

Health Consultation

CONCORD CLEANERS

NASHVILLE, DAVIDSON COUNTY, TENNESSEE

EPA FACILITY ID: TND0344829952

DCERP FACILITY ID #D-19-165

APRIL 4, 2005

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 that, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

HEALTH CONSULTATION

CONCORD CLEANERS

NASHVILLE, DAVIDSON COUNTY, TENNESSEE
EPA FACILITY ID: TND0344829952
DCERP FACILITY ID #D-19-165

Prepared by:

Tennessee Department of Health
Under a Cooperative Agreement with
The Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

In October 2004, the Tennessee Department of Environment and Conservation (TDEC), Division of Remediation (DOR), Drycleaner Environmental Response Program (DCERP), contacted the Tennessee Department of Health (TDH), Environmental Epidemiology (EEP). DCERP requested that EEP review environmental sampling data for air quality within a building that housed a former drycleaning facility. The Concord Cleaners facility was formerly operated at 3706 Hillsboro Pike, Nashville, Davidson County, Tennessee, 37215 (Figure 1).

Over the years, the drycleaning industry has used several different solvent cleaners. The drycleaner solvent of concern at this site is tetrachloroethylene (PCE). At sites where drycleaning was performed for many years, it is not uncommon to find that cleaning solvents lost through routine operations have contaminated the soils and groundwater underneath the building, and in some cases the contamination spreads to adjacent properties. The State of Tennessee has established the DCERP to cleanup sites where drycleaning operations have created pollution.

The Concord Cleaners operated as a drycleaning business on the subject property from the 1950s to July 1999. After the closing, the building was renovated for a coffee shop which is still operating at this time. Concord Cleaners building fronts Hillsboro Pike, a major urban highway, and is located within a dense commercially developed area.

In 1999, Concord Cleaners entered into the DCERP and is registered as Abandoned Facility #D-19-165. Ten groundwater monitoring wells were constructed on the property during the course of subsequent environmental investigations. The sampling of the groundwater from the monitoring wells revealed the presence of PCE and its breakdown products. Additionally, other groundwater contaminants found at the site include benzene, toluene, ethylbenzene and xylenes. Collectively these constituents are commonly referred to as BTEX. BTEX chemicals are used in gasoline and are commonly associated with automotive exhaust emissions and automotive service stations that had underground storage tanks that leaked. These constituents are not considered to be related to this drycleaner site.

There is a basement below the main floor of the building that housed the drycleaner business. The basement is unfinished and utilized for non-food item storage. The floor of the basement is concrete and toward the west side of the basement there is a shallow concrete pit or sump in the floor (Figure 2). The sump is approximately five feet square and eighteen inches deep. During the course of the environmental investigations, it was found that groundwater enters the sump. Since the groundwater in the monitoring wells contained drycleaner solvent, DCERP directed that the sump water be tested.

The groundwater in the sump contained the same contaminants as found in the monitoring wells. However, of particular concern to DCERP was the increase in the level of PCE and its breakdown products in the sump water. DCERP subsequently directed that air sampling be conducted in the basement to determine whether detrimental levels of contaminants were present in the indoor air. The analytical data from the indoor air and water samples collected in the Concord Cleaners basement (TVG; August 2004, October 2004, and January 2005) will be the focus of the health document.

Discussion

Introduction to Chemical Exposure

To determine whether persons are, have been, or are likely to be exposed to chemicals, Environmental Epidemiology of the Tennessee Department of Health evaluates mechanisms that could lead to human exposure. An exposure pathway contains five parts:

1. a source of contamination
2. contaminant transport through an environmental medium,
3. a point of exposure
4. a route of human exposure, and
5. a receptor population

An exposure pathway is considered complete if there is evidence that all five of these elements are, have been, or will be present at the site. The pathway is considered either a potential or an incomplete exposure pathway if there is no evidence that at least one of the five elements listed is, has been, or will be present at the site, or if there is a lower probability of exposure.

When a chemical is released from an area such as an industrial plant or from a container such as a drum, it enters the environment. A chemical release does not, however, always lead to human exposure. Persons can be exposed to a chemical when contact is made by breathing, eating, drinking, or otherwise touching the chemical.

Furthermore, physical contact alone with a potentially harmful chemical in the environment by itself does not necessarily mean that a person will develop adverse health effect. A chemical's ability to affect public health is also controlled by a number of other factors, including:

- the amount of the chemical that a person is exposed to (dose)
- the length of time that a person is exposed to the chemical (duration)
- the number of times a person is exposed to the chemical (frequency)
- the person's age and health status
- the person's diet and nutritional habits.

Environmental Sampling

Groundwater

During the course of the DCERP assessment process to characterize the contaminant impact to the subsurface environment of the site, shallow groundwater samples were obtained from monitoring wells and the basement sump in August 2004 and October 2004. The August 2004 water sample was obtained from the standing water present in the sump. The October 2004 water sample was obtained from the sump after it had been purged of standing water and allowed to recharge with groundwater. The sump is approximately 18 inches deep, and the monitoring wells range from 8 to 46 feet in depth. The predominate depth to the groundwater in the monitoring wells (i.e. from the ground surface to the water in the well casing) is less than 7 feet. Thus, the overall groundwater level at this site is shallow in depth.

Laboratory analysis of water samples from the sump (Table 1) have confirmed the presence of drycleaner solvent and its breakdown products. As tetrachloroethylene in the groundwater degrades, it chemically changes to trichloroethylene, dichloroethylene, and vinyl chloride.

TABLE 1. Summary of the analytical results for drycleaner solvent and its breakdown products in shallow groundwater collected from the sump. Results are reported in parts per billion (ppb or µg/L).		
Chemical	Sampling Date 8/10/04	Sampling Date 10/14/04
Tetrachloroethylene	1.4	54,000
Trichloroethylene	not detected	8,000
Dichloroethylene	26.0	9,100
Vinyl Chloride	530	6,300

The groundwater pathway, though present in the basement, does not present a high level of potential for human exposure. The groundwater in the sump is not potable and thus is not utilized in any manner for human consumption. The only potential route of exposure to humans would be through skin contact (dermal contact) with the groundwater present in the sump. However, the literature does not specifically describe any adverse health effects from any duration of dermal contact with PCE or its breakdown products.

The basement is locked and closed to the public. Employees of the coffee shop that do enter the basement are there for only a short duration to retrieve supplies. There is no evidence to indicate that any persons come into direct contact with sump water for any purpose at any time.

Air

Concerns regarding the air quality arose as the laboratory analysis of the sump water indicated an increase in the levels of drycleaner related solvent and its breakdown products in relation to the monitoring wells. DCERP directed that indoor air sampling be conducted in the basement of the former Concord Cleaners. Indoor air samples were collected in the basement utilizing the industry standard SUMMA canisters (Figure 3) in October 2004 and January 2005. Table 2 (TVG 2004, 2005) shows the results of the laboratory analysis of the air samples. Of the four drycleaner related analytes tested, only PCE was detected in October 2004.

TABLE 2. Results of SUMMA canister indoor air analytical data for drycleaner solvent and breakdown products. All measurements reported in parts per billion (ppb).				
Chemical	Sampling Date 10/14/04		Sampling Date 1/19/05	
	Analytical Detection Limit	Measured Analytical Result	Analytical Detection Limit	Measured Analytical Result
Tetrachloroethylene	7.4	12	3.7	not detected
Trichloroethylene	9.4	not detected	4.7	not detected
cis-1,2-Dichloroethylene	13	not detected	6.4	not detected
Vinyl Chloride	20	not detected	9.9	not detected

The October 2004 results showed the level of PCE in the air to be 12 ppb. The Agency for Toxic Substances and Disease Registry's (ATSDR) Minimal Risk Level (MRL) for chronic exposure to PCE in air is 40 ppb. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure. The October measured analytical result for PCE is three times lower than the MRL. The January measured analytical results did not detect any PCE or its breakdown products. The increase in the levels of the drycleaner related solvents in the sump water are not paralleled or reflected in the air sampling results.

The air exposure pathway, though present in the basement and potentially in the coffee shop above the basement, appears to have a low potential for human exposure. For the Concord Cleaners site, there would be two potential populations that could be exposed to the drycleaner related solvent vapors. The employees of the coffee shop and the customers of the coffee shop.

The basement is not utilized on a continuous basis by the employees of the coffee shop. They enter the basement only for brief periods to retrieve supplies and then leave. Thus, any exposure to the vapors would be very limited, as in minutes per day. The employees working in the coffee shop above the basement would conceivably have a higher potential for longer periods of exposure. However, since the air sampling data is not indicating any appreciable levels of the drycleaner related solvent vapors in the basement, it is unlikely that the employees in the coffee shop are being subjected to any significant levels of exposure.

The customers of the coffee shop are essentially a transient population. There is a potential for some level of exposure to customers. However, customers are generally in the coffee shop for relatively brief periods of time and based upon the air sampling data, any exposure they would potentially be subjected to would be extremely low. Also, the dynamics of the indoor air space of the coffee shop differ considerably from that of the basement. The basement is a closed space with no environmental control and limited exchange of air with the outdoors. The coffee shop is an environmentally controlled space. There is a heating, ventilation, and cooling system to control the indoor climate. The doors to the shop space are constantly opening and closing, thus exchanging air with the outdoors. The physical conditions of the basement increase the potential for the entrapment of drycleaner related solvent vapors, whereas the physical conditions of the coffee shop decrease that potential. Thus, there is no reason to test the coffee shop since the air sampling data for the basement does not indicate any vapor problems.

Data from ambient air (outdoor air) monitoring studies in the United States suggest that levels of PCE in urban areas can range from less than 1 ppb to more than 30 ppb. In these studies, levels were found to vary between the fall/winter season and the spring/summer season, with the fall/winter levels usually higher (ATSDR 1997). Although clearly influenced by the past drycleaner activities, the October 2004 and January 2005 air sampling data reviewed in this report are within the normal ambient air range.

The work plan approved by DCERP calls for four quarterly air sampling events for the former Concord Cleaners. Two more quarterly air sampling events thus remain to be completed for this site.

Other Vapors

The indoor air sampling data for the former Concord Cleaners lists several other chemical vapors that were measured. These other vapors are not related to drycleaner solvent or its breakdown products. Some of the chemical vapors identified, such as acetone and MEK, are often components of commercial products. Some of the chemical vapors, such as benzene and xylene, are common byproduct components of automotive exhaust emissions.

Physical Hazards

The sump itself is a physical hazard. It contains several inches of standing water and is located in a poorly-lighted basement. The sump opening is approximately five feet square and eighteen inches deep. There is potential for injury to a person accidentally falling into the hole.

Tetrachloroethylene (PCE) $\text{Cl}_2\text{C}=\text{CCl}_2$

Tetrachloroethylene (PCE) is commonly called perchloroethylene or *perc* in the drycleaning industry. Introduced in the 1930s, PCE is the solvent, or cleaning agent, most often used by professional drycleaners. PCE removes stains and dirt from all common types of fabric. PCE does not usually cause clothes to shrink or dyes to bleed. PCE is not flammable, unlike many other common solvents. Additionally, PCE can be reclaimed after the drycleaning process and reused, helping to make it a cost-effective professional cleaner.

Tetrachloroethylene (PCE) is a clear, colorless liquid said to produce a sharp, sweet smell. It is nonflammable and evaporates very readily at room temperature. PCE is a synthetic chemical and is often used as a starting point for the manufacture of other chemicals (ATSDR 1997). If PCE pollutes surface water or surface soil, it will mostly evaporate into the air and disperse. PCE is in a class of chemicals called DNAPLs (Dense Non-Aqueous Phase Liquids). Due to the chemical properties of DNAPLs, PCE can readily travel through soil with little impedance and enter into groundwater. Once in the groundwater, PCE does not easily dissolve in to the water, and thus it can remain there for many months and years with very little chemical breakdown or change.

People can detect the smell of PCE in the air at 1 part per million (ppm) or more. Background concentration of PCE in the environment is usually less than 1 part per billion (ppb). PCE is used in certain consumer products including repellents, silicone lubricants, fabric finishers, spot removers, adhesives, and wood cleaners. Tetrachloroethylene has been widely used in the drycleaning industry for decades. Clothes brought home from a drycleaners may release small amounts of PCE into the air. The significance of exposure to small amounts of PCE is unknown, but to date, they appear to be relatively harmless (ATSDR 1997).

Children's Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances (ATSDR 1997, 1998). Children have lower body weights than adults. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health. In the preparation of this health document, the health of children was thoughtfully considered. No health threats unique to children that require special attention were observed during this drycleaner solvent investigation of the former Concord Cleaners.

Conclusions

1. No apparent health hazard exists from drycleaner solvent vapors in the basement of the Concord Cleaners (DCERP Abandoned Facility #D-19-165).

Recommendations

1. Complete the DCERP approved Vapor Monitoring work plan for the former Concord Cleaners site.
2. As a matter of prudent public health practice, the owner of the property should install a protective cover over the sump in the basement to prevent any accidental fall into the sump by persons entering the basement.

Public Health Action Plan

1. TDH EEP will provide copies of this health consultation to TDEC-DOR DCERP and the management and occupants of the former Concord Cleaners building.
2. TDH EEP is available to review additional data.
3. TDH EEP will continue to work with TDEC DCERP as needed as this site goes through DCERP regulatory process.

References

- [ATSDR] Agency for Toxic Substances and Disease Registry. 2004. Air comparison values. Atlanta, GA: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1997. Healthy children – toxic environments. Report of the Child Health Workgroup presented to the Board of Scientific Counselors. Atlanta, GA: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1998. Promoting children's health – progress report of the Child Health Workgroup, Board of Scientific Counselors. Atlanta: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1997. Toxicological profile for tetrachloroethylene. Atlanta, GA: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1997. Toxicological profile for trichloroethylene. Atlanta, GA: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1997. Toxicological profile for vinyl chloride. Atlanta, GA: US Department of Health and Human Services.
- [ATSDR] Agency for Toxic Substances and Disease Registry. 1996. Toxicological profile for 1,2 dichloroethene. Atlanta, GA: US Department of Health and Human Services.
- [TVG] TVG Environmental, Inc. 2000. DCERP Combined Facility Inspection and Prioritization Investigation Report. November 30, 2000. Nashville, TN.
- [TVG] TVG Environmental, Inc. 2004. Groundwater and Air Monitoring Report, Concord Cleaners. November 16, 2004. Nashville, TN.
- [TVG] TVG Environmental, Inc. 2005. Second Quarterly Air Monitoring Report, Concord Cleaners. March 1, 2005. Nashville, TN.

Preparers of Report

Mr. Ronald Clendening, PG, Environmental Health Specialist
Mr. David Borowski, MS, Environmental Health Program Manager
Tennessee Department of Health (TDH)
Division of Communicable and Environmental Disease Services (CEDS)
Environmental Epidemiology (TDH EEP)
4th Floor Cordell Hull Building
425 5th Avenue North
Nashville, TN 37247-4911

Reviewers of Report

Mr. Robert Safay, ATSDR Office of Regional Operations

Mr. Charles Rowan, PhD, PG, TDEC Division of Remediation, DCERP

ATSDR Technical Project Officer

Mr. Alan Yarbrough
Division of Health Assessment and Consultation
Superfund Site Assessment Branch

FIGURE 1 - Map of the location of Concord Cleaners, 3706 Hillsboro Pike, Nashville, Davidson County, Tennessee, 37215 and the surrounding vicinity. (Map Credit: MapQuest.com)



FIGURE 2 - Photo of the sump in the basement, Concord Cleaners, 3706 Hillsboro Pike. Nashville, Davidson County, Tennessee. (Photo credit: David Borowski, TDH, 1/19/05)



FIGURE 3 - Photo of the SUMMA canister setup, Concord Cleaners, 3706 Hillsboro Pike. Nashville, Davidson County, Tennessee. (Photo credit: David Borowski, TDH, 1/19/05)



Certification

This Health Consultation: Concord Cleaners, Nashville, Davidson County, Tennessee, was prepared by the Tennessee Department of Health Environmental Epidemiology under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was begun.

Alan W. Yarbrough

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

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

J. E. Rodenbeck (for R.E.)

Chief, State Program Section, SSAB, DHAC, ATSDR