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Measurement of activity concentration of ^{238}U and ^{232}Th series radionuclides in beach sand with a multidetector ($\text{LaBr}_3:\text{Ce}$) gamma-ray spectrometer

The activity concentrations of ^{238}U and ^{232}Th series radionuclides in beach sand were measured using a gamma-ray spectrometer comprising four $\text{LaBr}_3:\text{Ce}$ (2" x 2") detectors without background shielding. The sample was placed 10 cm equidistant from the detectors and counted for 48 hours. This spectrometer allowed for measurement in singles and coincidence (gamma-gamma) modes. Time-stamped data were acquired and time correlation used to remove the background offline.

In coincidence mode, the minimum detectable activity (MDAs) were two orders of magnitude lower than in singles mode. The weighted activity concentration of ^{238}U series radionuclides in singles and coincidence modes are $908 \pm 70 \text{ Bqkg}^{-1}$ and $972 \pm 99 \text{ Bqkg}^{-1}$ respectively. The weighted activity concentration of ^{232}Th series radionuclides in singles and coincidence modes are $1599 \pm 70 \text{ Bqkg}^{-1}$ and $1754 \pm 185 \text{ Bqkg}^{-1}$ respectively. Therefore we conclude that the results are consistent to within measurement uncertainty.

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