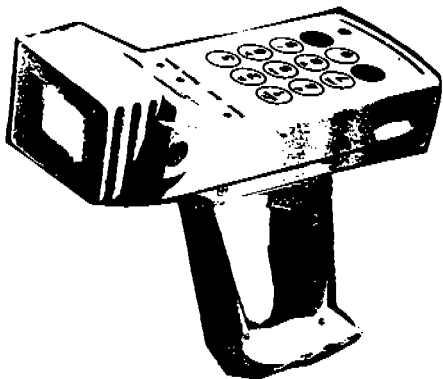




Just the Facts

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X-Ray Fluorescence (XRF) Analyzers for Lead-In-Paint Detection



This fact sheet presents guidance to consider before purchasing lead-in-paint analyzers that use x-ray fluorescence (XRF).

Method of Detection. Currently, there are about a half dozen portable lead-in-paint analyzers on the commercial market that use XRF as the detection method for determining the presence of lead in paint. They also share another common feature—a radioactive source. The most common radioisotope used in XRF analyzers is cobalt-57 with cadmium-109 used by at least two manufacturers. Both of these radioisotopes emit gamma radiation. The U.S. Army Center for Health Promotion and Preventive Medicine (Provisional) [USACHPPM (Prov)] currently uses an XRF spectrum analyzer equipped with a cobalt-57 sealed source.

Licensing Requirements. Prior to the purchase/acquisition of equipment containing radioactive material, obtain and file a valid Department of the Army Radiation Authorization (DARA). In addition, radioactive materials may be subject to specific licensing requirements and regulations of the U.S. Nuclear Regulatory Commission (USNRC) or the licensing requirements and regulations of a state with which the USNRC has entered into an agreement for exercising regulatory authority. Be sure to check with your local radiation protection officer (RPO) for further clarification.

Employee Health Monitoring. Employees will enter a medical surveillance program that will include a baseline blood count and medical history for potential radiation exposures. This exam will be repeated at least every 3 years and on termination of employment. Additionally, females will be given instructions concerning prenatal radiation exposure (USNRC Regulatory Guide 8.13).

Considering the potential health hazards to personnel using, maintaining, or storing these XRF devices, enrollment into a radiation dosimetry program is often recommended by manufacturers and required by RPOs. If an analyzer is used improperly, or if a damaged source begins to leak radioactive material, overexposure to gamma radiation could occur.

A properly administered dosimetry program, as part of the overall medical surveillance program, will provide an important chronological history of any individual radiation exposures. All USACHPPM (Prov) employees who use, maintain, or store these instruments are enrolled in a radiation dosimetry program and will receive annual radiation safety training.

◆ Industrial Hygienists,
Radiation Protection
Officers, DPW

◆ Lead-In-Paint Analyzers

◆ Radioactive Source

U.S. Army Center for Health Promotion and Preventive Medicine (Provisional)

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Direct-Reading or Spectrum XRF Analyzers. Today's spectrum XRF analyzers have distinct performance advantages over direct-reading XRF analyzers. Depending on the manufacturer, these advantages include automatic substrate correction, indifference to substrate, adaptability for soils or dust analyses, greater sensitivity, better accuracy, speed in measurements, etc. Direct-reading XRF analyzers, however, cost a few thousand dollars less than their spectrum XRF counterparts. Both types of analyzers require expensive source replacement, which can cost as much as \$4,000. Sources are recommended for replacement usually within 8 to 15 months after installation depending on the radioisotope and activity of the source. These sources will naturally decay regardless of instrument usage rate.

Common Problems/Hassles/Concerns.

- ◆ You probably will be required to use a military vehicle when transporting an XRF unit anywhere on an Army installation.
- ◆ Several industry experts dispute the accuracy of XRF instruments and state that better testing alternatives are available. Others claim that many XRF problems are due to specific unit reliability, adjustment to substrate levels, electronic drift, precision, and lack of operator experience.
- ◆ Something else to consider before purchasing an XRF is the required leak testing of the instrument's source for possible radioactive leakage and overall source integrity. These tests are required at least semiannually. A leak test is also required before and after transporting the analyzer. Leak test results are not normally available for several days because wipe samples are often sent to an outside laboratory for analyses.
- ◆ Each instrument has a range of results that are neither negative or positive. These results are considered inconclusive, and laboratory paint chip samples of the area are required to confirm the results.

Other Paint Testing Methods. Some experts believe that other detection methods, such as anodic stripping voltametry and rhodizonate chemical scratch testing, are simpler and possibly more precise alternatives. (Note: Chemical scratch testing will produce only qualitative results.) Recently, the Environmental Protection Agency hired two companies to perform an evaluation of lead paint testing methods to include current XRF technology, rhodizonate chemical scratch testing, and anodic stripping voltametry methods. Results of this evaluation have not been released.

Renting XRF Analyzers. If your lead testing work load can be accomplished in a couple of months, it probably will be more cost-effective to rent rather than purchase. Short-term renting does away with storing the instrument year-round, semiannual leak tests, employee radiation dosimetry (full-time program), and paying for source replacement and analyzer maintenance. Several major manufacturers of lead paint analyzers offer rental agreements for their equipment. Always coordinate the rental of equipment containing a radioactive source with your local RPO.

Additional Information/Guidance. Please call the USACHPPM (Prov), Industrial Hygiene Field Services Program, Industrial Hygiene Equipment Laboratory, DSN 584-2106 or Commercial (410) 671-2106.