

Testing the Use of Gamma-Ray Spectrometer for Soil Classification

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ABSTRACT

A gamma ray spectrometer is widely used for determining rock types based on the known significant differences in gamma ray emission of potassium, uranium, and thorium. According to the Geological Survey of Canada, a rock outcrop or boulder should exceed 1 meter in diameter in order to obtain reasonable measurements of gamma radiation. Unlike rock outcrops, soil profiles consist mostly of several horizons less than 1 meter thick.

The aim of this study was to test the applicability of the gamma ray GRM-260 spectrometer to determine soil radiation and to isolate the disturbance of background radiation from surrounding material. To do this, the radiation of 25-centimeter square slabs of granite with relative high radiation and of marble with relative low radiation at different distances was measured. The influence of background radiation was determined in a laboratory with relative high background radiation and on a water body with almost no radiation. The measurements had increased values for the marble slab in the presence of the granite slab and at laboratory locations that had higher background radiation. These different measurements showed that detected radiation is an integral of all gamma ray emitters in the range of the detector. Gamma ray spectroscopy can be applied to soil classification. Corrections for the background radiation are only necessary where the background radiation is similar to the soil radiation.

KEYWORDS: Gamma-Ray spectrometer, soil classification

