

## **HANDHELD XRF SOIL ANALYSIS FOR PRECISION AGRICULTURE AND PERI-URBAN FARMING APPLICATIONS**

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The safety of food sources is becoming increasingly important as the human population expands. With this growing demand, peri-urban farming and precision agriculture are becoming more commonplace. However, farming in areas adjacent to industrial and other urban facilities introduces the possibility of food crops grown in soil or irrigated with water with elevated levels of arsenic (As), mercury (Hg), cadmium (Cd), chromium (Cr) and lead (Pb). And, urban sprawl into areas once heavily farmed with unregulated pesticides may introduce As and Pb to these new community gardens. The use of handheld XRF for rapid in-field determination of these toxic metals will be presented. Additionally, advancements in tube and detector technology for handheld XRF that now allows field measurements of nutrients and fertilizers, such as calcium (Ca), magnesium (Mg), phosphorus (P) and potassium (K), will be discussed. Further, the use of portable XRF-GPS-GIS as an enhancement allowing for high intensity soil analysis with spatially modeled on-site results will be demonstrated.