

Letter Health Consultation

FORMER LAWSON'S CLEANER
MEMPHIS, SHELBY COUNTY, TENNESSEE
EPA FACILITY ID: TND083265587

**Prepared by the
Tennessee Department of Health**

DECEMBER 10, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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DEPARTMENT OF HEALTH
ENVIRONMENTAL EPIDEMIOLOGY PROGRAM
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December 10, 2009

Ms. Nancy Boisvert, Program Manager
Tennessee Department of Environment and Conservation
Drycleaner Environmental response Program
11th Floor, L&C Tower
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Nashville, TN 37243

Dear Ms. Boisvert:

The Tennessee Department of Health's (TDH) Environmental Epidemiology Program (EEP) has reviewed the indoor air sampling results provided to us for the former Lawson's Cleaners site located at 3195 South Mendenhall Road, Memphis, Shelby County, Tennessee, DCERP Facility No.: D-79-103. The former cleaner was located in a strip mall shopping center at the intersection of South Mendenhall and Knight Arnold Roads. The cleaner began operations in 1971 as a laundry and added drycleaning as a service in 1990. Drycleaning was conducted until 2008 when the machine was sold. Lawson's continues to operate today as a laundry. The laundry/cleaner is located in a cinderblock leased space midway in the shopping center. The Tennessee Department of Environment and Conservation's (TDECs) Drycleaner Environmental Response Program (DCERP) wanted to investigate if the indoor air of the former leased space of the cleaner and adjacent leased spaces were impacted by drycleaner-related chemicals.

Indoor air (vapor intrusion) sampling was performed in the rear portion of Lawson's Cleaners on September 24 and 25, 2008. More recent indoor air sampling was performed in the front portion of the former cleaner and in the adjacent leased space to the south (Chinese restaurant) and the adjacent leased space to the north (tobacco and beverage discount store) on February 2 and 3, 2009. Sampling was performed by environmental consultant Fisher & Arnold Environmental (F&A) of Memphis, Tennessee. F&A used SUMMA canisters that had flow controllers calibrated to collect a sample over a minimum fourteen-hour time period (F&A 2008 and 2009). Results of the September 2008 indoor air sampling are in Table 1. Both indoor air vapor intrusion sampling events were completed to determine if the indoor air in the lease spaces of the shopping center has the potential to be a public health hazard.

The resulting indoor air concentrations were compared to indoor air health comparison values published by the Agency for Toxic Substances and Disease Registry (ATSDR) (ATSDR 2008). For chemicals which ATSDR did not have comparison values, results were compared to U.S.

Environmental Protection Agency (EPA) Regional Screening Levels for residential indoor air (EPA 2008). Residential values were used because of the involuntary exposure that would be experienced by people working in or visiting the lease space of the former cleaner and other lease spaces in the shopping center. These individuals make up a potentially exposed population at this site. The individuals are not like workers who work in an environment with chemicals and are told about the hazards of them (OSHA Right-To-Know laws). Workers that work with or in areas near chemicals willingly accept the risks by continuing to work with them or be in the same area as the chemicals. These workers also have access to, and training on, the use of personal protective equipment (PPE) if they work with these chemicals.

This review specifically evaluates the indoor air concentrations of the chemical tetrachloroethylene (perchloroethylene or PCE) used in drycleaning. It also evaluates the indoor air concentrations of chemicals which break down from PCE. These chemicals include trichloroethylene (TCE) and vinyl chloride. The review of all the data collected is to protect the public health of those who visit and work in the businesses of the shopping center.

Unfortunately, concentrations of some chemicals that are considered classic breakdown products of PCE were not evaluated as part of this vapor intrusion study. This was because they were not included by the consultant in the list of compounds to be tested.

Former Lawson's Cleaners leased space

Indoor air within the former cleaner (current laundry) leased space was sampled on September 24 and 25, 2008, and February 2 and 3, 2009. The rear portion of the former cleaner was sampled in 2008 while the front portion of the former cleaner was sampled in 2009. Detections were noted for tetrachloroethylene (perc or PCE) at concentrations of 37 parts per billion (ppb) in the rear of the former cleaner in 2008 and 15 ppb in the front in 2009. Trichloroethene (TCE) was also detected in the 2008 indoor air sample collected from the former cleaner leased space. TCE was detected in 2008 at 18 ppb in the rear of the cleaner. There were no detections of TCE in the 2009 sample from the front of the cleaner leased space. Other drycleaner-related chemicals were not detected in the cleaner leased space in either 2008 or 2009.

The PCE concentrations of 37 ppb and 15 ppb in 2008 and 2009 respectively, were below the ATSDR non-cancer effects environmental media evaluation guide (EMEG) comparison value of 40 ppb for chronic (greater than 365 days) exposure. Furthermore, studies of PCE toxicity suggest effects to liver and kidneys with effects showing up with human lowest observed adverse-effects levels (LOAELs) at approximately 20 parts per million. These non-cancer effects are important endpoints for PCE. The levels measured in the indoor air of the Lawson's Cleaners space are far less than the LOAEL.

To adequately evaluate a site-specific exposure scenario, the concentration of PCE in indoor air of 37 ppb ($251 \mu\text{g}/\text{m}^3$) in the former cleaner was multiplied by the exposure time (8 hours), multiplied by the number of days worked per year (350), multiplied by number of years worked (25), divided by an averaging time of the number of hours in 70 years (613,200) to obtain an exposure concentration. This provides a concentration of $26.65 \mu\text{g}/\text{m}^3$ or 4.2 ppb for comparison purposes. Thus, the exposure for working in this space for 8 hours per day over 25 years is within EPA's acceptable range of risk of 0.06 to 6. Furthermore, the exposure concentration to those visiting the former cleaner would be much less than this calculated value. This is because

visitors would spend much less time in the former cleaner than the workers. Having a lower potential exposure would result in an appreciably low excess cancer risk.

TCE was detected in the indoor air in the former cleaner. There is no chronic non-cancer health effects comparison value established for TCE. EPA has a provisional value of 7.4 ppb. The concentration of TCE in the indoor air of the former cleaner is below this risk concentration. ATSDR has established a CREG of 0.22 ppb for TCE for a 1 in 1,000,000 excess cancer. Because EPA considers a cancer risk range of 1 excess cancer in 1,000,000 to 1 excess in 10,000 acceptable, these risks correspond to 0.22 ppb to 22 ppb. Therefore, the 185 ppb concentration of TCE in indoor air in the former cleaner is within this risk range. Therefore, there should be no appreciable increased risk of cancer health effects by breathing indoor air with TCE in the former cleaner. The total risk of cancer health effects is very low.

Other analyzed compounds in the former cleaner leased space were not detected. Detection limits were not low enough to apply CREGs or EPA RSLs appropriately. The limits of detection for analyzed chemicals were 5 ppb. Many of these compounds have a CREG comparison value or EPA RSL that is below the 5 ppb detection limit concentration. Assuming the concentrations of these compounds were one-half of the detection limit of the analysis for each, most of the chemicals would be in the 1 excess cancer in 1,000 (10^{-3}) to 1 excess cancer in 10,000 (10^{-4}). This range is for a lifetime exposure to these chemicals. This range would be outside of the excess cancer range considered acceptable by ATSDR and EPA. However, visitors and workers would not spend all day in the cleaner. They also likely would not visit or work in the leased space for a lifetime. Thus, the risk posed by any presence of these chemicals at or below the detection limit concentration of 5 ppb would likely be in EPA's acceptable risk range. Therefore, there should be no appreciable increased risk of cancer health effects by breathing indoor air containing these chemicals in the former cleaner. The total risk of cancer health effects is very low.

PCE and TCE are both present in the former cleaner. There are possible additive health effects from these chemicals on an exposed population. It is possible that PCE and TCE jointly act in an additive manner to impair nervous system function. There is no evidence to indicate that these chemicals jointly act on the nervous system in a less-than-additive or greater-than-additive mode.

A component-based hazard index approach that assumes additive joint toxic action and uses ATSDR MRLs based on neurological impairment is recommended for exposure-based assessments of possible health hazards from exposure to mixtures of TCE and PCE. There is no evidence to indicate that greater-than-additive interactions would cause liver and kidney effects to occur at exposure levels lower than those influencing the nervous system.

Based on the relatively low concentrations of PCE and TCE identified in the former cleaner, it is unlikely that additive health effects caused by the presence of both PCE and TCE in indoor air would create any increased harmful health effects to those who breathe the indoor air by visiting or working in the former cleaner.

Chinese Restaurant leased space

All drycleaner and drycleaner-related chemicals were below the method detection limit of 5 ppb in the indoor air of the Chinese restaurant. As with the drycleaner and drycleaner-related chemicals in the indoor air in the former cleaner leased space, detection limits were not appropriately low enough as the limits of detection for analyzed chemicals were 5 ppb. Many of the compounds analyzed for have a CREG comparison value that is below the 5 ppb detection limit concentration. As mentioned above, no compounds were detected in the air sample. In cases where the detection limits are above the ATSDR health comparison values or EPA regional screening levels for residential indoor air, they are treated as a detection, and one-half of the detection limit is used in the evaluation. Visitors and workers would not spend all day in the restaurant. They also likely would not visit or work in the leased space for a lifetime. Thus, the risk posed by any presence of these chemicals at or below the detection limit concentration of 5 ppb would likely be in the acceptable risk range and EEP believes there is no appreciable increased non-cancer or cancer risk that would harm people's health from breathing indoor air in the restaurant.

Tobacco and Discount Beverage Store leased space

The drycleaner chemical PCE was detected at 5 ppb in the tobacco and discount beverage store. All other compounds tested are below the 5 ppb detection limit. The PCE concentration of 5 ppb in February 2009 was below the ATSDR non-cancer effects EMEG of 40 ppb for chronic (greater than 365 days) exposure.

However, the PCE concentration was above the EPA RSL cancer effects comparison value concentration of 0.06 ppb for 1 in 1,000,000 (10^{-6}) excess cancers but within EPA's acceptable excess cancer risk range of 0.06 to 6 ppb, corresponding to the 1 in 1,000,000 (10^{-6}) to 1 in 10,000 (10^{-4}) excess cancer risk (EPA 1991). Again, these comparison values are established for someone being exposed to the chemical for 24 hours a day, 7 days per week, and 365 days per year. The comparison values therefore overestimate health risks as visitors do not spend a significant amount of time in the building and workers do not reside in the building. EEP believes there is no appreciable increased non-cancer or cancer risk that would harm people's health from breathing indoor air containing PCE in the tobacco and discount beverage store.

As with the other drycleaner-related compounds in the other leased spaces, detection limits were set at 5 ppb for the chemicals analyzed. Many of the compounds analyzed have a CREG comparison value that is below the 5 ppb detection limit concentration. In cases where the detection limits are above the ATSDR health comparison values or EPA regional screening levels for residential indoor air, they are treated as a detection and one-half of the detection limit is used in the evaluation. Visitors and workers would not spend all day in the store. They also likely would not visit or work in the leased space for a lifetime. Thus, the risk posed by any presence of these chemicals at or below the detection limit concentration of 5 ppb would likely be in EPA's acceptable risk range.

EEP concludes:

Results of the two sampling events suggest the indoor air of the former cleaner and the tobacco and discount beverage store contained PCE. The former cleaner also contains TCE.

EEP determined that the current concentrations of PCE and TCE in the former cleaner are not expected to harm people's health. Because of the limited amount of time visitors spend in the former cleaner, their health should not be harmed. Even though workers in the former cleaner spend more time than patrons visiting the space, the worker's health should also be unharmed.

No drycleaner-related chemicals were found in the indoor air sample collected in the Chinese restaurant. The detection limits for the drycleaner-related chemicals were not low enough to simply compare them to established comparison values. EEP believes exposures at concentrations at or below the detection limits of the analyses performed are not expected to have non-cancer or cancer adverse health effects by breathing indoor air in the restaurant.

The drycleaner-related chemical, PCE, was found in the indoor air sample collected in the tobacco and discount beverage store. Remaining drycleaner-related chemicals did not have appropriately low detection limits. Therefore, one-half of the detection limit was used as a conservative concentration for the other chemicals analyzed. EEP does not expect adverse non-cancer or cancer health effects from breathing indoor air in the tobacco and discount beverage store.

There are limitations with the data from the indoor air testing. Concentrations of some chemicals that are considered classic breakdown products of PCE were not evaluated as part of this vapor intrusion study. This was because they were not included in the list of compounds to be tested. The potential exposure at the site from chemicals such as cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and 1,1-dichloroethene (1,1-DCE) that could not be evaluated. However, these chemicals are expected to be minor contributors to the overall human health risk of the site relative to the concerns related to PCE and TCE in the indoor air. These exposures were evaluated as part of this health consultation.

EEP recommends:

No additional sampling be conducted at this time. If site conditions should change, DCERP should evaluate the need for additional sampling.

In the future, DCERP should provide environmental consultants with a list of drycleaner-related chemicals and breakdown products that should be tested for during vapor intrusion sampling (indoor air) events. The breakdown products of PCE which include the chemicals cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and 1,1-dichloroethene (1,1-DCE) should be evaluated as part of indoor air sampling events.

That DCERP also emphasize that detection limits less than 1 ppb should be used when analyzing for drycleaner-related chemicals in indoor air at former drycleaner sites and adjacent locations.

References

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- [F&A] Fisher and Arnold Environmental. 2009. Facility investigation task group B, passive soil gas and indoor air sampling report, former Lawson's Cleaners, DCERP Facility ID No. D-79-103, 3195 S. Mendenhall Road, Memphis, Shelby County, TN. Memphis, Tennessee. February 27, 2009.

Sincerely,

Joseph P. George
Environmental Health Assessor
Tennessee Department of Health
Environmental Epidemiology Program

TABLE 1. Indoor air sampling results for the former Lawson's Cleaners, Memphis, Shelby County, TN, leased space, and adjacent leased spaces. Event samples were collected on September 24 and 25, 2008, and February 2 and 3, 2009, over 8 hours with Summa canisters (Fisher and Arnold 2008b, 2009). Values reported in parts per billion (ppb). Health screening guidelines based on chronic exposure duration (greater than 365 days - ATSDR 2008) unless otherwise noted and EPA Risk-Based Concentrations (EPA 2008).

Chemical / Sampling Data and Location	Acronym	09/24-25/08 Rear of Cleaners	02/2-3/09 Front of Cleaners	02/2-3/09 Chinese Restaurant	02/2-3/09 Tobacco and Beverage Store	ATSDR MRL/EMEG (unless noted) (non-cancer)	ATSDR CREG (unless noted) (10 ⁻⁶ excess cancer risk)
		ppb	ppb	ppb	ppb	ppb	ppb
Tetrachloroethylene	PCE	37	15	<5	5	40	0.06 ^E
Trichloroethylene	TCE	18	<5	<5	<5	7.4 ^E	0.22 ^E
1,2-dichloroethane	1,2-DCA	<5	<5	<5	<5	600	0.01
1,1,1,2-Tetrachloroethane	1,1,1,2-PCA	<5	<5	<5	<5	ngv	0.001
1,1,2-Trichloroethane	1,1,2-TCA	<5	<5	<5	<5	ngv	0.01
vinyl chloride	VC	<5	<5	<5	<5	30i	0.04

Notes:

- ATSDR MRL/EMEG = Agency for Toxic Substances and Disease Registry Minimum Risk Level / Environmental Media Evaluation Guide (ATSDR 2008). Chronic non-cancer exposure comparison values (exposure greater than 365 days) used to determine if chemical concentrations warrant further health-based screening.
- ATSDR CREG = Agency for Toxic Substances and Disease Registry Cancer Risk Evaluation Guide (ATSDR 2008). Cancer risk comparison values for cancer risk of 1 excess cancer in 1,000,000 people used to determine if chemical concentrations warrant further health-based screening.
- <5 = not detected in the air sample (above the analytical detection limit of 5 ppb for compounds listed)
- E = EPA Regional Screening Levels for Residential Indoor Air (EPA 2008)
- i = ATSDR comparison intermediate value for 15-365 days exposure; typically higher than a chronic value
- nc = not classified as a carcinogen
- ngv = no guidance value available

Certification

The Tennessee Department of Health prepared this Letter Health Consultation, Former Lawson's Cleaners, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). At the time this Health Consultation was written, it was in accordance with the approved methodologies and procedures. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

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



Team Leader, Cooperative Agreement Team, CAPEB, DHAC, ATSDR