Handheld XRF Tests Lead (Pb) in Soil, Dust, and on Surfaces

Health hazards associated with Pb in pre-1978 structures containing lead based paint (LBP) are well established. Of primary concern is the presence of bioavailable Pb in flaking or chipped surface paint, dust, and the nearby soil of these structures when occupied by young children. Other areas of concern are the environs of community buildings and recreational areas in the vicinity of Pb-producing activities, such as heavy traffic, landfills, munitions sites, or industries that use and/or emit Pb.

Legally regulated limits of Pb vary from country to country and even city to city. Typical residential regulatory Pb levels are 400 PPM in play area soil, 40 mg/ft² (40 µg/wipe) in floor dust, 250 µg/ft² (250 µg/wipe) on interior window sills, and 1 mg/cm² or 0.5% by weight on painted structural surfaces. Laboratories are well equipped with techniques and instrumentation to measure Pb to confirm legal regulatory compliance. However, lab analyses are not immediate and tend to be expensive and time-consuming. Consequently, there is a need for more timely on-site determinations of potentially dangerous levels of Pb in suspected areas.

DELTA Handheld XRF Accessories

Tube-Based Handheld XRF

Tube-based handheld XRF analyzers are the optimum tool to perform Pb measurements directly in the soil, on dust wipes or filters, and on painted surfaces or paint chips and flakes. Should supplementary lab analyses be required, Handheld XRF can be used to optimize sampling at the property in an effort to minimize laboratory analysis costs.

Olympus Innov-X tube-based DELTA Premium Handheld XRF analyzers are equipped with the latest in silicon drift detector (SDD) technology and floating point processors to accurately detect low levels of Pb within seconds. Threshold limits can be preprogrammed for positive/negative or pass/fail Pb tests for PPM, % weight, or mg/cm² requirements. DELTA Handheld XRF Analyzers provide fast, accurate, precise results that are well within regulatory LOD levels. These modern tube-based Handheld XRF analyzers eliminate problems associated with older radioactive source-based Handheld XRF such as isotope loss of speed, high replacement costs, and post 9/11 regulatory and transportation restrictions.

DELTA Handheld XRF LODs for Pb Testing

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>DELTA Classic HHXRF SiPin Detector</th>
<th>DELTA Premium HHXRF Large Area SDD Detector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb in Soils &amp; Sediments</td>
<td>5 - 10 ppm</td>
<td>2 - 4 ppm</td>
</tr>
<tr>
<td>Pb on Filters &amp; Dust Wipes</td>
<td>3 µg/ filter or wipe</td>
<td>1 µg/ filter or wipe</td>
</tr>
<tr>
<td>Pb on Painted Structural Surfaces</td>
<td>0.3 µg/cm²</td>
<td>0.1 µg/cm²</td>
</tr>
</tbody>
</table>

Limits of Detection (LODs) measurements were taken in air for 20-30 seconds with optimized beam conditions. Standards used were in clean, homogenous, best case interference free matrices.
DELTA Tube Based Handheld XRF

Lead (Pb) in Soil Analysis

Soil contaminated with toxic levels of Pb is an obvious problem in children’s play areas, such as yards, parks and ball fields. Handheld XRF quickly and easily determines the amount of Pb and other metals in soil or sediments within seconds. Field XRF data integrated with field GPS-GIS data can provide metal concentration maps, essentially instant metal mapping. Data in this visual format is critical to determine and communicate where problems exist. Potential cost savings for remediation of Pb-contaminated sites with field XRF is evident, particularly the ability to assess quickly and to minimize lab testing costs. In fact, EPA Method 6200 encourages portable XRF screening for high density, high volume sampling to correctly characterize a site.

Pb in Dust Wipes & Filters Analysis

Exposure to airborne toxic metals has been found to develop serious health problems. NIOSH and OSHA developed methods for field analysis of Pb in dust wipes and air filters after successful use of Handheld XRF analyses at US Superfund sites. The obvious advantage to this field analysis technique is that regulators can obtain inexpensive, simple, real-time quality information to screen or verify exposure levels for immediate action plans. The DELTA Workstation is available for the NIOSH and OSHA developed dust wipe and filter analysis methods.

Pb on Painted Surfaces Analysis

Pb on painted structural surfaces is dangerous to children if it is bioavailable; this is most commonly seen in the form of paint flakes or chips. Regulations address residential structures and renovation, repair and painting work practices that disturb lead based paint in pre-1978 homes, child care facilities and schools. Handheld XRF can easily analyze for Pb at toxic levels with direct analysis on walls, floors, window casings, fireplace mantles or even decorative molding. Software-based proximity sensors enable easy measurements on uneven surfaces.

Protecting Society from Toxic Pb Levels

Olympus Innov-X Handheld XRF Analyzers are used worldwide to monitor Pb and other toxic metals and elements for public safety by Environmental & Consumer Protection Agencies, Housing & Urban Development Regulators, and Customs Agents.