CAUSE

Environmental permit permits for plants in a coherent system for final disposal of spent nuclear fuel and nuclear waste; now ask for opinion to the government

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Judgment of the Environmental and Environmental Court

The operation is permissible if

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Swedish Nuclear Fuel Management AB reports on evidence that the long-term repository plant meets the requirements of the Environmental Code despite the uncertainties remaining regarding the safety of the capsule

a. corrosion due to reaction in oxygen-free water

b. pit corrosion due to reaction with sulfide, including sauna

effect effect on pit corrosion

c. stress corrosion due to reaction with sulfide, including

impact of sauna effect on stress corrosion

d. hydrogen sprains

e. radioactive radiation impact on pit corrosion, stress corrosion

and hydrogen sprains.

It clarifies who is responsible for the long-term environmental protection of the final repository.

Before permission is given, Swedish Nuclear Fuel Management AB must provide a consolidated report of the plant's operational areas and indicate where two possible ventilation towers should be placed.

The government should consider whether a legislative amendment is needed regarding working hours for water activities. It should also be considered to give the Radiation Safety Authority the right to speak under Chapter 22. Section 6 of the Environmental Code and an opportunity to apply for reconsideration under Chapter 24. Section 7 of the Environmental Code.

1 Summary

1.1 Environmental impact assessment

Swedish Nuclear Fuel Management AB (SKB) has applied for a permit under the Environmental Code for the final disposal of spent nuclear fuel and nuclear waste from the Swedish nuclear power program. The application comprises two facilities, an encapsulation facility in Oskarshamn municipality and a final disposal facility in Forsmark, Östhammar municipality. The final storage is to be carried out with the KBS-3 method, based on three safety barriers - the 50 mm copper enclosure, the bentonite buffer and the mountain in Forsmark. The intention is to be able to deposit 6 000 capsules with approximately 2 tonnes of nuclear waste, a total of approximately 12 000 tonnes of nuclear waste. The landfill will take place at a depth of approximately 470 m. The construction of the final repository until its closure is estimated to take approximately 70 years.

The government will examine whether the activities may be permitted under the Environmental Code. The Land and Environmental Court has prepared the government's goal. Following an exchange of letters in the case, the court held a main hearing in Nacka, Oskarshamn and Östhammar. Visits have been held at SKB's facilities in Oskarshamn and at the location of the final disposal plant in Östhammar.

In the opinion to the government, the assessment of the Land and Environmental Court is reported on whether the activities can be allowed. If the government decides that the business is allowed, the case will be returned to the court, which will then examine questions about permits and terms of business.

1.2 The overall conclusions of the Market and Environmental Court

SKB's investigation is solid but there are still uncertainties about the capsule

The application concerns a comprehensive project for final disposal of spent nuclear fuel and other nuclear waste from the Swedish nuclear power program. For more than 30 years have SKB conducted research and development of the KBS-3 method for this purpose. This has resulted in a comprehensive and thorough investigation for assessing whether the activity may be permitted under the Environmental Code. A comprehensive safety assessment has been reported on the final repository's security for one million years after closure.

The Environmental and Environmental Court assesses that the environmental impact assessment meets the requirements of the Environmental Code and can therefore be approved. All in all, the investigation meets the high standards according to the Environmental Code, except in one respect, the safety of the capsule.

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

The Land and Environmental Court considers that there is some room for accepting further uncertainties. However, the uncertainties about certain corrosion forms and other processes are so serious that the Court cannot, based on SKB's safety analysis, find that the risk criterion in the Radiation Safety Authority's regulations has been met. According to the Environmental Code, the current documentation does not provide sufficient support for the final repository to be safe in the long term.

The conclusion is, therefore, that the activities are permissible only if SKB reports a basis that clarifies that the repository is long-term safe, even with regard to the capability of the capsule.

Before permitting, SKB needs to further specify the final repository's operational areas and indicate where two possible ventilation towers are to be placed.

Responsibility for the final repository in the long term needs to be clarified

The Land and Environmental Court considers that nuclear waste disposal activities will be carried out even after the final repository closure. The licensee according to the Environmental Code, has a responsibility for the business until further notice, ie. without time limit. There are different views on the responsibility for the final repository in the long term. The investigation does not show that SKB will have the resources to handle possible claims on measures hundreds or thousands of years after closure. Östhammar's municipality has opposed a last-man responsibility for the municipality. The question therefore arises if the state has a last man responsibility for the final repository. The court is of the opinion that the licensing authority or supervisory authority cannot decide that the state has a last-hand responsibility under the current regulations. It is important to clarify who is responsible under the Environmental Code in the long term.

The location of a final repository in Forsmark fulfills the requirements of the Environmental Code regarding location, protected areas and protected species

The Land and Environmental Court assesses that the chosen site for a final repository in Forsmark meets the environmental bar's requirements for a suitable location. The operations are consistent with current national interests, environmental quality standards, Natura 2000 areas and protected species, provided that protective measures are provided. In addition, compensatory measures need to be taken.

The exploitation poses a risk of significant damage in the area of ​​national interest for nature conservation, Forsmark-Kallrigafjärden, but the Land and Environmental Court believes that the national interest for the final disposal of spent nuclear fuel should be given priority. A permit is required for Natura 2000 areas Kallriga, Skaten-Rångsen, Storskäret and Forsmarksbruk, as the activity is likely to significantly affect the environment in the areas. If safeguards are taken, permission can be granted to all Natura 2000 areas. Such measures may also maintain a favorable conservation status for species covered by the species protection regulation.

The activities at Clab and Clink can be allowed

The Land and Environmental Court assesses that the requested activities at Clab and Clink in Oskarshamn may be permitted under the Environmental Code.

Certain legislative changes should be considered

Before giving permission, the government should consider whether a legislative amendment is needed regarding working hours for water activities. Consideration should also be given to giving the Swedish Radiation Safety Authority (SSM) a stronger position in the examination of permit issues under the Environmental Code by giving the Authority the right to speak and an opportunity to apply for reassessment.

1.3 The Environmental Impact Assessment may be approved

The consultation paper is sufficiently comprehensive and has been taken into account in the preparation of the environmental impact assessment. The cross-border consultation under the Esbok Convention also meets the demands made. The environmental impact statement contains a sufficient account of alternative sites, designs and materials, and complies with other requirements, according to the environmental framework. Consequently, the content of the environmental impact assessment with supplementary additions has been used as a basis for the assessment of the Land and Environmental Court.

1.4 The demand for funding is high

A final disposal of spent nuclear fuel requires very comprehensive measures to protect human health and the environment. The demand is therefore high. This means that the requirement for SKB's investigation is far-reaching, but the requirement is not so high that it can be considered unreasonable to fulfill it.

When assessing according to the Environmental Code's general rules of consideration, it is advisable to seek guidance in nuclear legislation. The investigation shall support the fact that the risk criterion specified by SSM in its regulations is not exceeded in the period 1 000 years and 100 000 years and beyond. The risk criterion is stated in Section 5 of the SSMFS 2008: 37.

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In a comprehensive risk assessment, a full investigation is required that the final repository is safe for 1000 years after closure. According to the opinion of the Environmental and Environmental Court, however, there can not be a full investigation of the risks of leakage and radioactivity in the environment for 100,000 years or longer. It is reasonable to accept certain uncertainties about the repository's protective capabilities in the long term. Overall, the uncertainties are not significant in relation to the risk criterion, but it is acceptable if the uncertainties are small. The requirements for the investigation must be met in the assessment of permissibility under the Environmental Code. When assessing whether the final repository is long-term safe, consideration should not be given to any further investigation following a decision on admissibility.

1.5 Additional support is required for the capability of the capsule

The capsule

The capsule should enclose the nuclear waste for a very long time and is the final repository's primary safety function. The capsule has a 50 mm thick copper envelope and an insert of cast iron. The capsule must withstand corrosion and mechanical strain.

The investigation on the capability of the capsule is extensive and involves complex technical and scientific issues. This includes about groundwater chemical conditions, corrosion processes, and creep and hydrogen sprays (the latter affect the mechanical strength of the capsule). The parties have different views on several issues that are crucial to the final repository's long-term security.

The Land and Environmental Court is of the opinion that the following uncertainties regarding the capsule are most important in the risk assessment to be undertaken:

1. General corrosion due to reaction in oxygen-free water. The parties have different views on scientific issues arising from this corrosion. The Court considers that in this section there is a significant uncertainty that has not been included in the results of SKB's safety analysis.

2. Local corrosion in the form of pit corrosion due to reaction with sulfide. The Court considers that there is significant uncertainty regarding pit-corrosion due to reaction with sulfide. This uncertainty has not been included in the safety analysis. In addition, there will be some uncertainty about the sauna effect, which may have a reinforcing effect on pit corrosion.

3. Local corrosion in the form of stress corrosion due to reaction with sulfide. The Court considers that there is significant uncertainty regarding stress corrosion due to reaction with sulfide. This uncertainty has not been included in the safety analysis. In addition, there will be some uncertainty about the sauna effect, which can have an amplifying effect on stress corrosion.

4. Hydrogen digestion is a process that affects the mechanical strength of the capsule. The Court is of the opinion that there is significant uncertainty regarding hydrogen sprays. Uncertainty has not been included in the safety assessment.

5. Effect of radioactive radiation on pit corrosion, stress corrosion and hydrogen sprays. There is significant uncertainty regarding radioactive radiation impact on pit corrosion, stress corrosion and hydrogen sprays. This uncertainty has been included to a limited extent in the safety assessment.

Overall, according to the assessment of the Land and Environmental Court, there are several uncertainties regarding the protection capability of the capsule, which has not been included in the results of SKB's safety analysis.

The buffer and the refill

The buffer around the capsule and the refill in the deposition tunnel will delay the proliferation of radioactive substances if the capsule loses its containment function. The buffer shall consist of bentonite, a fine-grained leather material that swells when absorbed by water.

The main issues in this section relate to erosion of buffer and backfill, the effect of chloride on the buffer, other chemical transformation processes related to

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bentonite, radioactive radiation effect, freezing of buffer and decomposition of concrete in the landfill of the landfill tunnel.

The Land and Environmental Court estimates that there are minor uncertainties regarding the erosion of the buffer and backfill, the effect of chloride chloride on the buffer and other chemical transformation processes. The uncertainties have been included in the results of SKB's safety analysis.

mountain

The Land and Environmental Court agrees with SSM's assessment that it is reasonable to assume that the Forsmark area is low seismic. SKB has in the safety analysis scenarios of shear loads calculated with an overestimated probable earthquake frequency and conservatively assumed that all zones are reactivated. In view of this, the Court considers that uncertainty regarding earthquake is small.

The Land and Environmental Court assesses that the uncertainties are small in terms of the properties of the rock, the location and characteristics of the deformation zones, and the ability to adapt the deposition of capsules through, inter alia, respect distance. The risk is small that the mountain conditions on repository depth are significantly worse than expected, as the results from the site investigation gave a relatively consistent picture of this.

Some of the uncertainties have not been included in the results of SKB's safety analysis, such as the assessment by the Environmental and Environmental Court. coastal location and formation of disturbed zone. These uncertainties, however, have only a minor significance in a comprehensive risk assessment.

The closure

When the disposal of nuclear waste capsules has been completed and the landfills have been closed, all other parts of the final repository must also be closed. At the closure, the storage space needed for landfill, from tunnels and central areas to about 470 meters deep up to ground level. The seal should prevent accidental human intrusion and counteract the spread of radioactive substances if the final repository barriers would fall.

The environmental impact assessment shows that the closure is investigated at a more general level and that it is not determined how it will be implemented, as the closure is far ahead. The Land and Environmental Court is of the opinion that SKB's documentation on closure is sufficient to test permissibility, but more closure is required when closure approaches.

The investigation shows that the closure is an important part of the final repository from a radiation safety perspective. The summary investigation on the closure means that it is currently not possible to finally assess the requirements for safeguards that are justified. The Land and Environmental Court also considers that this will be assessed much later, when the closure work approaches. During this time there will be a technology development. These circumstances indicate that the issue of closer requirements for closure should be put to trial under the Environmental Code.

Overall assessment of long-term radiation safety

The opinion shows how the Land and Environmental Court has made a comprehensive assessment of the final repository's long-term safety. The court has largely taken into account the following. The assessment is based on the entire investigation. SKB's safety report is available in SR-Site, which covers about 900 pages and is based on extensive investigative material. According to SKB's safety analysis, the risk criterion is met in the SSM regulations. In the valuation of this result, the other investigation is considered, ie. the counterparties' written comments and the findings of the main negotiation. The uncertainties found throughout the investigation are compared to the uncertainties included in the results of SKB's safety analysis. If uncertainties have arisen compared to SKB's analysis, consider whether the additional uncertainties are significant in assessing whether the risk criterion is met. Additional uncertainties that have only a minor significance in the assessment need not be considered.

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Thus, the overall risk assessment may lead to the risk of an impact on human health and the environment, which may be accepted, taking account of the uncertainties encountered in the investigation. The assessment may also be that the uncertainties are so significant that the activities are not permissible.

The Land and Environmental Court assesses that there have been no uncertainties regarding the buffer and the refill that have not been included in SKB's safety analysis. There have been some uncertainties regarding the mountain that have not been included, but these are of little significance for a total assessment. The uncertainties now stated can be accepted in a comprehensive assessment.

However, the investigation shows that there are uncertainties as to how much the corrosion shapes and processes listed in five points above can impair the ability of the capsule to contain the nuclear waste in the long term. These uncertainties are overall significant and have not been fully included in SKB's safety analysis.

The Land and Environmental Court considers that there is some room for accepting further uncertainties. This is because the result of SKB's safety analysis shows that there is a significant margin to the risk criterion in SSM's regulations. However, the uncertainties about certain corrosion and other processes are so serious that the Court can not, based on SKB's safety analysis, find that the risk criterion is met. According to the Environmental Code, the current documentation does not provide sufficient support for the final repository to be safe in the long term.

The conclusion is, therefore, that the activities are permissible only if SKB reports a basis that clarifies that the repository is long-term safe, even with regard to the capability of the capsule. SKB should be given the opportunity to provide a new basis for the issues reported in the section above about the capsule.

SKB should, according to the assessment by the Environmental and Environmental Court, at least report the following in the environmental review. There is a basis for new considerations about the uncertainties that arise regarding the capability of the capsule. INTo the extent that the uncertainties persist after this, they need to be included in the overall safety assessment according to the requirements of the SSM regulations. There may be a new scenario where uncertainties have been included. Finally, a new calculated result of the entire safety assessment is required, compared to the risk criterion. In addition, the Land and Environmental Court does not take a position as to what additional documentation is needed regarding the protection of the canister and the long-term safety of the repository. SKB is responsible for the adequacy of the assessment of admissibility.

1.6 The localization principle is met

Clab and Clink

The expansion of Clab and the establishment of Clink is in line with the localization principle and the provisions on national interests, environmental quality standards, area protection and nature protection.

The disposal facility

A permit can be combined with the conditions for safeguards and precautionary measures needed to prevent the construction of a new bridge over the cooling water channel, the filling of Söderviken and storage of rock material, causing harm or inconvenience to human health or the environment.

The replenishment of smaller water areas and groundwater pollution causes significant damage to the natural values ​​in the area. The emission of nitrogenous lakes can affect the aquatic environment. The question is whether proposed protection measures allow water activities to be permitted as regards the localization principle, national interest areas, environmental quality standards, Natura 2000 areas and protected species. The Land and Environmental Court is of the opinion that the business is likely to significantly damage the Forsmark-Kallrigafjärden interest area, but priority is given to the national interest for the final storage of spent nuclear fuel and nuclear waste.

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Land use for the repository is compatible with areas of national interest for coastal and archipelagos and does not lead to the failure of the environmental quality standards for the aquatic environment. Necessary measures are needed because of nitrogen emissions.

The Land and Environmental Court considers that there is a risk that the activities will significantly affect the environment in the Natura 2000 areas Kallriga, Skaten-Rångsen, Storskäret and Forsmarkbrug. Therefore, permits are required for these Natura 2000 areas. Such a permit may be granted for all areas, provided that there are conditions for the necessary safeguards. In addition, compensatory measures need to be taken.

Operations are not deemed to be difficult to maintain the maintenance of favorable conservation status for species covered by the Nature Conservation Regulation, provided that conditions for safeguard measures are provided. In addition, compensatory measures need to be taken. The Land and Environmental Court also considers that the evidence in the case is sufficient for an assessment and that the affected species have been adequately dealt with. The Court notes, however, that further findings and experiences may lead to additional exemptions and safeguards being required.

1.7 Follow-up activities are no obstacles

Transport by road and offshore to and from the facilities constitutes follow-up activities. It is clear that the inconvenience caused by noise, vibration and airborne emissions resulting from the follow-up operations does not exceed any noise, environmental quality standards or other levels that the operations can not be allowed.

1.8 Terms and probation times

In assessing whether the activities may be weighed into proposed conditions and commitments, the Land and Environmental Court has ruled. The court has not found grounds to proposeconditions of admissibility The questions about conditions raised by mainly municipalities are handed over to the government to try.

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In case of a permit review, the Land and Environmental Court has to consider further the terms and conditions required for a permit. SKB and SSM have considered that conditions in radiation safety issues should not be prescribed in a permit under the Environmental Code. The Court considers that the current evidence is insufficient to assess the question.

The Land and Environmental Court considers that consideration should be given to, if possible, decide on a trial review on the closure of the final repository and on the preservation of information. The reason is that the current investigation into these issues is not sufficient to predict the effects of the business. During the trial period, SKB will be able to further investigate what safeguards and other precautionary measures are required and if this should be regulated under the Environmental Code.

The Land and Environmental Court assesses in the opinion that there are a number of uncertainties regarding the protective capacity of the repository. The current investigation into radiation safety issues shows that the effects of the operations can not be predicted with sufficient certainty to determine any final conditions. There may therefore be a need to decide on probation investigation according to the Environmental Code. However, further evidence and considerations are necessary. However, the Court would like to emphasize that in the investigation of, for example, the mountain in Forsmark there are uncertainties that may justify a trial review to determine conditions of respite or other precautions.

The questions about probation time need to be discussed further in the event of a permit review.

The Land and Environmental Court currently has no objections to SKB's proposal for probation time on energy saving in Clink.

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1.9 Questions about control need to be considered further

Radiation safety

SKB refers to radiation safety issues into an environmental monitoring program for the nuclear facilities. The investigation on radiological emission control is limited. No conditions have been proposed for radiological emission control or long-term radiation safety.

The Land and Environmental Court considers that in the event of a permit review, an in-depth discussion of questions about control of radiation safety is needed before and after closure of the final repository. This may be for example radiological emission control, control of water saturation of buffer and possible oxygen intrusion into tunnels.

In the event of a permit review, consideration should be given to whether, in a state-of-the-art permit, there are any further provisions regarding control during the construction and operation of Clab and Clink and the final disposal facility. It may then also be considered an authorization to the supervisory authority, ie. SSM, to provide detailed rules for control.

The issue of information retention after closure is important in a review under the Environmental Code. In the event of a permit examination, further investigation is needed on the measures needed for long-term information retention. The Land and Environmental Court assesses provisionally that the matter should be put to trial.

Groundwater diversion

Control of groundwater issues, including Injection and infiltration in wetlands to protect the high natural values ​​involved requires priority. Extensive control measures are needed over a long period of time, probably even after the final repository closure. The question should be further addressed in case of a permit examination.

1.10 Some changes to the law should be considered

Working hours for water activities

The Land and Environmental Court assesses that the government, before giving permission, should consider whether a change in legislation is necessary regarding working hours for water activities.

SKB has applied for a permit for water activities for the disposal of groundwater from the final repository during the period up to closure. In a permit for water activities, a working time, ie within which time the work for the water activities must be carried out. The term of office may not exceed 10 years, with the option of extending the period by no more than ten years. The Land and Environmental Court assesses that working time in this case is considerably longer than can be tolerated. This is due to the fact that groundwater disposal devices need to be installed as deposited tanks. Current law does not provide scope for determining working time in a manner that satisfies the development of the groundwater disposal plant for up to 50 years.

The Land and Environmental Court is of the opinion that the long working hours are not a fundamental obstacle to allowing the business to operate. However, the difficulties encountered in applying the provisions on working hours need to be resolved. A legislative amendment should therefore be considered.

Stronger position for SSM when tested according to the Environmental Code

The Land and Environmental Court considers that consideration should be given to giving SSM the right to speak in accordance with Chapter 22. Section 6 of the Environmental Code and an opportunity to apply for a review pursuant to Chapter 24. Section 7 of the Environmental Code.

The final repository for nuclear waste requires a permit under both the Environmental Code and the Nuclear Technology Act. SSM handles the application under the Nuclear Engineering Act and is responsible for a continued step-by-step investigation following a possible decision by the government regarding nuclear-

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technology law. The parties' discussion of the parallel trials raises questions about SSM's ability to bring action under the Environmental Code. The questions are related to the disposal of the final repository for a period of approximately 70 years.

There is continued technical development in many environmental areas. In many countries extensive research and development work is being carried out regarding the disposal of nuclear waste. It is expected that further amendments to environmental legislation will be made. The site and surrounding conditions in Forsmark, including animal and plant life, can change over the 70 years in which the work is to be performed.

The conditions for the operation may appear to be insufficient even when shedding of nuclear waste has been shorter for a shorter period. This may apply to both radiation safety and other conditions. With regard to radiation safety requirements, SSM has strongly emphasized the possibility of adjusting the requirements with regard to experience and new knowledge in continued step-by-step testing according to the Nuclear Engineering Act.

The Environmental Code contains provisions that can be applied to questions about the conditions for continued operation of the business due to technology development, new legislation, new jurisprudence, environmental changes or other changes. In Chapter 24 The environmental bar contains provisions on the review of permits and conditions. The provisions of Chapter 24 makes it possible to adapt a permit to different changes if necessary. There are also provisions that make it possible to revoke a license in certain cases and prohibit continuing operations.

SSM can not initiate a revocation of a permit or reassessment of conditions under Chapter 24. Environmental Code. Even though a state-of-the-art permit would not be combined with detailed conditions for radiation safety, under the age of 70, there may be a need to change the terms and conditions of a license. A question of revocation of permission or modification of conditions may be closely linked to the regulation in a state under the Nuclear Technology Act and what is evidenced by a continued step-by-step trial at SSM. The Land and Environmental Court considers that consideration should be given to granting SSM an opportunity to apply for reconsideration under Chapter 24, Section 7 of the Environmental Code.

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SSM also has no right to speak under Chapter 22. Section 6 of the Environmental Code, like some other state authorities. It seems that SSM is not allowed to appeal a possible permit with terms of business. SSM has an important role in licensing according to the Environmental Code of nuclear facilities. It should therefore be considered to give SSM the right to speak in accordance with Chapter 22. Section 6 of the Environmental Code.

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In the opinion of the Land and Environmental Court, the counselors Anders Lillienau, chairman and Monica Daoson, technical councils Jan-Olof Arvidsson and Ingrid Johansson, as well as the special members Agneta Melin and Mikael Lif participated. The opinion is unanimous.