Letter Health Consultation

Soil Lead Data Evaluation

OTTAWA LEAD SITE
OTTAWA, PUTNAM COUNTY, OHIO

EPA FACILITY ID: OHN000510386

Prepared by:
Ohio Department of Health

OCTOBER 21, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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Health Assessment Section
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OHIO DEPARTMENT OF HEALTH
246 North High Street
Columbus, Ohio 43215
614/466-3543
www.odh.ohio.gov
Ted Strickland/Governor
Alvin D. Jackson, M.D./Director of Health

September 27, 2010

Lori Muller
U.S. Environmental Protection Agency
25089 Center Ridge Rd. (ME-W)
Westlake, OH 44145

Dear Ms. Muller:

This letter is in response to your request for an evaluation of potential lead exposures at properties where waste glass obtained from the former local GTE/Sylvania/Philips facility had been disposed of. The Ohio Department of Health (ODH), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), evaluated the U.S. EPA soil sample results for this site in order to assist with recommendations for further actions.

Background and Statement of Issues

The Ohio EPA's investigation of plant records revealed documented disposal of waste glass occurred in Ottawa from the 1940s to the early 1990s and that waste glass from the former GTE plant has been disposed or used as fill at a number of locations in and around the village of Ottawa in Putnam County, Ohio. Most of the waste was disposed of at what are now private residences. In April 2009, the U.S. EPA Region 5 and the Ohio EPA performed a limited assessment on four residential properties in Ottawa where waste from the GTE/Sylvania/Philips operation had been disposed of. The sampling results showed elevated lead levels in surface soil at one of four properties (U.S.EPA 2009).

Due to the presence of lead detected in these wastes, federal and state agencies wanted to conduct additional assessments on other lots in and around Ottawa where industrial dumping may have occurred. In April 2010, the U.S. EPA performed additional testing at these other potentially impacted properties in Ottawa.

Data Evaluation

In April 2009 and April 2010, the U.S. EPA collected soil samples from 14 residential yards in Ottawa where dumping of industrial scrap glass may have occurred. The soil samples were separated into coarse, fine, and total fractions by sieving and then analyzed for lead, along with the unsieved soil samples. The results were expressed in parts per million (ppm), which is equivalent to milligrams per kilogram (mg/kg) [Appendix B].

Of the samples collected from the 14 properties, 2 out of 14 properties exceeded the recommended 400 ppm screening level for lead in surface soils at the depth interval of 0 to1

foot: a property on East Second Street and another on Blanchard Street. One additional property, an apartment complex on Defiance Avenue, had soil lead levels of 531 ppm, exceeding the 400 ppm screening level in a portion of the lot (section B) at a depth interval of 1 to 2 feet.

Sample Results above Site Screening Level (SL)

Soil Depth (feet)	*# Properties Above SL*	*Lead Hazard*
0-1	2	Yes
1-2	2	Potential
2-3	5	No
3-4	6	No

Sampling results show elevated lead levels at the 0 to1 foot depth interval in two of the residential lots, based on the total lead analysis and/or a soil fraction. Lead levels in the top 0 to 3 inches in surface soil are of most concern because this is where exposure is likely to occur – this area of concern is represented by the 0 to 1 foot intervals tested by the U.S. EPA. Subsurface soils from 1 to 2 feet may also serve as an exposure point for some residents under some conditions, such as gardening or landscaping. It is unlikely that contact with the subsurface soil will occur at greater depths (greater than 2 feet), except for those individuals involved in excavation or drilling. For a full discussion of the toxicological evaluation of the Ottawa Lead site, see attached Appendix A.

Conclusions

ODH HAS concludes that contact with lead-contaminated surface soil in two of the properties could potentially harm human health and pose a health hazard. Subsurface soils from 1 to 2 feet may also serve as an exposure point for some residents at one of the properties as the result of gardening or landscaping activities. As noted in the sampling results discussion, lead in soil at greater depths (greater than 2 feet) is not expected to pose a health hazard for people engaged in typical residential activities.

Recommendations

Future exposures to lead-contaminated soils can be eliminated by removing surface soils with lead levels in excess of the 400 ppm and replacing these soils with clean fill. Contact with exposed bare soil in the areas where surface soil lead concentrations exceed 400 ppm should be avoided.

Sincerely,

John Kollman

John Kollman, Environmental Specialist
Ohio Department of Health
Health Assessment Section

cc: Lori Muller, U.S. EPA

Appendix A. Toxicological Evaluation

Lead

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds. Once lead is deposited onto soil, it sticks strongly to soil particles and typically remains in the upper layer of soil. Some lead compounds are changed into other forms of lead by sunlight, air, and water; however, elemental lead cannot be broken down.

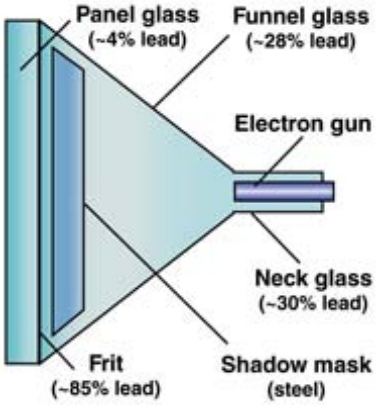
Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, the amount of lead used in gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. Lead in residential paint was discontinued in 1978.

Lead is well-known for its effects on the nervous system, with documented scientific associations between exposure to high lead levels and the onset/development of learning and behavioral problems in children. Although children are at greater risk from lead exposure, adult exposures can also result in harmful health effects. Lead-exposed adults may experience neurological symptoms, and weakness in fingers, wrists, or ankles. Lead can damage the kidneys and reproductive system. Lead exposure can also cause anemia and small increases in blood pressure, particularly in middle-aged and older people (ATSDR 2007a).

Lead-contaminated soil can pose a risk through direct ingestion, uptake in vegetable gardens, or tracking into homes. Uncontaminated "natural" soils contain lead concentrations at less than 50 parts per million (ppm) but soil lead levels in many urban areas exceed 200 ppm. The U.S. EPA's standard for lead in bare soil is 400 ppm in play areas and 1,200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR 2007b).

<u>Lead in Waste Glass</u>

In July 2008, the Ohio EPA collected a sample of waste scrap glass on a residential property in Ottawa that exceeded the Toxicity Characteristic Leaching Procedure (TCLP) criteria of 5 milligrams per liter (mg/L) for lead by a factor of 20. The waste material may have originated from a former plant that once operated in Ottawa and had documented disposal of reject television tubes on area lands (U.S. EPA 2009). As shown in the illustration, there are three kinds of glass (panel, funnel, and neck) in a cathode-ray tube (CRT) television or a computer monitor which contain lead. The panel glass makes up about two-thirds of the total mass of a CRT. Black & white CRTs contain a small amount of lead, about 3-4% as lead oxide (PbO). Color panel glass is a barium-strontium silicate glass, which was lead free after 1995. Funnel glass makes up about one third of the total mass of a CRT and typically contains 21-24% lead oxide. The neck glass makes up less than 1% of the



Source: Chemical Engineering April 2009

CRT but is a lead-rich silicate glass containing greater than 25% lead oxide by weight (Méar 2006).

The frit contains the most lead (about 85% lead) in a CRT and was used to seal the panel glass and funnel glass together. The frit is mostly lead oxide (about 78%) and was in the form of a paste containing a mixture of 93% leaded frit glass and 7% frit lacquer (amyl acetate). Waste frit paste and frit material from the CRT process were combined with other raw materials, mixed, and melted to make the funnel glass (U.S. EPA 2008).

The EPA has a toxicity threshold of 5 mg/L for the leaching of lead using the Toxicity Characteristic Leaching Procedure (TCLP), designed to determine the mobility of both organic and inorganic substances present in waste materials. In a University of Florida study, CRT samples were processed and analyzed by TCLP and produced an average concentration of 18.5 mg/L lead, exceeding the regulatory limit of 5 mg/L. Factors affecting the TCLP lead concentrations of each CRT included the location of the glass in the CRT (face plate, funnel, neck), the particle size used in the tests, and the CRT type. The most significant quantities of lead were contained in the funnel portion of the CRTs, which yielded an average lead concentration of 75.3 mg/L in the TCLP. The major source of lead in the funnel is the frit seal of color CRTs. Monochrome CRTs did not leach lead greater than hazardous levels (UF 1999).

Lead in Soil

Incidental ingestion is the major pathway of exposure to lead in soil and dust. According to the U.S. EPA, exposure to lead from ingested soil and dust is best represented by the lead concentration in the particle size fraction that sticks to hands (and perhaps clothing and other objects that may be mouthed) called the fine fraction. The fine fraction is the portion of the total sample that passes through a 250 micrometer (µm) [60 mesh] sieve (U.S. EPA 2000).

Lead may remain stuck to soil particles or sediment in water for many years. Movement of lead from soil particles into groundwater is unlikely unless the rain falling on the soil is acidic or “soft." Movement of lead from soil is also dependant on both the type of lead compound and the physical and chemical characteristics of the soil (ATSDR 2007a).

Public Health Assessment

This public health assessment of exposure to lead-contaminated soil at the Ottawa Lead site was based on the U.S. EPA soil sample results, with greater interest given to the fine soil fraction at a depth interval of 0 to 1 foot. Of the 14 residential yards that were sampled, portions of 2 yards had lead levels above 400 ppm in the 0 to 1 foot interval, where exposure is most likely to occur. It should be noted that lead was not found in the fine soil fraction in any sample at this depth. Exposure to lead in soil would most likely come from direct contact with bare soil and airborne dust from the ground surface. Exposure could occur from subsurface soils when the ground is disturbed by activities like extensive gardening, excavating or drilling.

The maximum level of lead detected in soils at the 0 to 1 foot depth interval at the Ottawa Lead site was 1,290 ppm in the coarse soil fraction. Using the EPA’s Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK), this level of lead in soil is predicted to result in

blood lead levels (BLLs) above 10 micrograms per deciliter (µg/dL), the Centers for Disease Control and Prevention (CDC) blood lead level of concern. Elevated levels of lead in surface soil (as found in the total, coarse, or fine soil fractions at the 0 to 1 foot interval) were limited to one residential property on East Second Street. A section of a property on Blanchard Street showed a lead level of 533 ppm in the unsieved (untreated) surface soil at the 0 to 1 foot interval, which was also above the screening level of 400 ppm. Harmful health effects, such as elevated blood lead levels in children, would not be expected to occur at this property or the rest of the properties that did not have elevated lead in the surface soil.

The International Agency for Research on Cancer (IARC) classifies inorganic lead compounds as *probably carcinogenic to humans (Group 2A)*, based on limited evidence of carcinogenicity in humans and sufficient evidence in animals. The National Toxicology Program (NTP) concluded that lead and lead compounds are *reasonably anticipated to be human carcinogens*" (NTP 2005). This determination was based on studies on laboratory animals and workers who inhaled high levels of lead fumes or accidentally ingested lead dust. These occupational exposures greatly exceed the expected types of exposures to lead through incidental ingestion of lead-contaminated soils in Ottawa, Ohio.

Regulations and Guidelines

The CDC identifies blood lead levels of greater than or equal to 10 µg/dL in children as "elevated." The state of Ohio defines these same blood lead levels in children as "lead-poisoning" [OAC 3701-30-01 (N)].

The Agency for Toxic Substances and Disease Registry (ATSDR) has not derived Minimal Risk Levels (MRLs) for lead, and the U.S. EPA has not developed a Reference Dose (RfD) for chronic oral exposure for lead. The U.S. EPA has decided that it would be inappropriate to develop a RfD for inorganic lead (and lead compounds) because some of the health effects associated with exposure to lead occur at blood lead levels as low as to be essentially without a threshold (IRIS 2009).

The U.S. EPA's standard for lead in bare soil in play areas is 400 ppm by weight and 1200 ppm for non-play areas. This regulation applies to cleanup projects using federal funds (ATSDR 2007b).

Children's Health Considerations

Because of their behavior and physiology, children are more affected by exposure to lead than are adults. Children generally ingest lead-contaminated soil and house dust at higher rates than adults because of mouthing and hand-to-mouth behaviors. Children who exhibit pica, a compulsive hand-to-mouth behavior and repeated eating of nonfood items, are at greatest risk. In addition, the percent of lead absorbed in the gut, especially in an empty stomach, is estimated to be as much as five to 10 times greater in infants and young children than in adults. Being shorter than adults, children spend more time in close proximity to the ground, which increases their exposure to lead-contaminated soil and dust. Children have a higher breathing rate (volume of air per pound) than adults and are more likely to breathe greater amounts of lead-contaminated dust and soil per unit body weight than adults (ATSDR 2007b).

In children, acute exposure to very high levels of lead may produce encephalopathy and other accompanying signs of coma, convulsions, death, hyperirritability, lack of coordination and stupor. The BLLs associated with encephalopathy in children vary from study to study, but BLLs of 70-80 μg/dL or greater appear to indicate a serious risk. Even in the absence of symptoms of encephalopathy, these levels are associated with increased incidences of lasting neurological and behavioral deficits (ATSDR 2007b).

Neurological effects in children may begin at low BLLs, in some cases at or below 10 μg/dL in some cases. Studies have found a measured decrease in intelligence quotient, or IQ, as BLLs increase. Furthermore, there is evidence that attention deficit hyperactivity disorder (ADHD) and hearing impairment in children increase with increasing BLLs, and that lead exposure may disrupt balance and impair peripheral nerve function (ATSDR 2007a).

References

ATSDR (Agency for Toxic Substances and Disease Registry). 2007a. Toxicological Profile for Lead. U. S. Department of Health and Human Services (DHHS), Atlanta. August 2007. Available at: http://www.atsdr.cdc.gov/ToxProfiles/TP.asp?id=96&tid=22.

ATSDR. 2007b. Case Studies in Environmental Medicine (CSEM) – Lead Toxicity. Course: WB 1105. U.S. Department of Health & Human Services. 71 p. August 2007.

CE (Chemical Engineering). 2009. Recycling Cathode Ray Tubes. Available at: http://www.che.com. By Kate Torzewski. Northbrook, IL 60065-3588. April 2009.

IARC (International Agency for Research on Cancer). 2006. World Health Organization (WHO). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 87. Inorganic and Organic Lead Compounds. 2006. Available at: http://monographs.iarc.fr/ENG/Monographs/vol87/index.php.

Méar F. et. al. 2006. Waste Management. The characterization of waste cathode-ray tube glass. 19 January 2006. Available at: www.elsevier.com/locate/wasman.

NTP (National Toxicology Program). 2005. Official Citation: Report on Carcinogens, Eleventh Edition; U.S. DHHS, Public Health Service, NTP. 31 January 2005. Available at: http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s101lead.pdf.

UF (University of Florida). 1999. Characterization of Lead Leachability from Cathode Ray Tubes using the Toxicity Characteristic Leaching Procedure. Timothy G. Townsend, Principal Investigator. Department of Environmental Engineering Sciences. December 1999. Available at: http://www.ees.ufl.edu/homepp/townsend/Research/CRT/CRTDec99.pdf.

U.S. EPA (Environmental Protection Agency). 2000. Short Sheet: TRW Recommendations for Sampling and Analysis of Soil at Lead (Pb) Sites. April 2000. Available at: http://www.epa.gov/superfund/health/contaminants/lead/products/sssiev.pdf.

U.S. EPA. 2008. National Partnership for Environmental Priorities (NPEP) Success Story: Sony Electronics. Last updated: 23 September 2008. Available at: http://www.epa.gov/epawaste/partnerships/npep/success/sony.htm.

U.S. EPA. 2009. Ottawa Lead Region 5 Cleanup Sites web page. September 2009. Available at: http://www.epa.gov/region5/sites/ottawalead/index.htm.

Appendix B. Example Letters to Residents

OHIO DEPARTMENT OF HEALTH

246 North High Street
Columbus, Ohio 43215

614/466-3543
www.odh.ohio.gov

Ted Strickland/Governor

Alvin D. Jackson, M.D./Director of Health

September 13, 2010

[redacted]
Ottawa, OH 45875

RE: [redacted]

Dear Mr. & Mrs. [redacted]

As a part of the U.S. EPA Ottawa Lead Site investigation, the Ohio Department of Health (ODH) Health Assessment Section (HAS) was asked to evaluate the U.S. EPA soil sample results to determine if there is a public health hazard. In April 2010 the U.S. EPA collected soil samples from your property located at [redacted] in Ottawa where disposal of industrial scrap glass may have occurred. This letter is in response to the U.S. EPA request to evaluate potential lead exposures at your property.

The below results are provided in measurement units called parts per million (ppm). For comparison, ODH used a screening level of 400 ppm (400 parts of lead per million parts of soil). Of the 40 samples collected in 2009 and 2010 at your property, 11 samples had lead levels that exceeded the recommended 400 ppm screening level for lead (see table below). Please note that the recommended action level for lead in soils is the level where there could potentially be health problems from contact. Sample results below 400 ppm were not listed.

The results show elevated lead in soils collected at intervals of 0 to 1 feet, 1 to 2 feet, 2 to 3, and 3 to 4 feet in several areas of the property. Lead levels in the top 0 to 3 inches in surface soil are of most concern because this is where exposure is likely to occur – this applies to the 0 to 1 foot intervals tested by U.S. EPA. Subsurface soils from 1 to 2 feet may also serve as an exposure point for some residents under some conditions, such as gardening. It is unlikely that contact with the subsurface soil will occur at greater depths (greater than 2 feet), except for those involved in excavation or drilling.

ODH HAS concludes that coming into direct contact with lead-contaminated surface soils on portions of the property could harm people's health. People could also be exposed to lead in subsurface soils from 1 to 2 feet if the soil is disturbed by residents. Lead in subsurface soil greater than 2 feet is not expected to harm people's health, because no one will be coming in contact with the soil at that depth, except for those individuals involved in excavation or drilling.

Sample Results above Site Screening Level

Sample ID	*Date Collected*	*Depth (feet)*	*Soil Fraction*	*Lead Level (ppm)*	*Screening Level (ppm)*
A-04	4/13/09	3 - 4	Coarse fraction	783	400
B-04	4/13/09	3 - 4	Fine fraction	4,620	400
B-04	4/13/09	3 - 4	Coarse fraction	2,630	400
B-04	4/13/09	3 - 4	Total lead	562	400
C-01	4/13/09	0 - 1	Coarse fraction	1290	400
C-01 DP	4/14/09	0 - 1	Coarse fraction	530	400
C-04	4/14/09	3 - 4	Total lead	1,440	400
D-01	4/14/09	0 - 1	Total lead	893	400
a-04	4/14/10	3 - 4	Fine fraction	791	400
a-04	4/14/10	3 - 4	Total lead	456	400
c-03	4/14/10	2 - 3	Fine fraction	1,050	400
c-03	4/14/10	2 - 3	Total lead	441	400
d-02	4/15/10	1 - 2	Fine fraction	769	400
d-02 DP	4/15/10	1 - 2	Fine fraction	652	400
d-02 DP	4/15/10	1 - 2	Total unsieved	3,180	400

Future exposures to lead-contaminated surface soils can be eliminated by removing surface soils with lead levels in excess of the 400 ppm. Contact with exposed bare soil in the areas with surface soils with lead concentrations greater than 400 ppm should be avoided.

For more information about the Ottawa Lead site, please contact Lori Muller at 440-250-1735 or see U.S. EPA Region 5's web page, available at: http://www.epa.gov/region5/sites/ottawalead/ for information on U.S. EPA's removal action.

ODH fact sheets on lead are available on-line at: http://www.odh.ohio.gov (go to "H" and "Health Assessment Section"). You may also call ODH at 614-466-1390 for more information.

Sincerely,

John Kollman, Environmental Specialist
Ohio Department of Health
Health Assessment Section

cc: Lori Muller, U.S. EPA

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Ted Strickland/Governor

Alvin D. Jackson, M.D./Director of Health

September 13, 2010

[redacted]
[redacted]
Ottawa, OH 45875

RE: [redacted]

Dear [redacted]:

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For comparison, ODH used a screening level of 400 ppm (400 parts of lead per million parts of soil). None of the four samples collected on your property exceeded the recommended 400 ppm screening level for lead in any soil fraction at any depth (down to 4 feet) in any of the locations sampled on your property. Please note that the recommended action level for lead in soils is the level where there could potentially be health problems from contact.

ODH HAS concludes that coming into direct contact with surface soils on the property is not expected to harm people's health. In addition, lead levels in the subsurface soils were low and not expected to harm people's health. No further action is needed at this time.

For more information about the Ottawa Lead site, please contact Lori Muller at 440-250-1735 or see U.S. EPA Region 5's web page, available at: http://www.epa.gov/region5/sites/ottawalead/ for information on U.S. EPA's removal action. ODH fact sheets on lead are available on-line at: http://www.odh.ohio.gov (go to "H" and "Health Assessment Section"). You may also call ODH at 614-466-1390 for more information.

Sincerely,

John Kollman

John Kollman, Environmental Specialist
Ohio Department of Health
Health Assessment Section

cc: Lori Muller, U.S. EPA

Certification

The Ottawa Lead Site Letter 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. Editorial review was completed by the Cooperative Agreement Partner.

Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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

Team Lead, Cooperative Agreement Team, CAPEB, DHAC, ATSDR