

# CDC IN YOUR NEIGHBORHOOD: Childhood Blood Lead Research Study

In 2014, we conducted a health study to evaluate the association between lead in the environment and blood lead levels in children living in some neighborhoods in Philadelphia near the former John T. Lewis facility. This fact sheet explains how we conducted the study, what we found, and how you can learn more.

## Study Looks at Lead Contamination

In July 2014, several agencies conducted a childhood blood lead study in selected Philadelphia neighborhoods near the former John T. Lewis facility. The purpose of the study was to:

- evaluate the relationship between blood lead levels and potential lead contamination in tap water, soil, and dust in children's homes and yards
- determine if young children in the community were exposed to elevated levels of lead, and
- help scientists develop better ways of identifying lead exposure in young children where they live.

(The agencies involved in the study included the Philadelphia Department of Public Health [PDPH], the Centers for Disease Control [CDC]/Agency for Toxic Substances and Disease Registry [ATSDR], the Pennsylvania Department of Health [PADOH], and the U.S. Environmental Protection Agency [EPA].)

## A History of Lead at the Study Site

The John T. Lewis site, most recently known as the Anzon site, is located in the Kensington area of Philadelphia. Lead paint production and lead smelting operations were conducted at the site for nearly 150 years (from 1849 to 1996). Plant emissions, equipment malfunctions, and fires at the facility released lead into the surrounding community. In addition to the John T. Lewis facility, a number of other industrial sources of lead used to operate in this community.

Residential homes have always been located nearby the facility. And, in the late 1990s and early 2000s, the facility grounds were redeveloped into a multiuse commercial complex. Although there is no specific health hazard currently known for the full study area, a limited number of soil samples from residential yards showed elevated lead levels.

## How We Conducted the Study

We recruited participants for the study during a two week period in July 2014. We selected households at random from various neighborhoods near the site, including Port Richmond, Kensington, and Northern Liberties. If the head of the household agreed to participate in the study, we did 4 things:

- 1) We collected tap water, soil, and indoor dust samples, and then we then analyzed the samples for lead.

### What is lead?

Lead is a naturally occurring metal. It is used in products such as batteries and ammunition. Lead in ceramic products, caulking, and pipe solder has been dramatically reduced in recent years because of health concerns. The use of lead as an additive to gasoline was banned in 1996 in the United States.

In 1978, the federal government banned the use of lead containing paint. But if your home was built before 1978, it may have lead based paint. Lead from paint, including lead contaminated dust, is one of the most common causes of lead exposure.

Lead remains in the environment and does not break down. Historical lead contamination from a variety of sources remains a concern in urban areas.

- 2) We took a free blood sample from children who were from 9 months through 6 years of age and lived in the participating households.
- 3) We asked the heads of households/guardians of children enrolled in the study to answer questions on factors potentially associated with lead exposure and other environmental hazards.
- 4) We conducted a Healthy Homes survey at each enrolled household.

(EPA Region 3 collaborated with the public health agencies and provided funding to conduct the study.)

## What We Learned from the Study

### Blood Lead Results

If a child has 5 or more micrograms of lead per deciliter of their blood ( $\mu\text{g}/\text{dL}$ ), they have an elevated blood lead level. This is called a reference value, and it's the measurement that CDC uses to identify children with elevated blood lead. About 2.5% children in the United States have a blood lead level equal to or above 5  $\mu\text{g}/\text{dL}$ .

Here's what the blood tests showed about the 126 children included in our study:

- The highest blood lead result was 11  $\mu\text{g}/\text{dL}$ .
- The geometric mean (which is a special type of average) was 1.96  $\mu\text{g}/\text{dL}$ .
- About 11-13% of the children from the study had an elevated blood lead level of 5  $\mu\text{g}/\text{dL}$  or above (estimates vary with different children's age ranges included in the analysis).

Protecting children from exposure to lead is important to lifelong good health. There is no safe level of lead in children's blood. Even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement. The effects of lead exposure cannot be corrected.

### Environmental Sample Results

Figure 1 below describes how many samples we collected for this study. It also shows what is considered an elevated level for each type of sample and how many of the samples in this study exceeded that elevated level. Finally, it shows the range of lead that we detected in the samples and the average (or "mean") level of lead we found in the samples.

**Figure 1: John T. Lewis 2014 Research Study Summary of Environmental Sample Results**

| Environmental Sample Type    | Number of Samples | Elevated Lead Level Definition | Number of Samples Exceeding Elevated Lead Level | Minimum and Maximum Concentrations Detected   | Mean                          |
|------------------------------|-------------------|--------------------------------|---|---|-------------------------------|
| Soil                         | 72                | *400 ppm                       | 51 (71%)  | 40 – 7,700 ppm                                | 774 ppm                       |
| Water                        | 120               | **15 $\mu\text{g}/\text{L}$    | 0   | Non-detect – 3.9 $\mu\text{g}/\text{L}$       | N/A                           |
| Dust Floor (Front Door)      | 119               | *40 $\mu\text{g}/\text{ft}^2$  | 26 (22%)  | Non-detect – 2,300 $\mu\text{g}/\text{ft}^2$  | 56 $\mu\text{g}/\text{ft}^2$  |
| Dust Floor (Child Play Area) | 116               | *40 $\mu\text{g}/\text{ft}^2$  | 21 (18%)  | Non-detect – 630 $\mu\text{g}/\text{ft}^2$    | 33 $\mu\text{g}/\text{ft}^2$  |
| Dust Window (Child Room)     | 106               | *250 $\mu\text{g}/\text{ft}^2$ | 13 (12%)  | Non-detect – 18,000 $\mu\text{g}/\text{ft}^2$ | 356 $\mu\text{g}/\text{ft}^2$ |

\*Definition of elevated soil and dust wipe sample results are EPA's standards under the Lead Renovation, Repair and Painting rule

\*\*Definition of elevated water result based on EPA's action level for lead under the Lead and Copper rule

## Conclusions from the Study

**Children living in the investigation area are 6 times more likely to have blood lead levels equal or above 5 µg/dL compared to the U.S. childhood population.**

We compared the blood lead data from this investigation to a national survey that CDC conducts called the National Health and Nutrition Examination survey, or NHANES. Generally, children in northeastern U.S. urban areas tend to have higher blood lead levels than children living in less urban areas. The blood lead data from this investigation are not directly comparable to the City of Philadelphia's blood lead surveillance information, so a city-specific interpretation is not possible at this time. The data are not comparable because the study and the City of Philadelphia use different methods to identify, collect, and, report childhood blood lead data.

**Environmental factors and elevated blood lead are strongly linked when the front door area has dust with high levels of lead and when the household also has two environmental samples (such as soil and window sill dust) with elevated levels of lead.**

Environmental factors included soil, dust, and water results. We considered lead levels in dust to be high if they were above EPA's standard. At this time, it is not possible to identify the environmental source(s) of the lead found in this investigation.

## Recommendations and Next Steps

CDC/ATSDR continues to help area residents understand the health risks associated with lead and the steps they can take to protect themselves. And we will continue to provide scientific assistance to EPA and the local and state health departments to further evaluate the results from this study.

CDC/ATSDR will continue to work with pediatricians and other health care providers to make sure young children living near the site routinely have blood lead tests. **Parents should have children tested for blood lead.** The Philadelphia Department of Public Health recommends all children in Philadelphia should be screened for lead at ages 12 and 24 months or at 36-72 months if there is not proof of prior screening, and that foreign-born children residing in Philadelphia (refugee and immigrant) should be tested within 60 days of arrival and again at 3 months after arrival, regardless of age, up to age 6 years.

EPA is conducting experiments to identify how much of the lead found in soil has the potential to be absorbed by the body. This will allow scientists to better assess the potential impact of people's exposure to lead in soil. Agency scientists are also using the study data to find better ways of determining if the community near the JT Lewis site and other communities have been exposed to lead at levels of health concern. Updates on this ongoing work will be posted on CDC/ATSDR's website.

## Where Can I Learn More?

Agency representatives are available to answer questions. You can contact them by telephone or email:

- **Ana Pomales** (ATSDR) 215-814-5716 or [APomales@cdc.gov](mailto:APomales@cdc.gov)
- **Paulette Smith** (Philadelphia Department of Public Health) at 215-685-2788 or [Paulette.Smith@phila.gov](mailto:Paulette.Smith@phila.gov)
- **Jack Kelly** (EPA) 215-514-6792 or [Kelly.Jack@epa.gov](mailto:Kelly.Jack@epa.gov)

All young children who live in Philadelphia (including the study area), should be tested for lead periodically (<http://www.phila.gov/health/childhoodlead/index.html>).

Find out more about this study, and things you can do to protect your family from lead exposure at <http://www.atsdr.cdc.gov/sites/jtlewis/index.html>

# DID YOU KNOW?

## Lead poisoning can affect nearly every system in the body.

- Lead poisoning occurs with no obvious symptoms and frequently goes unrecognized.
  - Children under the age of six years are at the greatest risk for lead poisoning.
  - Brains and nervous systems are still undergoing development.
- If left unchecked, very high or elevated blood lead levels can result in brain and nervous system damage, slowed growth as well as behavior and learning problems.
- Pregnant women also should avoid lead exposure.
  - Lead can easily cross the placenta and may be very harmful to an unborn child.

## Lead poisoning is preventable.

- No safe blood lead level in children has been identified.
- Parents can take simple steps make their homes more lead-safe.
  - Wash children's hands and feet after they have been playing outside
  - Wash children's toys regularly
  - Remove recalled toys and toy jewelry from children
  - Wipe shoes on doormat or remove them before going inside
  - Damp/wet mop floors and damp dust counters and furniture regularly
  - Eliminate paint chips or dust in windowsills, clean these areas regularly with a damp/wet mop.
  - If you live in a home built before 1978, talk to your local health department about testing paint and dust in your home for lead.

## Public health resources about lead exposure.

- The Centers for Disease Control and Prevention (CDC)
  - Lead Poisoning Prevention web site, visit: <http://www.cdc.gov/nceh/lead>
  - Lead in water, visit: <http://www.cdc.gov/nceh/lea/tips/water.htm>
- Environmental Protection Agency (EPA) and Housing and Urban Development (HUD)
  - Lead-safe renovation, visit: <http://www2.epa.gov/lead/renovation-repair-and-painting-program> or <http://www.hud.gov/lead>
- Consumer Product Safety Commission (CPSC)
  - Toy and toy jewelry recalls, visit: <http://www.cpsc.gov>