



Nordic Nuclear Safety Research 1994-1997 Project on disposal of radioactive waste

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NKS (Nordic Nuclear Safety Research) is a scientific co-operation program in nuclear safety, radiation protection and emergency preparedness. Its purpose is to carry out cost-effective Nordic projects, thus producing research results, exercises, information, manuals, recommendations, and other types of background material. This material is to serve decision-makers and other concerned staff members at authorities, research establishments and enterprises in the nuclear field.

During 1994-1997 a project on the disposal of radioactive waste was carried out as part of the NKS program. The objective of the project was to give authorities and waste producers in the Nordic countries background material for determinations about the management and disposal of radioactive waste. The project was called NKS/AFA-1. It was divided into three sub-projects: AFA-1.1, AFA-1.2 and AFA-1.3. AFA-1.1 dealt with waste characterisation, AFA-1.2 dealt with performance assessment for repositories and AFA-1.3 dealt with Environmental Impact Assessment (EIA). The studies mainly focused on the management of long-lived low- and intermediate-level radioactive waste from research, hospitals and industry.

Representatives from all Nordic countries have participated in each of the sub-projects. Most of the work has been performed in a broad group of experts. This has contributed to a better understanding of the waste situation in the different countries and has also made it possible to learn from each other. Furthermore, in some cases it has contributed to common recommendations.

Waste characterisation (AFA-1.1)

The AFA-1.1 study included an overview on waste categories in the Nordic countries and methods to determine or estimate the waste content. New available methods were presented based on answers to questionnaires that were sent out to suppliers.

The study includes also recommendations regarding the characterisation of waste under treatment and the characterisation of existing and old waste packages. It is advisable to, if possible, obtain information concerning waste under treatment. Classification of the waste according to physical and chemical composition is also most simply achieved during the treatment. However, when radioactive waste is handled, the dose rate measurement should be the first precaution prior to any other procedures. Reference nuclides can sometimes be used for estimations on isotopes which are difficult to measure.

New regulations for the inventory of a repository may demand new assessments of old radioactive waste packages. The existing documentation of a waste package is then the primary information source although additional measurements may be necessary.

Performance analysis (AFA-1.2)

The AFA-1.2 project dealt with the performance assessment of the engineered barrier system (near-field) of the repositories for low- and intermediate-level radioactive waste. The topic intentionally excluded the discussion of the characteristics of the geological host medium. Therefore, a more generic discussion of the features of performance assessment was possible independent of the fact that different host media are considered in the Nordic countries.

The results from the AFA-1.2 study include a short overview of different waste management systems existing and planned in the Nordic countries. However, the main emphasis of the study was a general discussion of methodologies developed and employed for performance assessments of waste repositories. Some of the phenomena and interactions relevant for generic types of repository were discussed as well. Among the different approaches for the development of scenarios for safety and performance assessments one particular method, the Rock Engineering System (RES), was chosen to be tested by demonstration. The possible interactions and their safety significance were discussed, employing a simplified and generic Nordic repository system as the reference system.

A short review of performance assessments carried out in the Nordic countries for actual projects concerning repositories for low- and intermediate-level waste was also included in the study.

Environmental impact assessment (AFA-1.3)

The results from the AFA-1.3 study include information on similarities and differences between the EIA in the Nordic countries and also a review of experiences from EIA in the countries, both within the nuclear field and outside the nuclear field.

The system for environmental impact assessment (EIA) in a country depends on the legislative structure, the application of legislation, administrative practice and general social objectives. It is therefore natural that the EIA systems differ from country to country, even if the directives of the European Community and internationally accepted principles are adopted. There are e.g. differences in the objectives for the EIA systems in the Nordic countries. The EIA system in Denmark must provide a guarantee that a specific assessment of environmental consequences for certain projects has been carried out at the level of the planning of site use. Emphasis should be placed on public participation and an open decision process. The EIA systems in Finland, Iceland and Norway must guarantee that a special assessment of environmental consequences has been carried out for certain projects. Emphasis should be placed on project planning and public participation. The EIA system in Sweden shall give the authorities a basis for assessment of the effect on environment, health, safety and general interests in accordance with the Swedish Act on the Management of Natural Resources for a broad spectrum of projects. Differences can also be found regarding responsibilities for the Environmental Impact Statement (EIS). The proponent of the project is responsible for the EIS in Finland, Iceland, Norway and Sweden. The authority is responsible for the EIS in Denmark.