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RADIOACTIVITY OF SAND USED FOR BUILDING CONSTRUCTION AND ITS RELATION TO PARTICLE SIZE

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Environmental Radioactivity arises as a result of (a) naturally occurring radio nuclides of terrestrial origin (b) cosmic ray generated radio nuclides and (c) fallout from nuclear explosions. The largest contribution to the average dose of radiation that man receives comes from radio nuclides of terrestrial origin which are produced by a chain of successive and B-disintegrations of Uranium-238, Uranium-235 and Thorium-232 which are primondial radio nuclides. Rocks and sands contain these radio nuclides and in some areas in Sri Lanka sand shows considerable radioactivity.

These sands are used for building construction and the total radioactivity of the walls of a house (building) depends on the radioactivity of the sand used. The disintegration of Uranium and Thorium in the walls produces Radon-222 and Thoron-220 which are radioactive inert gases which diffuse out of the walls and mix with air. The disintegration of Radon produces a radioactive aerosol containing Po-218, Po-214, Pb-214, Bi-214, Pb-210 and Po-210. This constitutes a health hazard because breathing causes the inhalation of these which are then retained in the lungs.

We examined the relationship of the specific radioactivity to the grain size of sand. For this purpose, we collected samples of sand from beaches and rivers in different parts of Sri Lanka, separated them into several fractions depending on the sand particle sizes, using a set of nylon sieves and then measured the specific radioactivity of each fraction. Both alpha-activity and beta-activity were measured separately, and the gamma spectra of active fractions recorded. These results show that the radioactivity is concentrated in the finer particles of sand.

Thus, if a simple sieving procedure is used to separate and reject the finer fractions of sand before use, the radioactivity levels in air inside houses can be considerably reduced. This would reduce the average dose of radiation received by the public of Sri Lanka.

References:

1. Amarasiriwardena, D. D., Dharmawardena, K. G., (1977) "Annual Variation of Radiation Levels in the High Background Areas on the South-West Coast of Sri Lanka"; Paper presented at the 33rd SLAAS Annual Sessions, December.
2. Amarasiriwardena, D. D., Dharmawardena, K. G., (1979) "Natural Radiation Environment in Sri Lanka"; International Conference on Environment for Non-Governmental Organization in the ESCAP Region Colombo-Sri Lanka.
3. United Nations (1977), Report of the United Nations Scientific Committee on the Effects of Atomic Radiation"; (Prepared in the U.N. Secretariat—restricted publication, 31 Jan., 1977) N. Y.