Brownfields
Success Story

Lead Remediation at Brownfields Sites

New England

Over the past few decades, EPA's Brownfields program has helped reduce the threat of lead exposure by cleaning up hundreds of contaminated properties. By removing or encapsulating lead-based paint, excavating and disposing contaminated soil, and protecting groundwater, EPA has improved public health and safeguarded vulnerable populations, including expecting mothers and young children.

Background

Before the 1970s and 1980s, lead was freely used in a wide range of products and industrial practices. The federal government has since banned lead from many products, but this metal is still a common contaminant at Brownfields sites due to its historic use. Fortunately, EPA's Brownfields program has helped to clean up 580 such properties throughout New England, nearly half of all the Brownfields properties in the Region suspected of containing lead. This effort reduces an important public health risk while promoting community development and economic growth.

Why is lead found at Brownfields sites?

Lead is an inexpensive and versatile element used for centuries as a key ingredient in many products and industrial processes. As a dense, malleable, non-corrosive metal with a low melting point, lead has been pounded, molded, shaped and even combined with other metals to make objects, including jewelry, tableware, plumbing fixtures, water pipes, lead-solder cans, and ammunition.

Chemists also used lead compounds to improve product performance. For example, lead improved paint's luster, durability, water resistance, coverage, drying time, and anti-microbial properties. The lead-based compound tetraethyllead reduced premature combustion, or "knocking," when added to gasoline. Lead compounds added colors to everything from ceramics to hair dye. And farmers used lead-based pesticides, such as lead arsenate, to control gypsy moths and other pests in the early 1900s.

While lead-based paint and leaded gasoline are frequent sources of contamination at Brownfields sites, hazardous levels of lead pollute abandoned foundries, ammunition factories, farms, and facilities that used or manufactured lead-based products. Lead contamination can also be found at former landfills and wastewater treatment plants, often the final resting place of products and by-products containing lead.

A $200,000 Brownfields grant in 2012 jumpstarted the redevelopment process that removed lead based paint and other contaminants from the Tarr and Wonson Paint Manufactory in Gloucester, MA.

New England Brownfields sites with lead contamination and cleanup activities (as of September 2020)

- 3,224 New England Brownfields properties
- 1,247 properties suspected of lead contamination
- 1,111 site assessments confirming the presence of lead
- 580 properties with lead cleaned up

Project staff celebrate the planned removal of lead based paint on the exterior walls of the Tarr and Wonson Paint Manufactory in Gloucester, MA.

EPA
United States Environmental Protection Agency

The Colt complex in Hartford, CT now features 129 apartments, a power plant, and 315,000 square feet of commercial space after site cleanup removed lead and other contaminants.

"It's the perfect example of transforming and revitalizing a whole neighborhood that had been dormant for a long time."

Hartford Mayor Luke Bronin

What are the health effects of lead?

Although lead is toxic to everyone, unborn babies and children 6 months to 3 years old are especially susceptible because they absorb lead faster and react more strongly to its harmful effects. Specifically, lead displaces important nutrients, including calcium, iron and zinc. Lead also disrupts the function of glutamate, a neurotransmitter required for learning. Consequently, lead exposure harms the production of blood cells, weakens bones and teeth, inhibits muscle movement, and slows the proper function of blood vessels and nerves.

While very high exposure can be deadly, moderate to high levels of lead may cause anemia, nausea, headaches, loss of appetite, muscle and joint weakness, and kidney and brain damage. Even low levels of lead can impact a developing child's nervous system, resulting in neurological and behavioral problems, such as lower IQ and hyperactivity. According to the Centers for Disease Control, there is no known safe level of lead.

What are some typical lead exposure pathways at Brownfields sites?

Lead can be introduced into the bloodstream through three exposure pathways: inhalation, ingestion, and dermal exposure. The inhalation and ingestion of lead from lead-based paint and lead-contaminated soil is the largest concern at Brownfields sites. Exposure from drinking water and skin contact is much less prevalent.

Examples of Lead Contaminated Sites

As shown in Table 1, Brownfields site contamination arises from a variety of historic uses. These include buildings and structures painted before 1978, highly trafficked areas before leaded-gasoline was banned in 1996, lead-based pesticides that were used pre-1950, factories that manufactured lead-based products, sewage sludge contaminated with lead found at sewage treatment plants, and agricultural fields where sludge was applied as a fertilizer.

Table 1: Sources of Lead at Brownfields Sites

Source of Lead	Example of Previous Site Uses
Paint (before 1978)	Old structures and buildings, landfill operations, aircraft component manufacturing
High Traffic Areas (before 1996)	Land next to heavily trafficked roadways or highways built before leaded fuel was phased out
Pesticides (pre-1950)	Agricultural land; facilities engaged in produce packaging and shipping
Sewage Sludge	Sewage treatment plants; agricultural land

For more information:

Visit the EPA Brownfields website at www.epa.gov/brownfields or contact Robert Guillemin at 617 918 1814 and guillemin.robert@epa.gov

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How are lead health risks addressed by Brownfields site cleanup?

Onsite workers cleaning up Brownfields sites use the following methods to remove lead, prevent it from exposing people, or stop it from migrating into the environment.

- **Point-source contamination removal** identifies and removes pipes, equipment, or other objects containing lead
- **Lead paint removal** uses physical means (scraping, sandblasting and spray washing) or chemical treatment to remove lead-based paint.
- **Excavation and disposal** practices remove contaminated soil and treats it off-site, either to be returned to the project site or used on a landfill site.
- **Encapsulation** applies an adhesive barrier over lead-based paint to seal the paint to a surface and prevent the release of paint chips or dust.
- **Immobilization** addresses heavy metal contamination of groundwater by using chemical processes to fix lead and other heavy metals to soil particles so that they cannot leach out.

How many Brownfields sites have addressed lead risks in New England?

Our Brownfields grantees have used their grant funds to assess over 3,200 sites throughout New England since the program began in the mid-1990s. Of these sites, about 1,250 or 39 percent, were thought to be contaminated with lead. Communities and other stakeholders conducted assessments which confirmed the presence of lead at over 1,100 of these sites and cleanups at 580 to put these properties back into productive use.

Two examples of Brownfields lead remediation

In 1863, Gloucester's Tarr and Wonson Paint Manufactory produced the world's first anti-fouling paint for boat bottoms. In 1980, the company shut its doors, becoming an unused and contaminated facility that was unable to attract owners despite its waterfront location overlooking Gloucester Harbor. A $200,000 Brownfields cleanup grant in 2012 jumpstarted the redevelopment process, removing the lead-based paint and other contaminants from the property. Today, the site is the headquarters of Ocean Alliance Inc., a nonprofit dedicated to whale and ocean health.

In 1847, the Colt Firearms Manufacturing company began assembling weapons in Hartford, Connecticut. By 1990, the company ceased operations, leaving its 17-acre facility empty and contaminated with petroleum, solvents, PCBs, and heavy metals, including lead. In 1997, a Brownfields-funded assessment project kickstarted a successful site cleanup and redevelopment. Today, the Colt Factory complex houses 129 apartments, a power plant, and 315,000 square feet of commercial space that features two software companies and an architectural firm.