DokumentID
1560723, (1.0 Godkänt)
Reg nr

Sekretess
Öppen
Dokumenttyp
Promemoria (PM)

Sida
1(24)

Författare
2016-09-28 Lars Birgersson
Kvalitetssäkring
2016-10-19 Erik Setzman (Tillstyrkan)
2016-10-19 Helene Åhsberg (Godkänd)

Espoo - Summary of statements received

1 Latvia – authorities

1.1 Environment State Bureau of the Republic of Latvia

1.1.1 The Republic of Latvia has previously answered that it will abstain from participation in the EIA procedures. Nevertheless Swedish Environmental Protection Agency has asked to submit any comments we might receive from the public or the authorities. EIA documentation was made publicly available and we have received a letter of comments from a member of the society. Therefore we have translated it into English and send it to you together with the original of the letter.

Response: SKB has taken note of the attached comments, see Section 2.1.

2 Latvia – private individuals and organisations

2.1 Ditta Rietuma

Ditta Rietuma has written an open letter to the Environment State Bureau of the Republic of Latvia regarding the existential threat to the living environment of the Baltic Sea region caused by radioactive contamination from the nuclear waste repository planned to be built in Forsmark. The letter does not address SKB and the comments have therefore not been addressed.

2.2 Östersjöväldet (Chris Busby and Ditta Rietuma)

The petition states that estimates of the health effects of ionizing radiation based on the risk model from ICRP are inaccurate and underestimate the health effects by a factor of 100 to 5000. It is further suggested that the radiation risk model developed by ECRR (European Committee on Radiation Risk) should be used for risk assessment.

Response: The risk model used by SKB is designated in SSM's regulations and is the one that SKB must follow. It is the risk model from the International Commission on Radiological Protection (ICRP), which describes the relationship between radiation dose and cancer risk. The conversion from dose to risk is determined in SSM's regulations. ICRP establishes how this should be done.

3 Lithuania

3.1 The Ministry of Environment of the Republic of Lithuania

3.1.1 We would be thankful to receive information about the decision taken in accordance with Article 6 of the UNECE Convention on Environmental Impact Assessment in a Transboundary Context.

Response: SKB notes the request to be informed about the final decision on the matter and expects that this information will be provided by the Swedish Environmental Protection Agency.

4 Czech Republic

4.1 Calla

4.1.1 The Swedish model KBS-3 (an abbreviation for kärnbränslesäkerhet, nuclear fuel safety; the "3" refers to the third variation) for the use of engineered barrier system to isolate high-level radioactive waste and spent nuclear fuel from humans and the environment is very questionable.

a) The use of copper as a canister for storing high-level radioactive waste is controversial. Canada and the Czech Republic have already abandoned the pure copper canister as recent academic research has repeatedly shown that the behavior of copper in the repository environment is unpredictable. Indeed, copper may corrode away at a very high rate.

b) Behaviour of bentonite clays is problematic at various hydrological conditions. The results of the experiment LOT (especially the uptake of the A2 package) in the underground laboratory Äspö Hard Rock near the Oskarshamn nuclear power plant showed that the clay undergoes irreversible chemical changes. For the past 5 years, the company SKB refused to deal with this problem.

Response: a) The statement that copper is about to be abandoned as a container material is incorrect. A number of countries, including Canada, have chosen copper on scientific grounds as the main candidate for a corrosion resistant barrier material for the final disposal of highly radioactive waste. SKB's safety assessment SR-Site, which was included in the consultation documentation, shows that the copper canisters in the final repository in Forsmark with good margin provide the necessary corrosion protection required for the repository to be safe also in the perspective of a million years.

b) Bentonite has been chosen as a buffer material because it has the ability to be stable under different hydrological and geochemical conditions, even in a time perspective of one million years. The results of the LOT experiment (A2 package) are published in Karnland et al. 2009 (TR-09-29) and the conclusion of the report is that no irreversible changes can be detected in the clay mineral in the bentonite. This conclusion is also found in the studies that have been carried out by organizations not funded by SKB (Appendix 6-8 of the report). Despite the positive results from LOT, SKB has installed an additional series of experiments in the Äspö Hard Rock Laboratory (ABM). In ABM, various bentonites are exposed to a more aggressive environment than in LOT, higher temperatures and an iron heater instead of a copper heater. Two ABM packages have been retrieved. The results from the first are reported in Svensson et al. 2011 (TR-11-06). The results show no apparent change in the clay mineral. The analyses of ABM2 which has been exposed for a much longer time than the first package are still ongoing and will be reported in the coming year.

4.1.2 The planned repository site is on the Baltic coast which means that in case of radioactive releases from the repository, the sea would be very quickly contaminated. Siting process for the inland repository should be a priority, especially if it can be located in a recharge area for regional groundwater flows. Such a siting may delay leakage from a repository from reaching the surface for tens of thousands of years.

Response: The issue of siting on the coast or inland is covered in the Environmental Impact Statement in Section 3.7.6 “Siting on the coast versus in the inland”.

SKB has repeatedly assessed possible advantages and disadvantages of coastal and inland siting. More specifically, it has concerned whether the long flow paths (and long circulation times) for groundwater from inland sites can provide benefits for safety and if so, if this can be taken advantage of at siting.

SKB's conclusion is that it is not possible to demonstrate any systematic difference between coastal and inland sites regarding the existence of favorable flow conditions. The main reason is that studies and analyses have shown that with respect to groundwater flow, local conditions, mainly bedrock permeability, determine whether a site is suitable for a final repository or not. The site investigations in Laxemar and Forsmark have confirmed this view.

4.1.3 The intended repository site is situated in a geotectonic fault. This means that the stress due to the earthquakes and other movements in the rock, in particular in conjunction with a possible alternating periods of an ice age, can lead to the destruction of the repository.

Response: The so-called tectonic lens in Forsmark has been exposed to a very large number of glaciations and thick sediment layers that have sometimes increased and sometimes reduced the load on the bedrock. Despite this, SKB's extensive site investigations show that the lens has been affected only very slightly. SKB therefore considers it reasonable to assume that the next glaciation will not affect the lens in any radically different way than the combined effect of Weichsel, Saale and previous glaciations.

The site investigations showed that the latest ice age, the Weichselian glaciation, has not affected seismically sensitive sediment deposits. SKB has therefore concluded that larger earthquakes ($M \geq 6$) have not occurred. Regardless of this, SKB does not exclude that large earthquakes could be triggered by the next glaciation, which has also been a prerequisite for the calculations in SR-Site.

4.1.4 The proposed site for the repository is adjacent to several Natura 2000 sites and the site itself would have been a nature protected site if it had not been selected for the repository plans. On the site there are at least two species that appear on the IUCN red list: Fen orchid (Liparis loeselii4) and Pool frog (Rana lessonae).

Response: The Forsmark area has high conservation value which depends on the interaction between various factors. One of these factors is that the area is relatively undisturbed due to the nuclear power plant that began operating in the early 1980s.

As reported in the EIS, both the pool frog and fen orchid are found in wetland habitats in the Forsmark area. To ensure that local populations of these species are not adversely affected by the planned activities, SKB has already proposed and initiated various measures for these two species and the wetland habitats they are associated with. For example, SKB has dug new ponds that will function as reproduction sites for the pool frog.

4.1.5 The monitoring of the repository during its operation is currently not being considered. We are convinced of the necessity of the monitoring, especially during the operation of the repository because if there are problems with leakages from damaged containers, operators can start taking these containers out (i.e. retrievability) as soon as possible.

Response: That the repository will not be monitored during operation is a misconception. It is clear from our response to Poland's clarifying question No. 2, see the document "Consultation according to the Espoo Convention", Appendix 2 "Clarifying questions from Poland".

4.1.6 It is necessary for the concept of retrievability to be thoroughly evaluated in terms of safety aspects in relation to possible terrorist attacks. In this respect it would be particularly useful to compare the concept of final repository at a depth between 300 to 500 metres with an alternative concept of deep boreholes.

Response: SKB considers it possible both before and after closure to retrieve canisters from the planned final repository, but the implementation will be more labor intensive and likely more complicated after closure.

SKB believes that the retrieval of canisters from a repository with the deep borehole concept is probably more complicated than retrieval from a KBS-3 repository. This applies regardless of whether the retrieval is done before or after closure.

For both KBS-3 and deep boreholes, retrieval after closure is a large-scale operation that requires a societal effort.

5 Denmark – authorities

5.1 Ministry of Higher Education and Science

The Danish Agency for Higher Education and Science has stated that the Danish side will not participate in the environmental impact assessment of the Swedish final repository for spent nuclear fuel in Forsmark, Östhammar.

6 Denmark – organisations

6.1 NOAH Friends of the Earth Denmark

6.1.1 Firstly, NOAH and RenewableEnergy strongly disagree with the Danish authorities' decision not to participate in the environmental impact assessment procedures.

Response: SKB notes the standpoint.

6.1.2 Secondly, NOAH and RenewableEnergy share the views of the Swedish Society for Nature Conservation, SSNC, and the Swedish NGO Office for Nuclear Waste Review, MKG, and recommend that the application of a final disposal for spent nuclear fuel by the Swedish Nuclear Fuel and Waste Management Company, SKB, should be further elaborated. At several occasions, SSNC and MKG have stated that they lack answers to critical questions, such as the long termsafety of the barrier system and the account of alternative methods of disposal - deep borehole disposal in particular.

Response: SKB has repeatedly assessed the deep borehole concept and concluded that disposal in deep boreholes is not a realistic method for the final disposal of spent nuclear fuel. A KBS-3 repository can, unlike deep boreholes, be constructed, operated and closed in an at all stages controlled and verifiable manner.

The environment at depths of several kilometres is aggressive with among other things high salinity, high temperature and high pressure. As a consequence, the nuclear fuel within a relatively short time would come into direct contact with groundwater, which means that the rock would be the only protective barrier. For a repository with the deep borehole concept, there is thus considerable uncertainty about the evolution of the repository after closure.

SKB has answered MKG's questions within the framework of licensing under the Environmental Code.

6.1.3 Furthermore, they have raised concerns about the methods used when procuring evidence in support of claims for long-term safety, the suitability of the chosen site of Forsmark, as well as the risk of deliberate intrusion. Also, the two organisations are critical of the fact SKB refuses to publish material and completions concerning the long term-safety of the disposal methods, which means that significant issues, such as the process of copper corrosion, will not be thoroughly reviewed.

Thus, NOAH and RenewableEnergy draw the following conclusions: On the basis of the application's current content and taking into consideration the doubts that have been raised by SSNC and MKG regarding the lack of documentation on crucial safety issues, a license to SKB to build a final repository for spent fuel at Forsmark should not be granted. Furthermore, it appears that there is a large risk that neither the copper barriers, nor the clay will keep the radioactive waste isolated from the environment as long as necessary. Concerns have been raised that the site location at Forsmark is not suitable for the disposal method chosen by SKB. E.g. the bedrock is vulnerable to impacts of future ice ages. Considering that in some scenarios seepage from the final repository could occur as early as a few hundred years from now, negative transboundary impacts on public health and the environment cannot be ruled out in the future – a crucial argument for rejecting the current application.

Response: SKB notes the comments, but also notes that the consultation documentation (the EIS and SR-Site) clearly shows that SKB has good grounds for assuming that both the copper canister and the bentonite clay will fulfil their function as barriers, that Forsmark is a suitable site for the final repository and that KBS-3 is a suitable method for the final disposal of spent nuclear fuel.

7 Finland – authorities

7.1 Ministry of the Environment

7.1.1 Based on the statements Ministry of the Environment has received and with reference to the ministry's own experts, the Ministry of the Environment considers it unlikely that the planned project has substantial transboundary environmental impacts in Finland, despite the fact that Forsmark is located only 70 km from Åland. The Ministry of the Environment urges Sweden to, with utmost care, ensure that the implemented technology is safe at all times throughout the intended storage time.

Response: SKB notes the standpoint.

7.2 Ministry of Employment and the Economy

7.2.1 The Ministry of Employment and the Economy states that Sweden is acting responsibly by proceeding in the final disposal of the spent nuclear fuel. It is also an advance that Sweden and Finland are planning to use the same disposal method developed by SKB. The Ministry of Employment and the Economy states further that it is unlikely that the spent nuclear fuel management activities in Sweden have any impact on the environment in Finland.

Response: SKB notes the standpoint.

7.3 Ministry of the Interior

7.3.1 The Interior Ministry has no comment on this issue.

Response: SKB notes the standpoint.

7.4 Ministry of Social Affairs and Health

7.4.1 The Ministry of Social Affairs believes that the final repository of Sweden's spent nuclear fuel does not have environmental consequences that extend to Finland.

Response: SKB notes the standpoint.

7.5 Radiation and Nuclear Safety Authority (STUK)

Referring to that previously presented, Radiation and Nuclear Safety Authority in Finland considers that the information given is sufficient. STUK considers that the extension of interim storage, installation of an encapsulation unit and installation of a final repository unit for spent nuclear waste can be realized such that they do not have any impact on Finland.

Response: SKB notes the standpoint.

7.6 The Government of Åland

The Government of Åland assumes that the plans to dispose of spent nuclear fuel in Forsmark, only 70 km away from Åland, are implemented in a way that ensures the safety of people and the environment in the long term. The government does not have sufficient expertise in its management to scientifically assess the proposed storage solution. However, one can conclude that the research questioning the long-term safety of the KBS-3 method is of concern and should be taken very seriously. The Government urges the Swedish authorities to ensure that, before the KBS-3 method is put in use, irrefutable scientific evidence exists that copper corrosion does not occur to such an extent that radioactive substances are released during the planned storage time and thus endanger current and future generations.

Response: SKB notes the standpoint.

8 Finland – private individuals

8.1 Kari Kuusisto

8.1.1 I, as an environmentalist, support responsible plans for managing nuclear waste.

I ask the Ministry and your Swedish colleagues and the relevant business people that you together research new opportunities for cooperation and joint nuclear waste management. Posiva has its own cave in Eurajoki but Fennovoima does not yet have a solution for waste management.

There is the Sigyn ship, which can carry all Finnish and Swedish high-level waste, as all nuclear power plants are located on the shores of the Baltic Sea or the Gulf of Finland. I hope that the Ministry will make some changes in the legislation that will help to provide the cheapest solution for this issue. Finally, I wish you the best for the project.

Response: SKB notes the standpoint.

9 Germany – authorities

9.1 Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

9.1.1 With regard to the "interim storage" aspect of the overall project (extension of the CLAB and construction and operation of the encapsulation plant), no adverse effects for the German public can be inferred from the project documents. However, this statement must be made with the reservation that there is no detailed description of the incident scenarios investigated for the facility in question, nor any information regarding beyond design basis accidents.

Response: The design basis events analyzed with regard to radiological environmental impact are various mishaps when handling fuel. A fuelcassette dropped into water, with the conservative assumption that all the fuel in the cassette is damaged, is the event that results in the highest dose. The received dose is far below the current acceptance criteria for this type of event.

Non-design-basis events have also been analyzed. The calculated dose at a distance of 30 km from the facility is below the acceptance criterion for environmental impact during normal operation of the facility. Thus the radiological impact on the German public for this type of events is judged to be of such magnitude that it can not be distinguished from the impact that could arise from the normal dose received from background radiation in the surrounding environment.

9.1.2 Whether radiological impacts are possible during the operating phase which might also affect German interests cannot be determined from the documents submitted for the EIA to the same degree as is possible for the long-term safety. I would welcome a similar report on this issue as well.

Response: SKB believes that the prepared documentation in English is sufficient. The radiological impact on the German public judges to be insignificant because even for unlikely events only the immediate environment is expected to be affected. See also the answer to question 9.1.1.

9.1.3 The step-by-step authorisation procedure followed by Sweden has the advantage of allowing plans and safety analyses to be gradually fleshed out and made more specific. According to the explanations given at the consultation, the next main steps are as follows:

- **Licensing pursuant to the Act on Nuclear Activities and the Environmental Code**
- **Licensing by Swedish Radiation Safety Authority (SSM) prior to construction**
- **Licensing by SSM for trial operation and emplacement.**

It was explained to me that no further steps involving the participation of other countries are envisaged for the above stages. Considering the long period until the repository begins operation, the further details still to follow and the importance the German public places on the

issue of final disposal, I would appreciate it if you could provide Germany with regular updates on the ongoing process.

Response: The consultation process with countries concerned under the Environmental Code and the Espoo Convention is concluded when a licensing decision is made. Although the same advocacy opportunities are not given after a licensing decision, the ambition is that Germany, among other countries concerned, will receive information in connection with major steps in the incremental licensing process such as when renewed safety assessments are submitted to the Swedish Radiation Safety Authority (SSM). In terms of information internationally, this is judged to be achieved through the Joint Convention. In the ongoing reporting according to the Joint Convention, countries should report on inter alia REGULATORY REQUIREMENTS ON and MEASURES TAKEN BY THE LICENCE HOLDER regarding DESIGN AND CONSTRUCTION OF FACILITIES. Furthermore, countries are expected to continuously also report DEVELOPEMENTS SINCE PREVIOUS REPORT. We hope that Germany's requests for information will be satisfied with this.

9.1.4 Furthermore, I assume that, for all facilities dealt with in the environmental assessment, you will make further reports on the implementation and safety design details of the individual projects, for instance at the Review Meetings under the Joint Convention.

Response: SKB notes the standpoint and refer to the answer to question 9.1.3 above.

9.1.5 The project description does not make any statements regarding liability or cover for possible damage arising from the release of radioactivity, nor regarding the settlement of damages.

Response: Under paragraph 10 § 2 of the Nuclear Activities Act those with permission to conduct nuclear activities are responsible for the implementation of necessary measures, inter alia to safely handle and dispose of nuclear waste arising from the activities or nuclear material arising therein that is not reused. This means that the nuclear companies that have had licenses to operate the nuclear power plants are also responsible for the handling and final disposal of the waste. Likewise, the licensee is responsible for safely decommissioning and dismantling the facilities where operations no longer will be conducted, 10 § 2 Nuclear Activities Act. The responsibility ends when all nuclear material and nuclear waste is placed in a final repository that has been finally sealed. According to § 30 of the Act (2010:950) on Liability and Compensation for Nuclear Accidents, the claim for compensation is limited to EUR 700 million.

Swedish Government official report SOU 2011:18 ”Strålsäkerhet – gällande rätt i ny form” [Radiation safety: About law in a new form] proposed regulations that mean that the State takes over the nuclear power companies' responsibility for the spent fuel if there is no-one else who may be held responsible. The report also discusses the State's possibility to take over the responsibility for the final repository after final closure. The proposals in the report have not yet led to legislation.

9.2 Ministry of the Interior and Sport of Mecklenburg-Western Pomerania

9.2.1 Radiological impacts in the context of beyond design basis accidents are not part of the environmental impact assessment. Regardless of this however, I would be interested to know the following:

a) What worst-case design basis accidents (umbrella cases) were radiologically investigated for the encapsulation plant?

b) Are there any estimates of the radiological impacts of beyond design basis accidents resulting from terrorist activities, which have a geographical range as far as MecklenburgWestern Pomerania?

Response: a) The design basis events analyzed for radiological environmental impact from Clink are various mishaps when handling fuel. A fuelcassette dropped into water, with the conservative assumption that all the fuel in the cassette is damaged, is the incident that results in the highest dose. The received dose is well below SSM's current acceptance criteria for this type of events.

b) Non-design-basis events have also been analyzed. The calculated dose at a distance of 30 km from the facility is below the acceptance criterion for normal operation of the facility. SKB believes that non-design basis events due to terrorist activity can not have larger environmental impact on the surroundings far away than the impact the non-design basis events that are analysed should give. Thus the radiological impact on Mecklenburg-Western Pomerania for this type of event is judged to be of such magnitude that it can not be distinguished from the impact that could arise from the normal dose received from background radiation in the surrounding environment.

9.3 Schleswig-Holstein – Ministry of Energy, Argiculture, Environment and Rural Areas

9.3.1 Crystalline is less suitable compared to other storage mediums in terms of its hydraulic properties. For storage in granite (crystalline) the suitability of the technical barriers (e.g. copper canisters/bentonite buffer) would therefore be especially important. Storage in granite could, in the event of ice ages, entail a heightened risk of corrosion for the canisters and the inventory (see Synthesis Report issued by the Federal Office for Radiation Protection: A comparison of host rocks· Conceptual and safety-related issues regarding the disposal of radioactive wastes, 4 November 2005).

I would therefore recommend that evidence be provided in the further procedure which shows that in the case of granite storage the technical barriers will perform their task effectively over a period of one million years. Alternatively, proof could be provided which indicates that long-term safety only needs to be guaranteed for a considerably shorter period of time.

Reasoning: The latest discussions in Germany conclude that geological barriers should make a significantly higher contribution to safety than technical barriers. If this safety standard is relinquished and storage in granite planned, the standards for the technical barriers must be set considerably higher.

In this respect, a safety case for one million years is not provided in the documents submitted by Sweden. Instead it is indicated (but not conclusively substantiated) that safety only has to be guaranteed for a considerably shorter period of time ("After about 100,000 years, the spent fuel has the same activity as the uranium that was once mined in order to produce the fuel"). Such an assumption has not yet been proven in the international debate.

Response: That the granitic bedrock would not be accorded decisive importance for the long-term safety of the repository is a misconception. This is for two reasons - the rock properties are essential for the performance of the engineered barriers and the rock itself constitutes an important barrier to retain and delay any radioactive emissions from the engineered barriers. The selected site in Forsmark has for a granitic bedrock very low permeability and a low frequency of water-bearing fractures, which is favourable for both these aspects. Rock properties were decisive for the choice of Forsmark as the site for the final repository.

The time aspect for the safety assessment of a spent fuel repository is also misunderstood. It is clear from the documentation for the Espoo consultations both that Swedish regulations require that the analysis covers one million years after closure and that the assessment of the repository in Forsmark is made for this time period. The assessment shows that the granitic rock at Forsmark together with the engineered barriers of the KBS-3 method provide full protection for humans and the environment throughout this period.

10 Germany – private individuals and organisations

10.1 Similar statement from 34 persons

34 persons have submitted a similar statement consisting of some 50 comments. Differences between the documents have been compiled in the document “Compilation of differences in statements – overview”.

Response: SKB notes the comments and also notes that the comments result from the persons having only read the consultation documentation available in German, which is the 17-page non-technical summary. Information on and answers to the issues concerned are, however, available in the much more extensive consultation documentation that was provided in English. The comments will therefore not be adressed. As regards the extent of the documentation that has been translated into German, SKB refers to the Swedish Environmental Protection Agency's assessment, which is found in the answer to question 10.4.1.

10.2 Name lists – Rolf Bertram and others

Six petitions with the following comments have been signed by 62 persons:

10.2.1 We express, for the following reasons, objections to the planned nuclear facilities:

1. **Buildings located above ground in the planned interim storage facility, the planned final repository for irradiated nuclear fuel elements as well as in the planned encapsulation plant are neither sufficiently secured against terrorist attacks nor against aircraft crashes.**
2. **Even during the planned operation, radioactivity will be continuously released into the biosphere through the exhaust air and water emissions.**
3. **Accidents during the transportation of radioactive materials by sea and land can not be excluded.**
4. **Releases of radionuclides may reach Germany via air and water - radioactivity knows no borders.**

Response: SKB notes the comments and refers to the answers to questions 9.1.1 and 9.2.1. Question 3 has been commented in the document "Consultation according to the Espoo Convention", Appendix 2 "Clarifying questions from Poland".

10.3 Name lists – Fritz Storim and others

Two petitions have been signed by 19 persons. The signed document consists of the following text: *With my signature, I offer objections to the proposed project "EIA Sweden: Final repository, encapsulation plant and extension of interim storage", the reasons for this are described in detail in the following pages.* The signed document also contains the 50 comments outlined in Section 10.1.

Response: SKB notes the standpoint.

10.4 Brigitte Artmann

The following are the views presented in the first part of the document. The document concludes with the 50 comments also given by 34 persons, see section 10.1. A similar petition has been submitted by Karsten Hinrichsen.

10.4.1 a. 17 pages in German is decidedly too little to get an overview of Sweden's plans. I can speak English, but many of Germany's 80.5 million citizens are certainly not able to read documents in English. I therefore refer only to the German version, that is, of 17 pages. Pure German-speaking people are discriminated against. While Swedes can read the full documentation. Sweden is therefore in breach of international and European law. Sweden has signed the Aarhus Convention of 20 May 2005, and has also approved the Espoo Convention. Relevant items are as follows:

The texts are written by Jan Haverkamp, Greenpeace:

Over European law also stand international treaties - and especially where the EU is party to those treaties, it is the European Commission that has to guard over their implementation.

Here's the law:

Aarhus 3(9): Within the scope of the relevant provisions of this Convention, the public shall have access to information, have the possibility to participate in decision-making and have access to justice in environmental matters without discrimination as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities.

Espoo 2(6): The Party of origin shall provide, in accordance with the provisions of this Convention, an opportunity to the public in the areas likely to be affected to participate in relevant environmental impact assessment procedures regarding proposed activities and shall ensure that the opportunity provided to the public of the affected Party is equivalent to that provided to the public of the Party of origin.

EIA Directive 85/337/EC, art. 7(5). The detailed arrangements for implementing this Article may be determined by the Member States concerned and shall be such as to enable the public concerned in the territory of the affected Member State to participate effectively in the environmental decisionmaking procedures referred to in Article 2(2) for the project.

Response: The Swedish Environmental Protection Agency's letter of 27 May 2016 to the Land and Environment Court "Report on completed transboundary consultations for SKB's planned interim storage, encapsulation and final disposal of spent nuclear fuel, Case No. M1333-11." (Case ID: NV-07138-15) states: "The Espoo Convention does not regulate how translations are to be made. Over the years practices have developed among countries as to what should be translated into the relevant languages. How much should be translated to the affected party's language is determined from case to case. Some countries have bilateral

agreements where the translation issue can be regulated but Sweden has no such agreements. A benchmark is that the non-technical summary always should be translated to the affected party's language. If it is clear that there is an concerned public (“the public … in the areas likely to be affected” article 4 point 2, Espooconvention) in the affected party, for example, if the case concerns a facility very close to a border or if it is obvious that there is a risk for significant environmental impact in the other country, a larger part of the documentation is usually translated to the language of the country concerned, usually following direct contact between responsible parties in each country. More technical information that is primarily of interest to the country's environmental authorities and for environmental or industry organisations is usually also translated into English. In this case, neither the responsible authorities in Germany or Sweden considered that there is a risk of significant transboundary environmental impact or that there was need for translation of additional documentation into German."

SKB also wants to stress that comprehensive consultation documentation was available in English. Five countries had expressed their wish to participate in the consultations. The non-technical summary of the EIS was translated into the languages of these five countries, including German.

10.4.2 80.5 million people in Germany were not actively informed. They found the EIA documentation by chance. Or did not. During the earlier stages, I could not attend inperson because I did not know. The claim "information was available online and everyone could participate," is not true. Only the people who knew or were informed about it could participate. This must be improved.

Response: Sweden has, through the Swedish Environmental Protection Agency, distributed the consultation documentation provided by SKB to the countries around the Baltic Sea, including the responsible authority in Germany. SKB is not responsible for further dissemination.

10.4.3 The KBS-3 method is described, but the German version says nothing about the problems with corroding copper canisters. This must be rectified.

Response: Information on the corrosion of the copper canisters that is expected is reported in SR-Site, which was included in the consultation documentation. SKB can not see that the very limited and slow corrosion that is expected will lead to any problems with regard to the post-closure safety.

10.4.4 The realistic risk of war or terrorist attack is missing in the German version, but also in the English version. During repository operation for 45 years, it is possible to cause an unimaginable disaster with bunker-piercing weapons through the open entrance. The Baltic Sea would be seriously affected. A description of how this is to be avoided does not exist, and must be submitted.

Response: The goal of the entire final disposal programme is that the spent nuclear fuel will be disposed of so that the repository will be able to operate safely without society's control. The method that SKB intends to use, KBS-3, will be located at a depth of 500 meters in the Swedish bedrock. This depth is an optimization of scientific and technical parameters to achieve the reducing conditions needed for post-closure safety, but it also serves to make the spent nuclear fuel very difficult to access for unlawful handling.

In addition, the physical protection of the final repository for spent nuclear fuel is part of the application that SSM and ultimately the government will decide on for a future license for the construction of the facility. Ongoing analyses that take into account international development are made by SKB for the physical protection, in consultation with the responsible authorities. For obvious reasons, the description of the physical protection is classified and hence not available to others than the Swedish authorities.

10.4.5 Espionage and misuse of the knowledge gained by terrorist groups is not explained sufficiently and needs to be clarified. https://www.publicintegrity.org/2016/02/29/19376/terrorist-group-s-plot-create-radioactive-dirty-bomb

Response: See answer to question 10.4.4.

10.4.6 Sweden wants to operate its nuclear power plant for several more years. The risks that John Large has described in a Greenpeace study are relevant also in Sweden. The study is secret. Greenpeace would surely however release this study at the request of the Swedish safety authorities. Contact Heinz Smital: Heinz.Smital@greenpeace.de

This must be improved in the text.

Response: See answer to question 10.4.4.

10.4.7 Oda Becker has also presented several studies on terrorist attacks in interim storage facilities and nuclear power plants commissioned by Greenpeace and the German BUND. They are available on the Internet or can be ordered from Ms. Becker. These studies are also relevant for the presented project. Contact Oda Becker: oda.becker@web.de

This must be improved in the text.

Response: See answer to question 10.4.4.

10.4.8 "It must first be proven clearly that the artificial barriers actually work and protect us from nuclear waste. In Finland they say: We will solve the problem of corrosion when it occurs. They know therefore that this problem exists and I think it is very problematic to begin construction of the repository and then maybe stop again because problems arise."

Response: SKB has in SR-Site, supported by various supplements to SSM (see the document "The barriers in the KBS-3 repository in Forsmark," which was included in the consultation documentation), clearly demonstrated that the repository's engineered barriers will function as intended.

We also question the "quotation" from Finland, whose origin we do not know. We work closely with our sister organisation in Finland (Posiva) in all matters related to barrier performance and know that they take these matters as seriously as we do ourselves. In its review of Posiva's application, the Finnish Radiation and Nuclear Safety Authority (STUK) stated that Posiva for the next step in the licensing process needs to provide a detailed account of among other things corrosion issues. This is of course also Posiva's intention.

10.5 Bastian Zimmermann

A similar petition has been received from Bastian Zimmermann and four other persons. Differences between the documents have been compiled in the document "Compilation of differences in statements – overview".

10.5.1 Rock stress and water permeability

Sweden follows the concept of storing radioactive waste in the bedrock. When selecting a site in the bedrock, the rock mechanical stress conditions in particular must be taken into account. On the Forsmark site, these rock mechanical stress conditions are more precarious than at the Oskarshamn site. This has an impact on the long-term stability of the repository.

As a result of the last ice age, the Scandinavian land (the Cap of the North) is rising steadily. As a result, movements in the rock and reactivation of ancient fault zones occur. Earthquakes can not be excluded. Since the different blocks of rock are not rising uniformly, old fractures and fissures in the ground will grow. Also, new cracks may be formed (mechanical fault zones). In connection with this, the used storage containers and the surrounding bentonite may be damaged. Moreover, it can lead to different types of groundwater penetrating.

Since the basic rock types in Sweden have a significantly high water permeability, special measures must be taken with regard to the container concept for the disposal of radioactive material, as the container assumes the crucial barrier function in the repository system.

Response: The selected site in Forsmark has low permeability and low frequency of water-bearing fractures compared to typical granitic formations in the Fennoscandian Shield. Rock stresses are relatively higher. An important issue in the assessment of post-closure safety is to evaluate the evolution of the rock from excavation, the impacts of disposal and continued evolution first due to the heat generated from the spent fuel and later due to the load from future glaciations. These analyses are presented in Chapter 10 of SR-Site and include the evolution of both rock, buffer and canister. The conclusion from these analyses is that future mechanical loads have very limited impact on rock properties.

10.5.2 Canister Concept

In Sweden, copper canisters will be used for disposal of the highly radioactive waste. In addition, a bentonite buffer encloses the copper containers.

1. Described advantages of copper canisters and bentonite buffers

Named advantages of the copper canisters are that biofilms will have difficulty forming on copper. They are said to be antibacterial. Consequently, they are said to be difficult to corrode. The bentonite buffer is described as important for the mechanical stability. The buffer is said to protect in case of

earthquakes and vibrations and seals against water and other liquids.

2. Disadvantages of copper canisters and bentonite buffers

As for the long-term safety it can not be guaranteed that the copper canisters will provide adequate protection in contact with water for a period of 100,000 years (what is needed is 1 million years, see below). Therefore, contact with water must be avoided.

Although the canisters are difficult to corrode there is a danger that corrosive H2S is formed in bentonite as a result of an intensive sulphate reduction. For Sweden, this is important because the clay mineralogy and the absorption behaviour may vary depending on the geochemical load. In poorly compacted bentonite, microorganisms may penetrate, such as sulphate-reducing bacteria that produce H2S and thus attack the copper containers.

Several experts fear a corrosion of the copper containers, such as Gunnar Hultqulst, materials researcher at the Royal Institute of Technology (KTH) in Stockholm, Peter Szakalos, materials researcher at the Royal Institute of Technology (KTH) in Stockholm, the Swedish environmental organization MKG - the Swedish NGO Office for Nuclear Waste Review and Prof. Dr. rer. nat. Joachim Reitner at the University of Göttingen.

As far as I know, the operator Swedish Nuclear Fuel and Waste Management Co (SKB) must show that the copper containers that enclose the nuclear waste will remain intact and protect against radiation during the time period required. Artificial barriers like the container must prevent highly toxic radionuclides from leaking out and reaching the environment through the groundwater. According to current science and technology, an isolation from the biosphere for a period of 1 million years is considered necessary for highly active long-lived waste. In my opinion, it is not possible to ensure an isolation for 1 million years at this site with sufficient reliability with a concept based so heavily on artificial barriers. In my opinion, it is a serious mistake by the authorities, for such dangerous and long-lived radioactive waste, to not select the location in Sweden for the final repository that provides the best possible safety according to current knowledge. Upon release from the repository, a farreaching radioactive contamination via the Baltic Sea must be feared, in my view. Therefore, I consider the selected location to be irresponsible.

In addition, the Swedish operator SKB should reconsider its repository concept with regard to the ability to control the nuclear waste containers. Prof. Dr. Reitner at the University of Goettingen proposes e.g. the development of a concept where the containers after the operational phase (late 2100s) for a certain period may be retreived as a precaution and their quality and integrity be checked. Thus, there would be an opportunity to react faster to any corrosion damage. Our experience from final disposal in Germany shows that certain eventualities that jeopardize the security can not be predicted. That is

why the safety requirements of the German Environment Ministry from 2010 also include the possibility of retreiving the radioactive waste for a period of 500 years.

The Swedish organization MKG also suggests leaving the waste produced so far in the interim storage facility CLAB in Oskarshamn for the time being and researching safer containers and storage methods.

Response: SKB has long ago identified sulphide as the main cause of copper corrosion in the final repository and corrosion caused by sulphide both from groundwater and from microbes in the clay buffer and backfill are included in the safety assessment, as well as all other known corrosion mechanisms. There are strong scientific objections to the claims about corrosion made by some researchers at KTH. This has been accounted for extensively by SKB in the ongoing licensing process. The safety assessment covers a million years, and the results show that the canisters provide full corrosion protection during this entire time period.

SKB intends to monitor the repository during operation. This is clear from our response to Poland's clarifying question No. 2, see the document "Consultations according to the Espoo Convention", Appendix 2 "Clarifying questions from Poland". If future generations want to retrieve the spent fuel after the closure of the repository they are free to do so, and society will then consider whether the radiation safety benefit of a retrieval is in reasonable proportion to the radiation exposure and costs that would result from such a retrieval. SKB would like to emphasize that the safety of the entire final repository concept is based on the idea that it should not be necessary to monitor the repository and that the repository performance is so robust that a decision to retrieve the repository for radiation safety reasons must be considered virtually impossible.

10.5.3 Further aspects

It is as yet unclear whether the expansion of capacity of the existing interim storage facility CLAB will also lead to the interim storage being updated according to the most recent science and technology. Questionable for example is the storage method in pools in caverns approximately 30 meters deep in contrast to today's preferred solution with dry storage. Nor is it apparent from the documents made available by SKB if new measures will be taken in view of the natural disaster in Fukushima and the real threat of international terrorism, in terms of protection against flooding and terrorism. Lacking also is a reliable risk assessment for the transport of radioactive material to the Simpevarp peninsula, especially as SKB itself describes the county road 743, used for transport, as periodically having a high traffic load.

The assumption that no national interests or protected areas will be affected neither by CLAB nor by transports to and from the facility is not proven in detail. Nor is it proven that no health risks to local residents are caused by the continuous release of radionuclides and that the overall risk is significantly lower than the risk criterion (SSM), which means that people in the vicinity of the repository may not be exposed to greater risks.

In the search for a final repository for high-level radioactive waste, the greatest possible safety of the site should be a top priority. The voluntary principle, which in Sweden has led to two nuclear power municipalities having voluntarily applied as sites and one of them finally being named as a potential location for the repository, must not

lead to inadequate consideration of critical security issues for the long-term safety and the protection of man and nature against radiation. I consider the selected location, directly on the Baltic coast, to be irresponsible.

I ask you to consider these remarks in the further process and particularly in the siting decision, and I would be grateful if you would keep me informed of your continuing process.

Response: Clab has been in operation since the mid-1980s and safety improvement measures will take place for as long as the facility is in operation. SSM is responsible for the supervision of nuclear activities. Wet storage of spent nuclear fuel is a proven method. The supplementary EIS concerning extended interim storage in Clab and Clink that was included in the consultation documentation discusses dry interim storage as an alternative to extended interim storage in Clab's existing pools.

After the nuclear accident in Fukushima, demands have been made for implementation of so-called stress tests of nuclear power plants and the Swedish Government has decided to also include Clab in this requirement. SKB has conducted the stress tests for Clab and the results have been reported to SSM.

Transport of radioactive waste between the Swedish nuclear power plants and SKB's facilities is only done with the specially constructed vessel M/S Sigrid and transport of radioactive material by road 743 is therefore not relevant. Transport of radioactive waste is presented in the EIS.

The EIS gives an account of the consequences of continued operation of Clab (Chapter 8) and of the construction and operation of Clink (Chapter 9). This account includes assessments of both the impact on the natural environment and the possible consequences of increased transport to and from the facility. The consequences for humans and the environment of the radioactive releases from the operations are also reported in detail. The release of radioactivity from the existent Clab facility is low and emissions from Clink are also estimated to be low. Information on releases of radioactivity is the basis for calculations of the so-called dose to the critical group to assess the consequences for humans. The dose requirement in force in Sweden is applied to all nuclear facilities in the same geographic area. The dose contributions from existing nuclear facilities in Oskarshamn, Clab and the nuclear power plants, are together far below the limit.

Site selection and the factors considered in this selection are presented in Chapter 3 of the EIS and Section 3.7.6 specifically concerns the issue of siting on the coast or inland.

As regards information on the ongoing process, please refer to the answer to question 9.1.3 above.

10.6 Martina Hasse

10.6.1 Apart from all the reasons, which should be addressed individually, that speak against your planned nuclear waste repository, it should be rejected in principle as long as nuclear waste is still produced in nuclear power plants in your country, Forsmark, Oskarshamn and Ringhals. Otherwise, we support the objections of BIWAANAA from the Upper Palatinate

Response: SKB notes the standpoint.

10.7 Umweltinstitut München

SKB perceive that the main objection from Umweltinstitut Munich stems from the absence of sufficient information in German. This opinion is commented on in the response to question 10.4.1.

Umweltinstitut Munich also gives a number of opinions resulting from only taking into account the information provided in German. These opinions are not commented on.

10.7.1 The documentation submitted is not sufficient. In German only a translation of the non-technical summary is provided, which includes only 17 pages. The full report is, however, important for an evaluation. According to the Espoo Convention, all citizens should have the opportunity to see the complete documentation in the local language.

The goal of a "full and open involvement of the German public" has thus not been achieved. Therefore the provision of the full report in German and a new process is required.

Response: See answer to question 10.4.1.

10.7.2 The current EIA report is very vague, with many empty claims and even contradictions. It does not permit an adequate assessment of the planned final repository and facility.

For these reasons, we reject the current "non-technical summary" and request a new report with complete documentation in German which allows an assessment.

Response: See answer to question 10.4.1.

10.8 Greenpeace

10.8.1 The information provided is insufficient to assess the project. Specifically the information available in German does not meet the requirements of the Aarhus Convention.

Response: See answer to question 10.4.1.

10.8.2 Selection of repository site/options

In June 2009, a systematic comparison of the conditions on the sites showed that all things considered, Forsmark is the site that offers the best prospects for achieving long-term safety. SKB therefore decided to submit licence applications for a final repository located in Forsmark. [1]

The choice of location for the construction of the repository in Forsmark assumes that long-term safety can be met by the planned engineered barriers. Under this condition, the requirement on the geological barrier to prevent the spread of radioactivity is of secondary importance. For now, however, the barrier effect of the technical facilities for the requested time period is highly questionable. The scientific hypothesis that oxygen-free water does not lead to corrosion of copper containers seems to be false (see footnote[2]). This results in corrosion rates that can lead to the release of radioactivity within less than 1000 years. Thus, the geological barrier effect once again becomes more important and the question of siting becomes relevant. This also means that SKB's statement that a systematic review of conditions at the sites shows that overall Forsmark would be the site that offers the best conditions for achieving long-term safety loses its foundation.

Response: There is extensive support for copper in pure, oxygen-free water only corroding to the very limited extent predicted by established thermodynamics. This has been extensively reported by SKB in the licensing process for the spent fuel repository in Forsmark. SKB's safety assessment shows that the engineered barriers, combined with the favourable geological conditions in Forsmark, provide full protection for humans and the environment also in the perspective of one million years. The assessment also shows that if all canisters are hypothetically damaged, the rock at Forsmark provides a significant reduction of the releases into the biosphere. The selected site in Forsmark has for a granitic bedrock very low permeability and a low frequency of water-bearing fractures. This means that the supply of corrosive substances into groundwater is slow and that radioactive substances that could reach the groundwater if a canister is damaged will be delayed considerably.

[1] http://www.skb.com/wp-content/uploads/2016/02/UVE-f%C3%BCr-das-KBS-3-System-%E2%80%93-nichttechnischeZusammenfassung.pdf
s.4

[2] http://nuris.org/wp-content/uploads/2015/04/Arvegard_The-Review-of-the-Swedish-Spent-Fuel-Repository-License-Application.pdf

10.8.3 Deficiencies in the canister concept

"Filled canisters are placed in transport casks and transported by sea to the final repository. The function of the canister in the repository is to contain the spent nuclear fuel and isolate it." [3] At present, the canister concept must be regarded as a failure.

Response: SKB has in SR-Site demonstrated that the canisters in a KBS-3 repository at Forsmark are designed to withstand both chemical and mechanical loads in the final repository. In the response to the supplementary information on the canister's corrosion properties and mechanical strength provided during the licensing process further details to support this have been presented. A summary of the material on the barriers that form the basis for SSM's review of the application under the Nuclear Activities Act, see the document "The barriers in the KBS-3 repository in Forsmark", included in the consultation documentation.

10.8.4 Deficiencies in the geological description

There are long, water-conducting horizontal fractures within the upper approximately 150 metres of the rock. At depths greater than 400 metres, the average distance between water-conducting fractures is more than 100 metres and the groundwater flow is limited. Due to these conditions, along with the area's gently dipping topography, most of the groundwater flows take place relatively close to the ground surface, without much exchange with deeper groundwaters. [4] Even if the exchange with potentially radioactive contaminated water (due to faults in the engineered barriers) is currently considered to be low, an impact on the environment must still be expected. No indication was given of how much a temperature increase due to the highly radioactive and heat-generating radioactive waste affects groundwater flow and how warmer water affects the higher groundwater flow. Referring to the problems in the former final repository Asse II in Germany, a more detailed assessment of the waters in the area surrounding the repository must be completed as soon as possible. A temporal assessment of the sustainable stability is missing entirely.

Response: The selected site has been investigated and evaluated very carefully. This is clear from Chapter 10 in SR-Site, which is part of the consultation documentation. Through the systematic use of safety functions in the safety assessment, both the chemical and mechanical stability of the repository is evaluated for the entire time period covered by the assessment. Assessments of stability are carried out in several different time frames. From the documentation it is also evident among many other things that the heating of the rock has a very limited impact on the groundwater flow.

[3] http://www.skb.com/wp-content/uploads/2016/02/UVE-f%C3%BCr-das-KBS-3-System-%E2%80%93-nichttechnischeZusammenfassung.pdf
s.10

[4] http://www.skb.com/wp-content/uploads/2016/02/UVE-f%C3%BCr-das-KBS-3-System-%E2%80%93-nichttechnischeZusammenfassung.pdf
s.5

10.8.5 Additional problems with the proposed disposal concept

Additional points of criticism[5] stem from problems caused by the possible swelling of the bentonite clay barrier, by stray currents from the direct current power cable under the sea, by tectonic and glacial disturbance forces acting on the mountain. Scenarios with people's disruptive behavior during the storage process and security measures that prevent the theft of nuclear material in the long term are not dealt with adequately in the EIA.

Response: SKB has in both the application and the supplementary material presented during the licensing process shown that the effects of leak currents and tectonic and glacial loads do not threaten the safety of the repository after closure. The bentonite clay is expected to swell after deposition and this property is favourable for safety. Human impact on the repository is analyzed in the application according to requirements in the Swedish regulations, which are on par with international standards.

10.8.6 Extending the interim storage facility Clab

If an extension of the interim storage in Clab is ecologically motivated, this is not clear from the minimal version of the EIS. An extension of the interim storage can provide an economic advantage, but it is important to question how high the environmental impact actually is. SKB's assessment seems to be rather short-sighted, because the site must absolutely be reassessed according to current, applicable standards, not as in the environmental impact assessment [EIA] with standards more than 40 years old.

Response: The environmental impact caused by the extension of Clab is treated in the consultation document "Additional EIS, Environmental Impact Statement, regarding changes in Clink and increased interim storage", which is available in English.

[5] http://www.mkg.se/