

ABSTRACT

The radioactivity in the environment is due to cosmic rays and naturally occurring radionuclides. Fallout due to testing of nuclear weapons and discharges from the nuclear industry also contribute to this. The background radioactivity varies from place to place. In certain areas of the world, the background radioactivity is enhanced due to the presence of radioactive minerals (eg. monazite sand).

Since, Sri Lanka has not yet ventured into the nuclear industry, it is necessary to carry out an environmental radioactivity surveillance to record the present levels. The present studies were carried out concurrently in two phases.

Phase I was to investigate natural radioactivity in the environment. Gross activities and fallout nuclide levels ( $^{137}\text{Cs}$ ) were studied under Phase II.

On natural radioactivity, dose rate survey in several localities of the island, monthly radiation dose rate variations in monazite areas in the South-West Coast and the West Coast of the island were investigated. The radiation levels in households and the doses received by the population in Beruwela were studied.

The sand samples collected from the areas named above were analysed by Ge(Li) gamma spectroscopy. The radon daughter levels in air,  $^{210}\text{Po}$  levels in several localities were measured.

Gross beta activities in the dissolved fraction,  $^{137}\text{Cs}$  concentration and  $^{40}\text{K}$  levels were also studied under Phase II.

The average dose rate obtained from the survey from normal background areas is  $0.014 \text{ mR h}^{-1}$ . It can however, vary from  $0.01 - 0.04 \text{ mR h}^{-1}$ . It has been found that the major portion of the island is within the normal natural background radiation levels.

However, the results have shown that Sri Lanka has areas of high natural background activity. These areas are present in the South-West Coast (i.e. Beruwela, Kalutara) and the West Coast. The radiation levels here are comparable with high background areas reported in the world, such as in Kerala and Brazil.

Of the population in Beruwela-Polkotura village 22.9% of the adults and 19.2% of the children are exposed to greater than twice the natural background radiation. It is also shown that 23.5% of the households in the village are subject to high natural radiation. The possible critical group of population which receives highest radiation consists of fishermen and their children in this area.

The monthly variations of radiation levels are observed in several hot spots (peak points) along these high background areas. This variation is linked to the monaxite deposition pattern. Further, it has been shown that there is a long shore movement of deposits along the coast due to possible long shore current.

An iso dose rate contour map was prepared for the Polkotura village at Beruwela and it was seen that several high background radiation spots are present inside this hinterland.

Gamma spectral analysis of sand samples have shown that these beach sands contains  $^{232}\text{Th}$  and  $^{238}\text{U}$  together with their daughter products of  $^{208}\text{Tl}$ ,  $^{228}\text{Ac}$ ,  $^{212}\text{Pb}$ ,  $^{214}\text{Bi}$  etc. which are gamma emitters. These nuclides are mainly responsible for the gamma radiation dose in the environment.

Field radon daughter measurements in selected localities in the island have shown fairly low levels except in a few localities. The concentration of  $^{210}\text{Po}$  levels in the aquatic system ranges from  $0.01 \text{ pCi l}^{-1}$  to  $0.72 \text{ pCi l}^{-1}$ .

The gross beta activities of the drinking water in the island were within the permissible level, while  $^{137}\text{Cs}$  levels

were fairly low.

As expected,  $^{40}\text{K}$  concentration in sea water samples was found to be higher than in fresh water samples, and the level found in sea water is comparable with reported levels by UNSCEAR Committee (ie.  $300 \text{ pCi l}^{-1}$  - 1972).