Radiation and Nuclear Safety Authority Regulation on the Long-Term Safety of Disposal of Nuclear Waste

Content

STUK
SÄTEILYTURVAKESKUS
STRÅLSÄKERHETSCENTRALEN
RADIATION AND NUCLEAR SAFETY AUTHORITY

Osoite | Adress | Jokiniemenkuja 1, 01370 Vantaa | Ånäsgränden 1, 01370 Vanda
Address | Jokiniemenkuja 1, 01370 Vantaa, FINLAND
Tel. | Tfn. | Tel. | (09) 759 881, +358 9 759 881 | www.stuk.fi

In accordance with the Radiation and Nuclear Safety Authority's decision, the following provisions are issued under section x, subsection x of the Nuclear Energy Act (xx/yyyy):

1 Scope

This regulation applies to the safety of disposal facilities for nuclear waste after the closure of the disposal facility.

2 Definitions

For the purposes of this regulation:

1. *representative person* shall refer to an individual of the population most exposed to a particular radiation source whose radiation dose is representative of the doses received by individuals in their population group;
2. *disposal system* shall refer to disposal facilities and those parts of the environment of the disposal facility whose characteristics and behaviours affect long-term safety;
3. *long-term safety functions* shall refer to the properties of a barrier that isolate nuclear waste from the habitat, prevent the release of radioactive materials, or restrict their migration;
4. *performance target* shall refer to a measurable or imputable factor of a barrier that can be used to assess the implementation of a long-term safety function;
5. *annual dose* shall refer to the sum of the effective dose arising from external radiation within the period of one year, and of the committed effective dose from the intake of radioactive substances within the same period.

3 Long-term safety functions and performance targets

SYT-3540 - The barriers and related long-term safety functions of the disposal system shall be determined.

SYT-3541 - The effectiveness of long-term safety functions shall be demonstrated by analysing the properties of the barrier and the development of said properties. As a whole, the long-term safety functions are to be sufficiently effective for the period covered by the safety assessment.

SYT-3539 - Performance targets shall be set for barriers that are used to implement the long-term safety functions. When setting performance targets, attention shall be paid to the quantities and half-lives of the radioactive substances contained in the waste, as well as the estimated

developments in the disposal system.

4 Assessment of developments in the disposal system

SYT-3536 - The developments in the disposal system and its environment shall be analysed. This analysis shall be carried out systematically and comprehensively, covering all events and factors that may have an impact on the long-term safety of the disposal system.

SYT-5550 - The analysis of developments shall take into account both the external and internal factors affecting the disposal system.

SYT-5142 - The developments used as the basis for the design of the disposal system shall be selected and the selection justified.

5 Safety analysis of a disposal facility's long-term safety

SYT-3545 - In order to demonstrate compliance with the dose constraints referred to in section 216, subsection 3 of the Nuclear Energy Act, deterministic analyses shall be carried out for the developments used as the basis for the design of the disposal system to determine the quantities of radioactive substances released from the disposed waste through the barriers into the environment, and the resulting annual doses.

SYT-3543 - The annual dose shall be assessed for a representative person living in a self-sufficient household.

SYT-3544 - The safety analysis shall cover the post-closure period necessary for ensuring the safety of the final disposal of nuclear waste. The duration of the selected period is to be justified in the safety analysis.

SYT-3542 - In addition to the developments used as the basis for the design of the disposal system, the annual doses resulting from developments outside the design basis, the criticality of the spent fuel, and unintentional human intrusion shall be assessed as comprehensively as is reasonably possible with the methods available. When assessing the consequences of inadvertent human intrusion, it shall be assumed that, at its earliest, the event could occur 200 years after the closure of the disposal facility.

6 Impact of modifications to long-term safety assessments

SYT-3548 - In connection with the modifications to the disposal system, the impact of the modification to the implementation of long-term safety and the developments used as the basis for the safety analysis shall be evaluated. If necessary, the analysis of developments shall be updated and the safety analyses required by the modifications shall be carried out.

SYT-3547 - In the case of an event affecting the barriers used at the disposal facility, the impact of the event shall be evaluated from the perspective of the realisation of long-term safety. If necessary, safety assessments shall be carried out as required by the evaluation.

7 Other assessments concerning the realisation of long-term safety

SYT-3550 - In addition to the safety assessment, the long-term safety of the final disposal shall be justified through complementary examinations. Such complementary examinations shall include, at minimum, calculations made using simplified methods, comparisons with natural analogues, “what-if” considerations of the functional capacity of barriers, probability-based analyses, and other necessary examinations.

8 Source data and models

SYT-3556 - The source data and models shall be such that they can be used to comprehensively and reliably analyse safety. They shall be consistent with the conditions foreseen in each development of the disposal system.

SYT-3555 - The source data and models shall be based on applicable research data and expert evaluations, and they shall be documented in a traceable manner with such accuracy that they can be assessed. The choice of source data is to be appropriately justified.

SYT-5718 - The methods used in the assessments shall be documented, verified, and validated.

SYT-3553 - The models describing the disposal system and its environment, together with the selection of source data and the analysis, shall be prepared in such a way that the resulting quantities of released radioactive substances and level of radiation exposure shall be higher in the assessment than they would be in real life.

SYT-3554 - Any uncertainties related to the source data, models, and analyses shall be identified

and their significance for the fulfilment of safety requirements be assessed through sensitivity and uncertainty analyses.

9 Entry into force and transitional provisions

This regulation shall enter into force on X/X/202X and shall remain valid until further notice.