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Strålsäkerhetsmyndigheten
Swedish Radiation Safety Authority

Statement of SSM's views

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Pronouncement on licence applications for permission to develop facilities for final management of spent nuclear fuel

Statement of the Swedish Radiation Safety Authority

The Swedish Radiation Safety Authority (SSM) recommends licence approval for Svensk Kärnbränslehantering AB (SKB, the Swedish Nuclear Fuel and Waste Management Company), company registration number 556175-2014, under the Act on Nuclear Activities (1984:3; *Kärntekniklagen*), for permission to:

- At Forsmark, located in Östhammar Municipality, construct, possess and operate a facility for final disposal of nuclear materials, mainly comprising spent nuclear fuel, in addition to nuclear waste[1] from the Swedish nuclear power programme[2], and
- At this facility, possess, manage, transport, dispose of and otherwise handle spent nuclear fuel, in addition to nuclear waste from the Swedish nuclear power programme.

Further, SSM recommends licence approval to SKB under the Act on Nuclear Activities for permission to:

- Continue to possess and operate the existing interim storage facility for spent nuclear fuel, Clab, located in Oskarshamn Municipality, and at this site continue to possess, store, manage and process nuclear materials (mainly comprising spent nuclear fuel) and nuclear waste (for example, structural materials in fuel elements and used core components), whereby the amount of spent nuclear fuel[3] stored at any time may total a maximum of 11,000 tonnes,
- Adjacent to Clab, construct a facility for encapsulation of nuclear material and nuclear waste[4],

[1] Structural materials in the fuel elements.
[2] The nuclear material and waste to be disposed of are specified by SKB in its licence application, section 1.2.
[3] In the case of spent nuclear fuel, this limit refers to the amount of uranium (also, for MOX fuel, plutonium) in the unirradiated fuel.
[4] Structural materials in the fuel elements.

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- Carry out those modifications to Clab that are required for integration of this facility with the encapsulation plant,
- Possess and operate Clab and the encapsulation plant as an integrated facility (Clink) for storage of nuclear material (mainly comprising spent nuclear fuel) and nuclear waste (for example, structural materials in fuel elements and used core components) and encapsulation of nuclear material (mainly comprising spent nuclear fuel), whereby the amount of spent nuclear fuel stored at any time may total a maximum of 11,000 tonnes, and
- In connection with the above-mentioned authorisations, possess, process, transport, or otherwise handle nuclear fuel (mainly comprising spent nuclear fuel) and nuclear waste (for example, structural materials in fuel elements and used core components).

SSM considers that the environmental impact assessment attached to SKB's respective licence applications under the Act on Nuclear Activities may be approved.

Preconditions for SSM's recommendation

SSM recommends approval of the licence applications subject to the precondition that SKB ensures that the preparatory preliminary safety analysis reports (F-PSARs) as well as management systems for the facilities are further developed in accordance with the established procedure for a step-wise permitting process under the Act on Nuclear Activities, as stated in Chapter 4, Section 2 of the Swedish Radiation Safety Authority's regulations concerning safety in nuclear facilities (SSMFS 2008:1). A further prerequisite for SSM's recommendation is that SKB, in the development of detailed designs, associated safety analysis reports, and operational limits and conditions for the facilities, takes into consideration the development needs identified by SSM in its scrutiny of the licence applications and pointed out in the attached regulatory review reports. In order to assure implementation of the step-wise permitting process, SSM proposes that the Government establish the licence conditions specified below (2 to 4).

SSM's recommendation for licence approval applies to the sites specified in the applications submitted by SKB, as well as to the specified quantities and types of spent nuclear fuel. In relation to technical design and technological development, SSM notes that provisions for periodic reviews of safety and radiation protection are stipulated by Section 10a of the Act on Nuclear Activities. This provision stipulates that a licensee is formally required, by means of a periodic safety review at least once every ten years, to consider how safety and radiation protection can be maintained and improved, and to report on the outcome to SSM. More detailed provisions on the procedure by which SSM exercises its statutory mandate regarding the approval of major refurbishing or rebuilding works, or major modifications to a facility in connection with an existing licensed nuclear activity, are contained in Chapter 4, Section 5 of SSMFS 2008:1.

Moreover, the licence approval recommended by SSM presupposes that SKB, during the construction phase of the different facilities, takes into account matters of significance for nuclear safety and radiation protection. In the case of the integrated encapsulation facility and central interim storage facility for spent nuclear fuel (referred to as 'Clink' in SKB's licence application), such considerations are mainly related to the need to ensure safe ongoing operation and security of the central interim storage facility (Clab) during construction of the encapsulation plant. In the case of the spent fuel repository, it is

important to identify those tasks that are of significance for ensuring radiation safety during the construction phase of the repository, while taking into account that construction has to be achieved in a manner that meets the quality requirements specified in SKB's account of post-closure radiation safety. Consequently, SSM's recommendation for licence approval presupposes that SKB, prior to commencement of the construction phase of Clink and the spent nuclear fuel repository, produces reports describing how such issues will be addressed through the period in which the facilities are constructed.

Furthermore, in connection with SKB's petitions regarding the Clink licence application, SSM's recommended approval presupposes that the company, in parallel with production of a PSAR covering the modifications to be carried out at Clab with the purpose of achieving an interim storage capacity of 11,000 tonnes of spent nuclear fuel, also provides an account of those measures that are important to enable Clink to comply with the nuclear safety and radiation protection requirements that apply to the future integrated facility.

Proposed licence conditions

With respect to the general licence conditions suggested by SKB in its applications for the spent fuel repository and Clink, SSM considers that these may be achieved either through the conditions proposed by SSM below (1 to 4), or via exercise of the Authority's mandate for regulatory supervision under the Act on Nuclear Activities, e.g. regarding the procedure for approval of facility modifications in connection with an existing licensed nuclear activity.

SSM proposes that the Government prescribe the following general conditions for the licences for SKB's facilities:

1. The facilities are to be constructed, taken into possession and operated in substantial agreement with the content of the licence application documents.
2. SKB may commence construction of the facility only after SSM has examined and approved a Pre-construction Safety Analysis Report (PSAR).
3. After construction, SKB shall develop an updated Pre-operation Safety Analysis Report (FSAR), which is to be examined and approved by SSM before the facility is allowed to be commissioned and commence test operation.
4. Before the facility is taken into routine operation, SKB shall produce a supplemented safety analysis report (SAR) that takes into account experience from commissioning; this also shall be subject to examination and approval by SSM.

The Swedish Radiation Safety Authority's assessments

SSM makes the following overall assessments regarding SKB's licence applications:

- The integrated encapsulation and central interim storage facility for spent nuclear fuel (Clink), which SKB plans to construct and operate at Simpevarp, located in Oskarshamn Municipality, has the potential to comply with radiation safety requirements needed for protection of human health and the environment against harmful effects of ionising radiation.
- SKB has provided sufficient documentation as part of the F-PSAR for Clink to justify that an interim storage capacity of 11,000 tonnes of nuclear fuel can be

achieved at the existing interim storage facility, Clab, in a way that meets applicable radiation safety requirements.

- The repository facility for spent nuclear fuel that SKB intends to construct and operate at Forsmark, located in Östhammar Municipality, has the potential to comply with radiation safety requirements needed for protection of human health and the environment against harmful effects of ionising radiation during the facility's construction and operation.
- Through its site investigations, research, development and demonstration activity in connection with drawing up a reference design for the spent nuclear fuel repository after closure, as well as an associated F-PSAR, SKB has demonstrated that the KBS-3V repository concept has the potential to meet the Authority's regulatory requirements for long-term nuclear safety and radiation protection.
- From the perspective of radiation protection and safety, SKB has observed the provisions of Chapter 2 of the Environmental Code in development and siting of the KBS-3 system for final management of spent nuclear fuel, and has applied these provisions to the extent that it cannot be considered unrealistic to fulfil them. These include requirements on knowledge and skills, the adoption of precautionary measures and utilisation of best available technology, the principles of natural resource management and conservation, as well as siting principles.
- SKB's environmental impact assessment, as supplemented and with the support of other material submitted as part of the licence applications, demonstrates and enables an assessment of the main impacts of final disposal activities on human health and the environment from the perspective of radiation protection and safety.

Overall, SSM considers that SKB has demonstrated that the facilities and associated safety analysis reports can be developed in accordance with the established procedure for step-wise permitting under the Act on Nuclear Activities, as stated in Chapter 4, Section 2 of regulation SSMFS 2008:1 and the corresponding proposed general licence conditions. SKB is also assessed to have the potential and capability to produce the required updated safety analysis reports relating to construction, operation and long-term nuclear safety and radiation protection. These reports will be subject to examination and approval by SSM in future stages of facility development after licences have been granted by the Swedish Government.

More detailed explanation and description of the rationale behind SSM's assessments can be found in the attached appendices (regulatory review reports) that have been produced by the Authority as a result of the scrutiny of SKB's licence applications under the Act on Nuclear Activities (Appendices 1 to 4; in Swedish only).

The review reports also present the technical issues that are considered by SSM to require particular consideration by SKB during the company's continued work to develop the facilities' detailed designs and associated safety analysis reports. Appendix 5 (in Swedish only) to this statement provides a compilation of outcomes and assessment results from the review work.

Appendices (in Swedish only)

1. Review report: Encapsulation and continued interim storage of spent nuclear fuel (Clink) (SSM2015-279-21)
2. Review report: Construction and operation of the spent fuel repository (SSM2011-1135-19)
3. Review report: Post-closure radiation safety (SSM2011-1135-17)
4. Review report: Overall disposal system issues (SSM2011-1135-18)
5. Summary report of SSM's regulatory scrutiny of SKB's licence applications under the Act on Nuclear Activities, regarding facilities for final management of spent nuclear fuel (SSM2011-1135-20)

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