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SENSITIVITY ANALYSIS FOR URANIUM SOILS DECONTAMINATION USING A MONTE CARLO SIMULATION

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Abstract

The washing method for uranium contaminated soils using three different reagents was investigated. Experimental data have been obtained for four types of soils, which have been characterized in terms of particle size distribution, as well as structure and chemical composition. Thus, the decontamination degree for each type of soil and reagent respectively has been measured. Subsequently, the decontamination process has been simulated using an artificial neural network. Based on this neural network, within the frame of a sensitivity analysis study, and after more than 1,000,000 Monte Carlo simulations it has been established that the most significant parameter (with a contribution to variance of 83.7%) is the soil granulometry. Clay concentration has a significant non-negligible negative influence on the fractional decontamination degree. This means that higher values of clay concentration correspond to a decreasing of the fractional decontamination degree. A similar effect, however smaller, is sludge concentration. Sand concentration in soil, due to their penetration properties, promote in a relative small proportion the decontamination process. These results are common for all three decontamination reagents which have been used.

Key words: artificial neural networks, Monte Carlo simulation, sensitivity analysis, soils decontamination, uranium

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