

ABSTRACT

DISSERTATION: CESIUM-137 FALLOUT IN INDIANA SOIL

STUDENT: Richard T. Whitman

DEGREE: Doctor of Education in Science

COLLEGE: Sciences and Humanities

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Atomic weapons testing during the Cold War and accidents at nuclear power plants have resulted in the release of radioactive fallout over great distances. Little is known about levels of fallout deposited in Indiana. The reported study sampled soil in all 92 Indiana counties to determine the present level of cesium-137 from the 2 to 12 centimeter depth from previous nuclear tests and other nuclear releases. A total of 67 samples were collected from forested areas and 25 from grasslands, both undisturbed since 1940, along with four controls from crawl spaces. Greater Cs-137 retention occurred in the forested areas at approximately a 2:1 ratio. Other parameters investigated included soil clay content, rate of rainfall, and soil pH. Each variable was examined for possible statistical correlation with Cs-137 retention. Both clay content and combined clay content/rainfall were significantly ($p < 0.05$) correlated with soil Cs-137 levels. The four controls showed very low values of Cs-137 indicating the movement of sub-micron sized fallout into areas considered safe from fallout. The Cs-137 data from this study will serve as a reliable baseline of Cs-137 levels in the event of a future release of fallout.

Keywords: Indiana; cesium-137; fallout