

Determination of ^{240}Pu : ^{239}Pu Ratios in United States Transuranium and Uranium Registries Cases Using High Resolution Alpha Spectrometry

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A new alpha spectrometry method for determining the isotopic ratio of ^{240}Pu : ^{239}Pu in human tissue samples has been developed by the United States Transuranium and Uranium Registries (USTUR). The method has been used to determine the ^{240}Pu : ^{239}Pu in several USTUR cases and is useful for identifying or confirming the source of plutonium present in the tissue. This method used unmodified, commercially available alpha spectrometry equipment and spectrum analysis software. Alpha spectra of plutonium separated from USTUR tissues were gathered with an alpha spectrometer system set up for low-level actinide determination. Experimental spectra were imported into a commercially available data analysis program and fit with mathematical descriptions of alpha-peaks using the Marquardt-Levenberg algorithm. The spectra were then deconvoluted into their ^{239}Pu and ^{240}Pu components and the isotopic ratio was calculated. The ^{240}Pu : ^{239}Pu isotopic ratios have been determined for selected tissues from several USTUR cases with confirmed internal plutonium depositions.

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