# Can we rely on field portable X-ray fluorescence (pXRF) for producing high quality data in environmental pollution studies?

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This research evaluates the analytical capabilities of a field portable X-ray fluorescence spectrometer (pXRF) for the measurement of contaminated soil samples using a matrix-matched calibration. The calibrated pXRF generated exceptional data quality from the measurement of ten soil reference materials. Elemental recoveries improved for all 11 elements post-calibration with reduced measurement variation and detection limits in most cases. Measurement repeatability of reference values ranged between 0.2-10% relative standard deviation, while the majority (82%) of reference recoveries were between 90-110%. Definitive data quality, the highest of the US EPA's three level quality ranking, was achieved for 15 of 19 elemental datasets. Measurement comparability against ICP-AES values was excellent for most elements (e.g. $r^2$ 0.999 for Mn and Pb, $r^2$ >0.995 for Cu, Zn and Cd). Parallel measurement of reference materials revealed ICP-AES measured Ti and Cr poorly when compared to pXRF. Individual recoveries of soil reference materials by both ICP-AES and pXRF showed that pXRF was equivalent to or better than ICP-AES values for all but two elements (Ni, As). This study demonstrates pXRF as a suitable alternative to ICP-AES analysis in the measurement of Ti, Cr, Mn, Fe, Cu, Zn, Sr, Cd and Pb in contaminated soils.