7  $\mu\text{g}/\text{m}^3$ . The level detected in the indoor air exceeds the ATSDR Cancer Risk Evaluation Guide (CREG) of 3.8  $\mu\text{g}/\text{m}^3$  but is below the MRL of 41  $\mu\text{g}/\text{m}^3$ . PCE was not detected in any other homes.

TCE was detected in two crawlspace air samples (0.19 and 0.34  $\mu\text{g}/\text{m}^3$ ) and three ambient air samples (0.22-0.28  $\mu\text{g}/\text{m}^3$ ), but was not detected in any indoor air samples. The CREG for TCE is 0.22  $\mu\text{g}/\text{m}^3$  and the MRL is 2.1  $\mu\text{g}/\text{m}^3$ .

#### *Health Effect Evaluation*

Per vapor intrusion guidance, more sampling is needed to fully evaluate the potential vapor intrusion pathway [ATSDR 2016]. However, assuming the September 2016 sampling event is representative of typical conditions in these homes, exposure to hazardous chemicals through the vapor intrusion pathway is unlikely to result in health effects.

The concentrations of naphthalene detected in indoor air were above EPA's regional screening level of 0.083  $\mu\text{g}/\text{m}^3$  but below the MRL of 3.7  $\mu\text{g}/\text{m}^3$ . Non-cancer health effects are not expected from exposure to naphthalene at levels detected in the September 2016 sampling. Naphthalene is classified by the EPA as a possible human carcinogen. DPH used CalEPA's Inhalation Unit Risk (IUR) value for naphthalene ( $3.4\text{E}-5$  ( $\mu\text{g}/\text{m}^3$ )<sup>-1</sup>) to calculate the estimated excess cancer risk for residents exposed at the measured levels for a 33-year residency. There is a low estimated excess cancer risk (8 in 1,000,000 to 3 in 100,000) for people exposed to a range of 0.52 – 1.8  $\mu\text{g}/\text{m}^3$  of naphthalene daily for a period of 33 years.

The measured level of PCE in indoor air of one home was well below the MRL, which indicates that non-cancer health effects are not expected. PCE is classified by EPA as likely to be carcinogenic to humans. DPH used EPA's IUR value for PCE ( $2.6\text{E}-7$  ( $\mu\text{g}/\text{m}^3$ )<sup>-1</sup>) to calculate the estimated excess cancer risk for residents exposed to 5.7  $\mu\text{g}/\text{m}^3$  of PCE for a 33-year residency. There is a very low increase in cancer risk (less than one in a million) for people exposed to 5.7  $\mu\text{g}/\text{m}^3$  of PCE daily for a period of 33 years.

TCE levels in ambient air and crawlspace samples slightly exceeded the CREG, but these values are below the laboratory reporting limit of 1.1  $\mu\text{g}/\text{m}^3$ . TCE was not detected in any indoor air samples. DPH used EPA's IUR value for TCE ( $4.1\text{E}-6$  ( $\mu\text{g}/\text{m}^3$ )<sup>-1</sup>) to calculate the estimated excess cancer risk for residents exposed to 0.34  $\mu\text{g}/\text{m}^3$  of TCE for a 33-year residency. There is a very low increase in cancer risk (less than one in a million) for people exposed to 0.34  $\mu\text{g}/\text{m}^3$  of TCE daily for a period of 33 years.

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<sup>3</sup> The MRL is an estimate of daily exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful, noncancerous effects.

<sup>4</sup> EPA's RSL is based on a CalEPA's inhalation unit risk value for a cancer health endpoint.

DPH recommends that EPA continue to monitor the groundwater plume near this site at least yearly and conduct vapor intrusion investigations when concentrations of volatile organic compounds (such as TCE, PCE, vinyl chloride, etc.) exceed vapor intrusion screening levels near homes and businesses. We will continue to work with you to provide health information and assessments for people who are at risk of exposure to contaminants from the Hemphill Road TCE NPL site. We look forward to continued collaboration with your team. If you have any questions or concerns, please feel free to contact me at [beth.dittman@dhhs.nc.gov](mailto:beth.dittman@dhhs.nc.gov) or by phone at (919) 707-5900.

Thank you,

Beth Dittman  
Health Assessor and Principal Investigator  
Health Assessment, Consultation and Education Program  
North Carolina Division of Public Health

Cc: Curtis Hopper  
Environmental Health Services Administrator  
Gaston County Department of Health and Human Services



## References

[ATSDR 2016] *Evaluating Vapor Intrusion Pathways: Guidance for ATSDR's Division of Community Health Investigations*. Agency for Toxic Substances and Disease Registry. October 31, 2016.

[ATSDR *in progress*] *Hemphill Road TCE NPL Site Evaluation of TCE in Drinking Water*. N.C. DHHS DPH OEEB. Expected 2017.

## **Report Preparation**

The North Carolina Department of Health and Human Services prepared this letter health consultation for the Hemphill Road TCE NPL site 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.

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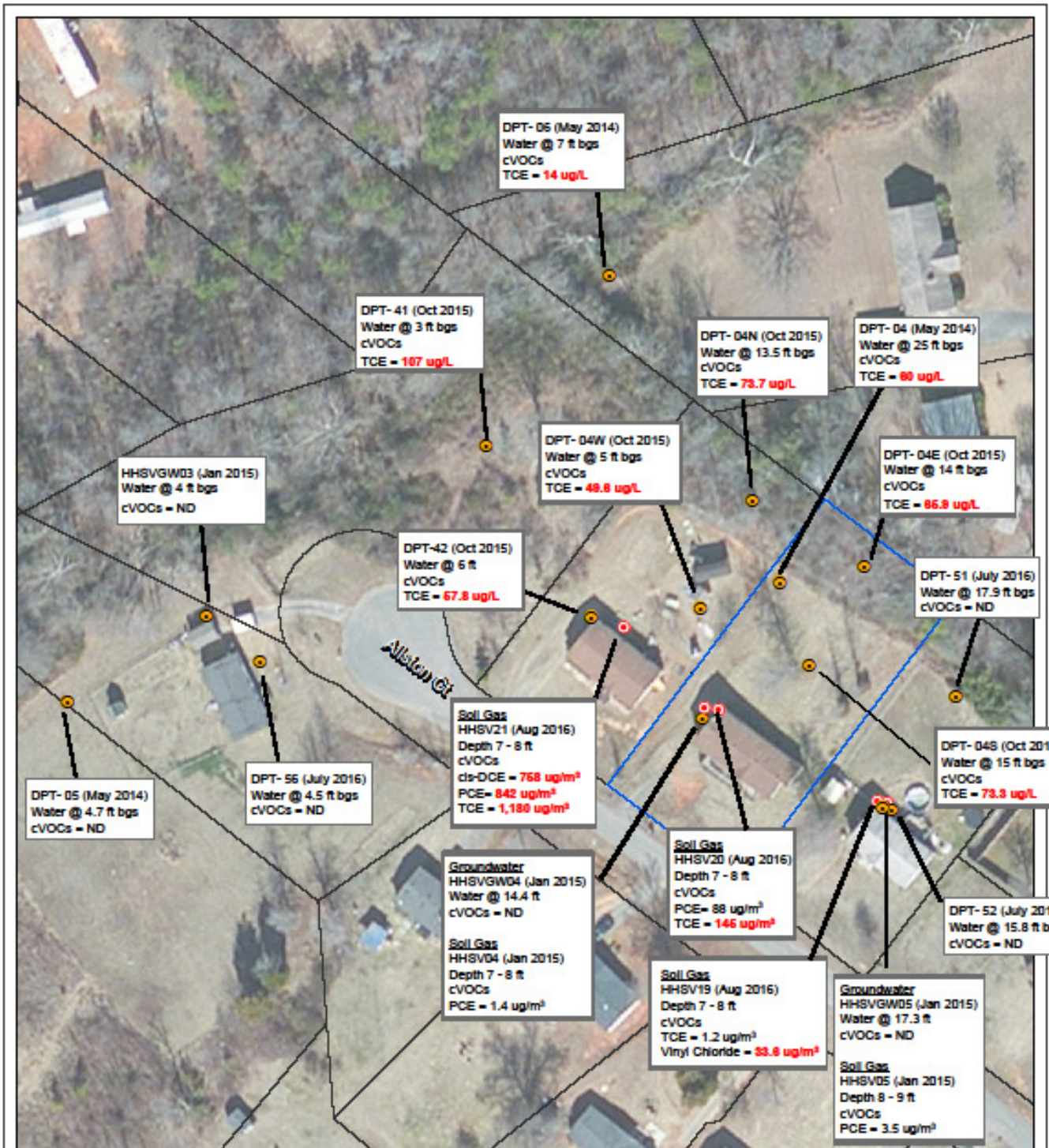
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Ileana Arias, PhD, Division Director

**Attachment A – Map of previous groundwater and soil gas samples taken near residences west of the Hemphill Road TCE NPL site.**

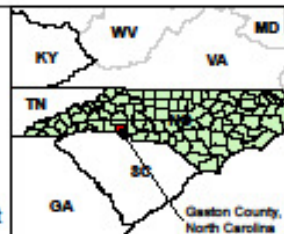


**Legend**

- DPT Groundwater Sample Location
- Hemphill Site
- Soil Gas Sample Location
- Parcels



1 inch = 1200 feet



Hemphill Road TCE Site  
Gaston, Gaston County  
North Carolina

**Figure 1**  
**DRAFT Summary of**  
**Groundwater and**  
**Soil Gas Investigations**

J.M. WALKER  
ASSOCIATES, INC.

**Attachment B – Map of proposed sampling locations for indoor air and crawlspace air at residences west of the Hemphill Road TCE NPL site.**





Note: This figure is from the proposed work plan. In September 2016, all samples were taken as indicated, except for HH30IA0916 due to denial of access.

**Attachment C – HACE TCE Factsheet Provided to EPA for Distribution**



# Trichloroethylene (TCE)

2016

Exposure to Trichloroethylene (TCE) has the potential to harm your health. The health effects of contact with any hazardous substance depend on how much, for how long and the way you are exposed. The effects also depend on personal factors such as your overall health, family history and lifestyle.

## What is TCE?

Trichloroethylene (TCE) is a volatile, nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste.

## Where is TCE found?

It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in glue, paint removers, typewriter correction fluids, stain removers and gun cleaners. It has been used to clean electronic components.

## How could I be exposed to TCE?

- Breathing, drinking or through skin contact.
- Contact with contaminated soil.
- Drinking from a contaminated well or water source.
- If your water source is contaminated with TCE, activities such as showering, doing dishes or running a dish washer or a washing machine can cause TCE in the water to evaporate and contaminate your indoor air.
- It can get into indoor air through the use of products that contain TCE in the home or by vapor intrusion. Vapor intrusion occurs when TCE in the groundwater or soil evaporates and gets into a building where people can breath it.

## What guidelines have been set to protect human health?

The U.S. Environmental Protection Agency (EPA) has established health guidelines for TCE in the air of 2.0 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). The maximum contaminant level for TCE in public drinking water systems is 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts of water (5 ppb).

## How can TCE affect my health?

Exposure in workplace settings showed that breathing small amounts for short periods may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating. Drinking or breathing small amounts of TCE for longer periods may cause damage to the kidneys, heart, reproductive system, or immune system, and impaired fetal development in pregnant women.



Drinking or breathing larger amounts of TCE for long periods may cause damage to the nervous system, liver, or changes in mood or sleep patterns. Skin contact with TCE for short periods may cause skin rashes.

TCE is classified as a human carcinogen by the EPA. Studies have shown a strong association of TCE with kidney cancer. Studies suggest that TCE may be associated with liver cancer and non-Hodgkin's lymphoma. It may also be associated with childhood leukemia, bladder, esophageal, prostate, cervical, and breast cancers, although the evidence is weaker.

### How can I limit my exposure to TCE?

- Remove household sources of TCE.
- If your private well water is contaminated use an alternative source of water or a whole-house carbon filter and keep up with the filter maintenance.
- If you are concerned about TCE vapor intrusion, contact an environmental professional to assist in the initial evaluation, design, and installation of a control system.

### When should I see a doctor?

See a physician if you or your children have symptoms that you think are caused by TCE exposure. You should tell the physician about the symptoms and about when, how and for how long you think you and/or your children were exposed to TCE.

### Well Testing

Contact your local health department to have your well water tested.

### Additional information

NC Department of Health and Human Services, Division of Public Health, Health Assessment, Consultation and Education program at (919) 707-5900 for additional information.

### References

U.S. Environmental Protection Agency. Toxicological Review of Trichloroethylene (CAS No. 79-01-6) in Support of Summary Information on the Integrated Risk Information System (IRIS). September 2011. Available at <http://www.epa.gov/iris/supdocs/0199/index.html>

U.S. Environmental Protection Agency. Trichloroethylene. Technology Transfer Network, Air Toxics Web Site. Accessed on November 20, 2012 from <http://www.epa.gov/ttn/atw/hlthef/tri-ethy.html#ref4>

Agency for Toxic Substances and Disease Registry (ATSDR). ToxFAQs for Trichloroethylene (TCE). Accessed on November 13, 2012 from <http://www.atsdr.cdc.gov/toxfaq19.html>



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