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Radionuclide Release into the Underground Water from Hypothetical Reactor at the New NPP Site in Lithuania

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Lithuania is planning to construct a new nuclear power plant (NPP) nearby the closed one. The proposed new NPP will be constructed and operated within Ignalina NPP industrial area. The landscape of the site is industrial and characterized by power production units and buildings related to power.
Groundwater flow and radionuclide (3H, 14C and 137Cs) transport model was performed for model domain of new NPP site in Lithuania assuming that the radionuclides will reach groundwater straight after the new NPP operation beginning. Calculations of radionuclide transport within groundwater were performed using the computer code FEFLOW which allows modelling of groundwater flow and contaminant transport in a layered three-dimensional system. The goal of these estimations is to demonstrate possibility of radionuclide transport from hypothetical reactor of new NPP. The model was calibrated using monitoring data of water level.
The results show that tritium would have the greatest prognostic activity after 10 years and would reach 160 Bq/l in groundwater and 0.4 Bq/l in confined aquifer (maximum allowed tritium activity concentration in drinking water is 1.5•104 Bq/l). The maximum radiocarbon activity concentration will be very small, 0.5•10-4 Bq/l in groundwater and 1•10-6 Bq/l in confined aquifer, when the maximum allowed radiocarbon activity is 472 Bq/l). 137Cs transport will be observed only in the first year of NPP's operation. The highest 137Cs activity concentration will be in groundwater near a hypothetical reactor and will reach 0.1 Bq/l in groundwater and 1•10-6 Bq/l in confined aquifer. The maximum allowable 137Cs activity concentration in drinking water is 21 Bq/l. It shows that the contamination in the groundwater will not be found. The data is important to solve tasks of nuclear safety.

Country or International Organization

Lithuania

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