

Urban Soils

Understanding Lead as a Common Contaminant in Urban and Peri-Urban Soils

In Allegheny County, growing interest in backyard gardening and vacant lot revitalization has led to more urban agriculture, green spaces, and play yards. Contaminants, such as lead and other heavy metals, are common in urban soil, and can be hazardous to health when ingested or inhaled. ACCD offers soil testing as an important first step to reducing your risk of exposure.

Fast Facts:

- **Lead is naturally found in soil** at low levels (10–50 parts per million), but levels can be much higher in urban areas due to old lead paint, leaded gasoline, and industrial sources.
- **Lead doesn't break down or disappear over time.** It stays in the soil for thousands of years and doesn't easily wash away.
- **Exposure to lead in soil occurs** most commonly when soil particles are inhaled or ingested, especially when soil is disturbed. Risk of exposure depends on concentration of lead, as well as frequency and length of exposure instances.
- **Some plants can absorb lead**, but this depends on the type of plant, the part you eat, and the soil conditions.
- **There is no safe level of lead exposure.** Children are especially at risk for lead toxicity in the form of developmental delays, learning disabilities, hearing loss, insomnia, hyperactivity, and more. Adults can also face a variety of chronic health issues.
- **Lead is just one of numerous heavy metal contaminants.** Other common heavy metals that may be found in urban soils and are hazardous to health include arsenic, cadmium, copper, lead, nickel, chromium, zinc, and more.



Resident Soil Screening Events

Drop-off Events: Every spring and fall, ACCD partners with local organizations to host soil drop-off events for backyard gardeners. Residents register online, follow collection instructions and drop off soil sample(s) at a nearby site. ACCD analyzes samples with pXRF technology and emails results within two weeks.

Pop-up Events: ACCD teams up with local groups to host pop-up events during the growing season. Residents bring soil samples to be screened on-site for free with pXRF technology and receive same-day results. ACCD staff is available to explain results, share resources, and help plan next steps. New events are added regularly. Check ACCD's online event calendar for the latest information.

Community Greening Soil Services

Heavy Metal Micro-Mapping: ACCD provides free soil screening services to urban growers in the region, including agricultural producers, urban farmers, community gardens, greenspaces, Adopt-a-lot/ Farm-a-lot lessees and more. Services include a site visit, assistance with soil sample collection, analysis using pXRF technology, lead results mapping, full heavy metal report, signed results letter and one-on-one support. Urban growers can request this assistance online.

Urban Soil Health Remediation Projects: Urban growers that have previously participated in heavy metal micro-mapping that received medium or high risk results may qualify for remediation assistance.

Soil Health Technical Assistance

Soil health is the foundation of resilient, healthy communities. The biological, chemical, and physical properties of a soil interact to determine soil health. ACCD staff can help you assess soil health, as well as access lab services and understand results to improve soil health. Soil lab testing can provide information on both soil fertility and contaminants, but must be mailed to an accredited lab for a fee. Lab tests give the most accurate results for lead levels and are recommended after ACCD's pXRF screening.



Scan the code to learn about ACCD's Urban Soils Program, find resources, and request assistance online.

📞 412.241.SOIL
7 6 4 5

🌐 ACCDPA.ORG

Reducing Risk of Exposure to Soil Lead

Soil Testing



Soil testing is the first step to reduce your risk of exposure to soil lead. Learn how to collect a representative soil sample using ACCD's online instructions. Samples can be submitted to ACCD at resident soil screening events, or mailed to an accredited lab for soil fertility and contaminant testing for a fee.

Interpreting Results

Laboratory test results will report soil lead concentrations in terms of $\mu\text{g/g}$ (micrograms per gram), mg/kg , or ppm (parts per million) which are all equivalent units of measurement. Interpreting soil lead results can be challenging as bio-availability, of lead depends on biological, chemical, and physical properties of soil.

There is no single threshold that defines acceptable levels of lead in soil. While there are no federal regulations on "safe" soil lead levels, local or state guidelines may vary. The chart below indicates the degree of risk associated with various soil lead concentrations utilized by ACCD and partner agencies for pXRF results. Other heavy metal contaminants have very different risk thresholds and must be interpreted separately.

HIGH RISK: 1,000+ PPM

Do not garden in soil with contamination in this range. Keep children and pets away from areas with bare soil and take steps outlined in other risk categories to reduce dust and in-ground lead mobility. Keep the area covered. If lead contamination exceeds 2,000 ppm, contact your local health department, Penn State Extension office or regional Department of Environmental Protection office for advice on lead abatement measures.

MEDIUM RISK: 401 - 1,000 PPM

As lead moves from low to medium risk, working in soil becomes more difficult. At a medium risk level, in-ground gardening of leafy green and root crops should be moved to raised beds with clean soil. Covering bare ground with mulch or thick turf can also help by reducing the presence of dust.

LOW RISK: 151 - 400 PPM

After interacting with soil, thoroughly wash hands and keep shoes at or near the door to avoid bringing dust indoors. When gardening, wash all produce, cover pathways to reduce dust and place garden beds away from roads, driveways and old painted structures. It is considered high risk for children to interact with soil at 200+ ppm (EPA 2024).

VERY LOW RISK: 0 - 150 PPM

This is the range of lowest risk. Because lead contamination occurs on a continuum, it is important to always clean hands after interacting with soil.

Safe & Clean Gardening Guidelines

There is no safe level of lead exposure. Even if your soil tests as "Very Low" or "Low" risk, consider following these guidelines:

- Wash your hands after working in the soil; consider wearing protective gear (gloves, masks, etc.) to avoid ingestion or inhalation.
- Remove shoes before entering indoors to avoid tracking dust indoors.
- Mulch walkways at least 4 inches to reduce dust.
- Thoroughly wash all produce to remove soil particles.
- Throw away outer leaves of leafy greens and peel root crops.
- Opt to grow fruiting crops like tomatoes, peppers and eggplants instead of leafy or root vegetables.
- Keep tools and equipment clean.
- Watch children to avoid hand-to-mouth contact with contaminated soil and prevent children from playing in areas with bare soil patches that are likely to produce dust.
- Use raised beds with a landscape fabric barrier instead of planting directly into ground.

Taking Action

For sites that require intervention, consider the below strategies for reducing exposure to soil lead.

- 1. Cap & Build:** This method blocks access to contaminated soil by covering it and building on top. Use a plastic tarp, 6–8 inches of wood chips, or plant grass or other perennials to create a cap. In extreme cases, paving the surface might be the best solution. Once access to contaminated soil is limited, bring in clean fill, build raised bed infrastructure, or grow in planters. This option is best for community gardens or public greenspaces.
- 2. Dilute & Lock-up:** This method reduces lead risk by diluting contaminated soil with clean soil and changing soil conditions to keep lead from being absorbed. When lead is locked in the soil, it's less likely to be taken up by plants or absorbed by the body if accidentally inhaled or ingested.

Steps include:

- Add clean soil to dilute lead levels.
- Adjust soil pH to neutral or slightly basic (above 7) to reduce likelihood of lead bio-availability.
- Add phosphorus to help bind lead into a stable form.
- Use compost, mulch, and cover crops to improve soil and help "lock in" lead.

Note: This method may not work the same for other metals like arsenic or cadmium. Always get detailed soil testing and talk to a soil expert before using this approach.

- 3. Remove & Replace:** Remove the contaminated soil entirely. You can either have it chemically cleaned and brought back or replace it with clean fill. This approach is usually the most costly and disruptive.