

학위논문 연구계획서

(학과 보관용)

연구 계획서 제 출 자		과 정	석사	학 과	지구천문대기학부(지구	학 기	4
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연구 제 목	국 문	흡착제에서 탈착되는 방사성 세슘의 대수층 2차 오염 모델링 연구					
	영 문	Transport Modeling of Desorbed 137Cs from Contaminated Artificial Lake					

Despite many safety measures in nuclear power plants, some unexpected situations can occur and cause severe radiation accidents. A considerable amount of radionuclides can be released into the large area from these accidents and Cesium-137 (¹³⁷Cs), one of the most fatal radionuclides, can contaminate surrounding water resources. In this situation, spraying adsorbents such as clay minerals is one of the most effective methods to remove dissolved ¹³⁷Cs in the surface water reservoir. However, without proper treatments, ¹³⁷Cs can be desorbed from the settled sorbents and contaminate adjacent aquifers. Therefore, it is important to understand how the desorbed ¹³⁷Cs behaves in subsurface aquifers. In this study, the 2D cross-sectional aquifer model using TOUGH2-EOS7R was conducted to simulate the process of ¹³⁷Cs transport caused by the seepage of groundwater beneath the artificial lakes. The ¹³⁷Cs plume primarily migrates through advection and dispersion in the aquifer and affected by the adsorption process, radioactive decay of ¹³⁷Cs, and hydrogeologic properties of the aquifer. Therefore, for a systematic investigation of ¹³⁷Cs transport, various scenarios were considered with a reported range of distribution coefficient (K_d), lake temperature, and desorption rate of ¹³⁷Cs. Then, predictive simulations were conducted with heterogeneous aquifer conditions including spatially correlated permeability and related K_d values. The average concentration of ¹³⁷Cs plume and the annual radiation dose during the extended period were calculated to evaluate the contaminant plume evolution of each scenario.

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