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Available at: nonuclear.se/n-waste-sweden-no-solution18may2019

Miles Goldstick, 18 May 2019

Nuclear Waste in Sweden - The KBS-3 Method is Not a Solution¹

There is a general consensus that there are many uncertainties.

In Sweden, since the mid-1970s, the nuclear industry has put forward the KBS method of handling spent fuel. According to SKB, the total estimated planned quantity of spent fuel is 11,404 tonnes. Now in 2019, more than 40 years after the KBS project began, there is a general consensus among all stakeholders, with few exceptions, that there are many uncertainties. There is however a wide range of views among this diverse group about the severity of the uncertainties and how to deal with them. This is particularly evident when comparing the results of the reviews by the Land and Environment Court (MMD) and the Swedish Radiation Safety Authority (SSM). Some main results of their reviews are given below.

Result of the Review by SSM: Yes, Providing Certain Conditions are Met

SSM wrote in their 23 January 2018 statement to the government that they approve SKB's application provided certain conditions are met. Following is a quote from the statement (emphasis added).

`SKB may commence construction of the facility only after SSM has examined and approved a Pre-construction Safety Analysis Report (PSAR).2`

With regard to the copper corrosion issue SSM wrote that the issue might be resolved in the future (emphasis added).

`According to SSM there is potential to achieve an acceptable corrosion barrier with a 50 mm thick copper casing (p. 66).`

Result of the Review by the Court: No, Unless Certain Conditions are Met

MMD wrote in their press release regarding their 23 January 2018 statement to the government:

`The court cannot, based on the current safety assessment, find that the final repository is safe in the long-term.3`

The overall result of the Land and Environment Court (MMD) review was that the industry application should not be permitted unless specific uncertainties are resolved. The court wrote the following on page one of its 23 January 2018 statement.

¹ This text is from a 16 page document by the author at <http://www.nonuclear.se/spent-fuel-sweden2019mg>. For More Information from Environmental NGOs in Sweden see: www.mkg.se/en and www.nonuclear.se/en/kbs3

² SSM. 2018-01-23. "Pronouncement on licence applications for permission to develop facilities for final management of spent nuclear fuel - Statement of the Swedish Radiation Safety Authority." 5 pp. See p. 3. Ref. no: SSM2011-1135 and SSM2015-279. Document no: SSM2011-1135-23. Available at: <https://www.stralsakerhetsmyndigheten.se/en/areas/radioactive-waste/spent-nuclear-fuel-repository/final-repository-for-spent-nuclear-fuel/our-review-process/pronouncement-on-repository-applications/>.

³ Mark- och miljödomstolen, Nacka tingsrätt. 2018-01-23. "Mark- och miljödomstolen lämnar sitt yttrande till regeringen i målet om ett slutförvar för kärnavfall". (Unofficial translation: "The Land and Environment Court submit their statement to the government in the case regarding a final repository for nuclear waste".) In Swedish only. Available at: <http://www.nackatingsratt.domstol.se/Om-tingsratten/Uppmarksammade-mal/Ansokan-om-slutforvar-for-anvant-karnbransle-mm/>.

The activity is permissible if:

1. The Swedish Nuclear Fuel and Waste Management Co. provides documentation that the final repository will meet the requirements of the Environmental Code in the long term, despite remaining uncertainties regarding how the protective capability of the canister is affected by:
 - a. corrosion due to reactions in oxygen-free water
 - b. pit corrosion due to reaction with sulphide, including the contribution of the sauna effect to pit corrosion
 - c. stress corrosion due to reaction with sulphide, including the contribution of the sauna effect to stress corrosion
 - d. hydrogen embrittlement
 - e. radioactive radiation impact on pit corrosion, stress corrosion and hydrogen embrittlement.
2. The long-term responsibility for the final repository according to the Environmental Code has been clarified.⁴

Regarding various uncertainties, following are more quotes from the court's statement.

Risk of copper corrosion (emphasis added):

The investigation shows that there are uncertainties, or risks, regarding how much certain forms of corrosion and other processes can impair the ability of the canister to contain the nuclear waste in the long term. **Overall, these uncertainties about the canister are significant and have not been fully taken into account** in the conclusions of SKB's safety analysis (p. 4).

Radiation safety (emphasis added):

SKB and SSM have expressed the view that conditions relating to radiation safety should not be prescribed in a permit under the Environmental Code. **The Court finds that the evidence presented to date does not provide a sufficient basis on which to assess the issue** (p. 11).

Risk in general (emphasis added):

...a new calculated result of the entire safety assessment is required...(p. 10).

Uncertainties in general concerning the repository, radiation safety, and the geologic conditions (emphasis added):

The Court however emphasizes that the study of the bedrock formation at Forsmark, for example, leaves ambiguities that may justify a probationary period for evaluation for the determination of conditions regarding respect distances or other precautionary measures (p. 14).

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⁴ Nacka District Court, Land and Environmental Court. 2018-01-23. "Summary Statement of the Land and Environmental Court, Case no. M 133-11, Matter: Permit according to the Environmental Code for an integrated system for final disposal of spent nuclear fuel and nuclear waste; at this time a matter of a statement to the government." Unofficial translation. Available at: <http://www.nonuclear.se/mmd20180123summary-statement-case-m1333-11spent-fuel>.