Health Consultation

HOWARD SCHOOL

(A/K/A HOWARD HIGH SCHOOL LANDFILL SITE)

CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

EPA ID# TND100842843

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Prepared by:

The Tennessee Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
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 previously issued conclusions.

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Background and Statement of Issues

Howard School of Academics and Technology in Chattanooga has witnessed its share of environmental public health questions over the years. The school property is influenced by Chattanooga Creek, historically one of Tennessee's most polluted areas. Historical activity caused pollution on portions of the school property requiring the area to be monitored by state Superfund. Recent Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) oversight noted dirt stockpiles that seemed out-of-place given the current working orders for a new gymnasium on the formerly remediated site.

A no digging order to prevent puncture of the protective cap was in place, yet TDEC personnel noticed soils with different, abnormal characteristics in the stockpiles. To ensure the protective cap had not been damaged, TDEC asked school officials about the dirt stockpiles and requested they analyze soil samples. Twelve soil samples were collected in October 2004. TDEC DoR requested that Environmental Epidemiology (EEP) of the Tennessee Department of Health (TDH) review the environmental sampling data to ensure protection of the public on Howard School property.

Construction of the new gymnasium and parking lot were observed by TDEC DoR to ensure contaminated soils were not exposed. A soil sample was collected around the gym in March 2004 to ensure no chemicals were present. Now that the construction of the gym is mostly complete, the construction site is being returned to normal use by establishing a gravel parking area, vegetative cover on exposed soil, and planting shrubs to provide aesthetic value.

After the initial TDEC DoR visit, the stockpiles were graded and seeded. On February 10, 2005, TDEC DoR visited the site and provided the site photo shown as Figure 1. On February 24, EEP visited the area in question at Howard School. Figure 2 is an aerial photo noting the arrangement of the new gym, the gravel lot, and the area of potential concern.

The analytical soil data from March 2004, April 2004, and October 2004 (TDEC 2005) will be reviewed in this environmental health consultation to ensure protection of students, children attending the on-site daycare facility, and anyone playing around Howard School.

Discussion

Introduction to Chemical Exposure

To determine whether persons are, have been, or are likely to be exposed to chemicals, Environmental Epidemiology of the Tennessee Department of Health evaluates mechanisms that could lead to human exposure. An exposure pathway contains five parts:

1. a source of contamination,
2. contaminant transport through an environmental medium,
3. a point of exposure,
4. a route of human exposure, and
5. a receptor population.

An exposure pathway is considered complete if there is evidence that all five of these elements are, have been, or will be present at the site. The pathway is considered either a potential or an incomplete exposure pathway if there is no evidence that at least one of the five elements listed is, has been, or will be present at the site, or if there is a lower probability of exposure.

When a chemical is released from an area such as an industrial plant or from a container such as a drum, it enters the environment. A chemical release does not, however, always lead to human exposure. Persons can be exposed to a chemical when contact is made by breathing, eating, drinking, or otherwise touching the chemical.

Furthermore, physical contact alone with a potentially harmful chemical in the environment by itself does not necessarily mean that a person will develop adverse health effects. A chemical's ability to affect public health is also controlled by a number of other factors, including:

- the amount of the chemical that a person is exposed to (dose)
- the length of time that a person is exposed to the chemical (duration)
- the number of times a person is exposed to the chemical (frequency)
- the person's age and health status
- the person's diet and nutritional habits.

Environmental Soil Sampling

On March 31, 2004, soil from the area of the new Howard School gym was collected. The soil was analyzed using the toxicity characteristic leaching procedure (TCLP) for metals. No metals failed the TCLP test. Extractable petroleum hydrocarbons (EPH) were measured at 868.2 parts per million (ppm) of EPH.

Soil was sampled from the same area on April 28, 2004. The soil contained 94.3 ppm EPH. Oil and grease was reported at 119.9 mg/L. Lab analysis for about 80 chemicals including

polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) was performed. The three chemicals detected are discussed later.

On October 22, 2004, additional soil samples were taken from the dirt stockpiles across the gravel parking area from the new gym. Laboratory analysis of the 12 soil samples measured EPH ranging from 26.5 to 542.7 parts per million (ppm) with a mean of 178.5 ppm.

Extractable Hydrocarbons

The EPH test is non-specific for hydrocarbons in the $C_{12} - C_{40}$ range. Samples are analyzed with gas chromatography, but analysis is not followed by mass spectrometry. This means that hydrocarbons in the size range are detected, but chemical identification of individual compounds is generally not possible. Common $C_{12} - C_{40}$ range biological chemicals are found in plant material including disaccharides, trisaccharides, pigments, digitalis, spices, saturated fatty acids, unsaturated fatty acids, plant hormones, vitamins A and E, and partially hydrolyzed starches and cellulose (Devlin 2002). Plants are prolific generators of exotic chemical compounds made of isoprene units, many of which are in the $C_{12} - C_{40}$ range (Devlin 2002; Mahler and Cordes 1971). In addition, fungi and invertebrates, such as spiders and insects, make chitin, a structural component analogous to cellulose in plants (Mahler and Cordes 1971). Partially hydrolyzed chitin will elute with EPH. It is not surprising to find hydrocarbons, partially hydrolyzed chitin, or phthalates eluting in the same size range as EPH in soil samples taken in grassy yards, with their concomitant plant material and small invertebrates. Exposure to these compounds is extremely unlikely to cause adverse health effects.

Petroleum fuels are not typically in the $C_{12} - C_{40}$ range. Many are different arrangements of methyl group(s) around a benzene (C_6) ring. These chemicals such as benzene, toluene, and xylene can be measured in a different analysis called total petroleum hydrocarbons (TPH). The April 2004 soil analysis detected none of these chemicals. Therefore, it is unlikely that the EPH numbers were influenced by the presence of petroleum products. TDEC uses a generic level of 100 ppm TPH as their site remediation guideline. EPH is subset of TPH. Even though the EPH data is above this guideline, the benign nature of the EPH compounds creates no cause for concern.

Other Chemicals

The laboratory data listed some other chemicals that were detected while sampling the soil from Howard School in April 2004. These chemicals were acetone, 2-butanone (MEK), and benzo(g,h,i)perylene. Acetone and MEK are common laboratory cleaners and common cleaners/degreasers used during construction. Benzo(g,h,i)perylene is a polycyclic aromatic hydrocarbon (PAH) commonly produced from incomplete combustion in smoke or exhaust. The presence of these chemicals in the soil or lab procedures do not pose a health risk because the amounts measured are several orders of magnitude below health screening guides (EPA 2004).

Children's Health Considerations

The many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children often play indoors on the floor and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. Children are shorter than adults; this means they breathe dust and vapors close to the ground. 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, nourishment, medical care, and risk identification.

Children and teenagers are both important receptor populations for the Howard School site. Fortunately, no environmental public health issues were discovered during this investigation.

Conclusion

No health hazard exists from extractable petroleum hydrocarbons (EPH) in the dirt stockpiles at Howard School.

Recommendation

As a measure of prudent public health practice, add clean top soil and improved vegetative cover to eliminate the dermal contact route of exposure.

Public Health Action Plan

Environmental Epidemiology will provide copies of this document to the Howard High School principal, Chattanooga-Hamilton County Schools, Chattanooga-Hamilton County Health Department, TDEC Division of Remediation, and other agencies or individuals as needed. EEP will be available to provide clarification or answer questions related to environmental public health regarding Howard School.

References

Delvin, Thomas M. 2002. Textbook of biochemistry with clinical correlations, 5th ed. New York: Wiley-Liss.

[EPA] Environmental Protection Agency. 2004. Region 9 Preliminary Remediation Goals PRGs. CA June 22, 2004.

Mahler, Henry R. and Cordes, Eugene H. 1971. Biological Chemistry, 2nd ed. New York: Harper and Row Publishers.

[TDEC] Tennessee Department of Environment and Conservation. 2005. Site reports and lab data sheets in Division of Remediation files. Chattanooga: TN.

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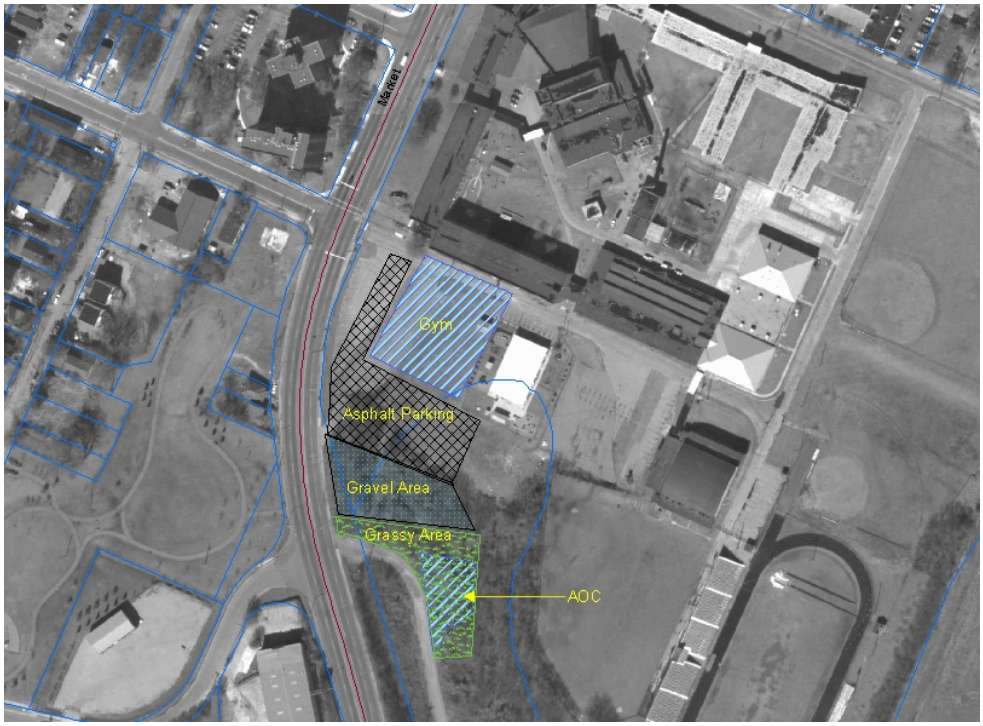
FIGURE 1. Photograph of the area in question at Howard School taken by TDEC DoR on February 10, 2004 were orange flags note the soil sampling locations. (photo: Jeb Barrett)

FIGURE 2. Aerial photograph of Howard School noting the location of the gym, asphalt parking, gravel lot, and the grassy area in question. (TDEC DoR)



Certification

This Health Consultation: Howard High School 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.

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

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