HEALTH CONSULTATION

MELROSE LEAD SITE

ST. PETERSBURG, PINELLAS COUNTY, FLORIDA

CERCLIS NO. FLD0000460824

August 29, 1998

Prepared by:

Florida Department of Health
Bureau of Environmental Toxicology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
U.S. Department of Health and Human Services

Background and Statement of Issues

The Florida Department of Health (Florida DOH), through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, evaluates the public health significance of Superfund hazardous waste sites in Florida. The U.S. Environmental Protection Agency (EPA) has requested that Florida DOH evaluate the past health effects of exposure to contaminants in soil at the Melrose Lead site in Pinellas County, Florida. EPA collected soil samples on and off of the site. EPA analyzed these samples for pesticides, polycyclic aromatic hydrocarbons (PAHs), metals, and chlorinated hydrocarbons. This health consultation will assess the public health threat from contaminants found on the Melrose Elementary School grounds and the residential property surrounding the school. The interpretation, advice, and recommendations presented in this report are site-specific and should not be considered applicable to any other sites.

The Melrose Lead Site (Melrose) is part of the playground area at the Melrose Elementary School in St. Petersburg, Pinellas County, Florida (Figs. 1 - 3). The Melrose school was built in 1963 on a reclaimed wetland area. The wetlands were reclaimed between 1927 and the mid-1940s by filling with construction debris and other unidentified materials (1). The Melrose Elementary School consists of a one-story administration building, an adjacent two-story classroom building, and several additional temporary classroom structures. There are about 620 children enrolled at the school. They range in age from 4 to 11 years in grades K-5.

According to 1990 census data (2), about 5,700 people live within a one-half mile radius of the school. Median family income in this area ranges from about $6,700-43,000 per year. Racial makeup of the population is about 96% black and 3% white. A foster home, a nursing home, and three children's group homes are within one-half mile of the school. There are no private drinking water wells within this area. However, there are about sixteen private irrigation wells (3). A search of EPA's Toxics Release Inventory indicated there are no facilities within the zip code area of the school that have reported releases of the same chemicals found on the school grounds (4).

Contractors for the Pinellas County School Board conducted a geotechnical investigation in June 1993. They found construction debris buried under the playground (3). In September 1993 the contractors collected 28 subsurface (0.5-1.0 ft) soil samples from the school playground. They found elevated lead levels in this soil. The potential health risks to children from lead in the soil prompted the Pinellas County School Board to temporarily close the school in October 1993 (3). At about this same time, the Pinellas County Health Department offered to test local children for lead. They screened 442 children from the school and 52 children from nearby residences. They found about 3% of the children with blood lead levels above 10 micrograms per deciliter (5). Fifty-three teachers at the school and 10 adults from nearby residences were also tested. They did not find any adults with elevated blood lead levels.

In January 1995, the Florida Department of Environmental Protection (FDEP) collected 23 surface (0-1 ft) and 10 subsurface (3-4 ft) soil samples from the school grounds and surrounding residential yards (6). They found elevated levels of lead in both areas. Based on these findings, in March 1995,the school board ordered the replacement of two feet of soil in the school playground with clean fill (7).

In May 1995, contractors for EPA collected 25 surface soil samples (depth not given) from six residential yards south of the school. They analyzed the samples for total lead (1) and found elevated lead levels in five of the yards. As a result of their findings, in April 1996, EPA removed surface soil from contaminated yards and replaced it with clean fill (8).

On September 12, 1997, Bruce Tuovila, Florida DOH, conducted a site visit at the Melrose Elementary School. With him were David Hutchins, ATSDR, Ben Moore, ATSDR, and Michael Flanery, Pinellas County Health Department. The school and school grounds are completely secured by chain-link fencing. The school is in the middle of a low-income residential neighborhood. The playground area is mostly dirt with a sparse grass groundcover. There is a concrete basketball court on the playground and various playground equipment such as swings and slides. There were children present on the playground during the site visit. The soil on the playground is noticeably different from the native soil off of the school grounds.

Table 1 shows the maximum level of each chemical of potential health concern in the soil samples collected at the school. Table 2 shows the maximum level of each chemical of potential health concern in the soil samples collected in residential yards. Chemicals not shown in the tables are below levels of human health concern. We selected these chemicals by comparing the maximum concentration to standard comparison values. A comparison value is used as a means of selecting environmental contaminants for further evaluation to determine whether exposure to them has public health significance. Those contaminants that are known or suspected human carcinogens were evaluated for both carcinogenic and non-carcinogenic adverse health effects.

Table 1. Maximum Contaminant Levels in Surface and Subsurface Soil Samples on Melrose Elementary School Property Before Remediation

CONTAMINANT	MAXIMUM CONCENTRATION-SURFACE SOIL	MAXIMUM CONCENTRATION-SUBSURFACE SOIL
ANTIMONY	38 mg/kg	NA
ARSENIC	77 mg/kg	34 mg/kg
LEAD	1040 mg/kg	6507 mg/kg
MANGANESE	363 mg/kg	686 mg/kg

mg/kg - milligrams per kilogram of soil
ND - not detected
NA - not analyzed
Sources: (1, 3, 6)

Table 2. Maximum Contaminant Levels in Surface and Subsurface Soil Samples in Residential Yards Before Remediation

CONTAMINANT	MAXIMUM CONCENTRATION-SURFACE SOIL	MAXIMUM CONCENTRATION-SUBSURFACE SOIL
ANTIMONY	11 mg/kg	NA
ARSENIC	25 mg/kg	ND
LEAD	1900 mg/kg	ND
MANGANESE	805 mg/kg	187 mg/kg

mg/kg - milligrams per kilogram of soil
ND - not detected
NA - not analyzed
Sources: (1, 3, 6)

Discussion

To evaluate health effects, ATSDR has developed Minimal Risk Levels (MRLs) for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. ATSDR has developed an MRL for each route of exposure, such as ingestion, inhalation, and dermal contact, and for the length of exposure, such as acute (less than 14 days), intermediate (15 to 365 days), and chronic (greater than 365 days). ATSDR presents these MRLs in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status. The U.S. Environmental Protection Agency (EPA) has developed reference doses (RfDs) to evaluate non-cancer health effects resulting from exposure to chemicals at Superfund sites.

Both MRLs and RfDs are health guideline values that are usually derived from experimental animal data, based on broad assumptions, and corrected by a series of uncertainty factors. Thus, the values serve only as guidelines and not as absolute values that explicitly divide ranges of safety from ranges of risk. Additional medical or toxicological information must be evaluated to determine what adverse health effects are likely from exposure to chemicals of concern at a site.

Exposure Before Remediation

The following discussion evaluates the health effects likely from past exposure to chemicals in the soil on the school playground and in nearby residential yards before it was replaced with clean fill.

Exposure in Children--Because this is an elementary school, the health effects from exposure to chemicals in young children are a special concern. Children are generally exposed to greater levels of contaminants in soil because their activities bring them into greater contact with the soil.
They are often more sensitive to the effects of chemical exposures than adults. About 15% of children ages 1-3 exhibit a condition known as "pica" in which they eat relatively large amounts of soil (about 5,000 milligrams [1 teaspoon] per day) (9).

Because there is the possibility that children in this age range live near the school, we have estimated the health effects from past exposure in pica children using a soil ingestion rate of 5,000 milligrams (mg) per day. For children at the school, who are above this age, we used a more typical soil ingestion rate of 200 mg per day to calculate their exposure. We assumed a body weight of 10 kilograms (kg) (about 23 pounds) for the pica children and 15 kg (about 35 pounds) for older children. We also assumed exposure was to the maximum level of each chemical in the soil samples.

Pica Children

Arsenic--The maximum estimated daily dose of arsenic from incidental ingestion of residential soil by pica children exceeded ATSDR's chronic oral MRL (10). Exposure at this level could have caused changes in the skin. Most common is the appearance of corns or warts on the palms and soles, and a darkening of irregular areas of the skin. Arsenic is a known human carcinogen. However, lifetime exposure (70 years) to the maximum estimated daily dose of arsenic in residential soil would have resulted in no apparent increase in the risk of cancer.

Arsenic is not readily absorbed through the skin. Skin contact with the low levels of arsenic in residential soil was not likely to cause any irritation. Therefore, no illnesses are likely to have occurred from skin contact in the past with arsenic in the soil.

Antimony--Very little is known about the health effects in humans who eat soil with low levels of antimony (11). Without human studies, the EPA has established a human reference dose for antimony based on studies in rats. Rats fed levels of antimony higher than those found in residential soil were less able to regulate their blood pressure. Their ability to regulate their blood pressure returned when they stopped eating antimony. Rats fed antimony similar to the low levels found in residential soil suffered no illnesses.

To be protective of human health, the EPA has established a human reference dose for antimony at a level 100 times lower than the lowest level causing this effect in rats. Although the maximum dose of antimony we calculated for a pica child living near the school is above the EPA's human reference dose, it is still 10 times lower than the lowest level causing effects in rats. It is therefore unlikely that any human illness would have resulted from incidental ingestion in the past of antimony-contaminated soil by pica children living near the school.

Antimony in soil binds very tightly to soil particles so that it cannot easily enter the body through the skin. Dermal exposure to antimony does not cause sensitization of the skin. Therefore, illnesses are not likely to have occurred from skin contact in the past with antimony in residential soil.

Lead--There is no ATSDR MRL or EPA RfD available for lead (12). The estimated daily dose of lead for a pica child from incidental ingestion of residential surface soil is similar to the level at which a decrease in blood enzyme levels has been observed in humans and impairment of learning tasks has been observed in animals. These effects could have occurred in pica children exposed in the past to lead in residential surface soils.

Lead is not readily absorbed through skin. Dermal contact with lead is not known to affect the skin. Therefore, illnesses are not likely to have occurred from skin contact in the past with lead in residential soil.

Lead is a probable human carcinogen based on animal studies. However, no increase in cancer has been observed in animals exposed to lead at levels similar to those likely in pica children near the school (12). Therefore, no increase in the risk of cancer is likely to have occurred in pica children from incidental ingestion of lead in residential soil.

Manganese--There is no ATSDR MRL or EPA RfD available for incidental ingestion of manganese in soil (13). The National Research Council has established an estimated safe and adequate daily dietary intake of 5 mg/day for manganese. The maximum estimated daily dose of manganese from incidental ingestion of residential soil by pica children is less than this level of intake. Therefore, illnesses are not likely to have occurred in pica children exposed in the past to manganese in residential surface soil.

There is little evidence that manganese can cause cancer. EPA has determined that manganese is not classifiable as a human carcinogen (13). Therefore, no increase in the risk of cancer was likely in pica children from incidental ingestion of manganese in residential soil.

Absorption of manganese through the skin is extremely limited. Manganese is not known to affect the skin. Therefore, illnesses are not likely to have occurred from skin contact in the past with manganese in residential soil.

Non-Pica Children

Arsenic--The maximum estimated daily dose of arsenic from incidental ingestion of soil in the past at the school by non-pica children exceeds ATSDR’s chronic oral MRL (10). However, exposure at this level has not been shown to cause illnesses in humans. Arsenic is a known human carcinogen. However, during their six years at the school, non-pica children exposed to the maximum estimated daily dose of arsenic in school soil would have no significant increased risk of cancer.

Arsenic is not readily absorbed through the skin. Skin contact with the low levels of arsenic in the soil at the school was not likely to have caused any irritation. Therefore, no illnesses are likely to have occurred from skin contact in the past with arsenic in the soil.

Antimony--Very little is known about the health effects in humans who eat soil with low levels of antimony (11). Without human studies, the EPA has established a human reference dose for antimony based on studies in rats. Rats fed levels of antimony higher than those found in soil at the school were less able to regulate their blood pressure. Their ability to regulate their blood pressure returned when they stopped eating antimony.

Although the maximum dose of antimony we calculated for a non-pica child at the school is above the EPA's human reference dose, it is still 100 times lower than the lowest level causing effects in rats. It is therefore unlikely that any human illness would have resulted from incidental ingestion of antimony-contaminated soil in the past by non-pica children at the school.

Antimony in soil binds very tightly to soil particles so that it cannot easily enter the body through the skin. Dermal exposure to antimony does not cause sensitization of the skin. Therefore, illnesses are not likely to have occurred from skin contact in the past with antimony in residential soil.

Lead--There is no ATSDR MRL or EPA RfD available for lead (12). The estimated daily dose of lead for a non-pica child from incidental ingestion of soil at the school is similar to the level at which a decrease in blood formation has been observed in animals. This effect could have occurred in non-pica children exposed in the past to lead in soil at the school.

Lead is not readily absorbed through skin. Dermal contact with lead is not known to affect the skin. Therefore, illnesses are not likely to have occurred from skin contact in the past with lead in school soil.

Lead is a probable human carcinogen based on animal studies. However, no increase in cancer has been observed in animals exposed to lead at levels similar to those likely in non-pica children at the school (12). Therefore, no increase in the risk of cancer was likely in non-pica children from incidental ingestion of lead in soil at the school.

Manganese--Manganese is below a level of health concern in children who do not exhibit pica behavior.

Exposure in Adults--Adult employees of the elementary school who came in contact with the soil on the school grounds may have been exposed to the chemicals found there. Exposure of adult employees to arsenic in the soil at the school for 35 years would result in no apparent increase in the risk of skin, liver, or lung cancer. The maximum estimated exposure doses for adults are below levels of health concern for all other chemicals.

Exposure After Remediation

The school board and EPA have removed contaminated soil on the school playground and in nearby residential yards and replaced it with clean fill. Therefore, current exposure to chemicals in the soil at a level of human health concern is unlikely.

Conclusions

Based upon the information reviewed, we conclude the site represented a public health hazard in the past but no longer poses a health hazard to children or adults at the school. We further conclude that illnesses such as changes in blood formation and enzyme levels may have occurred in the past in pica children and non-pica children from exposure to lead in soil at the Melrose Elementary School and in nearby residential yards. Because contaminated soils have been removed, no exposures to chemicals in the soil are currently likely. Therefore, no new illnesses are likely in pica children and non-pica children. If additional information becomes available concerning chemical exposures at the Melrose Elementary School, Florida DOH will evaluate that information to determine what actions, if any, are necessary.

Recommendations

The Florida Department of Health recommends no further public health actions regarding the soil at the Melrose Elementary School.

References

1. Roy F. Weston, Inc. Memorandum to Bob Rosen from Patrick R. McKeen concerning Technical Assistance Team Response Actions at the Melrose Elementary Site, St. Petersburg, Pinellas County, Florida. June 23, 1995.

2. Bureau of the Census, U.S. Department of Commerce, Washington, DC, 1990 Census Data Files.

3. Atlanta Testing & Engineering. Contamination Assessment Report and Interim Remedial Action Plan, Melrose Elementary School Playground, Pinellas County, Florida. April 25, 1994.

4. U.S. Environmental Protection Agency. 1987-1993 Toxics Release Inventory - CD-ROM. Washington, DC. June 1995.

5. Pinellas County Health Department. Personal communication to Bruce Tuovila, Florida

DOH, from Melanie Thoenes, Pinellas CHD, regarding results of blood lead screening at the Melrose Elementary School site. July 7, 1998.

6. Florida Department of Environmental Protection. Letter to Dorothy Rayfield, EPA, from Joseph McGarrity, FDEP, regarding results of soil testing at the Melrose Lead Site. January 26, 1995.

7. U.S. Environmental Protection Agency. Memorandum to Richard D. Green from Charles E. Fitzsimmons concerning a request for a Removal Action at the Melrose Lead Site, St. Petersburg, Pinellas, Florida. September 6, 1995.

8. U.S. Environmental Protection Agency. Procurement Request/Order to conduct removal activities at the Melrose Lead Superfund Site, St. Petersburg, Florida. September 7, 1995.

9. U.S. Environmental Protection Agency. Exposure Factors Handbook, Volume I, General Factors. EPA/600/P-95/002Fa. August 1997

10. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Arsenic (Update). Atlanta. ATSDR, April 1993.

11. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Antimony and Compounds. Atlanta. ATSDR, September 1992.

12. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead (Update). Atlanta. ATSDR, April 1993.

13. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Manganese (Update). Atlanta. ATSDR, September 1997.

Health Consultation Author

Bruce J. Tuovila
Biological Scientist IV
Bureau of Environmental Toxicology
(850) 488-3385

CERTIFICATION

This Melrose Lead Health Consultation was prepared by the Florida 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.

Roberta Erlwein
Technical Project Officer, SPS, SSAB, DHAC, ATSDR

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

Richard Gillig
Chief, SPS, SSAB, DHAC, ATSDR

Figure 1. State Map Showing Location of Pinellas County

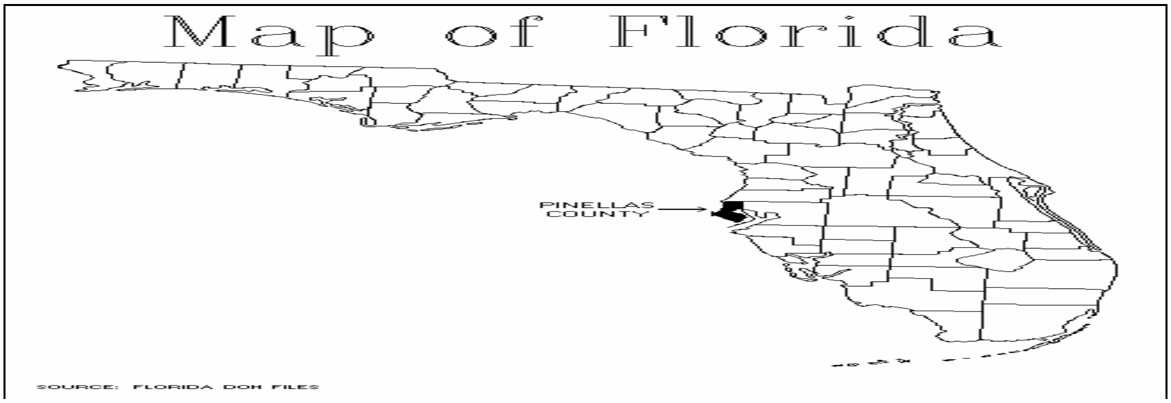

Figure 2. Location of Melrose Lead Site in Pinellas County

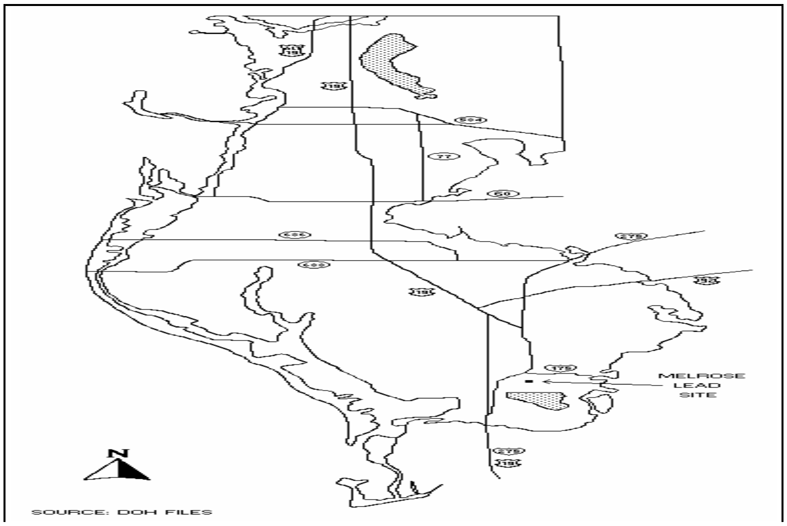

Figure 3. Detail of Melrose Lead Site