



Lead Screening for NH Soils: Minimizing Health Risks

Lead is a naturally occurring element that is present in all soils at very low concentrations of less than 50 parts per million (ppm). Elevated levels of lead in the soil are usually due to contamination. The major causes of soil lead contamination in populated areas include the use of lead paint around homes (pre-1970s), the use of lead-arsenate for pest control in orchards (1910-1950s) and the use of leaded gasoline (pre-1990s). Lead arsenate is no longer used as a pesticide and automotive lead emissions have effectively ceased as leaded gasoline has been phased out. Weathering, chipping, scraping, sanding and blasting of structures bearing lead-based paint increases soil lead contamination. Lead levels in contaminated areas do not decrease over time.

Lead is toxic when too much accumulates in the body. People can be exposed to lead from contaminated soil by inhaling or ingesting soil or dust on surfaces of leafy vegetables or root crops, or by consuming plants that have accumulated lead within their tissues. Children are more sensitive than adults to lead exposure because their brains and bodies are quickly developing and can absorb and retain higher amounts of lead. According to the Centers for Disease Control (CDC), blood lead levels as low as 10 micrograms/deciliter ($\mu\text{g/dL}$) can have harmful effects on children.

On home garden and lawn soil samples, UNH Cooperative Extension does a “lead screening” test that indicates whether or not lead could pose a health risk for your family. On your soil test report, if the lead screening levels are elevated, you will receive recommendations to help reduce your risk.

Lead Screen vs Total Lead

The UNH Cooperative Extension lead screening method extracts only a portion of the total lead in the soil. However, we have found it to be closely correlated with the total lead extraction method used by the United States Environmental Protection Agency (EPA), and therefore a good indicator of risk of lead exposure. When the

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lead screen gives high values, we recommend that you have the sample analyzed for total lead using EPA methods, although it is a more expensive test. You can get your soil analyzed for total lead through the UNH Cooperative Extension soil testing service. For complete information on doing this, contact the UNH Soil Testing office at 603-862-3200.

Lead Ranges and Risk Levels

	UNHCE	U.S. EPA
Risk Level	Lead Screen Level (ppm)	Total Lead Level (ppm)
Very Low	0 - 65	0 - 150
Low	65 - 180	150 - 400
Medium	180 - 450	400 - 1000
High	450 - 900	1000 - 2000
Very High	900 or greater	2000 or greater

Management Practices

Once lead is in the soil, there are various things that can be done to minimize the risk of the lead being taken up by plants. As the soil pH rises from 6.0 to 7.0 (and becomes less acidic) and as organic matter increases, the soils ability to “bind up” lead is increased. Therefore, by maintaining the pH near 7.0 and increasing organic matter in your garden soil by amending the soil with compost, you can reduce the risk of lead being taken up by plants.

Heavy metals like lead accumulate in and on the leaves and roots of vegetable crops. Crops vary in their ability to accumulate lead. Risks are highest with leafy crops (lettuce, spinach, etc.), since lead can accumulate in the edible portion of these crops, and root crops (carrots, radish, beets), because these are in direct contact with the soil. Lead is not readily taken up and moved into fruiting parts (e.g. tomatoes, peppers, squashes), but dust and soil can still accumulate on fruit surfaces. The best way to limit exposure if you have higher lead concentrations in your soil is to avoid growing edible crops for consumption.

Because ingestion of dust and soil can be a significant route of lead exposure for children, children should be taught to wash hands after contact with all soils, even those with relatively low levels of lead. If children have had, or continue to have, exposure to soils with medium levels of lead or higher, you may consider having their blood lead level tested by a health care professional to establish a baseline.

Reducing Exposure to Soil Lead

There are many ways to reduce the risk of food contamination, and it is important that you become familiar with these if your soil does have a higher level of lead. Some are listed on your soil test report and are based on the “risk level” indicated by the lead screening results. Additional management practices are listed below.

Very Low Levels

If the soil test lead screen indicated that soil levels are **very low** (0-65 ppm), no special precautions are necessary.

Low Levels

If the soil test lead screen indicated that your levels are **low** (65-180 ppm), the risk of lead exposure is slightly higher. The following precautions are recommended:

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- Wash hands after playing or working in soil.
 - Maintain the soil pH between 6.5 and 7.0 and maintain high levels of soil organic matter. Neutral soil pH and the presence of organic matter in the soil will help to reduce lead uptake by plants.
 - Wash all vegetables with water.
 - Peel root crops or scrub to remove all soil.

Medium Levels

If the soil test lead screen indicated that soil levels are **medium** (180-450 ppm), the risk of lead exposure is higher. In addition to the recommendations above:

- If you plan to grow vegetables in the garden, consider doing a “Total Lead” analysis to confirm the risk level to you and your family from soil lead.
- Do not grow leafy vegetables or root crops in this soil. Fruiting crops such as tomatoes, peppers, eggplants, melons and squash can still be grown but should be washed thoroughly to remove surface dust and soil. Grow leafy or root vegetables in raised beds or containers filled with uncontaminated (tested) soil.
- Do annual soil testing to make sure that the soil pH is between 6.5 and 7.0, and that soil organic matter is not decreasing.
- If children under age 6 have contact with this soil, contact a health care professional to have their blood lead level tested.

High and Very High Levels

If the soil test lead screen indicated that soil levels are **high** (450-900 ppm) or **very high** (900 or greater), this soil may be a significant source of lead exposure:

- We recommend that you do a “Total Lead” analysis to confirm the risk of lead exposure by gardening in this soil.
- Ingestion of this soil and dust may pose a risk of lead exposure; limit children’s direct contact with this soil.
- We do not recommend growing edible crops in this soil. Maintain soil pH between 6.5 and 7.0, and limit gardening to non-food crops such as flowers and ornamentals;
- If children under age 6 have contact with this soil, contact a health care professional to request blood lead tests. If the blood level is elevated please contact the NH Department of Health and Human Services (DHHS) Healthy Homes & Lead Poisoning Prevention Program at: 603-271-4718. DHHS collects blood lead testing data on NH residents, performs case management for lead poisoned children, and makes recommendations on how to manage lead-contaminated soils.



The following resources provide additional information on lead in soils

NH Department of Health and Human Services (DHHS)
www.dhhs.nh.gov/dphs/bchs/clpp/documents/environment.pdf

Environmental Protection Agency (EPA)
www.epa.gov/lead/protect-your-family-exposures-lead#soil
Telephone: 1-800-424-5323 (LEAD)

Center for Disease Control (CDC)
<http://www.cdc.gov/nceh/lead/>
NH Department of Environmental Services (DES) Laboratory Services
25 Hazen Drive
PO Box 95
Concord NH 03302
Telephone: 603-271-3445

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By Tom Buob, Extension Educator Emeritus; Becky Sideman, Extension Professor and Vegetable & Berry Specialist; and Geoffrey Njue, Extension Educator; UNH Cooperative Extension.

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