



# SOIL LEAD LEVELS

Soil and Plant Tissue  
Testing Laboratory

## *Interpretations and Recommendations*

**Soil Contamination by Lead** - Lead is naturally present in all soils. It occurs generally in the range of 15 to 40 parts lead per million parts of soil (ppm), or 15 to 40 milligrams lead per kilogram soil (mg/kg). Pollution can increase soil lead levels to several thousand ppm. The major cause of soil contamination by lead in populated areas is the weathering, chipping, scraping, sanding, and sand-blasting of structures bearing lead-based paint.

In the past the uses of tetraethyl lead as an anti-knock ingredient in gasoline and lead arsenate as an insecticide in fruit orchards were significant causes of soil contamination by lead. Automotive lead emissions have effectively ceased with the phasing out of leaded fuels. With the development of more effective pesticides and Integrated Pest Management (IPM), lead arsenate is no longer in use. Unfortunately, lead persists in soil many hundreds of years. Past use of these products continues to present problems in some areas.

Soil lead becomes a health risk when directly ingested or breathed as dust. Garden produce, which has accumulated lead in its tissue or has soil particles adhering to it, can also be a hazard if eaten. Lead poisoning is a particular concern for young children (under 6) because their play habits tend to maximize exposure and their bodies' rapidly developing systems are very sensitive to the effects of lead.

**Soil Lead Levels, Distribution, and Sampling** - The procedure used by the UMass Soil Testing Lab to measure lead in soil is the same used to measure the various plant nutrients. The Modified Morgan extracting solution, which contains dilute glacial acetic acid and ammonium hydroxide, removes a reproducible fraction of the total soil lead. This "extractable" lead is a measure of the reactive lead in the soil. A correlation between extractable lead and **ESTIMATED TOTAL LEAD** has been determined by testing a large number of soils (>300) using both this routine extraction procedure and a more rigorous total soil digestion. Your test result will also report an **ESTIMATED TOTAL LEAD** level based on this relationship. This is a calculated value. Total lead levels higher than 1000 ppm are considered a concern for all users. Contact your state's Department of Environmental Protection regarding removal of contaminated soil materials. Information derived from a variety of sources has resulted in classifying soil lead levels as follows:

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Lead Level	Extracted Lead (ppm)	*Estimated Total Lead (ppm)
Low	less than 22	less than 300
Medium	22 to 126	300 to 1000
High	126 to 293	1000 to 2000
Very High	greater than 293	greater than 2000

The listed categories are those of the UMass Soil Testing Lab. They are meant to correspond to the recommendations listed below. **\*If Estimated Total Lead levels are above 300 ppm, young children and pregnant women should avoid soil contact. Estimated Total Lead Levels above 2000 ppm probably represent a hazardous waste situation. Contact your state's department of environmental protection or your**

Due to the nature of the contamination process, lead in soil may be very unevenly distributed. The lead in paint removed from a structure will usually be concentrated near the source, but levels may vary greatly over small distances (ex. one foot). Lead arsenate residues in old orchards closely reflect the locations of sprayed trees. *Consider these facts carefully when sampling.* If the purpose of testing is to establish the extent of play area contamination, combine several, small, randomly taken samples from the surface 1-2 inches to create one sample for testing. If the concern is for lead uptake by garden vegetables, combine several vertical slices from the top 7 inches of soil (root zone) to create a sample.

### **Good Gardening Practices to Reduce the Lead Risk**

1. Locate gardens away from old painted structures and heavily travelled roads.
2. Give planting preferences to fruiting crops (tomatoes, squash, peas, sunflowers, corn, etc.).
3. Incorporate organic materials such as finished compost, humus, and peat moss.
4. Lime soil as recommended by soil test (pH 6.5 minimizes lead availability).
5. Discard old and outer leaves before eating leafy vegetables. Peel root crops. Wash all produce.
6. Keep dust to a minimum by maintaining a mulched and/or moist soil surface.

### **Recommendations**

**If your soil is contaminated with lead, keep young children away from all garden areas and other exposed soil surfaces.**

**LOW** - Follow the good gardening practices listed above.

**MEDIUM** - In addition to following good gardening practices:

- It is recommended that the blood lead levels of children under six be tested.
- Avoid growing leafy green vegetables and root crops if your children have above normal blood lead levels.
- Give planting preference to fruiting crops.

**HIGH** - In addition to following good gardening practices:

- It is strongly recommended that the blood lead levels of children under six be tested.
- Grow only fruiting crops or limit gardening to flowers and ornamentals.
- Replenish soil with clean topsoil; try to determine the depth to which soil is highly contaminated (it may be necessary to remove only a thin layer)
- Containerize garden in pots with clean topsoil; or create raised (or entrenched) beds lined in plastic and filled with clean topsoil to a depth of at least six inches.

**VERY HIGH** - Do not use this soil for vegetable gardening:

- Be certain to test the blood lead levels of children under six.
- Remove and replace soil; or grow only flowers and ornamental plants.
- Containerize garden in pots with clean topsoil; or create raised (or entrenched) beds lined in plastic and filled with clean topsoil to a depth of at least six inches.

# EPA Lead In Your Home: A Parent's Reference Guide

What is the Action Level for Lead? ...  
What should you do if lead is found in your home?

**Less than 400 ppm**

Nothing

**400-5,000 ppm**

- Cover bare soil by planting grass, piling mulch or sand on top of it, or landscaping with sod and bushes. To keep children from playing in soil near your home (which may have higher concentrations of lead), plant bushes close to the house. In areas near children's playgrounds, cover soil with mulch and gravel piled at least 6 inches.
- Move play areas away from contaminated soil.
- Put doormats outside and inside all entryways. Remove your shoes before entering.

**Higher than 5,000 ppm**

Abatement (see Chapter 7 and Appendix D).

