Permissibility assessment under Chapter 17 of the Swedish Environmental Code for facilities in a coherent system for final disposal of spent nuclear fuel

The Government's decision

Permissibility in accordance with Chapter 17 of the Swedish Environmental Code

The Government permits the construction and operation of a facility for final disposal of nuclear material and nuclear waste from the Swedish nuclear power programme on the properties of Östhammar Forsmark 3:32, 6:5 and 6:20.

The Government permits drainage by means of diverting groundwater from the facility for final disposal and that facilities needed for diversion are erected. The Government also permits the groundwater that is drained to be re-infiltrated into the ground and facilities needed for infiltration to be erected.

The Government permits smaller water areas at the surface of the final repository to be backfilled, a road bridge to be built over the cooling water channel and rock material to be stored adjacent to the surface of the final repository pending utilisation, as described in the application.

The Government permits the construction of a facility for encapsulation of nuclear material and nuclear waste from the Swedish nuclear power programme on the Oskarshamn Simpevarp 1:9 property and the subsequent operation of the existing central interim storage facility for spent nuclear fuel (Clab) and the encapsulation facility as one integrated facility (Clink).

The Government permits drainage by diverting groundwater from the encapsulation and interim storage facility and that facilities needed for diversion are erected.

Environmental impact statement

The Government approves the environmental impact assessment.

Special conditions in accordance with Chapter 17, Section 7 of the Swedish Environmental Code

Together with Östhammar and Oskarshamn municipalities, competent regulatory authorities and the regulatory authorities and organisations proposed by the municipalities, Swedish Nuclear Fuel and Waste Management Co (SKB) shall convene at least once a year to deal with local environmental issues based on the Swedish Environmental Code's objectives and area of application. Within the framework of these meetings, SKB must continuously provide information on such conditions in the activities at the facility for final disposal of nuclear material and nuclear waste or Clink that can give rise to a local environmental impact or that are of importance for the municipalities. SKB shall cover the costs of meeting rooms and the like. The meetings can be held with each municipality separately or together.

Other issues

The Government will not take any action pertaining to the Swedish Environmental Protection Agency's notification pursuant to Chapter 17, Section 5 of the Environmental Code on SKB's application for exemption pursuant to the Species Protection Ordinance (2007:845) for measures in connection with the construction of a final repository for spent nuclear fuel and nuclear waste in case M2017/02796.

The Government is submitting the case concerning facilities in a coherent system for final disposal of spent nuclear fuel to the Land and Environment Court at Nacka District Court for further review of SKB's application for a licence under the Environmental Code in the part of the application for which the Government has not previously, following the interim decision in the case on 26 August 2021, submitted the case to the Court for further review.

The case

Summary

SKB has applied for a licence under the Environmental Code for existing and planned activities to be part of a coherent system for final disposal of spent nuclear fuel and nuclear waste. The application includes two planned facilities, an integrated interim storage and encapsulation plant in Oskarshamn municipality and a final repository in Forsmark in Östhammar municipality. In addition to activities in the two planned facilities, the application also covers a licence to store, manage and process nuclear material and nuclear waste in the existing facility's interim storage facility for spent nuclear fuel (Clab) in Oskarshamn. According to the application, the facility planned for encapsulation will be built at the interim storage facility for spent nuclear fuel, Clab, and thereafter Clab and the encapsulation facility will be operated as one integrated facility, the interim storage facility and the encapsulation plant: Clink.

Pursuant to Chapter 17, Section 1 of the Environmental Code, the Government must examine whether the activities can be permitted. The application was submitted to the Land and Environment Court at Nacka District Court, which has prepared the case for the Swedish Government.

SKB is also applying for a licence under the Nuclear Activities Act (1984:3) for the activity. This application will be processed in Swedish Government Offices case M2018/00221.

In its interim decision of 26 August 2021 (M2018/00217), the Government permitted storage, handling and processing of nuclear material and nuclear waste at the existing Clab facility at Simpevarp, Oskarshamn municipality. The quantity of spent nuclear fuel stored at Clab may, at one and the same time, amount to a maximum of 11,000 tonnes. The section of the case pertaining to activities in Clab has been submitted to the Land and Environment Court at Nacka District Court for further review.

Licence application

Permit motions

In accordance to all documentation in the application and its appendices, SKB is motioning for a licence under the Environmental Code as follows.

A Regarding the facility for encapsulation of spent nuclear fuel (Clink) on the Oskarshamn Simpevarp 1:9 property, SKB is requesting permission
− to construct at Clab a facility for encapsulation of nuclear material (mainly consisting of spent nuclear fuel) and nuclear waste from the Swedish nuclear power programme and then to operate Clab and the encapsulation facility as one integrated facility (Clink),

− for Clink, to drain the groundwater needed and to construct the facilities needed for drainage to the Baltic Sea.

B Regarding the final repository on the Östhammar Forsmark 3:32, 6:5 and 6:20 properties, SKB is requesting permission
− to construct and operate a facility for final disposal of nuclear material, mainly consisting of spent nuclear fuel, and, in addition, nuclear waste from the Swedish nuclear power programme (final repository), within the specified area at Forsmark in Östhammar municipality,
− to backfill small wet areas on the surface of the final repository,
− to erect a road bridge over the cooling water channel,
− for the final repository, to drain the groundwater needed and to construct the facilities needed for drainage to the Baltic Sea,
− as a protective measure for the consequences of the drainage as described above, to re-infiltrate water in the ground and construct the installations needed for infiltration,
− to store rock material from the final repository's surface awaiting utilisation.

If such a licence is required, SKB is requesting permission in accordance with Chapter 7, Section 28a of the Environmental Code to operate the activities in Forsmark, including port-related secondary activities at the industrial harbour in Forsmark, with respect to three Natura 2000 areas.

SKB is submitting proposals for the start-up time for the environmentally hazardous activities, working hours for the additional water activities, conditions for the activities, test period procedures and authorisations, and is motioning for these to be established. SKB is also submitting proposals for permissibility stipulations.

SKB is motioning for approval of the application’s environmental impact statement and its supplements.

SKB’s description of activities

General information about business operations

For more than 40 years, the power industry in Sweden has been generating electricity in nuclear power plants. In addition to generating high-level spent nuclear fuel, operation of the nuclear power plants also produces other types of radioactive waste. Nuclear power reactors are operated by fuel assemblies containing uranium. Following operations in the reactor, fuel assemblies become highly radioactive and very hazardous to humans and the environment.

Since the mid-1980s, SKB has had a final repository for low- and intermediate-level short-lived radioactive waste (SFR) in Forsmark, and a central interim storage facility for spent nuclear fuel (Clab) in Simpevarp. Transport of the radioactive waste from the nuclear power plants to the storage

facilities is included in SKB's system for managing radioactive waste. Transport of waste over longer distances goes by sea.
Spent nuclear fuel is managed in several stages. In all these stages, accessibility is limited through containment to prevent dispersion and radiation shielding. Special casks are used during transportation and the fuel is stored for the interim in water pools in caverns 30 metres underground. Transport casks and the pool water shield from ionising radiation of the fuel.

The radioactivity of the spent nuclear fuel decays with time. Following about 30 years of interim storage, the radiation level of the fuel is down to about five percent of what it was when it was removed from the reactor. After about 100,000 years, the radiotoxicity of the spent nuclear fuel will have declined to about the same level as the natural uranium minerals it was made of.

The current activities include the nuclear material that exists today in the interim storage facility Clab as well as the spent nuclear fuel and nuclear material that arise from activities in Studsvik and from the operation of the nuclear power reactors that currently have an operational permit. There are also about 20 tonnes of spent nuclear fuel from an older nuclear reactor in Ågesta to be stored. Altogether, SKB is applying for a licence to store about 12,000 tonnes of spent nuclear fuel and nuclear waste.

The method

The KBS-3 method is based on three protective barriers: copper canisters, bentonite clay and the Swedish bedrock. The spent nuclear fuel is placed in copper canisters with high resistance to corrosion in a repository environment. The approximately five metre long canisters have an insert of nodular cast iron to enhance stability. The canisters are enveloped by a buffer of bentonite clay, a naturally occurring mineral that swells in water and protects the canister in minor seismic events. The bentonite clay also shields the canister from groundwater movements, limiting the amount of the groundwater's corroding agents that can reach the canister. The clay also absorbs radioactive elements that may be released if the canisters were to fail. The canisters embedded in bentonite clay are stored in bedrock with long-term stable conditions at a depth of about 500 metres. If any canister were to fail, the chemical properties of the radioactive substances, such as their water insolubility, entail a greatly limited risk of radioactive substances reaching the ground surface.

According to SKB, the main conclusion in the safety assessment that has been prepared in accordance with Chapter 4, Section 1 of the Swedish Radiation Safety Authority's regulations and general advice (SSMFS 2008:1) concerning safety in nuclear facilities is that the operations and their current design satisfy the long-term safety requirements. According to SKB, the risk evaluation results pertaining to final disposal of spent nuclear fuel and nuclear waste show that the risks, both for individual scenarios and for combinations of scenarios, are lower than the risk criterion indicated in Section 5 of the Swedish Radiation Safety Authority's regulations and general advice (SSMFS 2008:37) concerning the protection of human health and the environment.

The facilities

The facilities included in the integrated system for final disposal of spent nuclear fuel are a facility for interim storage and encapsulation, Clink, and a facility for final disposal of the encapsulated nuclear

fuel. The application also presents secondary activities involving transport of filled canisters from Clink to the final repository. In the application, the facilities have been designated a reference design.

Clink will be built where the interim storage facility Clab is located today on the Simpevarp Peninsula about 700 metres west of the Oskarshamn nuclear power plant in Oskarshamn municipality. Clink will encompass what is currently Clab and an encapsulation plant.

The distance between the Simpevarp Peninsula and Oskarshamn is about 30 km. To the south of the Oskarshamn plant is Simpevarp's industrial harbour, which is adapted for transporting heavy goods by SKB and the Oskarshamn plant. The ship M/S Sigrid regularly transports spent nuclear fuel and nuclear waste through the harbour. From the harbour, a specially built heavy traffic road leads to the Oskarshamn plant and Clab. Habitation in the area is sparse. The closest residential buildings are located about 500 metres south-west of Clab.

The spent nuclear fuel is first stored for about a year in water pools at the nuclear power plants. It is then transported by sea to Clab in transport casks that are designed to withstand even severe accidents.

In Clab, the spent nuclear fuel is interim-stored in pools in rock caverns about 30 metres below ground. The radioactivity and heat decay, which facilitates encapsulation and final disposal. The nuclear fuel will be interim-stored for about 30 years before it is time for encapsulation and final disposal.
The encapsulation section of Clink will contain a transport corridor, work stations, water pools and a handling cell. The facility will be designed to fill and seal about 200 canisters per year. A total of about 6,000 canisters will be stored in the final repository. The spent nuclear fuel is taken up from the storage pools in the interim storage facility and moved to the encapsulation plant in storage canisters via water-filled pools that provide continued protection, radiation shielding and cooling of the fuel. In the encapsulation plant, the spent nuclear fuel is lifted over to the canister insert. Canister handling is mechanical and designed so that the outside of the canister is not contaminated with radioactive particles during the process. After quality control, the filled canisters are placed in transport casks and transported to the final repository.

The surface sections of the final repository will be located on an area of about ten hectares of industrial property close to the Forsmark nuclear power plant in Östhammar municipality. The buildings in the near vicinity are sparse and there are no residents within one kilometre of the planned final repository's operations area. Within ten kilometres of the planned final repository, there are about 700 households, of which about 400 are recreational residents. On the planned industrial site at Forsmark there is a nuclear power plant with three reactors. There are also auxiliary activities that are required for the plant's operation, including a water and wastewater treatment plant, power lines and a near-surface repository for low-level waste. SKB's final repository for short-lived radioactive waste, SFR, is also located in the planned area. The Government decided on 22 December 2021 in case M2019/02009 to allow continued and extended final disposal of low- and intermediate-level waste at SFR. This case is now being further processed by the Land and Environment Court at Nacka District Court. There is also an industrial harbour adapted for transporting SKB's and the Forsmark plant's heavy goods.

The time for construction, operation and closure of the final repository is estimated to be about 70 years, based on current planning of the nuclear power plants' operating time. During the

construction period, no radioactive material will be handled. On the ground surface, buildings will be built and sections of a first deposition area will be constructed, and shafts and ramps to the repository level will be constructed. Operation takes place in two stages: trial operation and routine operation. During trial operations, the deposition rate is slower. Deposition of canisters in the repository and construction of new repository areas will take place in parallel. The operating phase is concluded when the last deposition tunnel has been backfilled and sealed. The phase for closure and decommissioning begins when all spent nuclear fuel has been deposited and the operating phase has been concluded. Other tunnels as well as shafts and ramps will be sealed. The handling of buildings and equipment on the ground surface depends on the prevailing conditions and preferences at that time. The final phase is concluded when the facility has been closed and been transitioned to a passive final repository.

The facility will be divided into an outer and an inner operations area. Within the inner operations area, spent nuclear fuel will be handled. This area is a nuclear facility and therefore falls under the Nuclear Activities Act and the Radiation Protection Act (2018:396). The area will be monitored and will contain a number of buildings on the ground surface and in the underground section of the facility. In addition to the inner and outer operations areas, a rock heap and ventilation stations are included on the surface.

The underground section consists of a central area and a repository area, together with connections to the surface section in the form of shafts for lifts and ventilation, and a ramp for vehicle transport. It consists of a series of parallel halls with different purposes. The halls are connected by tunnels. Transport tunnels to the repository area where the canisters containing spent nuclear fuel will be finally disposed of, start from the central area. In its entirety, roughly four square kilometres of tunnels will be used for deposition.

Impact of operations on the environment

The area in Forsmark that is relevant for the final repository's facilities is of national interest for final disposal of spent nuclear fuel and nuclear waste. A large part of the area is also of national interest for energy production, and another part for nature conservation. The entire area is of national interest as highly exploited coastal stretches. The activities at the final repository risk reducing the groundwater level in parts of the area of national interest at Forsmark-Kallrigafjärden. Certain marshlands and forest environments risk becoming drier, which may impact nearby Natura 2000 areas and protected species. In the areas where it is feasible, SKB will take measures to reduce the impact of lowering groundwater. Protective measures such as grouting (sealing) of the rock will be implemented to reduce the lowering of groundwater. SKB has also undertaken to take compensatory measures, such as nature conservation oriented management of wetlands and forest environments in Forsmark.

The Simpevarp Peninsula, where Clink will be located, is of national interest for both energy production and final disposal of spent nuclear fuel and nuclear waste. The shipping lane outside the port of Simpevarp is of national interest for shipping. Västervik and Oskarshamn archipelagos are of national interest for nature conservation and outdoor recreation. Two areas south-east of Ävrö are of national interest for wind power. The area is also of national interest as highly exploited coastal stretches. SKB judges that the activity at Clink will not affect any of the national interests.

Activities at the final repository entail water activities consisting of diverting groundwater for draining the final repository, construction of a road bridge over the cooling water channel, backfilling of smaller water areas and filling of Söderviken. SKB intends to re-infiltrate water in the ground and operate the facilities needed for infiltration as a protective measure in view of lowering of groundwater resulting from drainage of the final repository. Protective measures and compensatory measures will be taken to reduce the negative impact of other water operations.

The drainage will lead to emissions of nitrogen to water. SKB has proposed protective measures and compensatory measures to counteract the impact on the recipient of nitrogen. Appropriate measures will be taken to prevent discharge from surface water, etc.

During the construction and operation of Clink, water activities such as diverting groundwater for draining shaft pits and rock caverns will be carried out. Here too, the necessary protective measures will be taken. During the construction of Clink, discharges to water will occur from e.g. drainage water and surface water, but with the proposed measures, the discharges to the recipient will probably decrease when compared to current levels. Clink will be located on the same site and be merged with Clab, making it possible to use several existing systems and parts of the facility. The extraction of cooling water for Clink is assumed to be accommodated within the framework of Clab's existing licence.

Construction of the final repository will also cause other disturbances and environmental impacts such as noise, emissions to air from construction activities and secondary activities in the form of transport. Certain cumulative effects can arise as a result of the transports needed for extending the final repository for short-lived low- and intermediate-level waste (SFR). Approximately 50 tonnes of hazardous waste and approximately 1,000 tonnes of other waste are expected to arise during construction as well as approximately five tonnes of hazardous waste and 120 tonnes of other waste per year during operation. Added to this are also diesel consumption, electricity consumption and handling of chemicals, etc. Constructing Clink will cause disturbances and environmental impacts from rock drilling, blasting and consequential activities such as transportation. Operating Clink will lead to water consumption of about 16,000 cubic metres per year and extensive energy consumption. SKB has undertaken to reduce the disturbances and energy consumption at the final repository and Clink by taking various protective measures and by e.g. setting environmental requirements on the vehicles to be used. SKB will also build a rock heap to store rock material awaiting utilisation adjacent to the final repository's surface areas. It will be possible to comply with applicable guideline values for noise by taking these disturbance-reducing measures.

Discharges to air will also occur as a result of construction work and sea transport of copper canisters. These emissions are not judged to result in exceeding any applicable environmental quality standards.

Case proceedings by the Land and Environment Court

The Land and Environment Court has prepared the case for the Government. Following correspondence, the Court held the main hearing in Nacka, Oskarshamn and Östhammar municipalities. SKB's facilities in Oskarshamn and the site for the final repository in Östhammar have been inspected. In its proceedings, the Court has carried out consultation in accordance with the Convention on Environmental Impact Assessments in a Transboundary Context, the Espoo

Convention. On 23 January 2018, the Land and Environment Court submitted the case to the Government for review.

The Land and Environment Court's assessment

In its opinion to the Government, the Land and Environment Court concludes that the activity as a whole is permissible under the Environmental Code if it is clarified who has responsibility under the Environmental Code for the final repository in the long term and if SKB presents data showing that the final repository meets the requirements of the Environmental Code in the long term despite the uncertainties that remain concerning how the canister's protective capability is affected by the following factors:

− Corrosion due to reaction in oxygen-free water.
− Pitting due to reaction with sulphide, including the influence of the sauna effect on pitting.
− Stress corrosion cracking due to reaction with sulphide, including the influence of the sauna effect on stress corrosion cracking.
− Hydrogen embrittlement.
− The effect of radioactive radiation on pitting, stress corrosion cracking and hydrogen embrittlement.

The Land and Environment Court further states that before permissibility is granted, SKB needs to submit an integrated account of the facility's operational areas and state where two possible ventilation towers will be located.

Finally, the Court states that the Swedish Government should consider whether a change in legislation is needed regarding working hours for water operations, and whether the Swedish Radiation Safety Authority should be granted the right of appeal in accordance with Chapter 22, Section 6 of the Environmental Code and an opportunity to apply for reassessment in accordance with Chapter 24, Section 7 of the Environmental Code.

Government administration of the case

In the Government's processing of the case, SKB has been ordered to provide additional information to their application. The application and sub-questions in the case have been referred. Through the Swedish Environmental Protection Agency, supplementary consultations have been held with Poland and Germany in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context. On two occasions, supplements received in the case have been announced. Below is a summary of the responses, statements and viewpoints that have been received.

SKB's supplement to the application

SKB has supplemented the information in the application and commented on the following. The outer boundaries of the Spent Fuel Repository's operations areas above and below ground and the location of the ventilation towers have been defined. The relative flexibility allowed by the reference area is not judged to have any effect on the impact area specified for the drainage of the final repository.

SKB has further described how the area of activity will be divided up and has clarified certain calculations concerning e.g. lowering of the groundwater level in the environmental impact statement. SKB further concludes that the responsibility for the final repository has been clarified in the long term by recently proposed legislative changes. SKB does not oppose the legislative amendments proposed by the Court regarding working hours in water and the right of appeal of the Swedish Radiation Safety Authority in accordance with Chapter 22, Section 6 of the Environmental Code.

In summary, SKB states the following regarding the canister's protective capability. Recent experiments and technical analyses in combination with previously available materials show in summary that no processes except microgalvanic corrosion (pitting) affect the total risk of harmful effects from the final repository after closure. Microgalvanic corrosion has been included in new calculations, but only has a marginal impact on the overall risk calculation. The calculated radiation dose after closure also falls below the dose indicated as the risk criterion in the Swedish Radiation Safety Authority's regulations and general advice (SSMFS 2008:37) concerning the protection of human health and the environment in connection with the final disposal of spent nuclear fuel and nuclear waste. In an assessment period of one million years, it would reach a maximum of about one tenth of the dose corresponding to the risk criterion even with pessimistic assumptions regarding buffer durability. The studies confirm SKB's previous conclusion that the planned final repository will be safe in the long term. The consequences of radiation to human health and the environment will be non-existent or at least so insignificant that they cannot be measured. SKB judges that the Land and Environment Court's questions concerning radiation safety have thereby been answered. The business operations comply with the precautionary principle and the requirement to use the best possible technology.

SKB has submitted proposals for the design of special stipulations in accordance with Chapter 17, Section 7 of the Environmental Code in the areas of safe radiation environment, limited climate impact and fresh air, conservation and development of natural environments in the Forsmark area and a good built environment. SKB has also proposed stipulations regarding SKB's contacts with the municipalities.

SKB believes that it is desirable to have stipulations on post-closure radiation safety and on the boundaries of the area of activity, but does not call for the Government to prescribe stipulations in general. However, SKB has submitted proposals for wording if the Government deems that stipulations are needed. SKB's view is that research should continue to be conducted in all areas that are relevant for the assessment of post-closure radiation safety. The research requested by the Swedish National Council for Nuclear Waste is already planned and is included in the programme for the comprehensive research and development activities that are needed to manage nuclear waste arising from the activities or the nuclear material arising therein that is not to be used again (the RD & D programme). The RD & D programme is being prepared in accordance with Section 12 of the Nuclear Activities Act by SKB on behalf of the reactor owners. The RD & D programme shall be prepared every three years and submitted to the Swedish Radiation Safety Authority. The RD & D programmes presented so far have been reviewed by the Swedish Radiation Safety Authority and referred to a number of organisations for comment. In parallel with the Swedish Radiation Safety Authority's review, the Swedish National Council for Nuclear Waste has also audited SKB's programmes. Based on the comments from these reviews, the Government has since decided that the programmes satisfy the requirements of the Nuclear Activities Act. SKB does not oppose the fact

that the Government prescribes stipulations that are linked to relevant research within the framework of the RD & D programme.

The purpose of the "Long-term test of buffer materials" (LOT tests) is to identify and quantify mineralogical changes in the bentonite resulting from exposure to repository-like conditions. The test packages contain copper tubes and copper coupons, but are not designed to evaluate copper corrosion in repository-like environments, e.g. with regard to the supply of oxygen. Evaluations of packages that have been selected show that the measured corrosion of metallic copper corresponds to the results of other experiments and calculations. SKB therefore determines that analysis of test packages that have not yet been retrieved will not yield any results that are not already known. SKB intends to follow the overall plan presented in the RD & D 2016 Programme and the results of remaining experiments will be presented and handled within the framework of the intermittent licensing that should be carried out under the Nuclear Activities Act. The outstanding research issues SKB is working on may be of importance for the requirements that the Swedish Radiation Safety Authority can set within the framework of intermittent licensing under the Nuclear Activities Act. The research is being conducted to determine the requirements that will apply to e.g. the manufacture and design of the copper canister and the optimisation of the repository. SKB is of the opinion that it is unreasonable and legally impossible to divide the Government's decisions into construction and operation. SKB has carried out an analysis of the studies of copper corrosion and cast iron that were included in the Government's referral on 24 September 2021 and determined that they do not affect the safety evaluation of the final repository. The safety aspects that are affected in the work are handled in the licensing process and will also be handled and assessed in the intermittent licensing process carried out by the Swedish Radiation Safety Authority following Government decision. Furthermore, SKB will conduct further research on the issues dealt with in the studies. SKB agrees with the Swedish National Council for Nuclear Waste on the importance of continuing to assess safety until closure of the final repository. Continued assessment can be expected to provide knowledge and provide a basis for optimising radiation safety after closure.

Referral responses and opinions from authorities and other referral bodies

The Swedish Armed Forces have no comment to make on the operations.

The Swedish Agency for Marine and Water Management recommends that the operations be allowed and provides comments on certain proposals for special stipulations.

The Swedish National Council for Nuclear Waste judges that it is not ensured that outstanding questions regarding the protective capability of the copper canister will be answered during the continued intermittent licensing process under the Nuclear Activities Act. The Swedish National Council for Nuclear Waste has expressed the following. More research is needed concerning some of the processes that the Court in its opinion requires SKB to present more data on and on the barrier system as a whole. There are uncertainties regarding the ability of all the barriers to perform their function. The Government should strike a balance between a repository and the zero alternative. If the Government permits the activity, the Government should require SKB to continue conducting research on the final repository method, especially regarding the properties and importance of cast iron for the durability of the copper canister. Research and safety assessments should continue until final closure. It is important to create clear frameworks for conducting an intermittent licensing

process and continuously assessing the process up to final closure, as well as handling questions concerning information preservation and responsibility after closure. The study of copper corrosion cracking included in the Government's referral on 24 September 2021 sheds light on details, but does not contain any new observations regarding stress corrosion cracking under repository conditions that change the level of knowledge. The study of the properties of cast iron in the referral shows the need for further research, and the Council is not currently able to assess the remaining uncertainties regarding the properties of the cast iron. The most recently reported results from the LOT tests do not provide new knowledge on the long-term integrity of the copper canisters under repository conditions. Furthermore, the Government should divide the decision according to the Environmental Code into a decision on construction and a decision on operation, or decide on a trial period on radiation safety issues. Despite the fact that research is being conducted within the framework of the RD & D programme, the Council finds that requirements for continued research concerning the repository's barriers should be linked to the issue of a licence for construction under the Environmental Code. This is because the environmental code assessment is not divided into steps in the same way as licensing under the Nuclear Activities Act. The Swedish National Council for Nuclear Waste provides proposals on permissibility stipulations regarding e.g. continued research, adequate data on the cast iron insert and on assessment and long-term radiation safety.

The Swedish Environmental Protection Agency expresses its opinion on the process and the importance of the processing meeting the requirements set out in Chapter 6 of the Environmental Code and the Aarhus Convention. The Swedish Environmental Protection Agency is of the opinion that permissibility stipulations are needed in matters concerning unauthorised impact on nearby Natura 2000 areas, environmental quality standards for water and impact on the area of national interest Forsmark-Kallrigafjärden. According to the Swedish Environmental Protection Agency, it is also of great importance that the issue of financial security is investigated.

The Swedish Geotechnical Institute (SGI) expresses the importance of it being possible to make changes to the underground facility and the deposition technology considering technical development during the period up to final closure and the continued gradual knowledge gathering that takes place concerning the actual geological conditions at repository level. This is to ensure that best available technology is used, that the repository site and deposition holes are optimised and that the radiation safety requirements are fulfilled. In this context, SGI would also like to emphasise the importance of SKB also taking into consideration the remaining uncertainties that will exist. The uncertainties are due to the fact that it is not possible to investigate and characterise the rock in the nearest vicinity of the deposition holes in detail, even if new technology is taken into account. In view of the integrity of the hole in different future scenarios, SGI believes that the physical, chemical and mechanical properties that such unknown geology contributes need to be taken into account. SGI is also of the opinion that a legislative change in working hours for water operations is an important issue.

The Geological Survey of Sweden (SGU) considers it important that the decision does not limit the possibility of adaptation of the repository based on the knowledge that will be obtained during the construction of the repository.

The Swedish Radiation Safety Authority approves the activities and states the following. The Authority has reviewed SKB's supplement and judges that SKB has satisfactorily investigated and answered the Court's specific questions regarding the integrity of the canister against possible

degradation and corrosion processes. The results of the authority's analysis are presented in a review report.
For the review, the Authority has obtained external expert support in matters concerning corrosion processes and consequence analysis. The two independent expert groups that have reviewed corrosion processes present different conclusions regarding SKB's results and one is more critical. In its review, the Authority has evaluated SKB's account, the experts' reports, and other available information and made its own judgements based on the results and arguments presented, and compiled the results in the review report.

The Swedish Radiation Safety Authority finds that SKB's supplementary scientific studies and experiments have provided considerable new information and provide a deeper understanding of corrosion processes and their importance for the repository environment. The Authority finds that SKB has reported the information from the LOT tests that is relevant. The tests are not designed to provide information on copper as an encapsulation material during the safety assessment timescale, but only provide some information on the initial evolution of the KBS-3 method's engineered barriers after closure. The Authority has conducted a review of the most recently cited tests and judges that SKB has carried out the tests with high quality and that the results are reliable. The Authority also states that the studies of the properties of cast iron and copper corrosion that are included in the Government's referral on 24 September 2021 do not contain facts that constitute a reason to change the Authority's previous assessments of SKB's prospects of satisfying the Authority's regulatory requirements. Regarding corrosion of copper with water molecules, the Authority judges that even if such corrosion were to exist, which is not fully understood, it is expected to make negligible contributions to the corrosion of the copper canister. The Authority's weighted assessment, in view of the proposed generous 50 millimetre thickness of the copper shell, is that SKB's final repository concept is robust in relation to expected corrosion in the repository environment.

The Swedish Radiation Safety Authority deems that SKB has reliably shown that the investigated corrosion processes have a small impact on the overall protective capability of the repository. The Authority holds the following opinion. The proposed site is suitable and the method is feasible with respect to the prospects of satisfying stringent requirements on radiation safety after closure.
The properties of the Forsmark rock at repository depth provide good prospects for preventing and limiting the dispersion of radioactive substances. The buffer surrounding the canister contributes significantly to limiting the impact on the canister and to limiting the spread even if one or more canisters should fail for some reason. The Authority would particularly like to point out that the copper canister, together with buffer and rock, constitute interacting barrier functions in the final repository system that need to be taken into account in an overall assessment of the long-term safety of the final repository and the impact on human health and the environment. The Authority judges that SKB has shown that the reference design of the final repository system as a whole is robust and that the risk criterion prescribed by the Authority (Section 5 of the Swedish Radiation Safety Authority's regulations and general advice [SSMFS 2008:37] concerning the protection of human health and the environment in connection with the final disposal of spent nuclear fuel and nuclear waste) can be met with considerable safety margins. The risk criterion entails that the final repository should be designed so that the maximum annual risk to human health does not exceed one in a million, which in practice corresponds to an individual dose of one hundredth of the natural background radiation. The consequence of a conceivable loss of the containment function of all canisters is limited to an individual dose that is at the level of the natural background radiation. The Authority further judges that SKB has the potential to satisfy all of the Authority's relevant regulatory requirements. This means that the Authority expects that SKB, after having constructed access roads

to repository level, further investigated the properties of the Forsmark rock, further developed fabrication and testing methods for engineered barriers for application on an industrial scale and completed studies prompted by the Authority's previous review comments, will be able to provide the information required to enable the Authority to approve deposition of the first sealed copper canisters of spent nuclear fuel (test operation). The Authority also agrees with SKB's assessment that it is important that the final repository can be site-adapted to ensure that the best available technology can be applied from a radiation safety viewpoint. The Authority has no objection to the proposal of the Land and Environment Court that the Authority should be given the right of appeal in accordance with Chapter 22, Section 6 of the Environmental Code and the opportunity to apply for reassessment in accordance with Chapter 24, Section 7 of the Environmental Code. Finally, the Authority finds that the proposals for stipulations submitted by SKB are reasonable.

The Swedish Transport Administration takes a positive view of transporting excavated rock by sea and emphasises that a dialogue must be held with the authority regarding the planning of measures that lie along public roads or that in any other way affect state infrastructure.

The Kalmar County Administrative Board approves the activities and shares SKB's conclusions that a final repository that is constructed according to the application will be safe in the long term. The County Administrative Board has clarified that the environmental aspects associated with ionising radiation have been taken into account in the County Administrative Board's statement and have been included in the assessment.

Uppsala County Administrative Board approves the activities. The County Administrative Board submits proposals for stipulations of permissibility pertaining to, e.g., a safe radiation environment, external monitoring and limited climate impact. The County Administrative Board also provides viewpoints on the stipulations proposed by SKB.

Oskarshamn municipality recommends that the Government decide to permit an encapsulation plant for spent nuclear fuel, Clink, in the vicinity of the Clab interim storage facility in Oskarshamn municipality. The municipality also has viewpoints on SKB's proposal for governmental stipulations.

Östhammar municipality recommends that SKB build facilities for final disposal of spent nuclear fuel and nuclear waste from the Swedish nuclear power programme according to the KBS-3 method in Forsmark in Östhammar municipality. The municipality argues that a prerequisite for the municipality's point of view is that it is a question of spent nuclear fuel from Swedish reactors, that Sweden should not store nuclear fuel from other countries, that a maximum of about 12,000 tonnes of spent nuclear fuel should be stored, and that the method is KBS-3-V. If the conditions change so that reassessment of the activities is required, the municipality is of the opinion that the recommendation from the city council should be obtained.
The municipality agrees with the Swedish Radiation Safety Authority's assessment regarding the integrity of the canister and its impact on the long-term safety of the final repository. The municipality shares the Land and Environment Court's assessment of the repository's environmental impact. The municipality presupposes that SKB will follow good scientific practice in its research activities and handle research results with the openness and unconditionality required to reliably answer the remaining questions. Regarding site adaptation in the area of operations, the municipality has no objections to SKB's supplementation, provided that this does not entail a greater impact than is indicated in the environmental impact statement. The municipality has further comments on the permissibility stipulations proposed by SKB and other reviewing bodies. The

municipality does not believe that the added value agreement concluded with SKB replaces the need for permissibility stipulations in any respect. The municipality also highlights the costs and challenges associated with hosting such extensive activities as the final repository and feels that there are reasons to announce stipulations to deal with this in this licensing process. The municipality has submitted proposals for such stipulations. The municipality also proposes that stipulations to ensure the role of the municipality in any future decision processes be added to the Government's permissibility decision, if any. Furthermore, the municipality is of the opinion that the Government should consider a legislative change that gives the Swedish Radiation Safety Authority the right to appeal and the opportunity to apply for reassessment under the Environmental Code, and that the Government should review the need for legislative changes for water operations working hours.

Stockholm University states that SKB has carried out a very thorough analysis of the protective capability of the copper canister and is satisfied with the conclusion that the canisters are safe.

Uppsala University is of the opinion that further studies on earthquakes are needed. The University interprets what has emerged in the case as indicating that SKB has undertaken to conduct such studies.

Swedenergy states that, according to SKB's account, in following the KBS-3 method, the intended final repository will be safe in the long term and that it meets very stringent requirements under the Environmental Code and the Nuclear Activities Act.

FMKK (the public campaign against nuclear power and nuclear weapons) motions for the Government to deny the application for permissibility in the first instance, to reject the application in the second instance and to return the application to the Land and Environment Court in the third instance. FMKK also motions for all safety analysis reports to be referred and sent to the Court to be finally decided by a referendum, that different demonstration plants should be built, that it should not be sufficient with the Swedish Radiation Safety Authority's consent to start certain measures, that the site is incorrectly selected and that biota should at no time be exposed to ionising radiation. FMKK is of the opinion that SKB has not been able to show that copper is a sufficiently good encapsulation material or that bentonite clay will act as a barrier. FMKK is of the opinion that SKB does not comply with the Nuclear Activities Act – a nuclear fuel repository must be completely safe and SKB and the Swedish Radiation Safety Authority must be able to guarantee that ionising radiation will not come into contact with the biosphere.

The Swedish Environmental Movement's Nuclear Waste Secretariat (Milkas) is of the opinion that permissibility for the KBS-3 method cannot be granted and motions that the Government reject the application. As support for their views, Milkas mainly presents the following. The site, method and alternatives need to be further studied. Copper canisters risk failing within a short period of time and bentonite clay does not behave the way SKB claims. SKB has not handled geological issues satisfactorily. SKB should supplement the application with mapping of the sea floor and surveillance and intrusion. The location under water and close to a nuclear power plant is unacceptable. More research needs to be done on the nodular cast iron, in particular radiation-induced embrittlement and blue brittleness. Crucial safety issues such as post-closure monitoring and safety of fuel shipments must be resolved before the project can begin. In addition, special means are needed for all parties to have the opportunity to provide information about the issue. An actor other than SKB should be given responsibility for the issues of nuclear waste.

The Swedish NGO Office for Nuclear Waste Review (MKG) and the Swedish Society for Nature Conservation state that the application does not meet the requirements of the Environmental Code. The associations motion that the Government deny the application for permissibility in the first instance, that the Government reject the application in the second instance, and that the Government remand the application to the Court for further preparation in the third instance. In support of their views, the associations cite the following: A large number of canisters may fail within a few hundred years if copper is used as a canister material. There are processes in the repository environment that can rapidly impair the function of the canisters. Copper can, for example, react with oxygen-free water, which causes corrosion. The risk of pitting is another argument for rejecting the application. SKB has not been able to deny that these processes together may result in leakage and radiation levels above the permitted limits. The application can therefore not be approved. The KBS project should be concluded and a new organisation formed to study and investigate other final disposal methods, such as deep boreholes. Through the associations' statements, the Court has had access to extensive documentation, including the whole body of data that the Swedish Radiation Safety Authority has access to. It is therefore not true that the Court's assessment would be based on insufficient documentation. The associations are critical of the Swedish Radiation Safety Authority's handling of the issue and believe that the Authority has not taken the risk of the integrity of the copper barrier, as shown in recent research results, seriously. The Swedish Radiation Safety Authority's risk limit will be exceeded within 1,000 years and there will be extensive effects on man and the environment. SKB's scenarios for the consequences of copper canister failure in the repository are misleading and do not describe scenarios where all barriers are defective. If the case is referred back to the Court, the Court can investigate the issue of copper corrosion in greater detail. Additional experiments must be conducted even if the Government grants permissibility and a licence for the final repository. The Government could use the RD & D process to demand that SKB conduct further research. SKB also needs to conduct further experiments on copper and bentonite clay under guaranteed oxygen-free forms and conduct further experiments on the cast iron insert. New experiments must be done and LOT testing must be further reported on before the Government makes a decision. Quality assurance of SKB's analyses must be transparent and offer full transparency to other actors involved in the nuclear fuel
repository licensing. The associations have also submitted proposals for how the Government should handle environmental licensing in the future to further strengthen the decision-making basis. The associations have also submitted proposals for permissibility stipulations regarding further research and presentation of the LOT tests.

OSS (opinion group for safe final disposal in Östhammar) has expressed that sufficient studies proving that the repository will function as intended have not been done. OSS expresses that the application does not contain a sufficient account of alternative methods and sites and that the Government should revise the entire Swedish model for disposal of nuclear waste and favour transparent, scientific and democratic processes.

The Swedish Nuclear Society states that SKB's supplementary statement has been well prepared and that it responds to the deficiencies identified by the Court and viewpoints received by the Government. The Society finds that the application satisfies all requirements and that the final repository is ready to proceed into the construction phase.

The Swedish Renewable Energies Organization expresses that the cast iron insert and copper canister should be surface treated to reduce the radiation impact and protect against external influences. The Organisation considers that the facilities in the Forsmark area and the design of the canister system

should be conducted as proposed by the Organisation. Furthermore, the Organisation motions for Clink to be located at least 30 kilometres from Clab and the O3 reactor and that it be designed in accordance with the Organisation's proposal.

Remarks and opinions from other organisations and individuals

A number of individuals and organisations have objections to the Spent Fuel Repository and in some cases motion that the Government deny, reject or return the case to the Land and Environment Court (Marie Andersson, Anatoly Belonoshko, Roland Davidsson, Värmland mot kärnkraft, Karin Gustafsson, Gröna kvinnor, Herbert Henkel, Berit Holmgren, Hans Jivander, Jordens vänner, Ylva Lundh, Swedish Green Party in Uppsala County, Swedish Green Party in Enköping, Swedish Green Party in Heby, Swedish Green Party in Håbo, Swedish Green Party in Knivsta, Swedish Green Party in Tierp, Swedish Green Party in Uppsala, Swedish Green Party in Älvkarleby, Swedish Green Party in Östhammar, Nils-Axel Mörner, the Swedish Society for Nature Conservation in Uppsala County, Ostkustens framtid, Jinshan Pan, Per-Axel Persson, Radiation Free Lakeland, Ditta Rietuma, Jaqueline Ottabong, Ivar Sagefors, Dr. techn. Peter Szakálos, Prof. em. Christofer Leygraf, Prof. em. Anders Rosengren, Prof. em. Seshadri Seetharaman, Associate Professor Olle Grinder and Dr. Techn. Jan Linder, Cristine Vaple, Torbjörn Åkermark, the Swedish Society for Nature Conservation in Östhammar).

They have expressed viewpoints on e.g. siting, environmental impact, rock suitability, repository design, impact on Forsmark's reactors, groundwater flows and the KBS-3 method with copper canister and bentonite clay. Some statements contain criticism of SKB's supplementation and the analyses of the state of research on copper corrosion that have been presented. The viewpoints also include the lack of reporting of alternative methods such as deep boreholes, other canister materials and surface treatments, as well as deficiencies in municipal and regulatory authority decision processes. Some viewpoints emphasise the need for more research on the KBS-3 method, deficiencies in SKB's safety assessment, deficiencies in the Swedish Radiation Safety Authority's conclusions and the need for transparency. Some comments also contain proposals for stipulations and requirements that SKB should report more LOT test results.

The Swedish Association of Municipalities with Nuclear Facilities has commented on the importance of the continued handling of the final repository issue and the decision process.

Several organisations and one individual approves the application (Swedenergy, Fortum Sverige AB, Sture Grönblad, Miljövänner för kärnkraft [MFK], Skogen, kemin, gruvorna och stålet [SKGS], the Swedish Nuclear Society, the Confederation of Swedish Enterprise, Sydkraft Nuclear Power AB [Uniper] Sydsvenska industri- och handelskammaren, Vattenfall AB, and Women in Nuclear Sweden).

Statements within the Convention on Environmental Impact Assessment in a Transboundary Context framework of consultation

In a supplementary Convention on Environmental Impact Assessment in a Transboundary Context consultation with Poland and Germany, these countries independently expressed that they have no viewpoints on the application at the time of the supplementary consultation in these countries and they state that they wish to be kept updated on the continued process.

Notification to the Swedish Government in accordance with Chapter 17, Section 5 of the Environmental Code on exemption in accordance with the Species Protection Ordinance

The Swedish Environmental Protection Agency has notified the Government in accordance with Chapter 17, Section 5 of the Environmental Code of SKB's application for exemption under the Species Protection Ordinance (2007:845) for measures for constructing a final repository for spent nuclear fuel and nuclear waste (M2017/02796).

The notification informs that SKB applied for dispensation in 2011 with the County Administrative Board of Uppsala to capture pool frog, damage and destroy the reproductive areas and resting places for the pool frog, the northern crested newt and moor frog, kill and damage smooth newt, the common frog, the common toad and grass snake, destroy the fen orchid, damage the fragrant orchid, ringless hook-moss, northern spikemoss, early marsh-orchid, marsh helleborine, heath spotted-orchid, lesser butterfly-orchid, greater butterfly-orchid, bird's-nest orchid, common spotted orchid, broad-leaved helleborine and common twayblade and to take other measures that require an exemption pursuant to Sections 14 and 15 of the Species Protection Ordinance. The County Administrative Board granted exemption in June 2013. The County Administrative Board's decision has been appealed to the Land and Environment Court at Nacka District Court by, among others, The Swedish Society for Nature Conservation and the Swedish NGO Office for Nuclear Waste Review (MKG).

As a reason for the notification, the Swedish Environmental Protection Agency states that the activities SKB is applying for exemption for are measures connected with constructing a final repository for spent nuclear fuel in Östhammar municipality. The Swedish Environmental Protection Agency considers it to be an activity of significant scope and intervention. The Swedish Environmental Protection Agency is of the opinion that the activities may be of importance in relation to what is specified in Chapter 1, Section 1 of the Environmental Code. SKB has commented on the matter and questioned whether there is reason for the Government to reserve the matter of exemption.

Announcement on the management of spent nuclear fuel

The Swedish Parliament has announced to the Government what the committee argues regarding the management of spent nuclear fuel (report 2020/21:FöU10, rskr. 2020/21:258).

Reasons for the Government decision

Basis for Government review

The activities are reviewed on the basis of two separate pieces of legislation, the Nuclear Activities Act and the Environmental Code. Licensing under the Nuclear Activities Act is mainly focused on safety and radiation protection issues and, according to practice, is specially designed to contain intermittent presentation and approval of the supporting material. Licensing under the Environmental Code concerns issues such as the nature and scope of the facility, as well as issues concerning the effects of activities on land use, the environment, energy, transport, etc. The issue of radiation safety is also included within the framework of the issue of the environmental impact of

the activities. Siting and best available technology are issues that are tested within both pieces of legislation.

According to Chapter 1, Section 3 of the Environmental Code, the Code applies in parallel with another law, which means that an activity covered by the Code must also meet the requirements of the other laws that apply to the activity. Accordingly, a Court ruling under the Environmental Code has only legal force against interventions under the Code and does not, for example, prevent the Swedish Radiation Safety Authority, with the support of the Nuclear Activities Act, from prescribing newer or stricter stipulations for an activity.

SKB's motions regarding Clab have been dealt with in the Government's interim decision on 26 August 2021.

Preparation requirements are fulfilled

Since the case was submitted to the Government, preparation of the case has continued, for example by giving SKB the opportunity to supplement the application in the light of the viewpoints of the Land and Environment Court, expressed in the Court's opinion to the Government. SKB's supplement has since been referred and announced. SKB has on several occasions commented on the responses to the referral and the viewpoints and comments received. The case was announced once more in December 2021.

The Government assesses that the requirements for the preparation of government cases dictated in the Constitution have been fulfilled (Chapter 7, Section 2, Instrument of Government) and that the case proceedings fulfil both the requirements in the procedure dictated in general administrative principles as well as the specific requirements made in environmental legislation.

The environmental impact assessment should be approved

In its interim decision on 26 August 2021, the Government has decided to permit the activities at Clab covered by the application. As is also evident in the interim decision, the Government has determined that the planned activities at Clab are well delimited from other planned activities in the system for final disposal of spent nuclear fuel and can be handled separately.

In conjunction with the interim decision on Clab, the Government approved the section of the environmental impact assessment that pertains to Clab activities. Now that the Government is testing the permissibility of other sections of the application, it is also taking a position on the environmental impact statement in its entirety and making an overall assessment of the environmental effects of the entire operation, i.e. the coherent system for final disposal of spent nuclear fuel, which also includes the activities at Clab. This does not mean that the Government is re-examining the activities at Clab as this review has been carried out in conjunction with the previous interim decision.

The Government agrees with the Land and Environment Court's assessment that the submitted environmental impact statement, with supplements, satisfies the requirements in Chapter 6 of the Environmental Code in its wording prior to 1 January 2018. The environmental impact assessment should therefore be approved.

The business operations are suitably located and the water activities can be permitted

In its opinion to the Government, the Land and Environment Court has carefully explained its rulings on the issue of permissibility of the activity under the Environmental Code.

The Court has made the assessment that the activity is permissible on the basis of applicable provisions in the Environmental Code concerning the location of the activity (Chapter 2, Sections 6 and 3 and Chapter 4), and that there are conditions for granting a permit in accordance with Chapter 7, Section 28a and for granting the requested species protection exemptions under the Species Protection Regulation. According to the Court, the activities entail an impact on the national nature conservation interest, but the Court determines that the national interest for final disposal of spent nuclear fuel and nuclear waste should take precedence pursuant to Chapter 3, Section 10 of the Environmental Code. From a radiation safety perspective, the Land and Environment Court judges that the construction and operation of the activities are permissible under the Environmental Code. In addition to the issue of chosen final disposal method and radiation safety in the long term after closure, the Court determines that the activity satisfies the requirements according to the general rules of consideration in Chapter 2 of the Environmental Code also in other respects.

Furthermore, the Court determines that the activities will not lead to any environmental quality standard not being met and that discharges to water therefore do not constitute an obstacle to permissibility provided that protective and compensatory measures are taken. The Court also concludes that SKB has the requisite competence for the water activities covered in SKB's licence application and judges that these activities can be permitted according to applicable provisions in Chapters 5 and 11 of the Environmental Code. The Court has determined that matters of financial security, information preservation, waste and control of the activities after closure, etc. can be handled by the Court in the continued licensing process and that they do not constitute an obstacle to permitting the activities.

The Government agrees with all the determinations made by the Court regarding the permissibility of the activity on the basis of these specified aspects. In the Government's case proceedings, a large number of viewpoints have been offered on issues such as the siting of the activities, the design of the repository and the environmental impact of the activities. The Government has taken these viewpoints into account in its scrutiny of the permissibility of the activities, but they do not lead to any other assessment.

The Government notes that, in its opinion, the Court emphasises that the provisions of the Environmental Code on working hours in water need to be reviewed. The working hours, i.e. the time within which the work for the water operations is to be carried out, may not exceed ten years in accordance with Chapter 22, Section 25, Paragraph 2 of the Environmental Code. Applicable regulations do not provide the scope for determining working hours that meets the time required for an extension of the facility for groundwater diversion. The Government will begin efforts to review the legislation in this respect. This issue does not constitute an obstacle to allowing the activities.

The Swedish Environmental Protection Agency's notification of SKB's application for an exemption from species protection should be left without action.

Certain measures connected to constructing the final repository require exemptions pursuant to Sections 14 and 15 of the Species Protection Ordinance. According to these provisions, exemptions from the prohibitions of the Species Protection Ordinance may be granted if there is no other suitable solution and the exemption does not impede a maintained, favourable conservation status of the species in its natural habitat. Exemptions in accordance with Section 14 also demand that the exemption is required for e.g.
compelling reasons with an overriding public interest.

The issue of exemption from the Species Protection Ordinance for measures connected with constructing the final repository has been examined by the County Administrative Board in Uppsala County and then appealed to the Land and Environment Court at Nacka District Court (Case no. M 4617–13). The Court has declared the case dormant pending the Government's assessment of the permissibility of the final repository. The Government shares the Court's assessment that there was no reason for the Court to hand over the dispensation case in question to the Government. A prerequisite for activities that are affected by Species Protection Ordinance prohibitions to be permissible is that there is no uncertainty that exemption will be granted. The issue regarding compatibility of the activities with the Species Protection Ordinance is therefore part of the Government's permissibility assessment. The Government agrees with the Land and Environment Court's assessment that the documentation in the case is sufficient to establish that there are prerequisites for granting the exemptions required under the Species Protection Ordinance so long as requirements for protective and compensation measures are made. The Government therefore assesses that the operations are permitted in accordance with Chapter 8 of the Environmental Code and the Species Protection Ordinance.

In the case of an exemption from species protection (M2017/02796), the Government does not believe that the Government is required to reserve the right to examine the permissibility of the measures to which the case relates, as detailed in Chapter 17, Section 3 of the Environmental Code. The Swedish Environmental Protection Agency's notification of this matter should therefore be left without action.

The area of activity and the location of the ventilation towers have been sufficiently specified

During the Government's case proceedings, SKB has submitted the supplement requested by the Land and Environment Court regarding the scope of the operational areas and the location of the two ventilation towers. The outer boundaries of the final repository's operations areas above and below ground and the location of the ventilation towers have been defined. The operational areas have been specified with a reference design so that the facility can be adapted to the geological conditions. SKB has further described how the area of activity will be divided up and has clarified certain calculations concerning e.g. lowering of the groundwater level in the environmental impact statement.

The Government has determined that SKB's supplement enables a satisfactory assessment of the permissibility of the activities under the Environmental Code as well as which siting of the facility is binding for SKB.

The chosen final repository method fulfils the requirements of the Environmental Code

In a case concerning final disposal of radioactive waste, the issue of radiation safety is of the greatest importance. Since human health and the environment can be seriously harmed by radioactive radiation, stringent requirements need to be made on the activities at Clink and the final repository. SKB must show that the activities satisfy the requirements of the Environmental Code according to the precautionary principle and the requirement to use the best available technique according to Chapter 2, Sections 1, 3 and 7 of the Environmental Code.

Regarding the chosen method for final disposal (the KBS-3 method) the Land and Environment Court has determined that SKB's study meets the stringent requirements in Chapter 2 of the Environmental Code for the two barriers, i.e., rock and bentonite clay, and in other issues such as the presentation of alternative methods. The Government agrees with this part of the Court's assessment. The viewpoints that have been offered during the processing of the case by the Government regarding e.g. the suitability of the rock, have not led to any other assessment.

In its opinion to the Government, the Court has stated that supplementary studies are needed regarding the third part of the KBS-3 method, the copper canister, on issues concerning the integrity of the canister against possible degradation and corrosion processes and how this affects the safety assessment which SKB has prepared in accordance with Chapter 4, Section 1 of the Swedish Radiation Safety Authority's regulations and general advice (SSMFS 2008:1) concerning safety in nuclear facilities.

During the Government's proceedings, SKB submitted a supplement that includes new studies and experiments as well as new risk scenarios.

The Swedish Society for Nature Conservation, MKG and several other organisations and individuals have objected to the KBS-3 method and SKB's supplement. According to their analysis, various studies have shown the corrosion rate of copper to be considerably higher than SKB has stated. They believe that the corrosion rate will also increase due to other processes such as the sauna effect (salt enrichment in the deposition holes), radioactive radiation and stray currents, and that the mechanical integrity of the copper canisters will degrade due to processes such as stress corrosion cracking and radiation-induced embrittlement.
According to their assessment, the KBS-3 method will not work and the safety assessment needs to be re-examined. In their opinion, SKB's supplementation does not show that the activity can be permitted.

The Government notes the following. The Swedish Radiation Safety Authority finds that SKB's supplement is satisfactory and confirms previous assumptions regarding the safety of the method. In its review of SKB's supplementation, the Authority has obtained expert help, not least from some of the researchers who are critical of the KBS-3 method, and thereafter made an overall assessment. The Authority's view that the method satisfies the safety requirements is supported by other reviewing bodies such as the county administrative boards in Uppsala and Kalmar County. However, the Swedish National Council for Nuclear Waste states that further research is needed before the method can be said to be sufficiently safe. The Swedish National Council for Nuclear Waste feels that

the case should be divided into two permissibility decisions, one for construction and one for operation.

The Government makes the following assessment. When assessing permissibility of the activity, it is not possible to postpone as central an issue as operation of the activity to the future. Instead, an overall assessment of the activity's impact on the environment must be carried out at the same time. The Government is of the opinion that SKB has satisfactorily supplemented the matter requested by the Land and Environment Court in its opinion to the Government with information concerning the uncertainties of the canister's protective capability in the long term. The study is sufficiently robust and shows that the remaining uncertainties do not affect radiation safety of the repository more than marginally. The Government is of the opinion that SKB has thereby shown that there is no appreciable risk of harm or detriment to human health or the environment, neither during construction nor after operation and closure of the final repository. The safety analyses show that the radiation will remain below the applicable risk criterion in Section 5 of the Swedish Radiation Safety Authority's regulations and general advice (SSMFS 2008:37) concerning the protection of human health and the environment in connection with the final disposal of spent nuclear fuel and nuclear waste. Furthermore, the safety analysis shows that the remaining uncertainties are not significant. The Government is of the opinion that the activities thereby meet the Environmental Code's best available technique requirements.

Regarding the question of the need for further research, the Government emphasises the following. SKB has been conducting research on the final repository method since the 1970s. As early as 2001, the Government judged that SKB should use the KBS-3 method as a planning premise for site selection investigations, while nonetheless monitoring alternative methods. The research that has been conducted since then has led to the application that is now under review. The method has been analysed and discussed for many years. Within the framework of the Government's current licensing process, criticism of the method has also been expressed, addressed by SKB and analysed by the Swedish Radiation Safety Authority, among others. The criticism expressed has been valuable and led to further review of the method and preparation of additional analyses. The new analyses, however, confirm the overall picture that the method is sufficiently safe.

Despite this, the Government also adheres to the view of the Swedish National Council for Nuclear Waste and the Swedish Society for Nature Conservation, etc. that it is important that research continues. There is a very long time remaining until the repository is closed and new knowledge will be obtained as the repository is constructed. Future research results also need to be utilised for the best possible safety in the repository. The Government would therefore like to make clear that research on essential issues, including the sustainability of the copper canister, will not cease. Within the framework of the RD & D programme prepared according to Section 12 of the Nuclear Activities Act, as well as the intermittent licensing that constitutes stipulations for the licence under the Nuclear Activities Act, SKB will need to present the remaining LOT test results, conduct new safety assessments and conduct further research on copper corrosion. This research and these additional analyses are important and need to be carried out, but are mainly aimed at optimising the KBS-3 method. New research is not a prerequisite for the method to be permitted under the Environmental Code. Together, the intermittent licensing process under the Nuclear Activities Act and research under the RD & D Programme ensure that the KBS-3 method is optimised during the long construction period and that future research results are taken into account. As such, the Government feels confident that the issue of radiation safety will be handled in the best possible way.

In its opinion to the Government, the Land and Environment Court notes that the Swedish Radiation Safety Authority's right of appeal may need to be reviewed. The Government is aware that there is a need to revise the possibility of granting the Swedish Radiation Safety Authority the right of appeal in accordance with Chapter 22, Section 6 of the Environmental Code and the opportunity to request reassessment in accordance with Chapter 24, Section 7 of the Environmental Code. The Swedish Radiation Safety Authority, which is the expert authority on radiation safety issues, could use such a tool to ensure that the final repository is re-evaluated if necessary and to appeal decisions under the Environmental Code if necessary.

In its opinion to the Government, the Court also noted that, at the time of the statement, there was uncertainty regarding who is responsible for final disposal in the very long term and that this question needs to be answered if the activity is to be allowed. It is important that there is clarity about who is responsible for the activities in the very long term for the Environmental Code's goals in accordance with Chapter 1, Section 1 on promoting sustainable development, which means that current and future generations are ensured a good, healthy environment.

After legislative changes to the Nuclear Activities Act and the Environmental Code made as a result of the Government's proposal in govt. bill 2019/20:157, it has been clarified that the responsibility for a final closed geological repository and the waste in the facility will fall on the state. With these clarifications, there are no obstacles to allowing the activities from a long-term responsibility perspective.

The Government's decision should be combined with a special stipulation regarding contacts with the municipalities

During the Government's proceedings, SKB has submitted a number of proposals for special Government stipulations under Chapter 17, Section 7 of the Environmental Code. SKB advocates that the Government adopt stipulations for radiation safety after closure and on the boundaries of the area of activity, but does not call for other stipulations. It is SKB's judgement that the continued research requested by several reviewing bodies is already planned and included in the RD & D programme, but does not oppose a Government stipulation if it is linked to relevant research within the framework of the RD & D process.

Proposals for special stipulations under Chapter 17, Section 7 of the Environmental Code have also been submitted by the Swedish National Council for Nuclear Waste, the County Administrative Board of Uppsala, Östhammar municipality, MKG, the Swedish Society for Nature Conservation and several other organisations and individuals. Several reviewing bodies and individuals, including the Swedish Agency for Marine and Water Management, the Swedish Environmental Protection Agency, the Swedish Radiation Safety Authority and Oskarshamn municipality, have offered viewpoints on SKB's proposal for Government stipulations.

Östhammar and Oskarshamn municipalities are taking on a considerable degree of responsibility and the Government believes that good communication and insight are essential for promoting trust between the different participants in the final repository process. The Government has therefore determined that a stipulation concerning contacts with the municipalities, with the wording proposed by SKB, is appropriate.

Regarding other proposed conditions from SKB, the Government has determined that they do not need to be defined as special stipulations according to Chapter 17, Section 7 of the Environmental Code. The Government is of the opinion that several of SKB's stipulation proposals are well-designed, but deems the issues to be best handled by the Land and Environment Court within the framework of the continued licensing process.

The Swedish National Council for Nuclear Waste and MKG et al. have proposed stipulations regarding further research and that there should be adequate data on the cast iron insert. The Government is of the opinion that research on e.g. the robustness of the copper canister and the cast iron insert must continue. However, the Government determines that this has already been ensured by the RD & D programme and the intermittent licensing process under the Nuclear Activities Act.

Östhammar municipality has stated that the municipality is investing considerable resources in the final repository process and that questions such as competence management, infrastructure and water and sanitation plants would need to be regulated by governmental stipulations.

The Swedish Government agrees with the municipality that these are important issues, but does not believe that this decision should be combined with stipulations for such.

Östhammar municipality has also stated that the Government should decide on stipulations to ensure the role of the municipality in any future decision-making processes. The Government would again like to emphasise that the municipalities of Östhammar and Oskarshamn are taking on a considerable degree of responsibility and have shown great confidence in the decision process in the final disposal cases. Like the municipality, the Government believes that permissibility for major future changes to the activities should be reviewed by the Government and that the municipal council's authority should thereby be obtained before permissibility is announced. However, the Government cannot regulate with binding effect how future licensing processes will be carried out. The Government therefore deems that no stipulation should be set in this respect.

Regarding other proposed stipulations, the Government determines that they can be handled to the extent necessary by the Land and Environment Court in the continued licensing process. The Government does not consider it appropriate to decide on more special stipulations in order to satisfy public interests in the case.

With this decision and the Government's interim decision of 26 August 2021 regarding continued and expanded activities at Clab, the Government has taken the necessary measures to ensure, in the short and long term, the conditions for safe management of spent nuclear fuel and nuclear waste. The Swedish Parliament's announcement concerning the management of spent nuclear fuel is thereby finally processed (report 2020/21:FöU10, rskr. 2020/21:258).

Today, the Government has also decided to grant a licence under the Nuclear Activities Act for a coherent system of facilities for final disposal of spent nuclear fuel and nuclear waste, case M2018/00221.

On behalf of the Government,

Eva Nordmark Lina Österberg