

## **Low-cost NORM concentrations measuring technique for building materials of Uzbekistan**

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Concentrations of natural radionuclides of building materials are important in order to estimate exposure of humans to radiation, who can spend up to 80% of their time indoors. One of the indicators of building materials' safety is the radium equivalent activity, which is regulated by national and international normative documents [1,2,3]. Materials with  $Ra_{(eq)} \leq 370$  Bq/kg are considered to be safe [4,5]. We have studied the possibility of performing express analysis of building materials samples without ageing. Long measurement times including ageing of samples are major constraints for performing large number of analyses [6]. Typically ageing of samples and analysis is 40 days. Gamma-spectrometric analysis of brick, crushed stone, red sand, granite, white marble and concrete cubes was performed both before and after ageing of samples (10, 20, 30 and 40 days). Measurement times of samples were 1, 3, 6 and 12 hours. Samples were measured in 1 liter Marinelli beaker geometry, using NaI(Tl) spectrometers with crystal sizes 2.5 x 2.5 in and 3.1 x 3.1 in. Efficiency calibration of spectrometers was done using certified volumetric (1 liter Marinelli beaker) Ra-226, Th-232 and K-40 sources filled with silica sand and density 1,7 kg/l. Herein we present results indicating that one hour measuring may be sufficient for samples in 1 liter Marinelli beakers offering prospect of significant time and cost improvements.

### References:

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