Baseline Terrestrial Radioactivity around the Potential Nuclear Installation Sites in the Philippines

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The Philippines intends to transition to cleaner energy alternative and diversify its energy mix by adding nuclear energy to its energy mix, In the recent energy development plan, the country intends to have an operating nuclear power plant by 2032. As a licensing requirement, baseline environmental radioactivity measurements are part of the radiological and environmental impact assessment items to identify anthropogenic and natural sources of radiation.

In light with this, the current study aims to establish baseline natural radioactivity measurements in the following selected candidate nuclear installation sites: Puerto Princesa City, Palawan; Jose Panganiban, Camarines Norte; and Zamboanga City. A portable gamma-ray spectrometer (Radiation Solutions RS330) with a thallium-doped sodium iodide detector was used for terrestrial radiometric survey of the candidate sites. The instrument measures dose rate (nSv/hr) and concentration of radionuclides ⁴⁰K (%), ²³⁸U (ppm), and ²³²Th (ppm) after five minutes in assay mode and Geo_300 method.

Results showed an average dose rate with calculated occupation factor for public exposure of value of 0.22 mSv/yr in Concepcion and 0.07 mSv/yr in Inagawan Villages in Puerto Princesa City. While Jose Panganiban, Camarines Norte, and Zamboanga City measured 0.11 and 0.6 mSv/yr, respectively. The calculated average activity concentrations of the radionuclides are lower than the world average values except for the ⁴⁰K, ²³⁸U, and ²³²Th measurements from Puerto Princesa and ⁴⁰K measurements from Camarines Norte.

Variations in radionuclide concentrations and dose measurements are based on the lithology with the continentally derived slate rocks in Puerto Princesa City and potassic altered rocks in Jose Panganiban recording the highest activity concentrations and dose rate measurements. This study emphasizes the importance of natural radioactivity baselining in potential sites as part of site assessment and planning for potential exposure situations.

References

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