

Hand-Held Lead Paint Analyzer

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Environmental Problem

Lead in paint has been associated with a number of environmental and health risks. Exposure of pregnant women to lead can result in premature birth, low birthweight, or spontaneous abortion. Lead exposure in infants and young children is correlated with decreased intelligence scores, and may lead to decelerated growth and hearing problems. Also, exposure of adults and children to high levels of lead may cause brain and kidney damage.

Lead-contaminated soil at residential and industrial sites poses numerous environmental, safety, and remediation problems. Depending on the source(s) of lead, the contamination may be highly localized or distributed extensively about a property. For example, if the main source of lead is external house paint, then the lead in soil is expected to be highest near the dripline of the house and decrease rapidly away from the structure. Conversely, if the lead source is from a nearby industry or large lead abatement project, the soil contamination may be pervasive throughout the property. Only a thorough site assessment involving a detailed sampling pattern will produce an accurate contamination profile of such sites.

SBIR Technology Solution

With support from EPA's SBIR Program, NITON LLC developed and commercialized a unique instrument to detect lead in paint, soil, and air. In 1994, NITON introduced the first ever one-piece X-ray fluorescence (XRF) spectrometer, the NITON XL-309 Lead Paint Analyzer. In 2004, NITON introduced the newest generation of this device, the XLp 300 Series Lead Analyzer. This portable, hand-held analyzer provides rapid lead analysis for inspections, risk assessments, and screening.

The NITON XLp 300 Series Lead Analyzer is compact, lightweight, and battery operated. It produces rapid, accurate measurements of lead and can be equipped with the capability to be used for numerous applications, including: (1) lead in paint, independent of the composition, thickness, and substrate of the paint; (2) lead in soil for site characterization, clearance screening, and remediation quality control; (3) lead in dust wipes for lead inspection, risk assessment, and site clearance; and (4) lead on filters for tracking workers' exposure to harmful airborne lead. The device weighs 3 lb, including battery pack, and has an integrated touchscreen display.

The device uses a ^{109}Cd source to measure the concentration of lead in paint, even when covered by 50 or more layers of non-lead paint of unknown thickness and composition. This results in no substrate correction and simple, point-and-shoot operation on any surface. Positive/negative classifications are displayed automatically when 95 percent confi-

dence is achieved, and the results are continuously displayed and updated. In some cases, results are obtained in as little as 1 second with no inconclusive ranges. The XLp 300 Series Lead Analyzer complies with both National Institute for Occupational Safety and Health (NIOSH) Method 7702 and Occupational Safety and Health Administration (OSHA) OSA 1 for airborne-lead monitoring and with EPA Method 6200 for lead-in-soil screening.

NITON participated in the "Evaluation of Field Portable Measurement Technologies for Lead in Dust Wipes" conducted by EPA's Environmental Technology Verification (ETV) Program to evaluate



NITON's XLp 300 Series Lead Analyzer, pictured above, can measure the concentration of lead in paint even when covered by 50 or more layers of non-lead paint of unknown thickness and composition.

the performance of commercially available field analytical technologies for analyzing dust wipes for lead. Data from the XL-300 series showed excellent agreement with the estimated lead value for the range of samples analyzed, with very few false negative results.

Commercialization Information

Since receiving SBIR funding, NITON's lead paint analyzers have become the industry standard for lead-in-paint analysis, and the devices have evolved into complete lead analyzers. In addition to its XL-309 lead analyzer, NITON manufactures XLI and XLT series XRF analyzers for a wide variety of analysis applications. To date, more than 6,000 portable NITON analyzers are in use every day worldwide in applications ranging from lead paint detection to quality control of alloy materials in manufacturing. NITON ships more than 1,000 new instruments each year.

Companies using NITON analyzers include Northrup Grumman Space Technology, Lockheed Martin Aerospace, Boeing Aerospace, Exxon/Exxon Mobil, British Petroleum, Chevron/Texaco, Eli Lilly, Sanyo Electronics, and General Motors. A number of government agencies (e.g., EPA, NIOSH, OSHA) also are using NITON's devices.

Company History and Awards

NITON LLC was founded in 1987 and has offices in Billerica, Massachusetts; North Kingstown, Rhode Island; Bend, Oregon; Munich, Germany; and Hong Kong. The company was a finalist for

the 1994 Discovery Award and was awarded its first R&D 100 Award for its significance in miniaturization and mainstreaming of portable XRF technology, based on the XL-309. NITON also received the Lead Tech Product of the Year Award in 1995, and won another R&D 100 Award in 2003 for its XLT and XLI analyzers. NITON became

the largest portable XRF manufacturer in the world, and based in large part on the success of its analyzers, the company was purchased by Thermo Electron Corporation in 2005.

SBIR Impact

- Lead in paint has been associated with a number of environmental and health risks, with pregnant women and young children most at risk.
- NITON developed and commercialized a portable, handheld analyzer that provides rapid lead analysis for inspections, risk assessments, and screening.
- NITON's XLP 300 Series Lead Analyzer uses a ¹⁰⁹Cd source to measure the concentration of lead in paint, even when covered by 50 or more layers of non-lead paint of unknown thickness and composition.
- Since receiving SBIR funding, NITON's lead paint analyzers have become the industry standard for lead-in-paint analysis, and more than 6,000 portable NITON analyzers are in use every day worldwide.