

**E1-05    *In situ* gamma spectrometric measurements of natural radionuclide content in Usvatakeiyawa Beach Sand**

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High radiation levels have been measured along the Usvatakeiyawa coast due to the presence of naturally occurring radionuclides. It was reported previously that the highest dose rate measured from this area was  $5 \mu\text{sv h}^{-1}$  and a seasonal variation of dose rate had been observed.

*In-situ* gamma spectrometric measurements were carried out to measure the average concentrations of natural radionuclides in the beach sand in Usvatakeiyawa coastal area and calculate the exposure rate due to the environmental gamma radiation field, in order to further estimate the annual absorbed dose from gamma radiation. The survey was done in a stretch of about 1 km along the coast.

The spectral measurements were conducted using a portable Hp Germanium detector at 6 sites at sea level which were selected after taking the dose rate measurements of the area. Spectrum analysis, identification of radionuclides and activity concentrations in sand were carried out using Genic PC software tool which was precalibrated for environmental measurements.

The response function was determined between the exposure rate measurements with a dose meter and the spectrum energy at the sampling sites by the least square fitting technique. Using the above function and spectrum peak energy, the gamma-exposure rate contributed by each series at each measurement site was calculated.

The radionuclides  $^{231}\text{Th}$ ,  $^{235}\text{U}$ ,  $^{214}\text{Bi}$ ,  $^{241}\text{Pb}$ ,  $^{212}\text{Pb}$ ,  $^{228}\text{Ac}$ ,  $^{212}\text{Bi}$  which are relevant to  $^{235}\text{U}$ ,  $^{238}\text{U}$  and  $^{232}\text{Th}$  series were identified. The activity concentrations of each element for highest and lowest dose rate sites were 1325, 23.1, 170, 107, 745, 792, 561 and n.d, n.d, 207.8, 145.5, 855, 746, 472 Bqkg<sup>-1</sup> respectively. (n.d. - not detected).

Measured highest and lowest dose rates were  $4.5$  and  $0.3 \mu\text{svh}^{-1}$  respectively. The calculated dose rates contributed by  $^{235}\text{U}$ ,  $^{238}\text{U}$  and  $^{232}\text{Th}$  series at highest and lowest dose rate sites were 0.344, 1.762, 0.517 and n.d, 0.129, 0.200  $\mu\text{svh}^{-1}$  respectively.

The difference between measured dose rate and calculated dose rate at a particular site can be attributed to dose due to cosmic rays and other terrestrial radioactive elements such as  $^{40}\text{K}$ .

Laboratory analyses reported previously were only related to  $^{238}\text{U}$  and  $^{232}\text{Th}$  series from this area. *In-situ* gamma spectroscopic analysis in the present study identified  $^{235}\text{U}$ , series elements in addition to the  $^{238}\text{U}$  and  $^{232}\text{Th}$  series nuclides. In general *in-situ* measurements of radioactivity are more sensitive and representative than measuring the soil samples in the laboratory, because *in-situ* counts of gamma rays contributed by the soil represent a few hundred m<sup>2</sup> of the soil, so that a single field analysis can average out small local inhomogeneities in the soil.

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