

# 2014 Childhood Blood Lead Study Philadelphia, PA

**National Center for Environmental Health  
Agency for Toxic Substances & Disease Registry  
U.S. Environmental Protection Agency  
Philadelphia Department of Public Health**

Community Meeting: The Urban Worship Center

17 September 2015

National Center for Environmental Health  
Division of Emergency and Environmental Health Services



# Historical lead emitting industry in Philadelphia, Pennsylvania



USA TODAY December 2012

Map: Nations Online Project, Wikimedia Commons

USA TODAY

NEWS

SPORTS

LIFE

MONEY

TECH

TRAVEL

OPINION

70°

CRO

including John T. Lewis, National Lead and Anzon. Tests by USA TODAY and the EPA have found hazardous levels of lead in residents' yards.



Lisa Conway and husband Mike Conway with their son, Mason, in the backyard of their home in 2012. Their home is near the former John T. Lewis/National Lead/Anzon lead factory site in Philadelphia. (Photo: Eileen Blass, USA TODAY)

Conway and her husband, Mike, have added clean topsoil and sod to their backyard to help protect their children from the old soil below. "That was a fairly expensive measure," she said. Despite USA TODAY's series, she says neighborhood awareness of the potential soil hazards in the area remain "ridiculously low" because of an ongoing influx of new residents moving into the area.

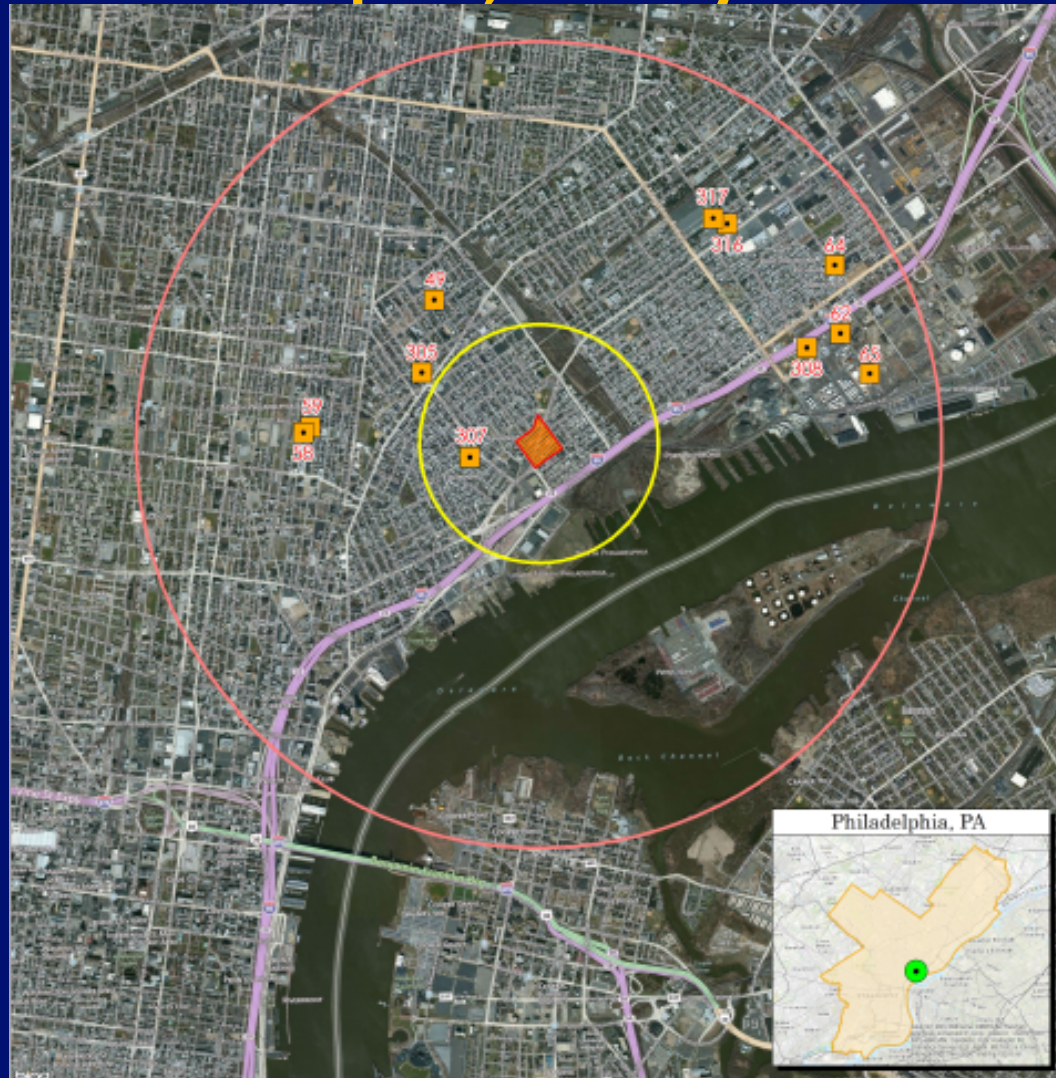
Sandy Salzman, executive director of the New Kensington Community Development Corp., which serves the neighborhood, said her group is working with the EPA to offer free blood testing for lead and anonymous soil testing to area residents. She said she's hopeful the tests will help provide data to support a cleanup.

John Pendergrass, a senior attorney at the Environmental Law Institute in Washington, D.C., said he's found the agency is often inconsistent across the country in how it handles lead-contaminated sites in urban areas.

"At its best EPA has used Superfund authority and funds to remediate wide-area lead



# Historical lead emitting industry in Philadelphia, Pennsylvania



**Legend**

■ 'Eckel List' Former Lead Facilities  
■ Former JT Lewis Site Property

U.S. Environmental Protection Agency  
 Region 3  
 GIS Team - Map 3800  
 Produced by: Jonathan V. Cruz  
 April 21, 2014

**Distance from JT Lewis Site (km)**

0.80  
 2.70

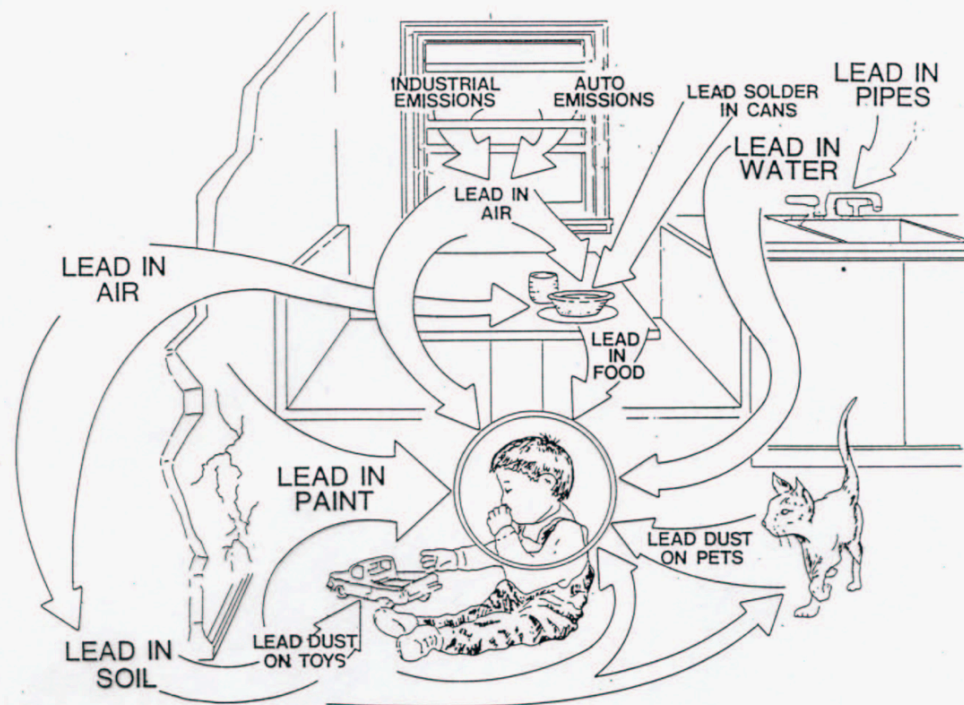
## **JT Lewis Community Site Child Blood Lead Study Epi Aid 2014-0064**

### **■ Collaboration**

- National Center for Environmental Health (NCEH)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Environmental Protection Agency (EPA)
- Philadelphia Department of Public Health
- Pennsylvania Department of Health
- Epidemic Intelligence Service Program

- **To determine blood lead levels and identify risk factors for elevated lead status among children 9 to 71 months of age living around the John T Lewis site**

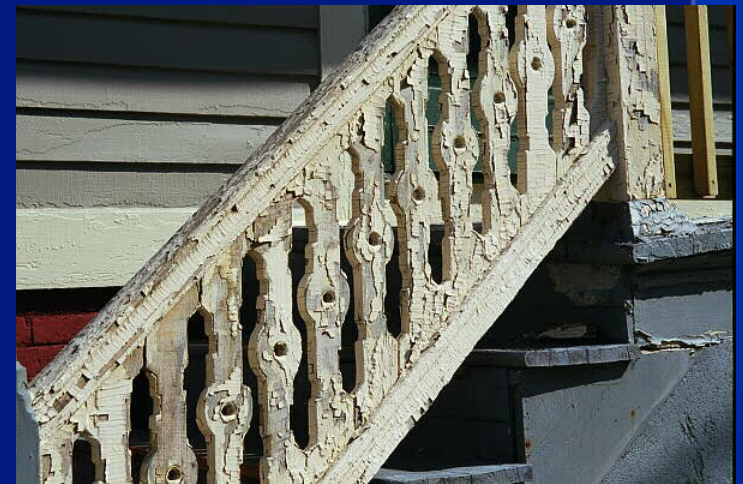
## Environmental Sources of Childhood Lead Exposure





## Where do lead hazards come from?

- Most lead hazards come from lead paint chips that have been ground into tiny bits
- These tiny bits of lead become part of the dust and soil in and around our homes.



## Child enrollment

- Residences randomly selected up to 2.7 km from John T Lewis site
- Field work conducted from July 15 to 31, 2014
- Eligibility criteria:
  - Child 9 to 71 mo with a consenting legal guardian present
  - Child lived in residence at least 3 days a week for at least 6 months



## Data collection and result dissemination

### Legal guardian questionnaires:

- Household
- Healthy homes
- Child
- Environmental



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### Child:

- Venous blood

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### Child:

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### Household:

- Tap water
- Dust on window sill near child's bed
- Dust from play area
- Dust near front door
- Soil where child plays

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- Soil where child plays

- Participants informed of sample results
- Philadelphia Department of Public Health followed-up with children based on established protocol



# Participants

Children 9 through 71 months enrolled  
n=151 from 105 households

Refused blood sample collection, n=53  
Missing information, n=3

Children 9 through 71 months with  
available BLL data  
n=95 from 66 households

## **Blood Lead Level (BLL) results**

- **Blood lead results of 126 children included in the study**
  - **Maximum blood lead results was 11 ug/dL**
  - **Mean blood lead result was 1.96 ug/dL**
- **CDC/ATSDR uses a reference value of 5 µg/dL to identify children with an elevated blood lead result.**
  - **Approximately 13.7% of children 9-71 months of age in the study had a blood lead result of 5 µg/dL or above.**
  - **At the national level, approximately 2.5% children have a blood lead level equal to or above 5 µg/dL.**

## Soil Results

- Soil samples were collected from child's play area
- Levels of lead in soil were considered elevated if above 400 parts per million (ppm)

Number of samples	Number of elevated soil lead results	Minimum and maximum concentrations detected	Mean
72	51 (71%)	40 – 7,700 ppm	774 ppm

\*Elevated soil and dust wipe sample results are defined as results exceeding EPA's standards under the Lead Renovation, Repair and Painting rule



## Dust Wipes Results

- Dust wipe samples were collected from the floor in the house entryway, the floor in child's play area and window sill.
- Lead dust wipe results were considered elevated if above 40 micrograms per square foot ( $\mu\text{g}/\text{ft}^2$ ) on child play area or if above 250  $\mu\text{g}/\text{ft}^2$  on window sills

Sample location	Number of samples	Number of elevated dust wipe results (%)	minimum and maximum levels detected	Mean
Dust Floor (Front Door)	119	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	21 (18%)	Non-detect – 630 $\mu\text{g}/\text{ft}^2$	33 $\mu\text{g}/\text{ft}^2$
Dust Window (Child Room)	106	13 (12%)	Non-detect – 18,000 $\mu\text{g}/\text{ft}^2$	356 $\mu\text{g}/\text{ft}^2$

## Drinking Water Results

- Tap water samples were collected from the kitchen sink spigot in each participating household.
- EPA's action level for lead in public drinking water (15 micrograms per liter ( $\mu\text{g/L}$ )) was used to assess the water sample results.

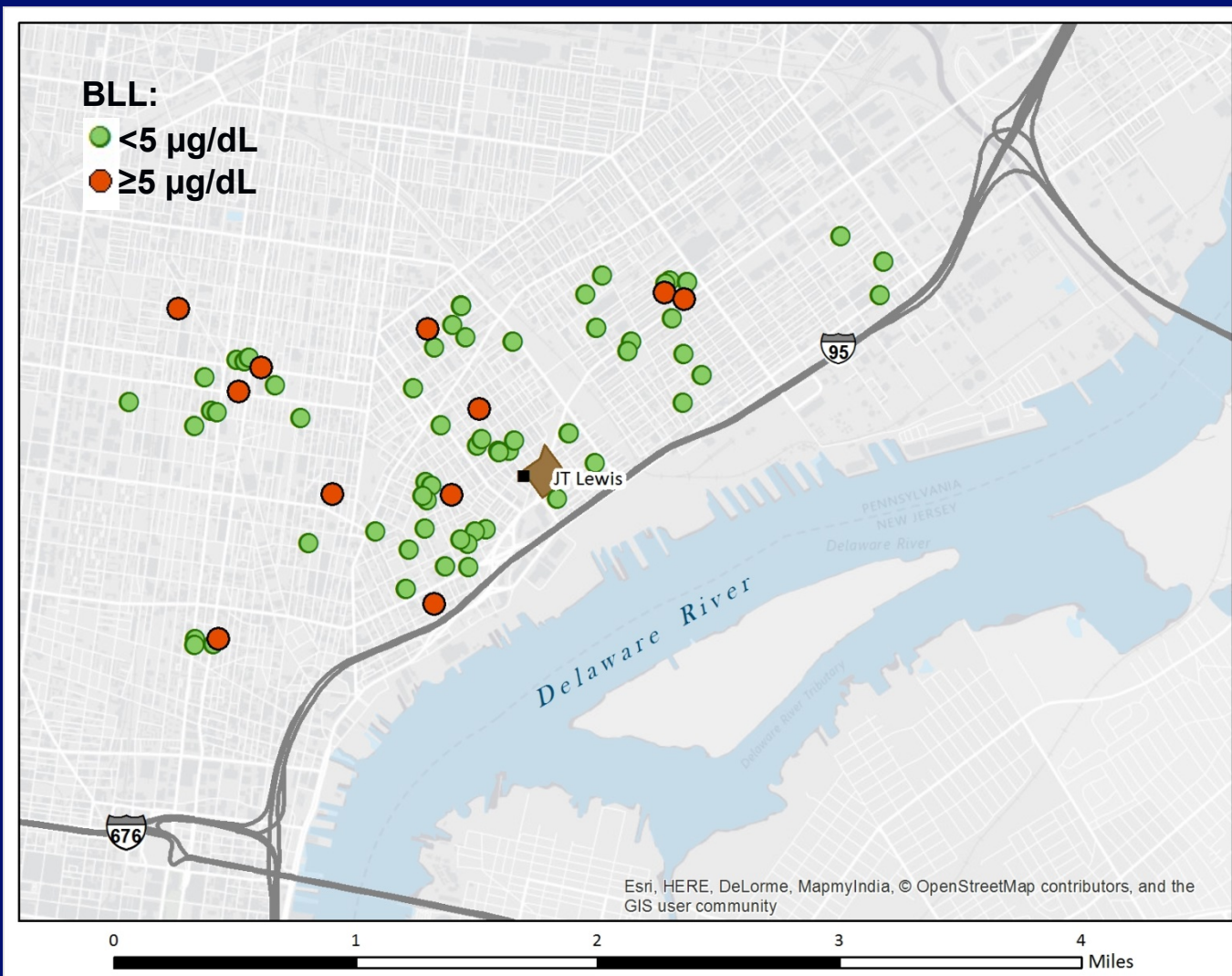
Number of samples	Number of elevated water sample results	Minimum and maximum concentrations detected	Mean
120	0	Non-detect – 3.9 $\mu\text{g/L}$	N/A

## **Public health significance**

- **We found a 13.7% prevalence of elevated BLLs among children 9 to 71 months of age living around the John T Lewis site**
- **Elevated lead in environmental samples increase odds of elevated BLL**
- **Providers and parents of children less than 6 years old should make sure the children are tested for BLL regularly**



# Spatial distribution of BLLs above the reference value



Map: Randall Young, CDC GRASP

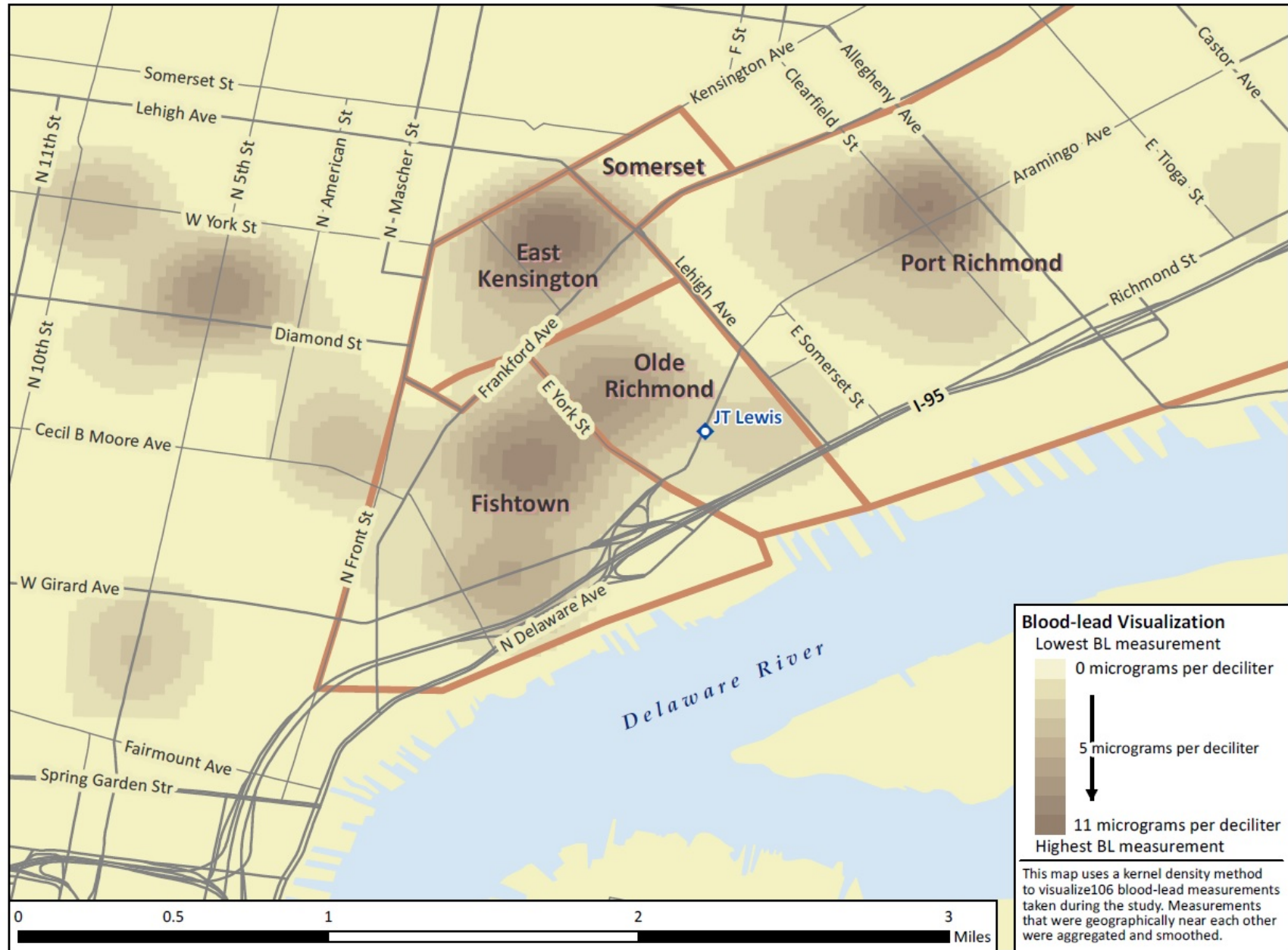
## Public health significance

- Older housing is associated with higher blood lead levels in children in the study. The highest blood lead levels in children in the study area are seen with children living in pre-1900 housing.

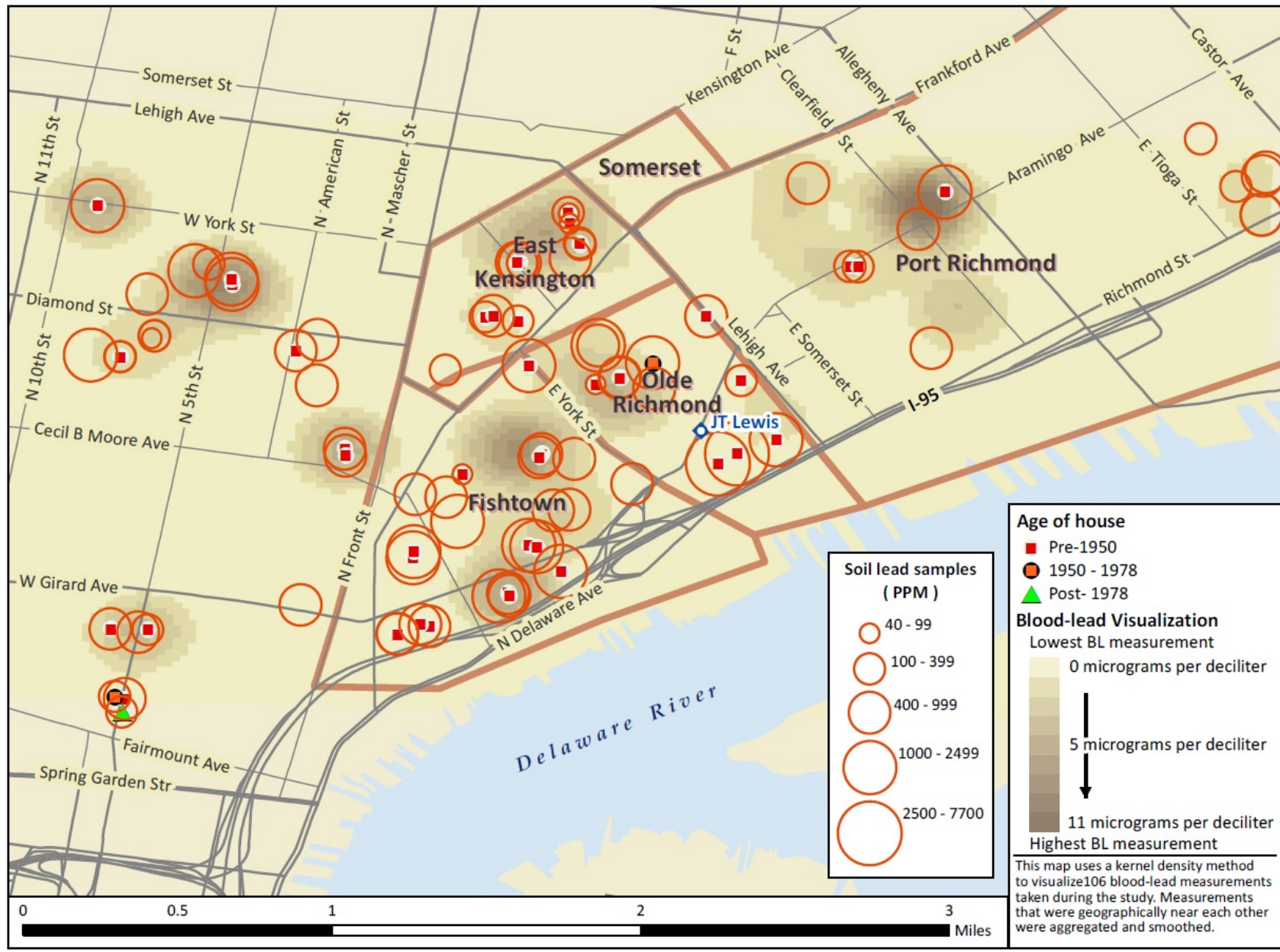
<b>Year House Built</b>	<b># of Homes</b>	<b>Mean BLL</b>	<b>Median BLL</b>
<1900	42	2.83	2.85
1900-1919	25	2.16	2.02
1920-1939	87	2.57	1.73
1940-1959	7	1.15	1.1
>1959	7	1.86	2
<b>Total:</b>	<b>168</b>		

## **Public health significance**

- **Higher levels of lead in soils are associated with higher blood lead levels in children**
- **When categorizing distance from the former JT Lewis site into quartiles, we do not see a relationship between blood lead levels in children in the study and where they live relative to the former site; however, we are continuing to study this further in different ways**
- **Having a single elevated dust result is not associated with higher children's blood lead levels**







## Strengths and limitations

### ■ Strengths

- Population
- Environmental and blood samples collected at same time
- Applied a formal sample strategy to cover an important area around the site

### ■ Limitations

- Utilized incomplete tax assessor data during randomized selection of residential plots
- Not powered to look at all outcomes of interest
- Not able to assess possible differences between children who did and did not participate in the study.



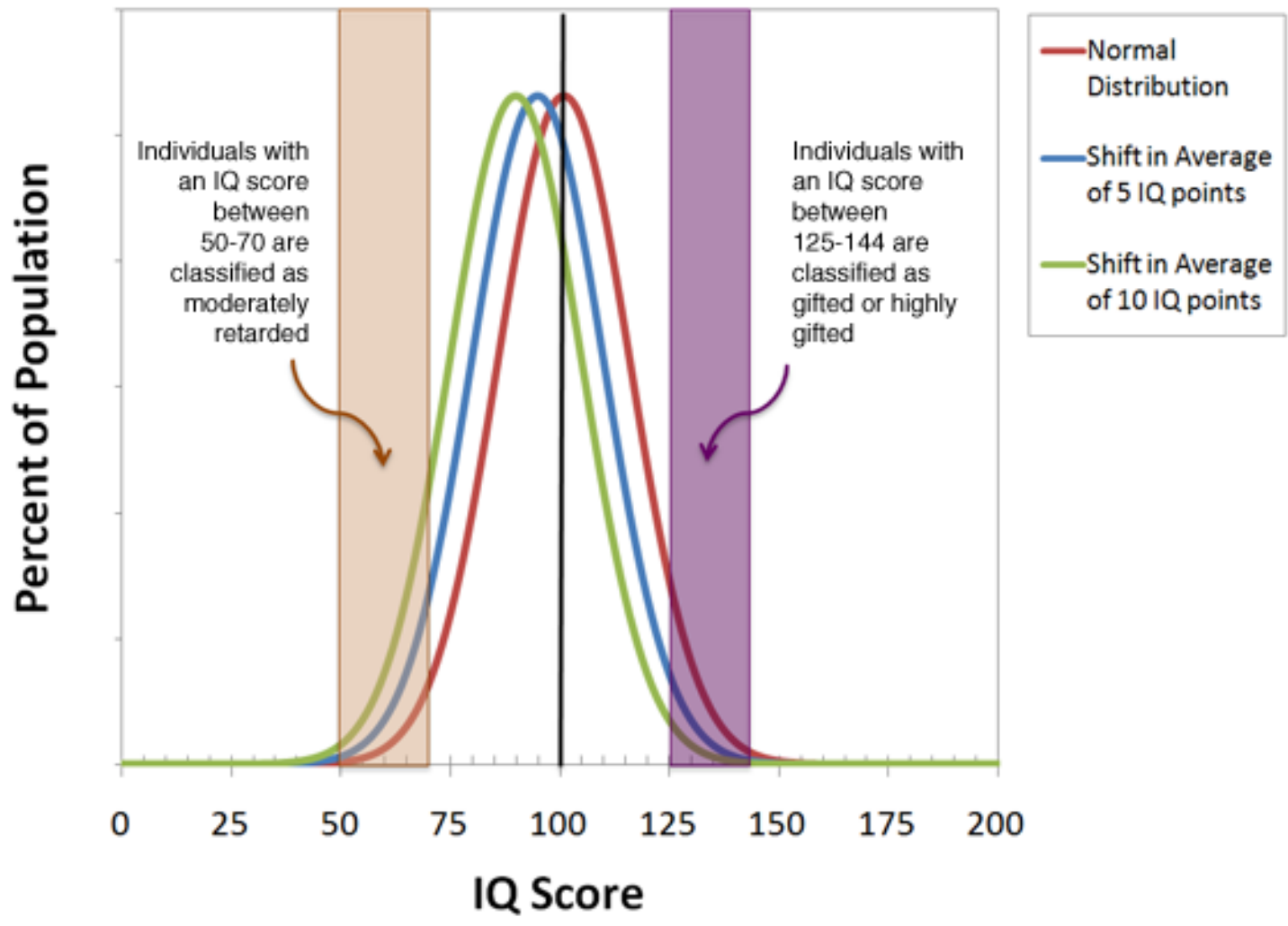
## High blood lead levels in children

- Lead exposure can result in physical, cognitive and neurobehavioral consequences<sup>1</sup>
- No known safe blood lead level<sup>1</sup>
- Contributes to 600 000 new cases of children with intellectual disabilities every year<sup>2</sup>
- Children are more sensitive to health effects<sup>3</sup>
- Most important exposure sources for children in US occur in residential environment<sup>3</sup>

1 ACCLPP 2012

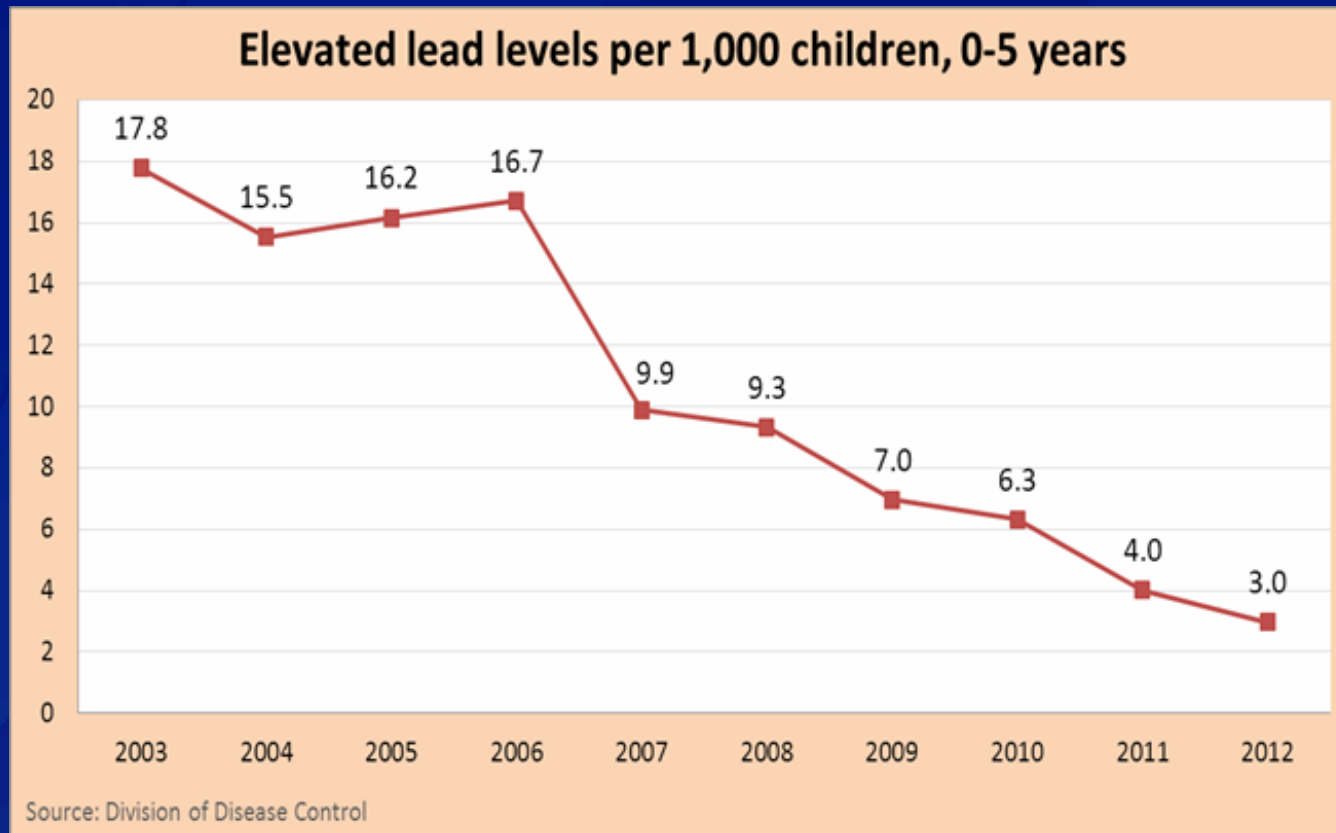
2 WHO 2013, Bouftini 2014 (Morocco), Dabrera 2015 (London), Kennedy 2014 (USA), Caravanos 2014 (Zambia), Ajumobi 2014 (Nigeria)

3 ATSDR 2007



UCLA, 2009

## Children with Blood Lead Levels Above 10 $\mu\text{g}/\text{dL}$ , 2003-2012, Philadelphia, PA



## Philadelphia Lead Screening and Lead Poisoning of Children

Children Screened At least One Time for Blood Lead, Philadelphia, PA  
( $\leq 6$  years of age)\*

Calendar Year	Children Tested, #	Census Population Tested, %
2010	89,500	74.8
2011	94,868	79.3
2012	98,889	82.7

\*Testing and child age as of December 31 for year shown. Includes tests performed in previous years (PA NEDSS 4/11/14)

Children with confirmed blood lead levels  $\geq 10$   $\mu\text{g/dL}$ , Philadelphia, PA ( $\leq 6$  yrs)

Calendar Year	Children, #	Children Tested, %
2010	981	6.2
2011	648	3.9
2012	601	2.9
2013	552	2.9

## Next Steps

PDPH and CDC/ATSDR will continue to

- Help residents understand the health risks associated with lead and the steps they can take to protect themselves
- Provide scientific assistance to EPA and the local and state health departments to further evaluate the results from this study
- Work with health care providers to make sure young children living near the site routinely have blood lead tests
- Provide healthy homes referral services to eligible families

**PDPH follows up on all children in the City with elevated blood lead results**

## Next Steps

**EPA will continue to**

- **Conduct experiments to identify how much of the lead found in soil has the potential to be absorbed once it is inside the body.**
  - This will allow scientists to better assess the potential impact of people's exposure to lead in soil.
- **Partner with health agencies and community organizations in outreach activities**





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