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Influence of distribution co-efficient on radionuclide transport modelling of uranium from a tailings pond in northern Karnataka, India

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A well-designed environmental monitoring plan is essential for safety of uranium mining and processing operations. Evaluating the possible uncertainties in a numerical model helps in enhancing the model output and also increases the reliability over the model results. For a radionuclide transport model, distribution co-efficient is a sensitive parameter and major source of uncertainty in results. In this study, an approach to quantify input source of uncertainty of distribution co-efficient in an engineered tailings pond in Northern Karnataka, India has been carried out. Probabilistic analysis such as Response Surface Method and Monte Carlo Simulation are used to propagate uncertainty. This study considers uncertainty associated with intrinsic heterogeneity of natural systems and estimates the probability that dose rate value through drinking water pathway around the tailings pond exceeds the WHO guidelines for drinking water. The radionuclides considered in this study are ^{238}U , ^{234}U , ^{230}Th and ^{226}Ra . This study can be used to study the impact of distribution co-efficient on the radionuclide transport model.

Key words: Numerical modelling, Tailings pond area, Uranium mining, Uncertainty, Distribution coefficient