

# Health Consultation

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KINGSJUNIOR HIGH SCHOOL

KINGS MILL, WARREN COUNTY, OHI

EPA FACILITY ID:

SEPTEMBER 30, 2003

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**

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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

KINGS JUNIOR HIGH SCHOOL

KINGS MILLS, WARREN COUNTY, OHIO

Prepared by:

Ohio Department of Health  
Health Assessment Section  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## **STATEMENT OF ISSUES**

The Health Assessment Section (HAS) of the Ohio Department of Health (ODH) was asked by the United States Environmental Protection Agency (U.S. EPA) to review analytical results of soil samples collected from the Kings Junior High School in Kings Mills, Warren County, Ohio to determine if the levels of lead detected on the school property posed a public health threat to students, faculty, and visitors of the school. Review of historical documents for another site in Warren County indicated that the school property once housed a trap and skeet shooting range. Areas occupied by shooting ranges have a known history of containing elevated levels of lead in the soil due to the lead shot used in shotgun shells. In addition to reviewing the analytical results, HAS staff were asked to provide recommendations and communicate possible health implications of the results to school district staff. This health consultation documents activities taken place to date and makes recommendations to the school district and U.S. EPA to reduce and mitigate exposure to lead contaminated soils.

## **BACKGROUND**

The possibility of lead contamination at King's Junior High School was discovered while Ohio Environmental Protection Agency (Ohio EPA) was investigating the former Peter's Cartridge ammunition site located approximately 5 miles northwest from Kings Junior High School. Historical documents related to Peter's Cartridge make reference to an employee shooting range that appears to have been located on the property where the current junior high school is located. Additional information on the property was disclosed when Ohio EPA was investigating a complaint filed by a Warren County resident that soils contaminated with lead shot and clay pigeons were disposed of on a local horse farm. Anecdotal statements initially indicated that the waste dumped at the horse farm may have originated from the former Peter's Cartridge employee shooting range. Ohio EPA was also able to acquire a 1960 aerial photograph that identified what appeared to be a shooting range on the eastern portion of the property where the current junior high school is located. As a result of the information collected, Ohio EPA approached the Kings School district and requested access to the junior high school property to conduct a site inspection. During the site inspection, fragments of clay pigeons were visible in the surface soils on the school property. Ohio EPA made the decision to collect soil samples at the school and analyze them for lead to determine if students and faculty are being exposed to lead contaminated soils (pers. comm. w/ Scott Glum-Ohio EPA, 2003).

## **DISCUSSION**

Soil samples were collected on two occasions at the Kings High School. Initial soil samples were collected on August 13, 2003 by the Ohio EPA. Nine surface samples were collected from a depth of 0 to 2 inches and analyzed for total lead. Analytical results indicated total lead concentrations ranging from 80.3 parts per million (ppm) to 53,100 ppm. Samples were collected from several locations around the school with the highest detections of lead coming from two locations (Figure 1). Lead was detected at 581 ppm

in bare dirt located just outside of the western entrance of the junior high school (sample 9) and at 53,100 ppm in bare dirt adjacent to the spectator stands at the football field (sample 6) on the southern portion of the schools property. HAS uses a soil concentration of 400 parts per million (ppm) as a screening level when determining if a potential exposure to lead contaminated soils could pose an adverse health risk. If the screening level is exceeded it does not immediately indicate that people would be expected to develop adverse health effects. It merely means that it is necessary to take a closer look at the situation and examine the specifics of the potential exposure such as the frequency and duration. Of the nine samples collected only the two mentioned above exceeded the 400 ppm screening level (Ohio EPA, unpublished data, 2003).

Based on the data collected during the initial soil sampling event, the Ohio EPA contacted the U.S. EPA to request assistance in collecting additional soil samples in order to better define the magnitude of soil contamination on the school property. A meeting was held on August 19, 2003, with the Kings Local School superintendent and several other school staff members to explain the results of the initial sampling event and outline plans for future actions. The meeting was also attended by HAS, the Warren County Health Department, and the Ohio EPA. During the meeting, HAS and the Warren County Health Department made a recommendation to the school district that they restrict access to the areas of the school property that have shown elevated levels of lead in the surface soils. This recommendation included restricting access to the football field until the extent of the contamination could be further evaluated.

The U.S. EPA initiated a second sampling event on August 20, 2003 through their contractor Tetra-Tech. Tetra-Tech established a grid system across the eastern portion of the school property, where the 1960 aerial photograph indicated that the shooting range was located, and collected samples from 100 locations. Two samples were collected from each location at depths of 0-2 inches and 2-12 inches below ground surface. Samples were shipped to GEL Labs and analyzed for total lead. Analytical results confirmed the presence of lead over a large portion of the junior high school property. The majority of the lead contamination appears to be located in the area of the football field with total lead concentrations ranging from 15.5 – 4187 ppm. Additional contamination was also found in front of the school up to 938 ppm and on the baseball field up to 805 ppm. The contamination on the baseball field was limited to the grass covered areas. However, only two samples were collected from the bare soil infield, so the full extent of the contamination in the bare soil in the infield is unknown (Tetra-Tech, unpublished data, 2003).

### **Exposure Assessment**

Students and faculty of the school have to come into physical contact with the lead-contaminated soils and be exposed to the contamination for adverse health effects to occur. In order for people to come into contact with the lead in the environment, there must be the development of a *completed exposure pathway*. A completed exposure pathway consists of five main parts: These include: 1) a source of lead in the environment; 2) a way for the lead to migrate from its source to the soil; 3) a place where

the residents comes in to contact with the lead; 4) a pathway (route) by which the person comes into contact with the lead (eating, breathing); and 5) people who could potentially be exposed. Exposure pathways can also be characterized as to when the exposure occurred, as in either, the past, present, or future.

Physical contact with the lead in the environment by itself does not necessarily mean that a person would develop adverse health effects. Lead's ability to affect a resident's health is also controlled by a number of factors, including:

- How much lead a person is exposed to (dose)
- How long a person is exposed to the lead (duration)
- How often a person is exposed to the lead (frequency)
- The resident's age
- The resident's diet and nutritional habits

Most of the lead detected in soils on the junior high school property appears to be present in grass covered areas. Grass cover is an effective barrier in limiting exposure to lead contaminated soils. Ingestion and inhalation of lead contaminated soils are the two most serious exposure pathways for lead exposure. Skin contact with lead is not likely to pose a significant health threat since lead is not readily absorbed by the skin (ATSDR, 1999).

Exposure to lead has the largest impact on children under the age of six and on pregnant women with developing fetuses. Lead's primary negative impact is on the developing nervous system and has been seen to impair development and cause a decrease in IQ in young children (ATSDR, 1999).

There are elevated levels of lead in surface soils over a large portion of the Kings Junior High School campus and it is likely that a large portion of the student and faculty may come into contact with the contamination. However it is unlikely that any of the students or faculty would be expected to develop adverse health effects from the exposure. The most likely route of exposure for faculty and students is skin contact with the soils which would not be an effective route for lead to enter the body. Other smaller exposure pathways would include incidental ingestion of soils during a football game or possible inhalation of airborne dust that contains lead. Because of the amount of grass cover at the school and the infrequency that any of these events would occur, it is unlikely that current exposures at the school would result in adverse health effects for the students and faculty. One population that may be of concern is small children that may visit the school for sporting events. Small children are at greater risk from lead exposure and are more likely to exhibit hand to mouth behavior which may increase their exposure risks. The highest lead level detected to date was in bare soil next to the football bleachers in an area where small children could easily come into contact with the soils.

## **CHILDREN'S HEALTH CONSIDERATIONS**

Children are the most at risk to lead exposure from contaminated soils due to their smaller size and propensity to engage in hand to mouth activities. Lead also has a greater

impact on children's health because of their developing nervous systems. HAS considered the health of children when evaluating analytical results and making recommendations for reducing exposure on the King's School property. While it appears unlikely that anyone at the school would be exposed to the lead contamination at high enough levels for long enough periods of time to develop adverse health effects, HAS still feels that it is important to limit access to the lead contaminated soils to protect the health of certain children who may exhibit behavior that may increase their exposure.

## **CONCLUSIONS**

The lead detected in the surface soils of the King's Junior High School currently poses a public health hazard to children. Students and faculty are exposed to the lead contamination by either coming into dermal contact or by ingestion and inhalation of small amounts of lead during outdoor sporting activities at the school. Small children who visit the school for sporting events have the potential to ingest soil with elevated levels of lead contamination that could pose a public health hazard. It is not expected that students and faculty that have used the school grounds would experience adverse health effects from these exposures due to the infrequency of the exposures and the fact that expected exposure pathways are unlikely to result in a large amount of lead being absorbed by the body. Since the potential exists for children to be exposed to lead levels far above the established screening level of 400 ppm HAS feels it is necessary to classify the site as a public health hazard.

## **RECOMMENDATIONS**

- The King's School District should continue to restrict access to those areas of the school property that contained concentrations of lead in the surface soil above 400 ppm.
- U.S. EPA should ensure that the contaminated surface soils at the school are removed and that the remaining soils do not have lead concentrations above 400 ppm.

## **PUBLIC HEALTH ACTION PLAN**

- HAS will continue to review any new environmental data that is collected at the site and make recommendations to reduce or prevent exposure. HAS staff will also attend any additional public or agency meeting to answer health related questions and provide educational materials to school officials or concerned parents. The Ohio Department of Health will continue to be available to answer questions related to exposure to lead contaminated soils and to provide educational materials to interested individuals and also review and comment on additional sample results collected at the school.
- HAS is not currently recommending that faculty and children of the King's Junior High School be tested for lead because there is no evidence that there is a

completed exposure pathway to lead at that would be expected to cause adverse health effects. If parents continue to have concerns about lead exposure they may contact their family physician for information about having a blood lead screening for their children.

#### **PREPARED BY**

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Robert Frey, Ph. D., Principal Investigator

#### **REFERENCES**

Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead (Update). U.S. Department of Health and Human Services. 1999.



## **CERTIFICATION**

This Kings Junior High School Health Consultation was prepared by the Ohio Department of Health 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.

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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.

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Chief, State Program Section, SSAB, DHAC, ATSDR