Recent advances in Handheld XRF for Site Remediation

Handheld XRF has become a standard tool for site analysis when studying the level of hazardous elements in soil and mapping the extent of contamination. In the past few years a major advance in handheld XRF technology has been the implementation of Silicon Drift Detectors (SDD) in place of SiPIN detectors. This technology has brought a dramatic improvement in the performance of these systems when used for soil analysis. This technology provides a significant improvement in the count rate, resolution and light element detection.

A major improvement in performance is seen in the ability to measure realistic levels of light elements such as Si, S, P, Cl in addition to dramatically improving the detection limit for K and Ca all of which are common components in soil matrix. This not only allows the quantification of these elements but substantially improves the overall analysis as it is possible to measure more of the total sample thus making the overall analysis more accurate. In addition to the light element detection the new detector technology provides better resolution and peak to background thus contributing to lower detection limits for most of the hazardous elements such as Cd, Pb, Hg and Sr.

In addition to discussing the new detector technology this paper will discuss site specific calibrations which allow the addition of elements not normally analyzed in standard soil analysis calibrations such as Cs and U as well as type standardization which allows the "tuning" of a factory calibration to specific locations. Finally, the concepts of limit of detection and limit of quantification will be discussed.