Regulatory challenges in the licensing of a spent nuclear fuel repository in Sweden

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The nuclear programme

- Ten reactors in operation
- Two closed down reactors
- Central interim storage facility for spent fuel (Clab)
- Final repository for short-lived LIL waste (SFR)
- Fuel factory (WSE)
- Research reactors under decommissioning (Studsvik)
- Waste treatment facilities (Studsvik)
- Closed down uranium extraction facility (Ranstad)
National policy

- The reactor operators have the prime responsibility to manage and dispose of SNF/NW
- The expenses should be covered by revenues from the energy production giving rise to SNF/NW
- Swedish SNF/NW has to be disposed of in Sweden - only by exception is the disposal of foreign NW allowed in Sweden
- The State has the ultimate responsibility
  also
  - Swedish SNF should not be reprocessed, in Sweden nor elsewhere
Research, development and demonstration

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International Conference on Effective Nuclear Regulatory Systems
Ottawa, Canada, 8-12 April 2013
Research and demonstration facilities

The Bentonite Laboratory

The Åspö Hard Rock Laboratory

The Canister Laboratory

Source: SKB

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National waste management system

PLANNED FACILITIES

1 = encapsulation plant
2 = repository for spent fuel
3 = repository for long-lived waste
4 = repository for decommissioning waste

the KBS-3 system

Figure 2-1. Overview of the Swedish system for management and disposal of the waste products of nuclear power and other radioactive waste.
Licensing review for a spent fuel repository

- Encapsulation plant in Oskarshamn
- Geological disposal at 500 m depth in Forsmark
Siting process

- Type areas: 1977–1985
- Regional studies: 1990s
- Feasibility studies: 1993–2002
- Site investigations: 2002–2008
- Licence application: March 2011

Forsmark, Östhammar municipality

- Östhammar
- Oskarshamn
A step-wise licensing process

Government decision
(Based on SSM and L&E Court reviews and after consultation with the host municipality)

License to construct, possess and operate

License to start construction

SSM authorisation

License for trial operations

License for routine operations

Timeline

License for closure

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Initial review phase objectives

- To make a first assessment of the quality and completeness of SKB’s application based on a broad review of all primary licensing documents
- To identify scientific and technical areas for an in-depth review in the coming main review phase
- To develop requests for complementary information from SKB

The submitted applications for a spent fuel repository according to the Nuclear activities act and Environmental code comprise 63 unique documents and around 7,000 pages under five topics.
NEA international peer review

To provide an international perspective on SKB’s post-closure safety case
- General statement on safety and assessment methods
- Feasibility of engineering solutions
- Justification of disposal method and site selection

Complimentary support to SSM and other decision-makers
- Not a compliance evaluation
- Not a formal part of the licensing review
Initial review phase findings

- SKB’s reporting is sufficiently comprehensive and of sufficient quality to justify a continuation to the main review phase
- A need for complementary information in several areas, e.g.
  - long-term performance of the canister
  - safety reporting for the encapsulation plant
  - reporting on alternative disposal methods
- National consultation
  - focus on justification of the KBS-3 method and site
- International peer review
  - SKB’s post-closure safety report is sufficient for the decision at hand, but improvements are recommended for future licensing steps

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Building trust over (a long) time…

- Clear division of responsibilities between regulator and industry
- Integrity and independence of the regulator
- Open and predictable step-wise siting and licensing process
- Preconditions for an active involvement of stakeholders – with legal requirements on formal consultations and financial support
- Financial arrangements in place
- Continuous research and development programme
- The long term strategy for the management and disposal of SNF/RW is being implemented!
  - Central interim storage facility for SNF (Clab) established
  - Central disposal facility for operational SL-LIL waste (SFR) established
  - Application for a SNF repository submitted to SSM in 2011
  - Application for a decommissioning waste repository expected in first quarter 2014