Health Consultation

Parker Solvents Company Indoor Air Sampling Results

PARKER SOLVENTS COMPANY

8909 MABLEVALE PIKE

LITTLE ROCK, PULASKI COUNTY, AR 72209

EPA FACILITY ID: ARD035565068

DECEMBER 10, 2008

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

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Prepared By:

Arkansas Department of Health
Under a Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Statement of Issues

This health consultation was prepared in response to a review of the indoor air samples taken at offices of the Arkansas State Highway and Transportation Department (AHTD) and private residential homes affected by groundwater contaminated from volatile organic compounds (VOCs) from the Parker Solvents Company (PSC). The indoor air samples were collected and validated by the U.S. Environmental Protection Agency (EPA). The indoor air samples were initiated after a hearing by the Arkansas Pollution Control and Ecology Commission (APC&EC) on April 27, 2007. The EPA issued a Response Engineering and Analytical Contract (REAC) to Lockheed Martin, who began air sampling on-site on June 8, 2008.

As a request by the APC&EC member and Deputy Director and Chief Operating Officer of the Arkansas Department of Health (ADH) in April 2007, our personnel reviewed the PSC Human Health Risk Assessment (HHRA) prepared by the Arkansas Department of Environmental Quality (ADEQ) dated August 22, 2005 [1] under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). The review entailed conducting a public health evaluation of the reported data using the standard methodologies of ATSDR. The data used for both the HHRA and ADH's assessment were dated from 1999 – 2003, and our office concurred with the conclusions made within the HHRA report via a memorandum to the ADH Chief Operating Officer in May 2007. Included in the concurrence report was the ADH/ATSDR recommendation for air sampling of indoor office space at PSC or AHTD [2]. This health consultation is a review of that subsequent indoor air sampling performed in June 2008.

Background and History

PSC, located on 1.2 acres at 8909 Mablevale Pike, Little Rock, Pulaski County, is a facility that provides custom-blended chemicals to various clients. The main chemicals used at PSC include VOCs such as: acetone, benzene, methanol, tetrachloroethene (PCE), toluene, trichloroethene (TCE), vinyl chloride, and xylene. According to an on-line database (AFIN # 60-00745), PSC has held active permits with ADEQ for air, water (industrial and storm runoff), and hazardous waste from 1992 to the present [3].

This site is bordered to the west and north by Mabelvale Pike Road. (See Appendix A for site map.) The main AHTD building is located across Mabelvale Pike to the west. Several single-family residences lie to the north of PSC, directly across from Mabelvale Pike Road. The south and east sides of PSC are bounded by AHTD maintenance facilities and storage yards [4].

In addition to solvent blending, PSC is a temporary bulk storage, sales and distribution facility. It has been in continuous operation since 1957, and includes an office and warehouse complex, a solvent blending operation, a wastewater treatment building, and a tank farm to store bulk solvents. The tank farm is constructed within a single containment wall holding 23 above-

ground storage tanks, ranging in capacity from 1,000 gallons to 15,100 gallons, and two 1,000-gallon fuel storage tanks. Solvents are also stored in the warehouse in 55-gallon drums [4].

PSC entered into a Consent Administrative Order (CAO) LIS 92-047 with ADEQ on May 30, 1992. This CAO required the facility to investigate the nature and extent of contamination in soil, groundwater, and surface water at the site and adjoining properties. Since then, subsequent corrective measures, risk assessment reports, and partial remediation have been performed as a result of VOC contamination on- and off-site from PSC.

Discussion

Exposure to contaminants of concern is determined by examining human exposure pathways. An exposure pathway has five parts:

1. A source of contamination (e.g., contaminated groundwater),
2. An environmental medium such as water, soil, or air that can hold or move the contamination,
3. A point at which people come in contact with a contaminated medium (e.g., indoor air),
4. An exposure route, such as inhalation of volatile chemicals rising from the groundwater through a building foundation, and
5. A population who could come in contact with the contaminants (employees or residents).

An exposure pathway is eliminated if at least one of the five parts is missing and will not occur in the future. For a completed pathway, all five parts must exist and exposure to a contaminant must have occurred, is occurring, or will occur. For this evaluation of indoor air data, a complete pathway is plausible given the high concentrations of VOCs present in groundwater plumes directly under office buildings and residences within the vicinity of PSC.

Validated air data from EPA/REAC were mailed to our offices on September 10, 2008. The scope of work, performed June 10 – 11, 2008, included monitoring of indoor air, soil gas and indoor air sampling, and analysis for VOCs in the PSC building, several buildings at the AHTD complex, and four residential units in the vicinity. According to the EPA report, real-time indoor air monitoring for benzene, toluene, dichlorothene, xylenes, trichloroethene, and tetrachloroethene was conducted using the ECA Trace Atmospheric Gas Analyzer IIe (TAGA) mass spectrometer/mass spectrometer (MS/MS) located in the EPA's mobile laboratory [5].

The TAGA MS/MS system was used to determine whether there was an impact of the subsurface gas plume to indoor air quality. Fourteen monitoring surveys were performed in all the on- and off-site locations. Of the data points, only three exceeded the ATSDR air comparison values, evaluated in parts per billion (ppb) by volume (ppbv). ATSDR screening values for these chemicals are depicted in Table 1, below. The concentration and location of these compounds were: (a) benzene at 12 ppbv located in a residential living room; (b) tetrachloroethene at 49 ppbv located in the police office of an AHTD building ; and (c) xylenes at 100 ppbv located in the reception area of the PSC office. See Table 1 for all calculated theoretical risk results for a child or adult.

The theoretical hazard quotient (HQ) was determined by dividing the calculated daily intake (measured in milligrams/kilograms/day) by the chemical reference dose (RfD; measured in milligrams/kilograms/day). An HQ is a ratio of a single substance exposure level to a reference dose for that substance. If the HQ is found to be greater than 1.0, then harmful effects are likely. If the HQ equals 1.0, then it is thought not likely to cause harmful effect. If the HQ is less than 1.0, harmful effects are not expected.

The theoretical cancer risk was determined by multiplying the calculated exposure dose for a chemical (measured in milligrams/kilograms/day) by the chemical's set slope factor (measured in milligrams/kilograms/day) and exposure duration (in this case, a short-term default of nine years). If a theoretical cancer risk is greater than 1×10^{-4}, or a chance of one excess cancer risk in 10,000 cases, then it is thought that there is a moderate risk of possible cancer related to that chemical exposure. If the value is equal to or less than the range of 1×10^{-4} to 1×10^{-6}, the possible cancer risk from a chemical exposure is thought to be slight to insignificant. (See Appendix B for more detailed calculations.)

Table 1. Indoor air data from Parker Solvents Company air monitoring event (06/08/2008) that exceeds ATSDR air comparison values. All other data points were below health-based screening values ,where available.

Compound	Concentration in parts per billion by volume (ppbv)	ATSDR MRL screening value (ppb)	Theoretical Hazard Quotient (HQ)*	Theoretical Cancer Risk**
Benzene	12	3	0.27 (child) 0.09 (adult)	8.0 x 10-6 (child) 2.8 x 10-6 (adult)
Tetrachloroethene (PCE)	49	40	0.03 (child) 0.01 (adult)	1.2 x 10-5 (child) 4.3 x 10-6 (adult)
Xylenes	100	50	0.50 (child) 0.20 (adult)	N/A

*Theoretical Hazard Quotient less than 1.0 are interpreted as "no increased risk for cancer."

**Theoretical cancer risks between 1 x 10-6 and 1x10-4 are interpreted as "no increased risk for cancer." Calculations based on a short-term default of nine years of exposure.

ATSDR = Agency for Toxic Substances and Disease Registry; MRL = Minimal Risk Level; ppbv = parts per billion by volume; ppb = parts per billion

Community Health Concerns

No complaints or concerns from the community near PSC have been made to ADH, ADEQ, or EPA; therefore, there is no known community health concern or additional child health concern at this time.

Child 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 are adults from certain kinds of exposures to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; therefore, they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. 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. For samples analyzed at PSC, all VOC concentrations were measured for children and adults. It was determined that similar to the adult scenario, the child scenario evaluated presented no values that exceed standard target risk ranges. Therefore, at the PSC site, there is no additional potential health risk to address for children at this time.

Conclusions

Based upon the information reviewed, there was and is a completed exposure pathway to contaminants found in indoor air from the VOCs found at PSC. However, the concentration of VOCs detected in the air samples collected is unlikely to cause adverse health effects for adults or children. ADH has categorized the VOCs detected in the indoor air samples as ***no apparent public health hazard*** under the conditions that existed at the time of the sampling events. This hazard category is used in ATSDR public health consultations for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

Recommendations

No recommendations are indicated at this time.

Public Health Action Plan

The purpose of the Public Health Action Plan (PHAP) is to ensure that this health consultation not only identifies any public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous

substances in the environment. The PHAP implemented by ADH/ATSDR with regards to the PSC, is as follows:

Completed Actions

- Reviewed the PSC HHRA prepared by ADEQ dated August 22, 2005.
- Made a site visit on May 4, 2007.
- Sent review memorandum to ADH Director on May 24, 2007.
- Sent letter health consultation review to ADEQ on June 15, 2007.
- Reviewed indoor air sampling data provided by EPA on September 19, 2008.

Future Activities

- Complete a Community Needs Assessment for PSC.
- Continue to review any technical data tested from PSC, as requested and/or needed.
- Continue to educate the adjacent residents/public on contamination pathways, as requested and/or needed.

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Certification

The Arkansas Department of Health prepared this health consultation for Parker Solvents Company at 8909 Mablevale Pike, Little Rock, Pulaski County, Arkansas, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedure existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

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References

1. Parker Solvent Company Site, Little Rock, AR. "Human Health and Ecological Risk Assessment," Arkansas Department of Environmental Quality. August 22, 2005.
2. "Parker Solvent Company (Little Rock, AR) Human Health Risk Assessment Review: Letter Health Consultation," Arkansas Department of Health. May 24, 2007.
3. Arkansas Department for Environmental Quality (ADEQ) Resource Conservation and Recovery Act (RCRA) online database: http://www.adeq.state.ar.us/hazwaste/rcra2/facil_sum.asp, accessed September 9, 2008.
4. Arkansas Department for Environmental Quality (ADEQ) Human Health and Ecological Risk Assessment, Parker Solvents Company Site. August 22, 2005.
5. U.S. Environmental Protection Agency (EPA) Final Report, Parker Solvents Company Site, Work Assignment Number: 0-338; Contract Number: EP-C-04-032; July 2008.
6. Agency for Toxic Substances and Disease Registry (ATSDR) Public Health Assessment Guidance Manual online: http://www.atsdr.cdc.gov/HAC/PHAManual/toc.html, accessed October 30, 2008.

Appendix A– Figure

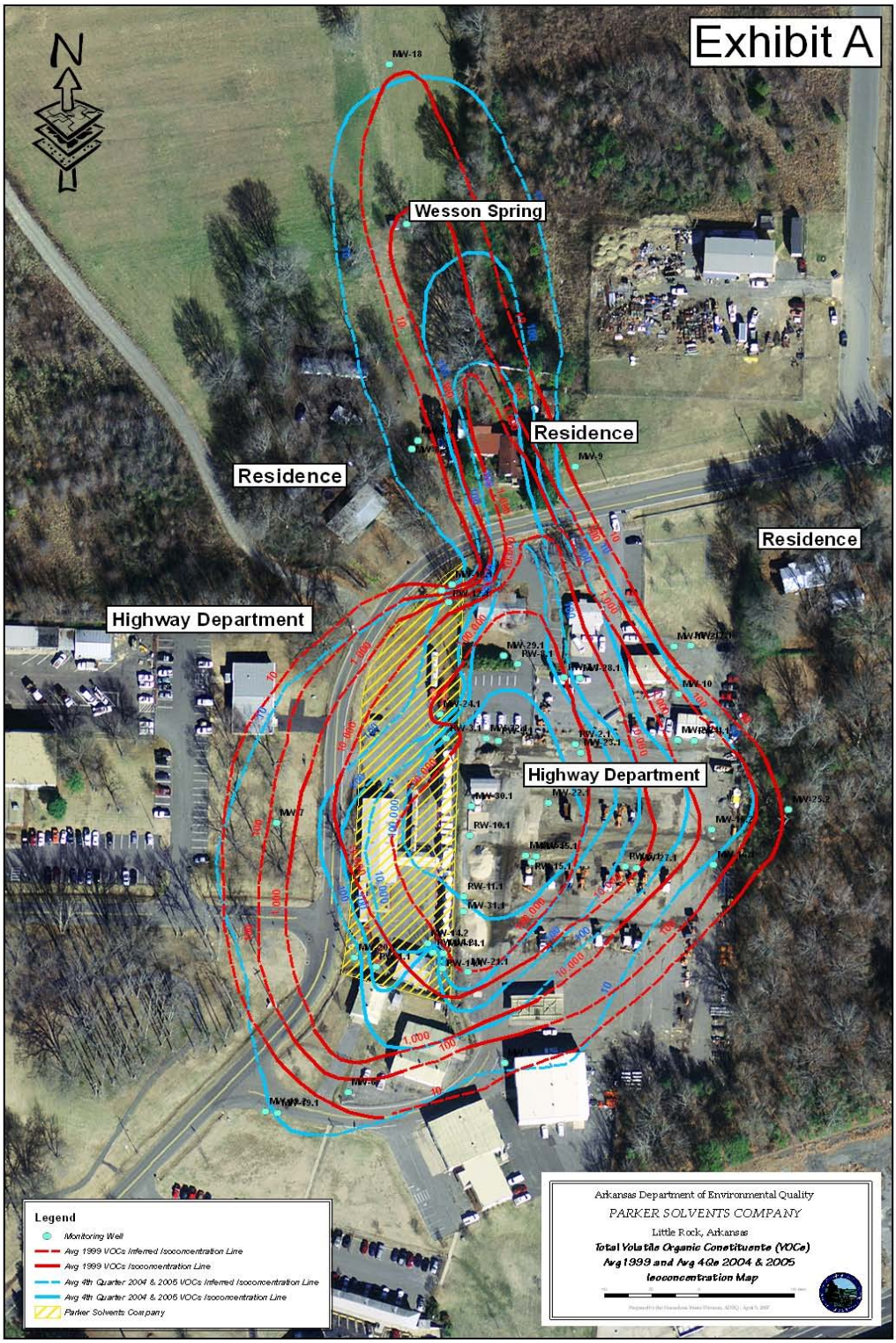

Figure 1. This map was taken from an ADEQ presentation depicting the volatile organic chemical (VOC) groundwater plume at Parker Solvents Company (indicated as yellow grid lines) and surrounding areas.

Appendix B – Theoretical Risk Equations

Inhalation is an important pathway for human exposure to contaminants that exist as atmospheric gases or are adsorbed to airborne particles or fibers. Inhalation exposure to contaminants from hazardous waste sites can occur as a result of direct release of gases and particles from an on-site facility, volatilization of gases from contaminated soils or water bodies, or resuspension of dust and particles from contaminated soil surfaces. When assessing exposure to atmospheric gases, generally, the estimation of inhaled dose is not necessary. The doses in the toxicological literature are reported as concentrations that can be directly compared to concentrations measured at a site [6].

Inhalation exposure doses can be estimated and provides default air intake rates. A person's activity level, physical condition, gender, and age are a few factors that will influence the air intake rate. See the specific equations, below, for all calculations of theoretical air inhalation exposure and potential risk variables at the Parker Solvents Company site.

Table 2. Calculations used in Parker Solvents Company Indoor Air Evaluation

Calculated Values for Table 1 Computations	Benzene		Tetrachloroethene (PCE)		Xylenes	
	Child	Adult	Child	Adult	Child	Adult
Exposure Dose (mg/kg/day)	0.0023	0.00081	0.0046	0.0016	0.014	0.005
Reference Dose (mg/kg/day)	0.0086	0.0086	0.17	0.17	0.029	0.029
Hazard Quotient (unitless)	0.27	0.09	0.027	0.009	0.48	0.17
Slope Factor (1/mg/kg/day)	0.027	0.027	0.021	0.021		
Exposure Years	9	9	9	9		
Lifetime Cancer Risk (unitless)	8.00E-09	2.80E-06	1.20E-05	4.30E-06	N/A	

mg = milligram; kg = kilogram

***Air Inhalation Exposure Dose Equation*: D = (C x IR x EF) / BW**, where

D = Exposure Dose (mg/kg/day)
C = Concentration (part per billion or mg/m^3)
IR = Intake Rate (m^3/day; default for child is 10, default for adult is 15.2)
EF = Exposure Factor (unitless)
BW = Body Weight (kg; default for child is 16, default for adult is 70)

***Hazard Quotient Equation*: HQ = DI / RfD**, where

HQ = Hazard Quotient (unitless)
DI = Daily Intake (mg/kg/day)
RfD = Reference Dose (mg/kg/day)

After the calculation, if…

HQ > 1.0 then harmful effects are likely
HQ = 1.0 Not likely to cause harmful effect
HQ < 1.0 Harmful effects not likely.

***Theoretical Life Time Cancer Risk Equations*: LCR = ED x SF x (Exposed years/70 years)**, where

LCR = Lifetime Cancer Risk (unitless)
ED = Exposure Dose (mg/kg/day)
SF = Slope Factor (mg/kg/day)
Exposed years = estimated or actual years person exposed to contaminant in indoor air (default for child and adult is 9 years)

Theoretical cancer risk estimates do not reach zero no matter how low the level of exposure to a carcinogen. After the calculation, if…

LCR > 1.0E-04 (or 1 in 1,000 excess cancer cases) then theoretical cancers expected in a lifetime are moderate

LCR < 1.0E-04 (or 1 in 1,000 excess cancer cases) then theoretical cancers expected in a lifetime are low to insignificant.