

Radioecological assessment after potential accident with the modern operative nuclear submarine in the Nordic marine environment

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Within the project "Consequences of severe radioactivity releases to Nordic marine environment" (COSEMA), funded by the Nordic Nuclear Safety Research (www.nks.org), a potential accidents with the modern operative nuclear vessel in the Iceland coastal waters and Kattegat region were considered.

The simulations were provided on the basis of the 3D hydrodynamic model for the Iceland coastal waters (the CODE model), the NRPA compartment model and the COSEMA regional compartment model, which is based on the methodology developed for the NRPA box model, which uses a modified approach for box modelling [1-2].

The radioecological consequences of the potential scenarios, leading to accidental releases of radioactivity, have been evaluated on the basis of the calculated concentrations of radionuclides in typical sea foods, collective dose rates to man, individual doses for the critical groups and doses to marine organisms.

The sensitivity and uncertainty analysis demonstrate that results come up against the problem of complexity, especially for description of water-sediment interactions. The results show that the concentration of radionuclides in the environment and the doses to man and marine organisms can either increase or decrease, given sufficient increase of the evaluated parameters. It is also shown that the results can strongly depend on the chosen time of analysis similar to [3].

It is demonstrated that the environmental sensitivity of the different marine regions can be described with developed sensitivity index for comparison of the state parameters, for instance, collective dose rates to man or individual doses for the critical group, where in environmental sensitivity index can vary significantly for different regions.

[1] Logemann, Ólafsson, Snorrason, Valdimarsson, and Marteinsdóttir (2013), *Ocean Sci.*, **9**, 931-955 [2] Iosjpe, Brown and Strand (2002). *J. Environmental Radioactivity* **60**, 91-103 [3] Iosjpe (2011), *J. Marine Systems* **88**, 82-89