

Investigation of the Origin of Radioactive Mineral in Godakawela Gem Field, Rathnapura in Sri Lanka

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Sri Lanka is well known for high-quality gemstones and 25% of the total land area is liable for potential gem fields. However, the identification of new gem bearing areas in Sri Lanka is mostly conducted by the sedimentological and geochemical analysis. Notably, most of the gem bearing areas have been associated with radioactive minerals (RAMs). Hence, the in-situ radioactivity survey is an important tool that has not been carried out intensively in Sri Lanka. Recent studies have revealed that the Godakawela gem field (GGF) in Rathnapura has an interesting radioactiveness. Therefore, the present study has conducted to investigate the type of the origin of the RAMs in GGF. The ambient gamma dose rate was measured by the plastic scintillation detector from 40 points in random walk mode and gamma energy was recorded in the NaI scintillation detector. Further, field observations, associated minerals, and surrounding geology were also considered together with the anomaly results. Anomaly results have proved that the GGF has high radioactiveness of 1305 nSv h⁻¹ gamma radiation, which is ten times greater than the average baseline value in Sri Lanka. Peak anomaly observed in the base of the valley has shown a decrement in gamma dosage of 476 nSv h⁻¹ compared to the mid-region of the slope. Hence, if it is a secondary deposit, a considerable amount of the RAMs must be settled to the low altitude area of the valley and given high peak anomaly. Godakawela is located in the Highland-Vijayan boundary which is also known to be fluoride-rich, and well-formed crystals of tourmaline have been associated in the area. Similarly, a large pegmatitic origin of the vein quartz deposit has been identified in this region. Therefore, depending on the distribution of radioactive anomaly patterns and the presence of associated minerals such as well-formed crystals of zircon, tourmaline together with the surrounded geological aspects has identified that the RAMs have primary origin in GGF.

Keywords: Radioactiveness, Radioactivity survey, Gamma dose, Primary origin