

SAFETY ASSESSMENTS OF ULTIMATE ISOLATION OF RADIOACTIVE WASTE IN DEEP GEOLOGICAL FORMATIONS IN RUSSIA: OBJECTIVES, PROBLEMS, PROSPECTS

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Main objectives of safety assessments of the ultimate isolation of radioactive waste (RW) from the human environment in deep geological formations are:

- justification of efficiency of technical solutions used for the ultimate isolation and assessment of critical man-induced impact of the facility on the environment and population;
- analysis of how safety indicators depend on the facility and host rock parameters to determine key protective functions and their parameters and to identify main critical events and phenomena producing a significant impact on the facility safety.

To solve these tasks, the deterministic methodologies and computer codes have been developed and widely acknowledged in Russia, which allow for calculating these parameter values with the known dynamics of changes of the facility parameters, its hosting environment and impacts of factors of different nature.

This approach, however, does not allow for adequate safety projections of ultimate isolation for longer term. Therefore, methods and computer codes for probabilistic safety assessments and analyses have started to develop in Russia.

Main problems that hinder the safety analyses and justifications, which are faced by researchers worldwide, are obtaining input data which describe processes of radionuclide contamination migration in the geological environment (migration characteristics) and projecting the dynamics of changes in parameter values of the host rock.

To determine migration parameter values, field studies are carried out in Russia on the behavior of radionuclide contamination having a complex

composition in rock mass; their results can be used by international researchers as input data for the probabilistic safety analysis.

The expertise accumulated in Russia in operation of underground facilities, which have been producing heat impacts to the host rock for decades that are similar to impacts to be produced by the RW ultimate isolation facility, can be used to solve the issue of projecting parameter changes of the geological environment hosting the RW repository.