

HEALTH CONSULTATION

CINCINNATI COUNTRY DAY SCHOOL LEAD SITE

CINCINNATI, OHIO

Prepared by:

Health Assessment Section
of the Ohio Department of Health
Under a 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 Cincinnati Country Day School located at 6905 Given Road in Cincinnati, Hamilton 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. Lead contamination has impacted soils at the school as the result of shooting range activities that took place at the Camargo Club, a county club that is adjacent to the school property. 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 (Lexington Manor PHC, 2003 and Kings Mills PHC, 2003). In addition to reviewing the analytical results, HAS staff were asked to provide recommendations for levels of lead that would be considered safe to be left in the soil. 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 in the soils at the Cincinnati Country Day School (CCDS) was discovered in 2003 when the Camargo Club presented the school with a report that indicated that lead shot may be present on the school's softball and junior high baseball diamonds. The lead shot was there as a result of skeet shooting activities at the Camargo Club. The Camargo Club offered skeet and trap shooting from 1926 until 1975. Since 1975 only skeet shooting has been allowed at the property. At the request of a local landowner, the Camargo Club conducted a survey to determine the extent of the drop zone of their skeet shooting range. Analytical results of this sampling indicated that the shot impact may extend onto the school's property, specifically to the softball field and junior high baseball field. After this contamination was discovered, the Camargo Club contacted CCDS and inquired about sampling the potentially impacted portions of the school property. As stated above, the shooting range has been in operation since 1926 and now only operates on weekends. However, all shooting activities have been suspended since September 2003.

DISCUSSION

Review of Sampling Data

Initial soil samples were collected from along the school's fence line in November 2003 to confirm that lead contamination did in fact extend onto the school's property. Additional samples were collected in December 2003, followed by two more rounds of sampling in January and February 2004. In total, approximately 150 soil samples were collected from the approximately 3-4 acres of the school property. Lead levels in the top six inches of the soil range from non-detectable levels up to 2,010 parts per million (ppm) (Figure 1). The highest levels of lead in the surface soil appear to be along the fence line between the school and the Camargo Club and in the outfield of the two ball

diamonds (Figure 2). Levels of lead in the soils deeper than six inches range from non-detect up to 56,000 parts per million (Figure 1). Based on the analytical data collected to date, the school administration has decided to restrict access to the impacted portion of the school and has found alternative locations for baseball and softball games that were normally played on the affected fields. The Camargo Club has accepted responsibility for the contamination and has agreed to remove the contaminated soils and return the property to the school with lead levels below 400 parts per million, which is the safe level of residential exposure established by U.S. EPA and the Ohio Department of Health.

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 school property appears to be present in grass covered areas. Grass cover is an effective barrier in limiting exposure to lead contaminated soils in these areas. The major barren areas are the baseball diamonds. During the ball games, dust is generated that exposes the players and the spectators to lead. 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 exposures have been associated with impaired development and decreased in IQ levels in young children (ATSDR, 1999).

There are elevated levels of lead in surface soils over a 3-4 acre portion of the CCDS campus. The contamination appears to be limited to the junior high school baseball field and the school softball diamond. Only students and patrons who use those fields have the opportunity to come into contact with the contaminated soils. It is unlikely that any of the older students or faculty who are not frequently at the ball fields would be expected to develop adverse health effects from the exposure. This is due to the older age of the students and a limited opportunity or likelihood that ingestion or inhalation of lead contaminated soils would occur. The most likely routes of exposure to this lead contamination is the incidental ingestion of soils during a baseball or softball game or the 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 majority of the students and faculty. However, populations that may be of concern are the athletes, coaches, and any 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. In addition to breathing in dust generated by the infield players, small children may play in any bare spots caused by spectator foot traffic surrounding the playing fields.

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 CCDS property. While it appears unlikely that the majority of the students 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 prudent to limit access to the lead contaminated soils since lead contamination has been found in the surface soil at levels over 2,000 ppm. This action is necessary to protect the health of certain children who may exhibit behavior that may increase their exposure.

CONCLUSIONS

Prior to the school restricting access to athletic fields, the lead detected in the surface soils of the CCDS posed a public health hazard to athletes and small children. Athletes that practiced regularly on the contaminated infield were exposed to contaminated lead dust. Small children who visited the school for sporting events potentially could have ingested soil with elevated levels of lead contamination which could pose a public health hazard. In addition to athletes and small children, older students and faculty were 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. It is not expected that the majority of the older 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 for most of the school's population. However, since the potential existed for both athletes and small children to be regularly exposed to lead levels well above the established screening level of 400 ppm, HAS feels it is necessary and prudent to classify the site as a public health hazard in the past (prior to the school restricting access to the athletic fields).

RECOMMENDATIONS

- The CCDS should continue to restrict access to those areas of the school property that contained concentrations of lead in the surface soil above 400 ppm.
- Ensure that the contaminated surface soils at the school are removed and/or remediated and that the remaining soils do not have lead concentrations above 400 ppm.

PUBLIC HEALTH ACTION PLAN

- The Camargo Club is conducting the cleanup under the oversight of the U.S. EPA. The U.S.EPA has asked HAS to recommend a safe level of exposure. HAS will provide the U.S. EPA with the requested information.
- 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 public or agency meetings to answer health related questions and provide educational materials to school officials or concerned parents. The Ohio Department of Health will 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 most of the faculty and students of the CCDS be tested for lead because there is no evidence that there is a completed exposure pathway to lead at levels that would be expected to cause adverse health effects. If parents have concerns that their child has been exposed to excessive lead they should contact their family physician for information about having a blood lead screening for their children.

PREPARED BY

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REFERENCES

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

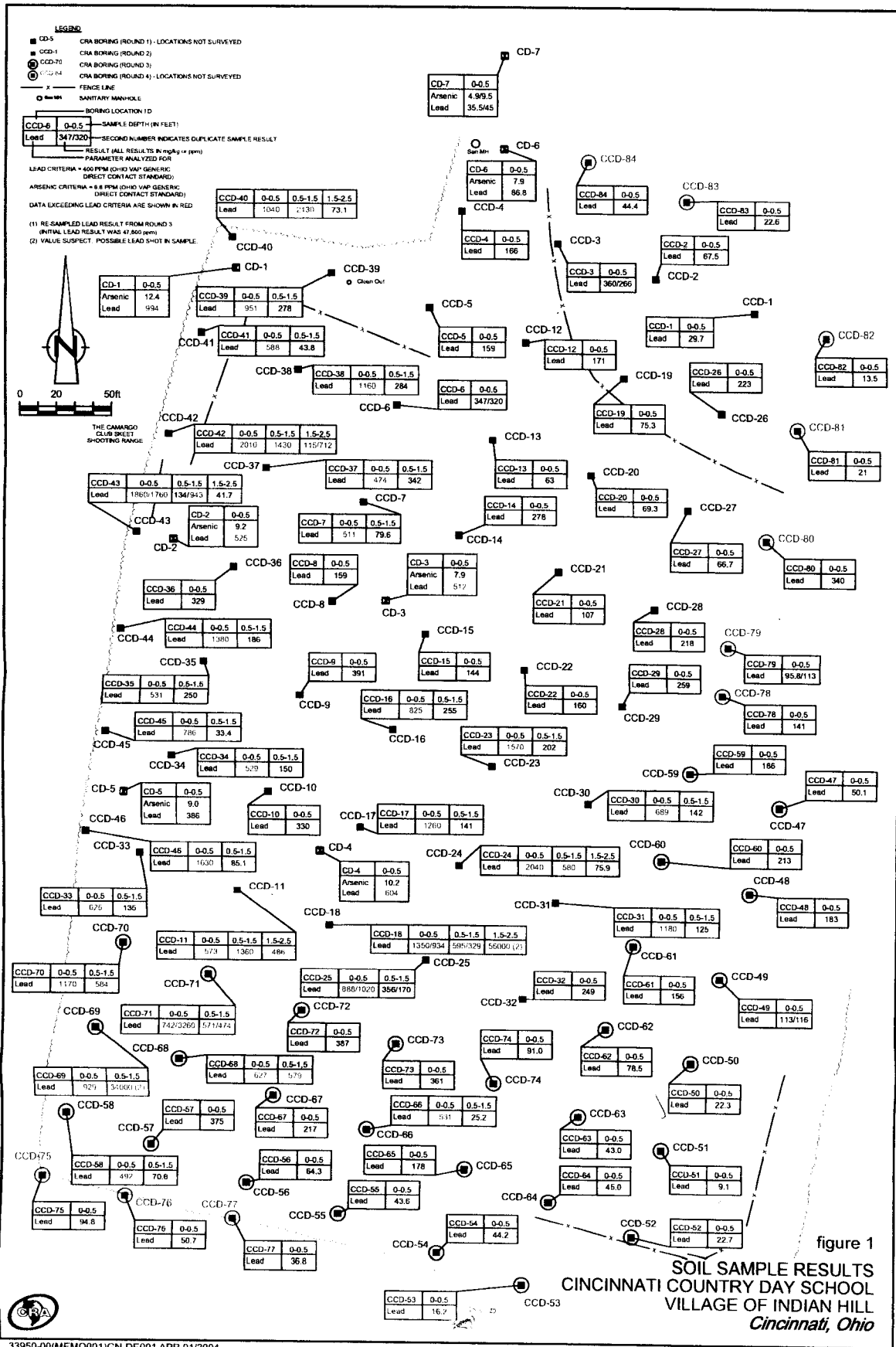
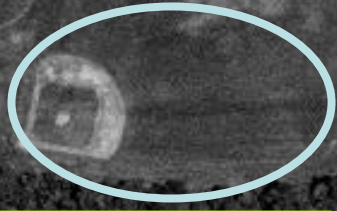
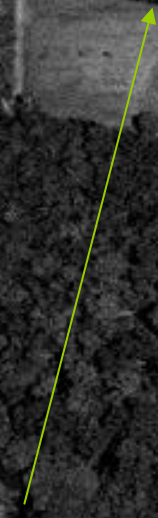


figure 1

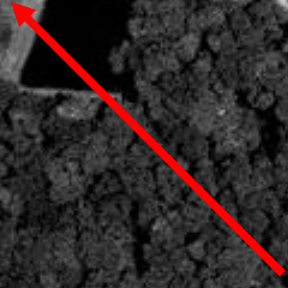
**SOIL SAMPLE RESULTS
CINCINNATI COUNTRY DAY SCHOOL
VILLAGE OF INDIAN HILL
Cincinnati, Ohio**

Figure 2

CCDS School Property Line



Camargo Club Skeet Range

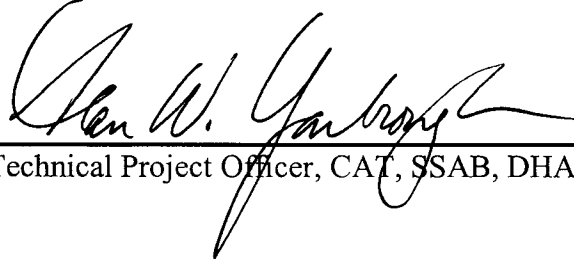


Approximate extent of Contamination



CERTIFICATION

This Cincinnati Country Day 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.



Technical Project Officer, CAT, SSAB, DHAC, ATSDR

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



Chief, Cooperative Agreement Team, SSAB, DHAC, ATSDR