

Letter Health Consultation

Evaluation of Vapor Intrusion at a Restaurant

MEMPHIS, SHELBY COUNTY, TENNESSEE

**Prepared by the
Tennessee Department of Health**

MARCH 16, 2010

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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MEMPHIS, SHELBY 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

January 7, 2010

Mr. Dana Petway, Environmental Specialist
Tennessee Department of Environment and Conservation
Division of Solid and Hazardous Waste Management
State Remediation Program
5th Floor, L&C Tower
401 Church Street
Nashville, TN 37243

Dear Mr. Petway:

The Tennessee Department of Health's (TDH) Environmental Epidemiology Program (EEP) was asked by the Tennessee Department of Environment and Conservation's (TDEC), Division of Solid and Hazardous Waste Management (DSWM), State Remediation Program (SRP), to provide comments on the *Indoor Air Monitoring Report* for a fast food restaurant (the report). The restaurant is located at 826 South Third Street, Memphis, Shelby County, Tennessee. The report was prepared by Pangean-CMD Associates (Pangean) of Bartlett, Tennessee, and submitted to the TDEC SRP on December 14, 2009. TDEC SRP asked for assistance in understanding if the testing results indicated any potential health hazard to workers or patrons of the restaurant who breathed the indoor air. TDEC was concerned because of the presence of certain chemicals in a groundwater plume that could be potentially beneath the restaurant. Vapors from a groundwater plume could potentially migrate into the indoor air of the restaurant creating a potential exposure pathway to workers and patrons and possibly harming their health.

The stand-alone fast food restaurant building is oriented in an east-west direction at the intersection of Third Street and East E.H. Crump Boulevard in south Memphis. The restaurant has a drive-thru window that is also used in addition to the inside dining area. Based on communication with TDEC SRP, EEP understands that the restaurant property has groundwater contamination beneath it. Several environmental investigations have been conducted in the vicinity of the restaurant property. These evaluations were completed to identify if legacy chemicals identified in groundwater may have migrated onto the restaurant property. The source of the groundwater plume is unknown. There is an operating gas station located across Third Street, west of the restaurant. A monitoring well on the restaurant property contains free-product

gasoline that is removed on a schedule. The restaurant site itself was formerly a gas station. The TDEC Division of Underground Storage Tanks (UST) provided a letter of closure for the former gas station on the restaurant property. The property on the southwest corner of Third Street and East E.H. Crump Boulevard was also the former site of a gas station. TDEC UST also issued a closure letter for that property. Chemicals previously identified in the groundwater on the restaurant property included benzene, ethylbenzene, toluene, and xylenes. These legacy chemicals were the only chemicals targeted by the vapor intrusion testing.

The environmental consultant measured air inside the restaurant at two locations and at one location outside. Indoor air was measured in the kitchen and in the dining areas of the restaurant. All three Summa canisters were set out for sample collection after the restaurant closed, at 11 o'clock in the evening on November 18, 2009. The test ended at 9 o'clock the next morning on November 19, 2009 (Pangean 2009). Air was sampled at the same time both inside and outside of the restaurant. The air samples were collected for approximately 10 hours. It was reported that the canisters were received by the lab in good condition (Pangean 2009).

Benzene, toluene, ethylbenzene, and xylenes were all detected in both the indoor and outdoor air samples. Results are shown in Table 1 below.

Table 1. Indoor and outdoor air monitoring results for the fast food restaurant located at 826 South Third Street, Memphis, TN. All results are reported in parts per billion by volume (ppbv) (source: Pangean-CMD Associates Indoor air monitoring report, December 14, 2009).					
Chemical	Outdoor (ambient air) Sample	Dining Area Sample	Kitchen Area Sample	ATSDR Chronic MRL ¹ (non-cancer)	ATSDR CREG ² (10 ⁻⁶ excess cancer risk)
benzene	0.25	0.32 / 0.31	0.31	3	0.04
toluene	0.41	0.58 / 0.57	0.51	80	ngv
ethylbenzene	0.041	0.078 / 0.084	0.062	300	ngv
total xylenes	0.147	0.63 / 0.63	0.202	50	ngv

Notes:

¹ ATSDR MRL/EMEG = Agency for Toxic Substances and Disease Registry Minimum Risk Level / Environmental Media Evaluation Guide (ATSDR 2009). Chronic non-cancer exposure comparison values (exposure greater than 365 days) are used to determine if chemical concentrations warrant further health-based screening.

² ATSDR CREG = Agency for Toxic Substances and Disease Registry Cancer Risk Evaluation Guide (ATSDR 2009). Cancer risk comparison values are for cancer risk of 1 excess cancer in 1,000,000 people (10⁻⁶ risk level) and are used to determine if chemical concentrations warrant further health-based screening.

0.32 / 0.31 = original sample result / duplicate sample result for dining area sample.

ngv = no guidance value available

The outdoor (ambient) air sample was used to measure background levels of these chemicals in the outdoor air. All of the chemicals of concern at the site were present in the outdoor air sample. This is not unusual as the restaurant is located on two major city streets. Car exhaust contains these same compounds. EPA has established an outdoor (ambient) air monitoring

station at 260 Joubert Street in south Memphis. This location is approximately 2.3 miles southwest of the restaurant. In 2008, the monitoring station measured 17 ambient air benzene concentrations. These concentrations ranged between 1.4 parts per billion (ppb) to 10.14 ppb. The results for the ambient air sample location at the restaurant are actually lower than those measured at the EPA monitoring station. Information on this monitoring station can be accessed at <http://www.epa.gov/aqspub1/>.

Overall, the test results showed only slightly higher amounts of these same chemicals in indoor air. Test results are below the Agency for Toxic Substances and Disease Registry's (ATSDR) chronic minimal risk levels (MRLs) (ATSDR 2009). The ATSDR MRLs were used as comparison values for non-cancer health effects because of the involuntary exposure that would be experienced by people working in or visiting the restaurant. These individuals make up a potentially exposed population at the site. Workers and visitors would have no knowledge of any vapors inside the restaurant due to the nearby gas station release. Workers in the restaurant would have a longer exposure frequency and duration. These 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) for their work with these chemicals.

The results for benzene in both the outdoor and indoor air sample locations were also compared to its ATSDR cancer risk evaluation guide (CREG) comparison value to understand potential cancer health effects. The benzene results were higher than its CREG comparison value. The CREG comparison value shown in Table 1, of 0.04 ppb, is established for one excess cancer in one million people. However, this value is established for an exposure that is happening 24 hours each day, 7 days a week for a lifetime. The actual exposure for workers or visitors to the restaurant would be much less. An employee likely only spends 8, 10 or 12 hours a day at the site. In addition to the potential vapor intrusion source, there are several other sources for benzene at this urban site. These include cleaning products, the exhaust from vehicles using the restaurant's drive-thru window, and vapors from the nearby gas station.

The concentrations of benzene are between the one excess cancer in one million people and one excess cancer in 100,000 people in both the indoor and outdoor air. This is an acceptable risk range according to the U.S. Environmental Protection Agency (EPA 1991).

EEP Concludes:

The Tennessee Department of Health's Environmental Epidemiology Program (EEP) cannot be absolutely definitive about the source of the chemicals identified in indoor and outdoor air at the site. The concentrations of chemicals detected are very low. It is unknown if minor intrusion of vapors is occurring at the restaurant or if the measured concentrations of chemicals are due to urban background levels with the addition of these same chemicals from the exhausts of cars using the restaurant's drive-thru window, the major intersection near the restaurant, or the gas station itself. Based on the data presented by Pangean (2009), it is not expected that those

working in or visiting the restaurant would experience any adverse non-cancer or cancer health effects by breathing the indoor air.

EEP Recommends:

EEP has no recommendations at this time.

References

[ATSDR] Agency for Toxic Substances and Disease Registry. 2009. Air comparison values. U.S. Department of Health and Human Services. June 16, 2009.

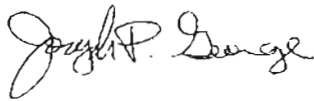
[EPA] U.S. Environmental Protection Agency. 1991. Role of the baseline risk assessment in superfund remedy selection determination. OSWER Directive 9355.0-30. Washington, D.C.

[Pangean] Pangean-CMD Associates. 2009. Indoor air monitoring report, Taco Bell, 826 South Third Street, Memphis, Tennessee, SRS-0801. Bartlett, Tennessee. December 14, 2009.

Google Earth. 2009. Can be accessed at <http://earth.google.com> Last accessed December 21, 2009.

Should you have any further questions or concerns please contact me at 615-741-7247 or via email at joseph.george@tn.gov.

Regards,



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

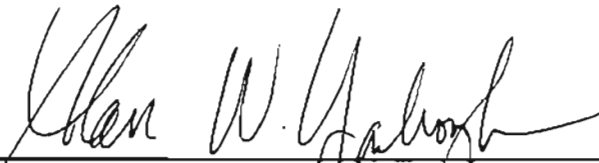
Certification

The Tennessee Department of Health prepared this Letter Health Consultation, Evaluation Of Vapor Intrusion at a Taco Bell, 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

