

# NON-DESTRUCTIVE COMPOSITIONAL ANALYSIS AND MATERIALS CHARACTERIZATION WITH PORTABLE X-RAY FLUORESCENCE ANALYZER'S (XRF)

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## ABSTRACT

Portable X-ray fluorescence analyzer's versatility and accuracy have made it the standard for on-site non-destructive compositional analysis and materials characterization in a variety of materials. Their portability and speed allow for rapid testing wherever it may be needed. It is also popular for quality control of alloys, ceramics and for prohibited materials screening (e.g. for tin whisker prevention) of electronics.

Recently, the European Union (EU) has mandated a switch to the use of lead-free solder in the electronic assembly process. A date of July 2006 has been set as the deadline for all electronic products sold in EU member countries to be lead-free. In addition to verification of lead-free solder, the NITON analyzers can also be used as screening tools for toxic elements (lead, mercury, cadmium, chromium and bromine) in plastics as part of the same EU directive.

Flow-accelerated corrosion, or FAC is a well-known source of problems in nuclear and fossil-fuel power plants. Small quantities of alloying elements - particularly chromium - greatly reduce the rate of FAC. Recent advancements in handheld XRF technology have resulted in dramatically improved detection limits, which now make XRF a valid alternative method for FAC analysis application. These applications and a brief history of portable XRF will be offered.

In addition a new portable XRF instrument with an internal helium purge system has been developed. This invention expands portable XRF's compositional analysis capabilities into alloys containing critical amounts of the lighter elements like Al, Si, Mg, and P. The technology, capabilities, and limitations will be presented and discussed as well.