

IN SITU TERRESTRIAL GAMMA RADIATION IN SEVATTUR–SAMALPATTI CARBONATITE COMPLEXES, TAMIL NADU, INDIA

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Natural radioactivity in rocks is caused principally by primordial radionuclides, such as ²³⁸U, ²³⁵U, ²³²Th, and to a lesser extent by ⁴⁰K and ⁸⁷Rb. Concentration of these radioactive elements could result in the anomalous values of terrestrial gamma radiation. Even though the radiation from these naturally sources are generally low, it may cause health problems. The geology of the area plays a major role in the concentration and distribution pattern of these elements. Hence a study of in situ terrestrial gamma radiation levels and distribution of dose rates in parts of the Sevattur–Samalpatti carbonatite complexes, Tamil Nadu, India has been taken up using a portable radiation survey meter. Correlation between gamma level of soils and the underlying rocks suggest that soils are in situ and they are derived from these rocks. The highest level of radiation is recorded from Sevattur in Carbonatite rocks and soil over these rocks. The carbonatites are poorly exposed and seen as isolated mounds and boulders as well as linear dykes, veins and lenses within pyroxenite and syenite. Carbonatites from Sevattur contain pyrochlore and apatite with calcite. The rocks contain 0.5% (Nb,Ta)₂O₅ and 10.% P₂O₅. The pyrochlore (uraniferous type) is in metamorphic state and is disseminated. The pyrochlore minerals contain 19.30% of U₃O₈. Hence the radiation is high. The Samalpatti carbonatites have very low radiation. The Samalpatti carbonatites are mainly sovite and silicocarbonatite. Calcite is the most prominent mineral with minor abundance of dolomite. Grossularite, chlorite, scapolite, diopside and barkevikite are present in the silicocarbonatites. In Onnakarai, riebeckite sovite, riebeckite ferroan sovite and ferroan carbonatitic breccia with abundant opaque minerals and ilmenite–rutile are present. The radioactive elements are very less in the carbonatites and hence the in situ Gamma radiation is not high in this carbonatite complex. Next to Carbonatites, Syenites and then followed by pegmatites, gneisses and pyroxenites have higher concentration in Sevattur. In Samalpatti very low radiation values were recorded in dunites and serpentinites. The dose equivalents and effective dose rates are well in excess of 1mSv/yr maximum permissible limits in sevattur areas, suggesting a reasonably good chance of radiation hazards in these places. People living in these areas should therefore be made aware of the potential radiation related health problems.

Keywords: natural radioactivity, carbonatites