

Title: Baseline radioactivity in the five candidate sites for the second nuclear power plant in Bangladesh and concomitant hazards assessment

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Abstract: To meet the increasing energy demands and foresee the shortage of fossil fuels as a source of energy, the Government of the People's Republic of Bangladesh has decided to install a second Nuclear Power Plant in the southern region of Bangladesh. This study was conducted to assess the baseline radioactivity using the High Purity Germanium (HPGe) detector of the five candidate sites to construct a nuclear power plant in the southern regions of Bangladesh and to evaluate the associated radiological hazard parameters. This pioneering study demonstrates that the mean activity concentrations (range) of ^{226}Ra , ^{232}Th , and ^{40}K in forty-five soil samples collected from the five candidate sites were 28.95 ± 2.72 (2.65–48.75), 30.10 ± 2.95 (10.35–46.65), and 278.82 ± 25.78 (126.05–418.61) Bqkg^{-1} . The evaluated area poses insignificant radiological concerns regarding mean absorbed dose rate, radium equivalent activity, annual effective dose, external and internal hazard indices, and excess lifetime cancer risk values. This study revealed a thorough picture of radioactive dispersion in soil samples from Bangladesh's southern areas, allowing policymakers to take appropriate measures in identifying viable candidate sites for constructing a Nuclear Power Plant. Moreover, the data of this study can be used as a reliable source of baseline radioactivity in the particular area.

Keywords: Nuclear power plant, candidate sites, baseline radioactivity, radiological hazards, HPGe detector, soil

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