

# Letter Health Consultation

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AMARK CLEANERS SITE

OAK RIDGE, ANDERSON COUNTY, TENNESSEE

**Prepared by the  
Tennessee Department of Health**

NOVEMBER 12, 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

AMARK CLEANERS SITE

OAK RIDGE, ANDERSON COUNTY, TENNESSEE

Prepared By:

Tennessee Department of Health  
Environmental Epidemiology Program  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry



STATE OF TENNESSEE  
**DEPARTMENT OF HEALTH**  
ENVIRONMENTAL EPIDEMIOLOGY PROGRAM  
1ST FLOOR CORDELL HULL BUILDING  
425 5TH AVENUE NORTH  
NASHVILLE, TN 37243

November 10, 2009

Ms. Nancy Boisvert, Program Manager  
Tennessee Department of Environment and Conservation  
Drycleaner Environmental response Program  
11<sup>th</sup> Floor, L&C Tower  
401 Church Street  
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 AMark Cleaners site located at 1900 Oak Ridge turnpike, Oak Ridge, Anderson County, Tennessee, Drycleaner Environmental Response Program (DCERP) Facility No.: D-01-105. The former cleaner was located in a strip mall shopping center. The shopping center was reportedly converted from a circa 1940s military building. The former cleaner lease space is now leased by a truck driving school. The Tennessee Department of Environment and Conservation's (TDECs) DCERP wanted to investigate if the indoor air of the former leased space of the cleaner and any adjacent leased spaces were impacted by drycleaner-related chemicals.

Indoor air (vapor intrusion) sampling was performed on December 30, 2008, in the former cleaner lease space (truck driving school), in another adjacent lease space that is occupied by a computer store, and in a church on an adjacent property parcel. Sampling was performed by environmental consultant S&ME of Knoxville, Tennessee, using SUMMA canisters that had flow controllers calibrated to collect a sample over a minimum eight-hour time period (S&ME 2009a and 2009b). Results of the December 2008 indoor air sampling are in Table 1. Based on the December 2008 results, additional testing was completed on April 28, 2009, in a grocery store located two lease spaces south from the former cleaner, an auto parts store located adjacent to the former cleaner, and again in the driving school (former cleaner) and computer store lease spaces (adjacent and north of the former cleaner). Again, samples were collected using SUMMA canisters over an eight-hour time period. Results of the April 2009 sampling are also in Table 1. Both indoor air testing 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 for 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 will specifically evaluate the indoor air concentrations of the chemical tetrachloroethylene (perchloroethylene or PCE) used in drycleaning. It will also evaluate the indoor air concentrations of chemicals which break down from PCE which include trichloroethylene (TCE) 1,2-dichloroethene (1,2-DCE) and vinyl chloride, if applicable. Additionally, this evaluation will provide discussion on other chemicals that were identified in indoor air at concentrations above their health comparison values in the two sampling events conducted. The review of all the data collected is to protect the public health of those who work and visit/shop in the businesses of the shopping center.

### **Church**

The church is the property parcel located on the next block west from the former cleaner, on East Lincoln Road. Indoor air was sampled on December 30, 2008. There were no detections of the drycleaner chemical PCE or chemicals that break down from PCE found in indoor air. The single detection in the indoor air of the church was for benzene.

The benzene identified in the indoor air of the church is not thought to be related to the drycleaner's activities but instead likely related to other sources within the church itself. Benzene is found in urban and suburban areas as a component of ambient air. Sources of benzene include automobile and truck exhaust, outdoor burning, and industrial emissions. In Loudon County, Tennessee, in close proximity to Oak Ridge, the average benzene concentration in ambient air for 2008 was 0.27 ppb (TDEC 2009).

The detected benzene concentration of 0.54 parts per billion (ppb) is below the ATSDR non-cancer effects environmental media evaluation guide (EMEG) comparison value of 3 ppb for chronic (greater than 365 days) exposure. However, the December 2008 concentration is above the ATSDR cancer risk evaluation guide (CREG) concentration of 0.03 ppb for 1 in 1,000,000 ( $10^{-6}$ ) excess cancers. The measured benzene concentration was multiplied by EPA's inhalation unit health risk for benzene of  $7.8E10^{-6}$ . This unit risk is based on a number of assumptions including those exposed would be exposed to inhaling the benzene 24 hours each day, 7 days per week, 365 days per year, for a lifetime. This calculation was completed to obtain a human health risk for the concentration of benzene in the church. The risk is calculated to be  $1.7E10^{-5}$ . However, the true risk will be even less than this value as people do not attend church services 24 hours per day, 7 days per week, 365 days per year, for a lifetime. The risk in the church is within EPA's acceptable excess cancer risk range corresponding to 1 in 1,000,000 ( $10^{-6}$ ) to 1 in 10,000 ( $10^{-4}$ ) excess cancer risk (EPA 1991). Therefore, EEP does not expect non-cancer or cancer adverse health effects from breathing the indoor air of the church.

As mentioned above, no other 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. Detection limits for the chemicals that have low comparison values are appropriately low enough to state that any detection would fall within the excess cancer risk range of  $10^{-6}$  to  $10^{-4}$ , considered acceptable by EPA and thus no non-cancer or cancer adverse health effects are expected.

### **Grocery Store**

The grocery store lease space is located on the south end of the shopping center, one lease space removed from the former cleaner. Sampling of the indoor air within the grocery store was completed on April 28, 2009. There were no detections of the drycleaner chemical PCE or chemicals that break down from PCE found in indoor air. Similar to the church however, the grocery store had minor concentrations of benzene of 0.24 ppb. Again, the benzene is not likely related to activities conducted at the former cleaner. Ambient air in urban and suburban areas contains benzene as a normal air pollutant. In 2008, ambient air benzene concentrations in Loudon County, Tennessee averaged 0.27 ppb. The benzene concentration in the grocery store is likely from a source within the grocery store itself. The grocery store benzene concentration was multiplied by its inhalation unit risk (IUR) of  $7.8E^{-6}$ . This calculation was completed to obtain a human health risk for the concentration of benzene in the church. The risk is calculated to be  $6.0E^{-6}$ . However, the true risk would be even less than this value as people do not visit the grocery store 24 hours per day, 7 days per week, 365 days per year, for a lifetime. Therefore, the risk of excess cancer occurrence is less than one in one million and EEP does not expect non-cancer or cancer adverse health effects from breathing the indoor air of the grocery store.

Detection limits for some compounds were not as low as their respective CREGs or, for non-cancer health effects, EMEGs for the respective compounds. Detection limits were appropriately low enough to state that any detection would fall within the excess cancer risk range of  $10^{-6}$  to  $10^{-4}$  considered acceptable by EPA and thus no non-cancer or cancer adverse health effects are expected.

### **Auto Parts Store**

The auto parts store lease space is immediately south of and adjacent to the former cleaner. Indoor air in this lease space was also sampled on April 28, 2009. There were no detections of the drycleaner chemical PCE or chemicals that break down from PCE found in indoor air. The auto parts store was found to have low levels of benzene in the indoor air, likely unrelated to the drycleaner. The concentration of benzene in the auto parts store was 0.24 ppb which is similar to the levels found in the grocery store. The benzene concentration in the grocery store is below its ATSDR non-cancer effects EMEG of 3 ppb for chronic exposure and but not below its ATSDR CREG concentration of 0.03 ppb. Using the IUR value for benzene and the benzene concentration measured in the auto parts store, the risk is calculated to be  $1.9E^{-6}$ . Again the actual risk would be less than this value as people are not in the store 24 hours a day, 7 days per week, and 365 days per year for a lifetime. The measured benzene concentration in the grocery store is within EPA's acceptable excess cancer risk range (EPA 1991). EEP does not expect non-cancer or cancer adverse health effects from breathing the indoor air of the auto parts store.

Detection limits for some compounds were not as low as their respective CREGs or, for non-cancer health effects, EMEGs for the respective compounds. Detection limits are appropriately

low enough to state that any detection would fall within the excess cancer risk range of  $10^{-6}$  to  $10^{-4}$  considered acceptable by EPA and thus no non-cancer or cancer adverse health effects are expected.

### **Truck Driving School**

The former cleaner space is now occupied by a truck driving school. The indoor air within the truck driving school was sampled on both December 30, 2008 and April 28, 2009. In December 2008, the concentration of tetrachloroethylene (PCE) in indoor air was 23 ppb. For the most recent event, the PCE concentration in indoor air was 0.67 ppb. The average of the two events is 11.8 ppb. Indoor air PCE concentrations of 23 and 0.67 ppb are below the ATSDR non-cancer effects EMEG comparison value for a chronic exposure of 40 ppb. Both concentrations were above the 1 in 100,000 ( $10^{-5}$ ) excess cancer effects concentration for PCE of 0.6 ppb listed in the regional screening levels table suggested for use by EPA (EPA 2008). The December 2008 concentration of 23 ppb is between one excess cancer in 10,000 and one excess in 1,000 (but closer to the 1 in 10,000). The April PCE concentration was much lower, at 0.67 ppb. This could be because the door to the driving school was noted in the field notes as "being left open pretty much all day." The concentration of 0.67 ppb is slightly above the 1 in 100,000 excess cancer concentration of 0.6 ppb listed in the regional screening levels table suggested for use by EPA (EPA 2008). Therefore, with both the December and April test results in mind, there may be an extremely low risk due to PCE of having an excess cancer due to "residing" in the former lease space of the cleaner. Of course, no one is living in the leased space and the comparison values for excess cancer risk are **conservative** concentrations calculated using an exposure of 70 years for 350 days a year, etc.

In December 2008, the trichloroethene (TCE) concentration was 2.1 ppb. The December concentration is below the EPA provisional reference dose of 7.4 ppb. The December PCE concentration of 2.1 ppb is within the 1 in 1,000,000 ( $10^{-6}$ ) to 1 in 10,000 ( $10^{-4}$ ) EPA residential indoor air regional screening value excess cancer range of 0.22 to 22 ppb. TCE was not detected in the April 2009 sampling at a detection limit of 0.2 ppb. The detection limit was just below the concentration of the  $10^{-6}$  cancer risk comparison value of 0.22. Coincidentally, this means the TCE measurement was less than the concentration of the  $10^{-6}$  cancer risk comparison value of 0.22. Therefore, there should not be any increased non-cancer or cancer adverse health effects from breathing air in the truck driving school.

1,2-DCE was also identified in the December 2008 indoor air sample collected in the truck driving school. It was not identified in the April 2009 indoor air sample. This drycleaner-related chemical does not have an established non-cancer EMEG and it is not classified as a human carcinogen. An acute and intermediate duration exposure inhalation minimal risk level (MRL) of 200 ppb for 1,2-DCE has been established by ATSDR based on a no observed adverse effects level (NOAEL) for humans of 200 parts per million (ppm) and additional margins of safety. The detected concentration of 1,2-DCE of 3.4 ppb is well below the MRL. There has not been a cancer effects value established for 1,2-DCE because of a lack of human study data.

Benzene concentrations present in the truck driving school were 3.4 ppb in December 2008 and 0.42 ppb in April 2009. The average of the two results is 1.9 ppb. Again, the lower concentration in April 2009 may be related to having the door to the truck driving school open "...pretty much all day." As with the other leased spaces, the benzene is unlikely related to the

drycleaner. It is likely from a source within the truck driving school itself. The December 2008 concentration was above the normal background concentration of benzene in ambient air in the area and also above the non-cancer effects EMEG for chronic exposure comparison value. The April 2009 benzene concentration was neither above the ambient air background value nor above the non-cancer effects EMEG. If the average of the two results is used, then the benzene concentration is below the non-cancer effects EMEG. Both the December 2008 and April 2009 concentrations were above the ATSDR cancer risk evaluation guide of 0.03 ppb for 1 in 1,000,000 ( $10^{-6}$ ) excess cancers. The December concentration of 3.4 ppb is slightly outside the acceptable range of 0.03 to 3 ppb, corresponding to the  $10^{-6}$  to  $10^{-4}$  excess cancer risk. However, the April concentration is within this acceptable risk range. There should not be any increased non-cancer or cancer adverse health effects from breathing air with minor amounts of benzene in the truck driving school. As with PCE discussed above, individuals would not be residing in the lease space and therefore would not be exposed to the benzene for long periods of time. The source of the benzene should be investigated as it is not likely related to the operation or activities carried out by the drycleaner.

### **Computer Store**

The computer is store adjacent to the former cleaner. Indoor air samples were collected from the computer store on both December 30, 2008 and April 28, 2009. PCE was noted in the indoor air of the computer store at a concentration of 69 ppb in December 2008 and 100 ppb in April 2009. Both concentrations were elevated. These concentrations are above the non-cancer health effects chronic comparison value of 40 ppb and above the 1 in 10,000 ( $10^{-4}$ ) excess cancer risk screening value concentration of 6 ppb. However, studies of PCE toxicity suggest effects to liver and kidneys with effects showing up with human NOAELs/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 Computer Store are far less than the NOAELs and LOAELs.

The amount of time customers spend in the leased space is small. The PCE concentration present should not affect the general public who comes and goes from the business. The health effects comparison values are set with long-term lifetime exposures in mind. The comparison values are calculated to represent exposures that are 24 hours per day, 7 days per week, and 365 days per year.

There is concern for the owner or any workers who may spend longer periods of time over several years in the store. Based on personal communication (Nancy Boisvert, May 7, 2009) the owner of the store works 10 hours per day, 6 days per week, and has worked in the space for 3 years. For this occupational setting, a calculated health comparison value would be 74 ppb at a risk of 1 in 10,000 excess cancers. The measured indoor air concentrations are 69 and 100 ppb in this leased space. The concentrations in the indoor air of the computer store are at the threshold of concern for a worker or manager who spends a great deal of time at the store. For a residential exposure over a lifetime, the calculated health comparison value would be 0.06 ppb at a 1 in 1,000,000 excess cancer risk and 6 ppb for a 1 in 10,000 excess cancer risk. Given that PCE is on a sliding scale for carcinogenicity and that this risk value assumes a continuous exposure and over a lifetime, this theoretical risk values would be an overestimation of the actual circumstances.



For TCE exposure, the December 2008 concentration of 7.4 ppb and the April 2009 concentration of 11 ppb are equal to or slightly above the EPA provisional reference dose of 7.4 ppb for non-cancer effects. Both sampling results are within the acceptable  $10^{-6}$  to  $10^{-4}$  excess cancer range of 0.22 to 22 ppb for TCE established by EPA (EPA 1991).

1,2-DCE was also identified at 3.5 ppb in the December 2008 indoor air sample collected in the computer store. It was not identified in the April 2009 indoor air sample, although the April 2009 results had a slightly elevated detection limit. Similar to the discussion of 1,2-DCE for the truck driving school, 1,2-DCE does not have an established non-cancer EMEG and it is not classified as a human carcinogen. An acute and intermediate duration exposure inhalation minimal risk level (MRL) of 200 ppb for 1,2-DCE has been established by ATSDR based on a no observed adverse effects level (NOAEL) for humans of 200 parts per million (ppm) and additional margins of safety. The detected concentration of 1,2-DCE of 3.5 ppb is well below the MRL. There has not been a cancer effects value established for 1,2-DCE because of a lack of human study data.

Benzene concentrations present in indoor air in the computer store were 2.8 ppb in December 2008 and 13 ppb in April 2009. Both the December 2008 and April 2009 concentrations of benzene are above its normal background concentration. The December 2008 benzene concentration was slightly below the ATSDR non-cancer EMEG chronic comparison value of 3 ppb. The April 2009 benzene concentration was above the EMEG. Both the December 2008 and April 2009 benzene concentrations were above ATSDR's CREG of 0.03 ppb for 1 in 1,000,000 ( $10^{-6}$ ) excess cancers. The December concentration of 2.8 ppb is essentially the same as the upper limit 3 ppb  $10^{-4}$  excess cancer risk value. The April concentration of 13 ppb is greater than this acceptable  $10^{-4}$  risk and in the range of 1 in 1,000 excess cancers. As with PCE above, individuals would not be residing in the lease space and therefore would not be exposed to the benzene for long periods of time. Shopping or visiting the computer store would not be a health hazard. However, again like PCE, working in the store for extended periods of time may increase the risk of harmful health effects. Again, the source of the elevated benzene in this lease space should be investigated.

**EEP concludes:**

Levels of non-site-related benzene found in the indoor air of the church, grocery store, auto parts store, truck driving school, and computer store are not expected to harm the health of those breathing the indoor air in these spaces. Benzene is present in ambient air in minor amounts in urban and suburban environments and is not thought to be a result of activities conducted at the cleaner. Typically, benzene concentrations in ambient air are above its ATSDR cancer effects comparison value. Even so, the levels found are such that no non-cancer or cancer adverse health effects are expected from breathing the air in the church.

No drycleaner-related chemicals were found in the indoor air samples collected in the church, or in the grocery store and auto parts store located in the shopping center. Therefore, there is no harm expected from chemicals used at the former cleaner in breathing air in these businesses.

The truck driving school is in the former drycleaner lease space. The drycleaner-related chemicals PCE, TCE, and cis-1,2-DCE were identified in this lease space. Benzene was also

identified in the indoor air. The concentrations of PCE, TCE, and benzene in the truck driving school are such that EEP does not expect non-cancer or cancer adverse health effects to the adults who breathe the indoor air in the truck driving school lease space.

Indoor air in the computer store contained elevated levels of PCE, TCE, and benzene. EEP does not expect non-cancer adverse health effects. EEP believes that there is a low but unacceptable cancer risk from breathing indoor air to the health of adults working in the computer store because they would spend long periods of time over several days in the store. Adults who work long hours in the store may experience long-term exposure to PCE, resulting in a potential increased risk of cancer from breathing the air in this leased space. EEP believes members of the general public who visit or shop at the store would have a limited exposure and no long-term cancer health effects.

**EEP recommends:**

DCERP oversee future actions at the site involving cleaning up (remediating) the site, mitigation of the vapors to make them less of a hazard (venting to the outside), or continued testing to understand the seasonal trend at the site.

Based on personal communication with Nancy Boisvert on May 11, 2009, the shopping center containing the grocery store, auto parts store, truck driving school, and computer store may be redeveloped. Preliminary redevelopment plans include demolishing the building and potentially constructing a new building. The time frame to the start of redevelopment is unknown. If redevelopment is performed, DCERP plans to investigate the source of the indoor air vapors when the building is demolished.

In the meantime, to insure the health of the worker(s) in the computer store, appropriate actions should be completed to reduce the amount of PCE and benzene in the indoor air of the computer store. One action could be to investigate the possibility of modifying the HVAC system to bring in more outside air. Another action could be as simple as running fans in the computer store that would exhaust indoor air out the back door or through windows, in an effort to create better ventilation in the lease space. A third would be to investigate installing carbon filters on the HVAC system of the computer store to remove the drycleaner-related compounds from the air in that lease space. A fourth would be for the computer store to move to another vacant lease space within the shopping center in an area that has been already identified as not harming the health of workers or visitors. DCERP informed EEP that there is a vacant lease space between the grocery store and the auto parts store in which the computer store could move into. Based on personal communication with Ms. Nancy Boisvert, the computer store is scheduled to move to the vacant lease space.

DCERP's future plans include performing remediation prior to construction of a new building on the property. Depending on investigation results, remediation of the site could include soil removal, installation of a polyethylene vapor barrier, and/or installation of a vapor (radon) mitigation system in the design of the new building to protect public health.

EEP suggests that DCERP follow up with the computer store owner to verify that the computer store moved into the vacant leased space between the grocery and auto parts stores. The move

should eliminate any potential for harm from breathing air in the computer store's former location. The indoor air of the grocery and auto parts stores were tested as outlined above. Therefore, breathing the indoor air in the leased space between these stores, in which the computer store can move into, should not cause any adverse health effects.

## References

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[S&ME] S&ME. 2009a. Report for ambient air sampling, former AMark Cleaners, 1900 Oak Ridge Turnpike, Oak Ridge, Tennessee, DCERP Facility No.: D-01-105. Knoxville, Tennessee. January 8, 2009.

[S&ME] S&ME. 2009b. Report for additional ambient air sampling, former AMark Cleaners, 1900 Oak Ridge Turnpike, Oak Ridge, Tennessee, DCERP Facility No.: D-01-105. Knoxville, Tennessee. May 10, 2009.

[TDEC] Tennessee Department of Environment and Conservation, Division of Air Pollution Control, Nashville, Tennessee. Personal communication with Robert Brauner, May 13, 2009.

Sincerely,

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

**TABLE 1.** Indoor air sampling results for the former AMark Cleaners, Oak Ridge, Anderson County, TN, leased space, adjacent leased space, and adjacent property parcel. Event samples were collected on December 30, 2008 and April 28, 2009, over 8 hours with Summa canisters (S&ME 2009a, 2009b). 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	12/30/08 Church	4/28/09 Grocery Store	4/28/09 Auto Parts Store	12/30/08 Driving School	4/28/09 Driving School	12/30/08 Computer Store	4/28/09 Computer Store	ATSDR MRL/EMEG (unless noted) (non-cancer)	ATSDR CREG (unless noted) ( $10^{-6}$ excess cancer risk)
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
Benzene		0.54	0.24	0.24	3.4	0.42	2.8	13	3	0.03
Tetrachloroethylene	PCE	<0.20	<0.20	<0.20	23	0.67	69	100	40	0.06 <sup>E</sup>
Trichloroethylene	TCE	<0.20	<0.20	<0.20	2.1	<0.20	7.4	11	7.4 <sup>E</sup>	0.22 <sup>E</sup>
1,1-dichloroethylene	1,1-DCE	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	20i	nc
cis-1,2-dichloroethylene	cis-1,2-DCE	<0.20	<0.20	<0.20	3.4	<0.20	3.5	<0.40	ngv	nc
trans-1,2-dichloroethylene	trans-1,2-DCE	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	200i	nc
vinyl chloride	VC	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	30i	0.04
1,1-dichloroethane	1,1-DCA	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	ngv	0.38 <sup>E</sup>
1,2-dichloroethane	1,2-DCA	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	600	0.01

**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.
- <0.20 = not detected in the air sample (above the analytical detection limit of 0.20 or 0.40 ppb for compounds listed)
- 69 = indoor air concentration exceeds both non-cancer and 1 in 1,000,000 excess cancer health comparison values
- 0.54 = indoor air concentration exceeds 1 in 1,000,000 excess cancer health comparison value but not the non-cancer health comparison value
- 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

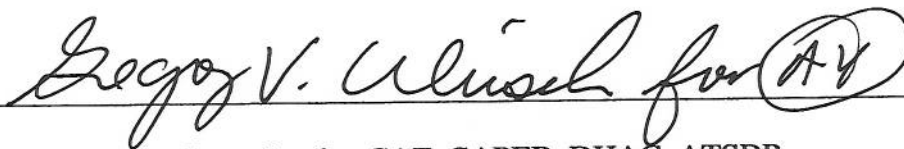
The Letter Health Consultation: AMark Cleaners was prepared by the Tennessee Department of Health, Environmental Epidemiology under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was begun. Editorial review of this document was performed by the Cooperative Agreement partner.



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Paul W. Allen  
Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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



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Gregory V. Ulrich for AV  
Team Leader, CAT, CAPEB, DHAC, ATSDR