

Guidance on Heavy Metal test results in Soil

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Heavy metals can be tested in soil to determine total concentration which involves an EPA method to dissolve the soil in acid. Another method for testing heavy metals is to use the Mehlich-3 extract routinely used in soil labs for determining plant nutrients. The Mehlich-3 extract determines a portion of the total concentration which is approximately 75% of the total.

Guidance on levels of concern in soil is mostly focused on lead in several extension publications from different states. Two of those publications are referenced below. The one from Rutgers provides recommendations on lead levels based on the Mehlich-3 method and total EPA method. The one from Penn State provides recommendations on lead levels based on the total EPA method.

The publication from Brooklyn College provides guidance on safe levels of other heavy metals in soil including chromium, nickel, arsenic, cadmium, and lead. Their guidance levels in soil are based on targets to achieve for total concentration of metals when remediating hazardous waste sites.

The table below shows levels of total heavy metals in soils that can have unrestricted use based on New York State Department of Environmental Conservation (NYSDEC). Assuming Mehlich-3 test extracts 75% of the total metal in soil, the third column represents the concentration of Mehlich-3 heavy metal concentrations where unrestricted use could occur. The publications from Penn State and Rutgers provides guidance on actions that can be taken for garden soils when soil lead levels are elevated.

	NYSDEC unrestricted use Total conc. (mg/kg)	NYSDEC unrestricted use Mehlich-3 conc. (mg/kg)
Arsenic (As)	13	10
Cadmium (Cd)	2.5	1.9
Chromium (Cr)	30	22
Lead (Pb)	63	47
Nickel (Ni)	30	22

Useful publications:

Lead Contaminated Soil: Minimizing Health Risks, Rutgers University

<https://njaes.rutgers.edu/fs336/>

Contents: Guidance on actions to take with different levels of lead in soil based on the Mehlich-3 soil test in unit of ppm which equals mg/kg.

Lead in Residential Soils: Sources, Testing, and Reducing Exposure, Penn State University

<https://extension.psu.edu/lead-in-residential-soils-sources-testing-and-reducing-exposure>

Contents: Guidance on actions to take with different levels of lead in soil based on total concentration in soil in unit of ppm which equals mg/kg.

Soil Testing Data: Heavy Metals in Garden Soil, Environmental Sciences Analytical Center@Brooklyn College

<https://radixcenter.files.wordpress.com/2015/04/brooklyn-college-heavy-metals-in-garden-soil.pdf>

Contents: Levels of chromium, nickel, arsenic, cadmium, and lead in soil as soil clean up objectives for remediating hazardous waste sites. Levels represent total metal concentrations in soil in unit of ppm which equals mg/kg.