

Solid/solution distribution coefficient (Kd) of trace stable elements and radionuclides during a Nuclear Power Plant liquid regulatory Release in the Seine River – Field data vs. geochemical modeling

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This study focuses on the determination of solid/solution distribution coefficients values of trace elements (TE) and radionuclides (RN) in the Seine River during a reglementary liquid release performed by the Nogent-sur-Seine Nuclear Power Plant (NPP) and their confrontation with the results obtained from a geochemical modeling.

For this purpose we have sampled at 5 points of the Seine River during a NPP's liquid release: upstream the release to assess the referential values, in the area of radioactive effluent/river water mixing (with transect sampling), and 2 points downstream. We obtained the main parameters for in-situ Kd calculation of stable elements and RN and the parameters required for their geochemical modelling. The results of confrontation of measured in-situ vs. modelled Kd values of contaminants (TE, RN) let us to identify the main adsorption phases and mechanisms for each element and after taking into account all corrections and requires for the geochemical calculations allowed us to develop the methodology of the modeling of representative site-specific Kd-s values for the French rivers.

The new representative site-specific Kd-s values for the Seine river have been calculated. Using of these new modelled Kd values in the assessment of health and environmental risks will help to reduce the significant errors in estimating the migration potential of contaminants (in particular RN) present in aqueous solutions.