

## Contaminants in Soils: Data Collection, Interpreting Test Results, and Minimizing Exposure

Hannah Shayler and Murray McBride

### WHERE ARE SOIL CONTAMINANTS A CONCERN?

Soil quality is affected by land use and proximity to pollution sources.

**AGRICULTURAL LANDS:** Contaminant levels may sometimes be high enough to inhibit crop growth or affect human health.

**RESIDENTIAL PROPERTIES:** Contaminants in yards or gardens may exceed levels recommended for the health of humans or plants.

**COMMUNITY GARDENS:** Garden sites, especially in urban areas, might have a history of contamination. However, there is increasing interest in creating community green and food-producing spaces.



**OBJECTIVE:** To provide guidance for soil testing efforts and increase access to resources to foster more informed decision making to reduce exposure to soil contaminants.

### WHAT ARE SOME COMMON SOURCES OF SOIL CONTAMINANTS?

<b>Paint (before 1978):</b>	<i>lead</i>
<b>High traffic areas:</b>	<i>lead, zinc, PAHs</i>
<b>Treated lumber:</b>	<i>arsenic, chromium, copper</i>
<b>Burning wastes:</b>	<i>PAHs, dioxins</i>
<b>Manure:</b>	<i>copper, zinc</i>
<b>Coal ash:</b>	<i>molybdenum, sulfur</i>
<b>Sewage sludge:</b>	<i>cadmium, copper, zinc, lead, PBTs</i>
<b>Petroleum spills:</b>	<i>PAHs, benzene, toluene, xylene</i>
<b>Commercial / industrial site use:</b>	<i>PAHs, petroleum products, solvents, lead, other heavy metals</i>
<b>Pesticides:</b>	<i>lead, arsenic, mercury (historical use), chlordane and other chlorinated pesticides</i>

### HOW ARE PEOPLE EXPOSED TO CONTAMINANTS?

- 1) INGESTION:** People may ingest small amounts of soil while working in soil, gardening or playing. Contaminants may accumulate on or in produce, or in meat, eggs, milk, or water.
- 2) SKIN CONTACT :** Some contaminants, such as many pesticides, can easily pass through the skin and enter the body.
- 3) INHALATION:** People may inhale contaminants with airborne soil particles (such as windblown dust) or that vaporize from soil.

The most likely route of human exposure will vary with the contaminant and with site conditions.

Contaminant levels depend on the history of a particular site. Soil testing can inform decision making about crop management, gardening practices, or land use to reduce human exposure and protect crops.



### HOW SHOULD SOIL SAMPLES BE COLLECTED?

The best sampling strategy depends on the particular site conditions and on the questions being asked. For example:

- To measure contaminant levels in specific locations, such as play areas or possible contamination sources, collect separate samples of the top 1-2 inches of soil from these areas.
- To measure average contaminant levels in surface soil, collect composite samples of the top 1-2 inches of soil across the site.
- To measure contaminants in garden soil, collect deeper samples (from 0-6 inches) from several locations in the garden and mix them together. Collect separate samples if you want to know if some parts of the garden have higher concentrations.

### WHAT DO SOIL TEST RESULTS MEAN?

There is no single standard for acceptable soil contaminant levels, but the resources of state and federal agencies and university extension programs can provide guidance for interpreting results.

The USEPA Soil Screening Levels and NYSDEC Soil Cleanup Objectives in particular may provide useful benchmarks for comparison. However, these values were designed primarily for the cleanup of industrial sites.

### HOW CAN EXPOSURE BE REDUCED?

- Wash hands or wear gloves when in contact with soil.
- Prevent soil from coming indoors on shoes, pets, or clothing.
- Avoid or contain contaminated areas: use raised beds for gardening, or mulch to reduce dust.
- Incorporate clean soil or organic matter, adjust soil pH, promote good drainage, wash produce, and peel root crops.
- Avoid or limit activities that can increase soil contamination, such as the use of certain waste-derived fertilizers.

### WHERE CAN I FIND ADDITIONAL INFORMATION, FACT SHEETS, AND OTHER RESOURCES?

For updates as our project progresses, please visit us at: <http://cwmi.css.cornell.edu/soilquality.htm>