Health Consultation

FORMER HIGHWAY 77E TRANSFORMER RECYCLING FACILITY

YORKVILLE, GIBSON COUNTY, TENNESSEE

DECEMBER 20, 2002

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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HEALTH CONSULTATION

FORMER HIGHWAY 77E TRANSFORMER RECYCLING FACILITY

YORKVILLE, GIBSON COUNTY, TENNESSEE

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 March 2002, the Jackson Environmental Assistance Center (J-EAC) Division of Superfund (DSF) of the Tennessee Department of Environment and Conservation (TDEC) met with a family in Yorkville, Tennessee. J-EAC DSF wanted to perform a preliminary assessment and site investigation on this family's property as they were concerned about potential chemical contamination from past transformer recycling activities in Yorkville.

This family, two adults, a five-year old child, and a teenage child, have been living at their Yorkville residence since October 2001. The Yorkville U.S. Post Office neighbors the property. The transformer recycling industry was prevalent in Yorkville years ago. Polychlorinated biphenyls (PCBs) were common coolants within these transformers (ATSDR 2000).

During a March 3, 2002, visit to the residence, J-EAC Superfund (DSF) staff talked with the home owners, observed the property, and collected soil samples. Soil and sediment samples collected between zero and 3 inches depth were analyzed (Figure 1 & Table 1). The soil and sediment samples contained lead and PCB concentrations that raised questions with DSF.

On July 8, 2002, representatives from J-EAC DSF held a conference call with representatives from the Tennessee Department of Health (TDH), Environmental Health Studies and Services (EHSS) concerning the Former Highway 77E Transformer Recycling Facility. J-EAC DSF asked the TDH EHSS, "What is the impact of exposure to chemicals associated with transformer recycling, specifically to the family now living at the Yorkville address?"

The measured lead concentrations in surface soil and sediment ranged from 26.8 to 505 parts per million (ppm) with a geometric mean ($\bar{x}$) of 176.4 ppm. The lead levels were deemed unlikely to be a health risk. Nonetheless, EHSS recommended that the children have blood lead levels tested to confirm this as well as comfort the parents. PCBs, including Aroclor 1260, were detected in surface soil samples ranging from undetectable to 107.00 ppm and $\bar{x}$ = 27.16 ppm (Table 1). PCB contamination was centered around the garage and shade tree area (Figure 1). The soil within the courtyard, where a swingset and lawnchairs are located, had yet to be tested for contaminants. A site visit with J-EAC DSF and EHSS staff was scheduled for July 16.

On July 16, 2002, Betty Maness, DSF, escorted Bonnie Bashor and David Borowski, TDH, to the Former Highway 77E Transformer Recycling Facility. The residence is located within the downtown area of Yorkville. A driveway connects Hwy 77E to the house and the current garage, which contained the former transformer recycling workshop. There is a courtyard behind the house. A steep drop-off continues to the backyard (Figure 2). At the edge of the driveway, exposed soil was witnessed under the shade of a large tree (Figure 3).

During the visit, a family member was provided information on the possible health risks of lead and PCBs including prevention literature and fact sheets. No indoor pathways were investigated.

At that time, TDEC DSF was contracting for the removal of backyard soil down to 1 foot depth. This backyard soil has since been removed, replaced with clean soil, and covered with sod.

DISCUSSION

Lead in Surface Soil

Lead is a naturally occurring bluish-grey metallic element that is found in small amounts throughout the Earth's crust. Lead has no taste or odor. Lead does not dissolve in water or burn. Lead can form compounds, either naturally or manufactured, that have different physical properties. Lead has been widely used in batteries, ammunition, electronic circuitry, pipes, solder crystal, paint, fuel, and medical equipment. Lead use in products that frequently contact people or the environment has been reduced in past thirty years. In fact, lead has been phased out of most pipes, paint, and fuel. Yet, humans have spread lead throughout the environment into air, soil, and water (ATSDR 1999).

Lead exposure can be through ingestion, inhalation, or dermal exposure. Dermal exposure to lead is thought to be a minimal health risk. Inhalation of lead contaminated dust is a health threat as lead readily passes from the lungs into the blood. If consumed, differing percentages of lead will be absorbed into the blood depending on the individual's age, types of food eaten, and the chemical form of the lead. Basically, children with empty stomachs have greater amounts of lead absorption. Once in the blood, lead can travel to soft tissues including the brain, heart, liver and kidneys. The body can store lead in bones and teeth. Adults can eliminate 99% of lead that enters their bodies as waste; children, however, are only able to eliminate 32% of lead that enters their bodies (ATSDR 1999).

The main target of lead is the nervous system in both adults and children. Lead can affect nervous system function and cause weakness in wrists and ankles. There is inconclusive evidence that lead may increase blood pressure. High levels of lead can damage the brain and kidneys. Children are much more sensitive to lead than adults. Children can develop anemia, kidney damage, colic, muscle weakness, and brain damage from lead exposure. Lead poisoning is not thought to cause cancer in humans (ATSDR 1999). Yet, lead is listed as a Group B2, probable human carcinogen, by the US Environmental Protection Agency (EPA) (ATSDR 2002).

Data for surface soil lead concentrations from 14 samples collected March 25, 2002, ranged from 26.8 to 505 ppm with a geometric mean of 176.4 ppm. Under a large tree on the corner of the driveway, shade prevented grass from providing good ground cover. This dirt area was used like a sandbox by the children and coincidently had the highest lead concentration.

The parents were encouraged to have their children's blood lead levels tested. To date no known testing has occurred.

PCBs in Surface Soil

PCBs are a group of synthetic organic chemicals; no natural PCB is known to exist. PCBs enter the environment as mixtures of chlorinated biphenyl compounds. PCBs are either oily liquids or solids; some can volatilize and exist as vapor in the air. PCBs have no known odor or taste.

PCBs do not burn easily and are good insulators; because of these properties, PCBs were widely used as coolants and lubricants in electrical components such as transformers and capacitors. PCB mixtures are commonly referred to by industrial trade names such as Aroclor 1260. The production of PCBs was stopped in the United States in August 1977 due to evidence that PCBs accumulate in the environment and may cause adverse human health effects (ATSDR 2000).

PCBs are understood to be a long-term chronic hazard. Evidence of cancer in rats and liver damage in humans exposed to PCBs over many years has been reported. PCBs are listed as a Group B2, probable human carcinogen, by the EPA (ATSDR 2002). PCBs are not known to cause birth defects. PCBs are not thought to be a risk in short duration, acute exposure situations. (ATSDR 2000).

The neurological effects of PCBs have been extensively investigated in humans. Studies show that even low levels of PCBs transferred to a fetus across the placenta may induce long-lasting neurological damage. In addition, PCBs are lipophilic substances and could be transferred from mother to nursing infant via breast milk (ATSDR 2000).

Evidence exists that the immune status of both adults and infants was altered after oral PCB exposure. Infants exposed *in utero* and/or via breast feeding seem to be particularly sensitive to the immunological effects of PCBs. An association was observed between infectious illness and PCBs in the children of mothers who consumed Lake Michigan or Sheboygan River fish (ATSDR 2000). Animal research provides strong support to the immunotoxicity of PCBs in humans.

Based on the maximum PCB concentration measured in surface soil, 107.00 mg/kg, a standard 200 mg/day soil ingestion rate for children, and a standard 16 kg child body weight, a PCB intake of 0.00125 mg/kg-day was calculated for the family's younger child.

The minimum risk level (MRL) from ATSDR for intermediate term exposure to PCBs is based on neurological effects in infant monkeys (the most sensitive species) plus an uncertainty factor of 300. The MRL for PCBs is 0.0075 mg/kg-day (ATSDR 2000). The calculated PCB intake of 0.00125 mg/kg-day is less than the MRL. Therefore, if the family has lived at the site for a year, we should not expect any health effects due to PCB exposure. This is especially true since after infancy, adverse effects to PCBs usually occur at higher doses (ATSDR 2000).

ATSDR Child Health Initiative

In 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) launched an initiative to place a special agency-wide emphasis on environmental hazards to children's health and to emphasize child health in all agency programs and activities. The initiative was begun because of the special vulnerabilities of children when they are exposed to hazardous substances (ATSDR 1997, 1998).

Children six years old or younger are more sensitive to the effects of lead than adults. At low levels of exposure a child's mental and physical growth may be affected. The Centers for Disease Control and Prevention (CDC) considers a blood lead level of 10 micrograms per deciliter (μg/dL) to be of concern (ATSDR 1999). TDH used the potential exposure of children to the lead or PCBs found in the soil in assessing the risks at this residence.

CONCLUSIONS

1. Lead was present in surface soils and sediment ranging from 26.8 to 505 ppm, with a geometric mean of 176.4 ppm.
2. PCBs were present in surface soils and sediment ranging from non-detectable to 107.00 ppm, with a geometric mean of 27.16 ppm.
3. A completed exposure pathway existed for incidental ingestion of soil containing either lead or PCBs. However, the backyard soil has since been removed, replaced with clean soil, and covered with sod.
4. No apparent health hazard existed for the children at this residence.

RECOMMENDATIONS

1. Continue to prevent exposure for both lead and PCBs.

PUBLIC HEALTH ACTION PLAN

Actions Completed

2. TDH has met with the family at the affected residence and informed them of the possible health issues associated with lead and PCB exposure. Fact sheets on lead and PCBs were distributed. TDH encouraged the family to not garden where soil contamination is possible. TDH also emphasized to the family the importance of dermal hygiene (i.e., hand washing).
2. TDEC DSF contracted for removal of top foot of backyard soil and replacement with clean fill and sod. The removal action was completed in September 2002. Due to frequent heavy rain, soil stabilization was still ongoing when this health consultation was published.

REFERENCES

ATSDR [Agency for Toxic Substances and Disease Registry]. 2002. Health guidelines comparison values. Atlanta: US Department of Health and Human Services.

ATSDR [Agency for Toxic Substances and Disease Registry]. 2000. Toxicological profile for polychlorinated biphenols. Atlanta: 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. Healthy children - toxic environments. Report of the Child Health Workgroup presented to the Board of Scientific Counselors. Atlanta: US Department of Health and Human Services.

ATSDR [Agency for Toxic Substances and Disease Registry]. 1999. Toxicological profile for lead. Atlanta: US Department of Health and Human Services.

EPA [US Environmental Protection Agency]. 1998. Clarification to the 1994 revised interim soil lead guidance for CERCLA sites and RCRA corrective action facilities. EPA/540/F-98/030.

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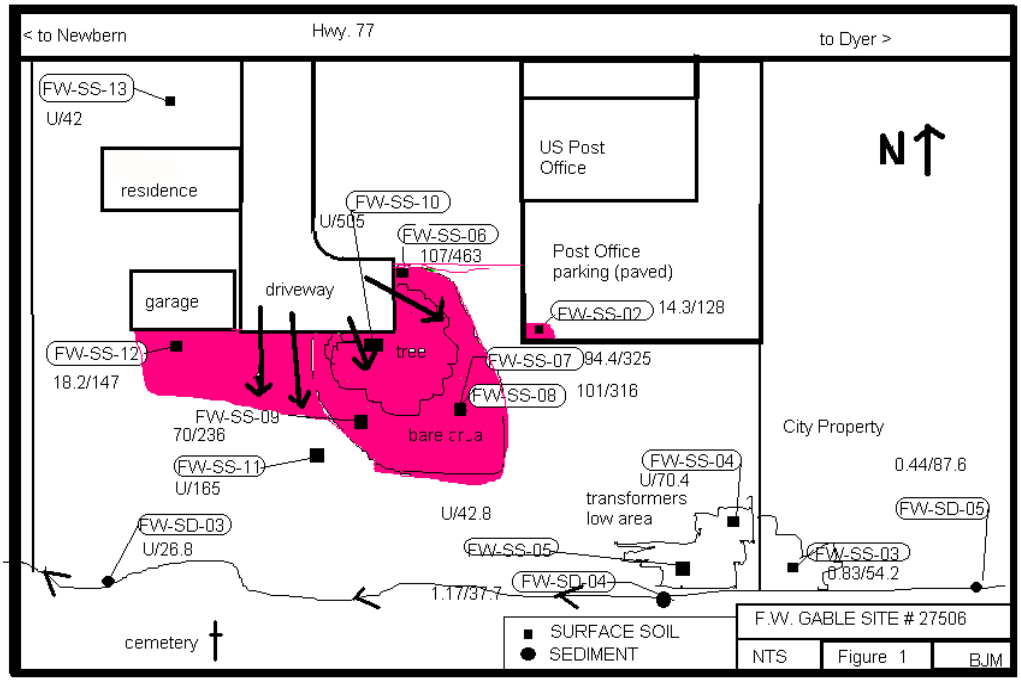
Figure 1
Map of site with PCB and Lead Sampling Locations and Concentrations
Former Hwy 77E Transformer Recycling Facility
Yorkville, Gibson County, Tennessee



(Map Credit: Betty Maness, TDEC)

Figure 2

July 16, 2002 Photo of Adjacent Garage and Shade Tree
Former Hwy 77E Transformer Recycling Facility
Yorkville, Gibson County, Tennessee

(Photo Credit: David Borowski, TDH)

Table 1
0-3" Soil Data - March 25, 2002
Former Hwy 77E Transformer Recycling Facility
Yorkville, Gibson County, Tennessee

Sample Number	[PCB] (ppm)	[Lead] (ppm)
FW-SS-01 (background)	U	12.2
FW-SS-02	14.30	128.0
FW-SS-03	0.83	54.2
FW-SS-04	U	70.4
FW-SS-05	U	42.8
FW-SS-06	**107.00**	**463.0**
FW-SS-07	**94.40**	325.0
FW-SS-08	**101.00**	316.0
FW-SS-09	**70.00**	236.0
FW-SS-10	U	**505.0**
FW-SS-11	U	165.0
FW-SS-12	**18.20**	147.0
FW-SS-13	U	42.0
FW-SD-03	U	26.8
FW-SD-04	1.17	37.7
FW-SD-05	0.44	87.6
$\bar{x}$	*27.16*	*176.4*

** Values in bold typeface are above EPA/TDEC guidelines. **

CERTIFICATION

This Former Highway 77E Transformer Recycling Facility, Yorkville, Tennessee health consultation was prepared by the Tennessee Department of Health Environmental Health Studies and Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing 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.

Richard Gillig

for Chief, State Program Section, SSAB, DHAC, ATSDR

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