ASSAYS OF THICK SOIL SAMPLES USING LOW-RESOLUTION ALPHA SPECTROSCOPY

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A novel instrument manufactured by Victoreen Inc. is being evaluated for use in rapid analyses of alpha activity in soils. The instrument consists of a small sample chamber, mechanical pump, 2" diameter Si detector, MCA, readout module, and laptop PC. Soil samples are dried, milled, loaded directly into the sample chamber, and counted for a sufficient interval to achieve the desired precision (10 - 1000 minutes). Low-resolution alpha spectra of thick samples are composed of a series of trapezoidal peaks, one for each major alpha emitter. Analysis of these spectra relies on an algorithm which fits the peaks, deconvolves the alpha stopping power (assuming a matrix of SiO_2), and generates an estimate in pCi/g for each isotope. Soil samples from the Nevada Test Site, the Rocky Flats Plant, the Fernald, Ohio plant, the Tonopah Test Range (NV), ORNL, as well as spiked and reference soils have been analyzed. For thirteen well-characterized soils the instrument demonstrated an accuracy of 110 ± 25%. The instrument performs best for cases of a few contaminants present at levels at least 2-3 times higher than the background alpha activity. Accuracy is degraded when many contaminants are present or assays are for near-background levels. With only a modest loss in accuracy the instrument can be used to screen even wet unprocessed soil samples. The instrument is simple, compact, and relatively inexpensive, and could serve as a powerful new **field analytical** tool.