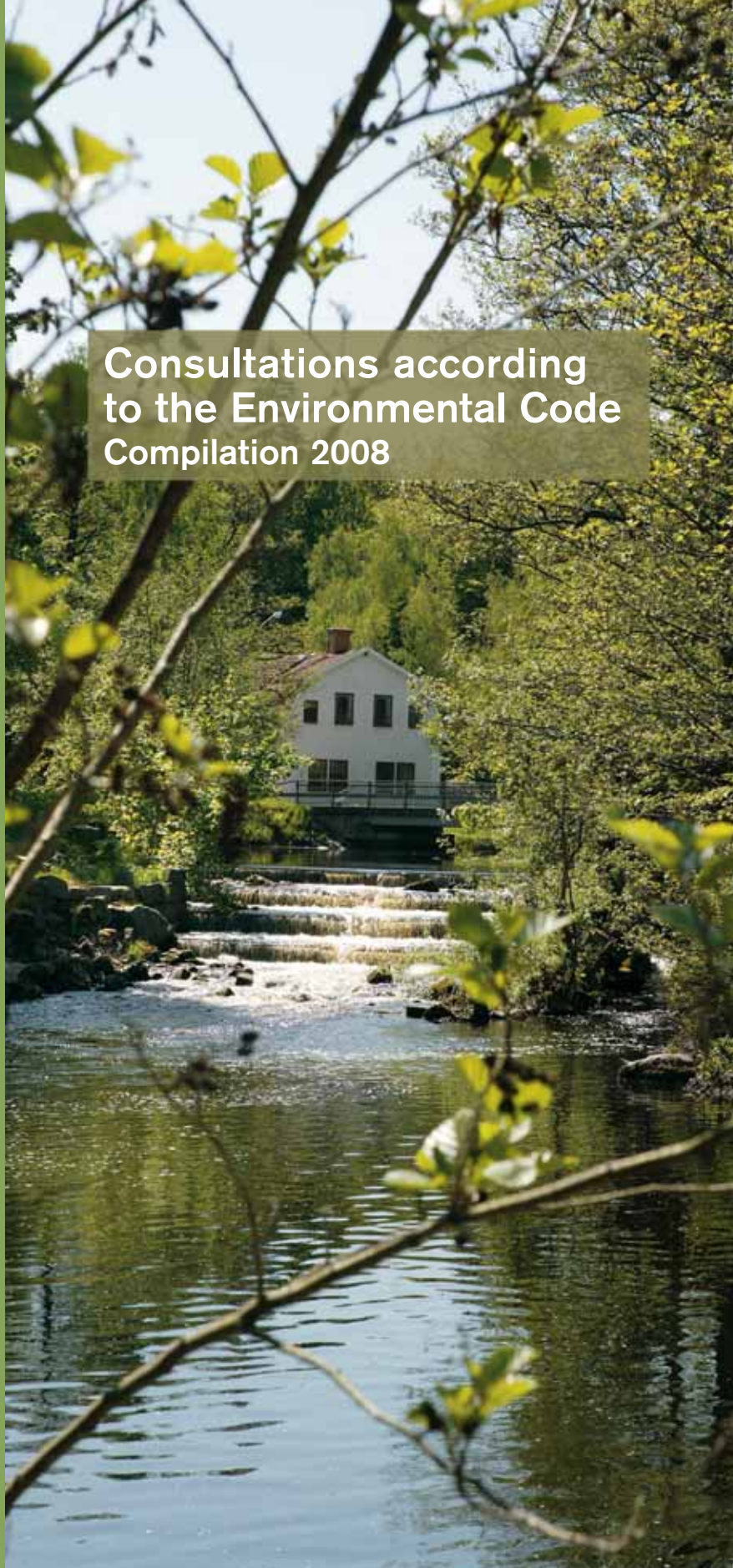
# Consultations according to the Environmental Code
## Compilation 2008



# Consultations according to the Environmental Code

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# Contents

# 2008 – next-to-last year of consultations!

**The consultations according to the Environmental Code and our work with the EIS for the upcoming applications are now entering the home stretch. The finish line is in sight. In 2009 SKB will select the site where we want to build the final repository. We will then prepare the applications under the Nuclear Activities Act and the Environmental Code. To provide enough time for the viewpoints that emerge from the consultations to be taken into account, they will be concluded at the end of 2009, about six months before the applications are submitted.**

It has now been seven years since we at SKB, after many years of preparations, initiated the site investigations and the formal consultations. The site investigations are concluded, but some monitoring and sampling is still taking place.

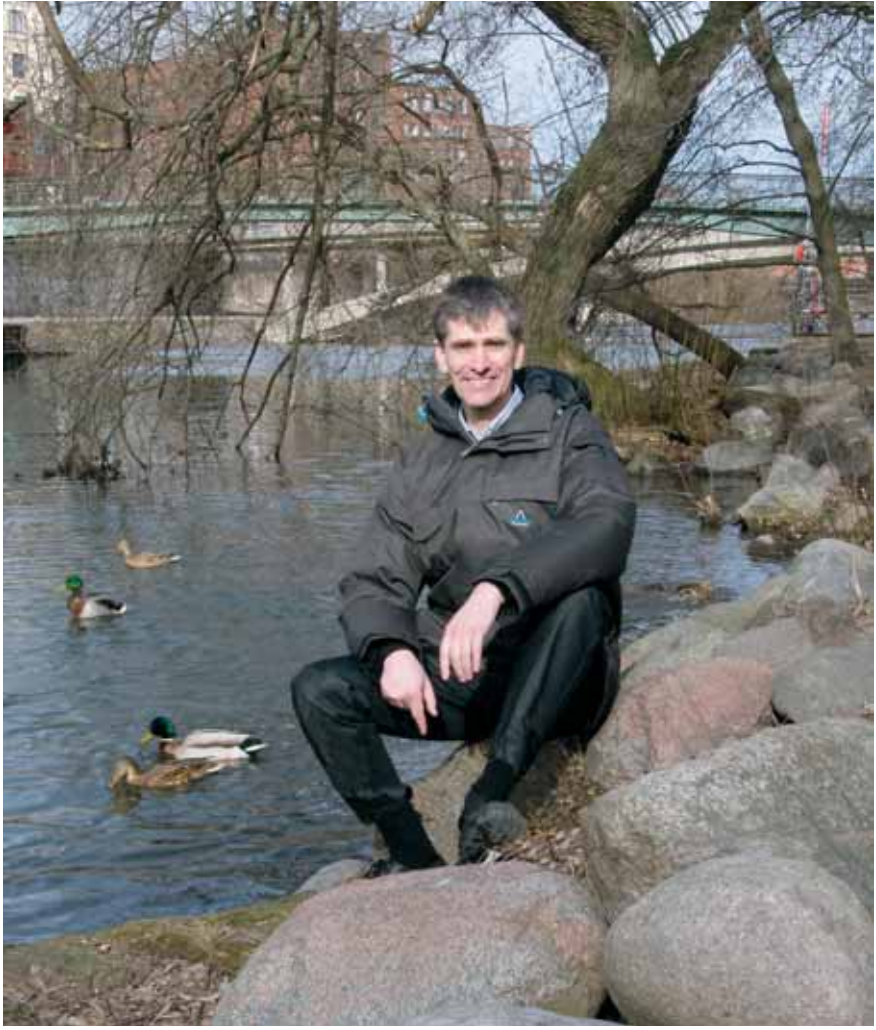
The data and the information that have been gathered during the site investigations are now being used in safety assessments, facility layout and design, environmental impact assessments, etc.

As in previous years, we held meetings and activities in the two site investigation municipalities and the two concerned counties during 2008. Nearby residents, organizations and decision-makers in the concerned municipalities, county administrative boards, regional councils, the new Swedish Radiation Safety Authority (SSM) and the Swedish National Council for Nuclear Waste, as well as the environmental organizations that receive funding from the Nuclear Waste Fund, continue to follow our work with interest.

Viewpoints and questions from the 2008 consultations are presented in this compilation. A general consultation meeting was held in Forsmark in October, preceded by presentations on the theme "siting, aesthetics and transportation". Much of what was said at or within the framework of the consultation meeting therefore had to do with transportation and its environmental impact. An equivalent consultation meeting was held in Oskarshamn in early 2009.

The annual nearby resident meeting in Forsmark was held on 23 August. In the light of our experience from the public consultation meetings, a much-appreciated formal consultation meeting was held in connection with this. The purpose was to give nearby residents an opportunity to ask questions about a possible final repository for spent nuclear fuel in Forsmark.

During 2008 we have furthermore carried out, via the Swedish Environmental Protection Agency, the first part of the consultations on possible transboundary environmental impact in accordance with the Espoo Convention. The consultations were carried out with the Baltic Sea countries that had previously declared their interest to participate. Viewpoints received mainly concerned the risk and consequences of transboundary dispersion of radioactive substances, in the short term (for example in connection with accidents) and in the long term (after closure



of the repository). The second and concluding portion of the consultations with the Baltic Sea countries will take place in connection with the circulation of the applications for review and comment.

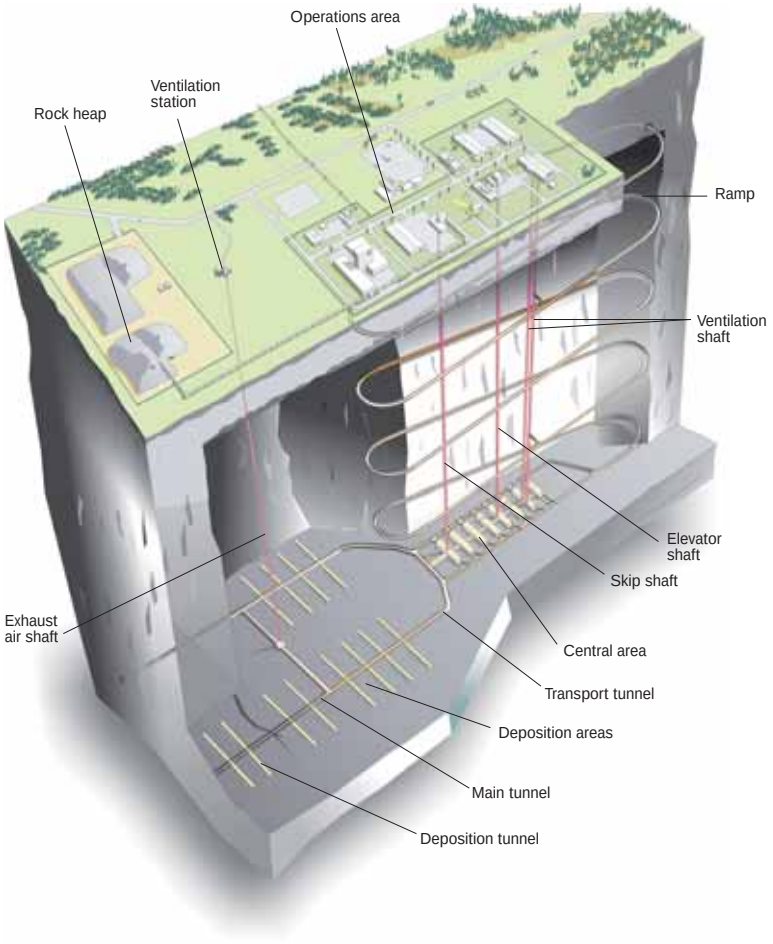
The Swedish National Council for Nuclear Waste's transparency programme has continued. Hearings have been held during the year on systems analysis, site selection and democracy and participation. For us who work with consultations, the hearing on democracy and participation was particularly interesting.

In conclusion, I would once again like to emphasize that your participation, along with all the questions and viewpoints that are addressed within the framework of the consultations, means a great deal to us and our success in building good facilities. This contributes to a long-term safe solution and minimum damage and detriment on the sites for the encapsulation plant and the final repository.

*Erik Setzman*
Head of the EIA Unit

# The nuclear fuel project

The nuclear power utilities in Sweden joined together in the 1970s to form Svensk Kärnbränslehantering AB (SKB, the Swedish Nuclear Fuel and Waste Management Co). Our mission is to manage and dispose of the spent nuclear fuel and radioactive waste from the Swedish nuclear power plants. This mission entails protecting man and the environment in both the short and the long term.



SKB's proposal is that the spent nuclear fuel will be disposed of according to the KBS-3 method. This involves encapsulating the fuel in copper canisters with cast iron inserts and depositing the canisters at a depth of 400–700 metres in the bedrock, where stable mechanical and chemical conditions prevail. The canisters are surrounded by bentonite clay, which constitutes a buffer against minor rock movements and prevents corrosive substances from getting in to the canister. The clay also effectively absorbs radionuclides that are released if the canister is damaged.

The key components for disposal according to the KBS-3 method are an encapsulation plant and a final repository.

The scientific and technical basis for the method has been continuously developed and presented to the regulatory authorities and the Government every third year in the RD&D programmes. The strategy of geological final disposal according to the KBS-3 method has been approved repeatedly.

## Purpose of the nuclear fuel project

The general requirements and premises for management and disposal of spent nuclear fuel are set forth in Swedish legislation and in international agreements and conventions which Sweden has pledged to abide by.

The most important requirements in Swedish legislation are *the environmental requirements* in the Environmental Code, the *safety requirements* in the Nuclear Activities Act with associated regulations, and the *radiation protection requirements* in the Radiation Protection Act with associated regulations.

Primarily based on these requirements and points of departure, SKB has defined the purpose of the work for the disposal of the spent nuclear fuel:

*SKB's purpose is to build, operate and close a final repository with a focus on safety, radiation protection and environmental considerations. The final repository is being designed to prevent illicit tampering with nuclear fuel both before and after closure. Long-term safety will be based on a system of passive barriers.*

*The final repository is intended for spent nuclear fuel from the Swedish nuclear reactors and will be created within Sweden's boundaries with the voluntary participation of the concerned municipalities.*

*The final repository will be established by those generations that have derived benefit from the Swedish nuclear reactors and designed so that it will remain safe after closure without maintenance or monitoring*

## Permit applications

Today the spent nuclear fuel is being temporarily stored in Clab (central interim storage facility for spent nuclear fuel) in Oskarshamn Municipality. In November 2006, SKB submitted an application under the Nuclear Activities Act for a permit to build and own an encapsulation plant for spent nuclear fuel and a licence to operate it integrated with Clab. This entails that the permits for Clab are also being reviewed. An environmental impact statement (EIS) was appended to the application.

Site investigations in preparation for siting of the final repository have been concluded in both Oskarshamn and Östhammar municipalities. The material has been reviewed, analyzed and evaluated during 2008 as a basis for the continued work. SKB plans to select one of these sites in mid-2009 and then prepare an application under the Nuclear Activities Act for the final repository. At the same time, SKB will apply for permits under the Environmental Code for the interim storage facility, the encapsulation plant and the final repository. A joint EIS must be appended to the applications.

## Consultations according to the Environmental Code

The consultation procedure for applications under both the Environmental Code and the Nuclear Activities Act is regulated by Chapter 6 of the Environmental Code. The consultations are supposed to deal with the siting and design of the activities as well as the form and content of the EIS. Consultations are held with the County Administrative Board, the concerned national authorities and municipalities, the public and the organizations that can be expected to be affected. If an activity is likely to have a significant environmental impact in another country, the Swedish Environmental Protection Agency is required by the Espoo Convention to inform that country and hold consultations with that country regarding any transboundary environmental impact.

The consultation process was initiated in 2002 and will be concluded about six months before the permit applications are submitted. Since the interim storage facility, the encapsulation plant and the final repository are parts of the system for final disposal of spent nuclear fuel, SKB has chosen to coordinate the consultations. Consultations are proceeding in parallel in the municipalities of Oskarshamn and Östhammar. An account of the proceedings, what questions have been raised and how they have been handled will be provided in the consultation report, which is an appendix to the EIS.

Previously held consultations are compiled in *Consultations according to the Environmental Code*, *Compilation 2003*, *2004*, *2005* 2006 and *2007 respectively*. This is the compilation of the 2008 consultations.

# SKB's consultations

SKB's goal for the consultations is that everyone who wants to get involved should be given an opportunity to do so. This applies to both private citizens and organizations as well as local and national authorities. The consultations also give SKB an opportunity to benefit from the knowledge and viewpoints of the participants.

The work leading up to the final disposal of the spent nuclear fuel is extensive and includes many years of research, studies, site investigations, design etc. It is not possible to consult about everything involved in the project on a few isolated occasions. SKB has therefore held consultations on different themes as the relevant studies have been completed. Questions and discussions at a consultation meeting are not limited to this theme, however, but focus on the participants' questions and viewpoints. All aspects that concern the final disposal of spent nuclear fuel can be brought up.

## Consultation meetings

Over the years, two main different types of consultation meetings have evolved. The one type, called public consultations, are held as meetings in the particular municipality. These meetings are advertised in the local and regional press. On a couple of occasions they have also been advertised in the national press. Prior to each public consultation meeting, SKB prepares background material with a given theme. Presentations are made on the theme before the actual consultation meeting. Participants have an opportunity to present both oral and written viewpoints up to two weeks after the meeting.

Written invitations to participate at the consultation meetings and/or to submit written viewpoints are sent to the organizations that receive funding from the Nuclear Waste Fund to follow the consultations, concerned government authorities and agencies and concerned municipalities. The material that is compiled prior to the meeting is available via SKB's website or can be requested from SKB. The material is also enclosed with the written invitations.

The second type of consultation meetings are those held with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group. At these meetings,

representatives of the relevant county administrative board and municipality meet with representatives of the Swedish Nuclear Power Inspectorate (SKI), the Swedish Radiation Protection Authority (SSI) and SKB. On 1 July 2008, SKI and SSI were merged into a single authority, the Swedish Radiation Safety Authority (SSM), with overall national responsibility for nuclear safety and radiation protection. In notes and minutes prior to 1 July 2008, SKI and SSI act as separate authorities and after that as one authority, SSM.

For a number of years the local county administrative board chaired the Oskarshamn EIA Forum and the Forsmark Consultation Group, but as from February 2008 the work forms were changed and SKB took full responsibility as the activity operator for driving the work of the group as a part of the consultations provided for in Chapter 6 of the Environmental Code. The principal changes were that chairmanship was transferred from the county administrative board to SKB and that SKB will now preserve the original minutes from the meetings.

Furthermore, consultations are held in connection with nearby resident meetings and with countries around the Baltic Sea in accordance with the Espoo Convention.

## Espoo Convention

In early 2008, as the first part of the consultations regarding transboundary environmental impact, the Swedish Environmental Protection Agency sent a draft table of contents for the EIS for the final repository system and excerpts from the SR-Can safety assessment to the countries around the Baltic Sea: Denmark, Estonia, Finland, Latvia, Lithuania, Poland, Russia and Germany.

## Environmental Impact Statement

The site investigations went on for six years and are now finished. The purpose was to gather the data needed for the evaluation of the suitability of the investigated sites for a final repository for spent nuclear fuel. Does the site satisfy the fundamental safety requirements? Are the construction-related conditions fulfilled?

The work of identifying the disturbances which the final repository system can give rise to, what consequences they would entail and suitable preventive measures continued in 2008. Both the structure and the content of the application documents and the EIS will be progressively defined and adjusted in response to what emerges in the consultations, as well as in design, investigations and studies for the planned facilities.

## Consultation reports

An EIS was appended to the applications under the Nuclear Activities Act for the encapsulation plant and Clab. An appendix to the EIS contained an account of the consultation activities related to the encapsulation plant that had been conducted up to and including November 2005.

The ongoing consultations relate to the interim storage facility, the encapsulation plant and the final repository for spent nuclear fuel. All viewpoints that

have emerged in the consultations will be presented in an appendix reference to the consultation report.

## Remaining consultations

SKB plans to select a site for the final repository in mid-2009 and then prepare the applications under the Nuclear Activities Act and the Environmental Code. To provide enough time for the viewpoints that emerge from the consultations to be taken into account in the EIS, the consultations will be concluded about six months before the applications are submitted.

All that remain are a couple of public consultation meetings in Oskarshamn and Forsmark and meetings with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group.

The second and concluding part of the consultations with the Baltic Sea countries is planned to begin during the latter part of 2010.

**Upcoming consultation activities**

**After site selection**

Public consultations on preliminary EIS and water activities.

***Three meetings will be held if Forsmark is selected***

Preliminary EIS – Forsmark (final repository)
Preliminary EIS – Oskarshamn (interim storage facility and encapsulation plant)
Water activities – Forsmark

***Two meetings will be held if Oskarshamn is selected***

Preliminary EIS – Oskarshamn (final repository system)
Water activities – Oskarshamn

In connection with the public meetings, written consultations will be held with concerned government agencies and municipalities as well as the organizations that receive funding from the Nuclear Waste Fund.

Meetings with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group, 1–2 times.

**After the applications have been submitted**

A second, and concluding, written consultation according to the Espoo Convention. The SR-Site safety assessment and the EIS are intended to comprise the main supporting documents. A meeting may be arranged in connection with this consultation occasion. This meeting would probably take place in 2011.

# Local information

In addition to the formal consultations under the provisions of the Environmental Code, extensive information activities are taking place in both Oskarshamn and Östhammar. Face-to-face contact has contributed to people's confidence in SKB in both municipalities.

Planning for the final repository requires a close dialogue with everyone who is in any way affected by our activities. SKB has regular contact with the owners of the land that is affected by or borders on the planned facilities. In addition, we arrange different types of meetings for information and goodwill, along with field visits for the purpose of presenting and obtaining viewpoints on suggested locations of the final repository's ground surface facilities. Three newsletters were sent during the year to everyone living in Misterhult parish in Oskarshamn. One newsletter was sent to nearby and part-time residents in the Forsmark area. The newsletters provide information on the site investigation, our activities in the field and current events.

The contact with nearby residents is particularly important. We therefore regularly invite them to our facilities or arrange get-togethers out in the field. There they have an opportunity to ask questions about our work and register any complaints they may have. We are happy that our nearby resident get-togethers are well-attended, since it makes our work easier if our neighbours are well-informed of our activities and our plans.

Another formal consultation meeting was arranged during the year in connection with the annual nearby resident meeting which is held on the subject of a possible final repository for spent nuclear fuel in Forsmark. The procedure is occasioned by the generally cool interest shown by nearby residents in participating in the public consultations, since they feel that they do not have enough opportunity to voice their questions there.

## Publications and the Web

Four issues of our information magazine Lagerbladet were published during the year. It is distributed to all households in each of the site investigation municipalities. In this magazine we discuss our activities and subjects that have a direct bearing on us, particularly on the local level.

A general description of each site was published when the site investigations were concluded: Site Investigation Forsmark 2002–2007 and Site Investigation Oskarshamn 2002–2007. They describe what the sites look like, how they were formed and what may happen to them if the final repository is sited there.

The websites for Oskarshamn and Forsmark can be accessed via SKB's website. They are updated regularly with information on SKB's activities and on past and planned events in each municipality.

## Visitor service

Our visitors to the facilities in Forsmark and Oskarshamn come from both near and far. Foreign delegations alternate with schoolchildren, local businessmen, politicians and university students.

# Documentation of the consultations

The final documentation of completed consultations is the consultation report that will be appended to the EIS for the permit applications. The compilations are published to provide an overview of questions and answers from the previous year's consultations.

All consultations, whether in the form of meetings or correspondence, are documented. All minutes, notes and received viewpoints are available on SKB's website.

## Meetings

Minutes are kept of meetings with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group, which the participants check and sign. Minutes are also kept of public consultation meetings. The minutes are checked and signed by persons appointed by the meeting. After the public consultation meetings it is possible to submit questions and viewpoints relating to the meeting for another two weeks.

The questions and viewpoints discussed during a consultation meeting and received within the appointed period after the meeting are included in the notes of the meeting. There SKB also answers those questions that can be answered immediately. Some questions may lead to supplementary studies and further discussion. Some questions are judged to lie beyond the scope of the nuclear fuel project and the EIA work and are dismissed from the consultations. Reasons are given for this.

## Written viewpoints

The viewpoints that are received between consultation meetings and in the written consultations, including the Espoo consultations, are made available on SKB's website and in the annual compilations. Whenever possible, SKB responds to questions and viewpoints.

An account of the Espoo consultations and replies to received questions are sent via the Swedish Environmental Protection Agency to the countries that have participated.

## Annual compilation

The consultations for the interim storage facility, the encapsulation plant and the final repository have been coordinated. This year's compilation contains excerpts from the minutes from 2008 grouped in the following categories:

- ❑ Interim storage facility and encapsulation plant
- ❑ Final repository
- ❑ Common issues

The excerpts focus on the questions and viewpoints that have come up in connection with the consultation meetings, as well as SKB's replies and comments.

The consultation report should explain how SKB has taken submitted viewpoints into account. The consultation report appended to the EIS for the encapsulation plant in 2006 contained the questions and viewpoints that concerned the encapsulation plant and/or the common issues, along with SKB's replies and comments on them. An appendix reference to the consultation report for future applications will present all questions and viewpoints received.

# Completed consultations

The consultation process has been going on for seven years. The early consultations were conducted in separate meetings for the encapsulation plant and the final repository. In the continued consultations, joint meetings have been held for both facilities as well as the interim storage facility.

## Early consultations

Early consultations regarding a final repository and an encapsulation plant in Oskarshamn and in Forsmark respectively were held during the period 2002–2003. Invitations were sent out to more households than just those who belonged to the category "likely to be affected". The invitation included specially compiled background material describing the project and the purpose of the meeting.

The background material compiled for the early consultations, the consultation reports and the County Administrative Board's decision is available via SKB's website.

| Early consultation | Date | Place |
|---|---|---|
| Final repository | 10 January 2002 | Oskarshamn |
| Encapsulation plant | 8 March 2003 | Oskarshamn |
| Final repository | 15 June 2002 | Forsmark |
| Encapsulation plant | 29 October 2003 | Forsmark |

## Continuation of the consultations

The extended consultations began in 2003. The consultations for the interim storage facility, the encapsulation plant and the final repository are coordinated in both Oskarshamn and Forsmark.

Changes were made in the Environmental Code in 2005. The terms "early consultations" and "extended consultations" were omitted and now only the term "consultations" is used. However, "extended consultations" for the final repository for spent nuclear fuel and the encapsulation plant began back in 2002 and 2003, respectively, and have been carried out in part under the old forms and using the terms early and extended consultations. They are therefore used in some contexts in this compilation as well as in older reports, notes and minutes.

SKB's consultation meetings consist of public meetings mainly intended for private citizens and concerned organizations and meetings with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group.

## Completed consultations 2008

One public consultation meeting was held in Östhammar Municipality during 2008. The consultation meeting was preceded by presentations dealing with the siting and aesthetics of the final repository as well as local and regional transportation. An equivalent meeting in Oskarshamn Municipality was held in early 2009.

The discussions at the meeting and viewpoints submitted in writing dealt with a number of aspects such as noise associated with transport to and from a future final repository, corrosion of copper canisters in oxygen-free water and how the facilities and the activities on the ground surface can be designed with respect to local natural and cultural environmental interests. A consultation meeting was also held in conjunction with the nearby resident meeting in Forsmark.

Two meetings each were held with the Oskarshamn EIA Forum and the Forsmark Consultation and EIA Group. In addition there was one joint meeting for both groups. All meetings were open to the public.

In February 2008 the Swedish Environmental Protection Agency sent out background material for written consultations to those countries that had expressed a wish to participate (Finland, Lithuania, Poland, Russia and Germany). The background material focused on aspects that can result in transboundary environmental impact in connection with construction and operation as well as after closure of a final repository for spent nuclear fuel. The material included the SR-Can safety assessment, which provides an initial evaluation of the long-term safety of a final repository in Forsmark and Laxemar (Oskarshamn). The same material was sent for information purposes to Denmark, Latvia and Estonia.

Viewpoints received mainly concerned the risk and consequences of transboundary dispersion of radioactive substances, in the short term (for example in connection with accidents) and in the long term (after closure of the repository).

**2008**

| | |
|---|---|
| 27 February | Forsmark Consultation and EIA Group |
| 12 March | Oskarshamn EIA Forum |
| 23 May | Forsmark Consultation and EIA Group |
| 28 May | Oskarshamn EIA Forum |
| 23 August | Consultation meeting with nearby residents in Forsmark |
| 6 October | Joint meeting with Oskarshamn EIA Forum and Forsmark Consultation and EIA Group |
| 22 October | Public meeting in Östhammar Municipality |

In conjunction with the public meeting of 22 October, written consultations were held with concerned government agencies and municipalities and the organizations that receive funding Nuclear Waste Fund.

Written consultations with the countries around the Baltic Sea under the Espoo Convention were carried out during the first half of the year.

## Previously held consultations

**2004**

| | |
|---|---|
| 19 January | Forsmark Consultation and EIA Group |
| 5 February | Public meeting in Oskarshamn Municipality |
| 24 March | Oskarshamn EIA Forum |
| 22 April | Local conservation and environmental organizations in Oskarshamn Municipality |
| 4 May | National conservation and environmental organizations |
| 13 May | Local conservation and environmental organizations in Östhammar Municipality |
| 14 May | Forsmark Consultation and EIA Group |
| 26 May | Oskarshamn EIA Forum |
| 1 October | Forsmark Consultation and EIA Group |
| 6 October | Public meeting with Oskarshamn EIA Forum |
| 25 November | Public meeting in Östhammar Municipality |
| 8 December | Oskarshamn EIA Forum |
| 10 December | Forsmark Consultation and EIA Group |

Written consultations were held during the first quarter of 2004 with regional actors in Kalmar and Uppsala counties.

## 2005

| | |
|---|---|
| 10 March | Forsmark Consultation and EIA Group |
| 11 March | Oskarshamn EIA Forum |
| 5 April | Public meeting in Oskarshamn Municipality |
| 1 June | Oskarshamn EIA Forum |
| 4 June | Public meeting in Östhammar Municipality |
| 3 July | Public meeting in Oskarshamn Municipality |
| 24 August | Joint meeting with Oskarshamn EIA Forum and Forsmark Consultation and EIA Group |
| 14 November | Public meeting in Östhammar Municipality |
| 17 November | Public meeting with Oskarshamn EIA Forum |
| 17 November | Public meeting in Oskarshamn Municipality |
| 18 November | Public meeting with Forsmark Consultation and EIA Group |

At the end of 2005, written consultations were held with concerned government agencies.

## 2006

| | |
|---|---|
| 10 March | Forsmark Consultation and EIA Group |
| 22 March | Oskarshamn EIA Forum |
| 31 May | Public meeting in Oskarshamn Municipality |
| 1 June | Public meeting in Östhammar Municipality |
| 2 June | Forsmark Consultation and EIA Group |
| 12 August | Open house in Östhammar Municipality |
| 13 August | Open house in Oskarshamn Municipality |
| 20 September | Forsmark Consultation and EIA Group |
| 28 September | Oskarshamn EIA Forum |
| 6 December | Joint meeting with Oskarshamn EIA Forum and Forsmark Consultation and EIA Group |

In conjunction with the public meetings of 31 May and 1 June, written consultations were held with concerned government agencies and municipalities and the organizations that receive funding from the Nuclear Waste Fund.

## 2007

| | |
|---|---|
| 28 May | Public meeting in Oskarshamn Municipality |
| 31 May | Public meeting in Östhammar Municipality |
| 8 September | Nearby resident meeting in Forsmark |
| 12 September | Oskarshamn EIA Forum |
| 13 September | Forsmark Consultation and EIA Group |
| 13 September | Road consultation with authorities (Oskarshamn) |
| 8 October | Road consultation with private citizens (Oskarshamn) |
| 5 December | Joint meeting with Oskarshamn EIA Forum and Forsmark Consultation and EIA Group |

In conjunction with the public meetings of 28 May and 31 June, written consultations were held with concerned government agencies and municipalities and the organizations that receive funding from the Nuclear Waste Fund.

# Excerpts from minutes

This section contains excerpts from the records of the consultations held in 2008. In each excerpt, questions, viewpoints and topics have been grouped in the following categories:

- ❑ Interim storage facility and encapsulation plant
- ❑ Final repository
- ❑ Common issues

Questions and viewpoints have been expressed both orally at the consultation meeting and in the form of written submissions directly related to the meeting. The excerpts from the public consultation meetings do not show who posed a question or expressed a viewpoint at the meeting. In the case of written questions and viewpoints, however, there is a notation of who expressed the question or viewpoint.

The excerpts also show the target group for the meeting, who was present and the theme of the background material, as well as how the invitation took place.

The groups that receive money from the Nuclear Waste Fund to participate are:

**MKG** – the Swedish NGO Office for Nuclear Waste Review (joint body between the Swedish Society for Nature Conservation, the Uppsala County Society for Nature Conservation, the Swedish Association of Field Biologists and Oss – Opinion Group for Safe Final Disposal in Östhammar).

**Milkas** – the Swedish Environmental Movement's Nuclear Waste Secretariat (represents the Swedish Anti Nuclear Movement and Friends of the Earth).

**SERO** – the Swedish Renewable Energies Association.

Furthermore, the Swedish National Council for Nuclear Waste and the concernes regional councils have taken an active part in the consultations.

## Public meeting with Forsmark Consultation and EIA Group

| | |
|---|---|
| **Date** | 27 February 2008 |
| **Time** | 9:00–12:30 hrs |
| **Place** | Municipal office, Östhammar. |
| **Target group** | Östhammar Municipality, County Administrative Board in Uppsala County, SKI and SSI. |
| **Invitation** | The date of the meetings is decided on jointly. SKB summons the regular parties to a meeting via e-mail. Invitations to private citizens were published in Upsala Nya Tidning (9 and 23 February), Östhammars Nyheter (7 and 21 February), Annonsbladet (6 and 20 February) and Upplands Nyheter (8 and 22 February). |
| **Purpose** | The group consults on matters related to SKB's plans to site an encapsulation plant and a final repository for spent nuclear fuel at Forsmark. Furthermore, each participating party gives a status report on the work they are taking part in that has a bearing on the disposal of spent nuclear fuel. |
| **Background material** | — |
| **Present** | County Administrative Board in Uppsala County – *Mats Lindman*<br>Östhammar Municipality – *Bertil Alm*, *Peter Andersson, Ronald Arvidsson, Marie Berggren, Sten Huhta, Hans Jivander, Virpi Lindfors, Jacob Spangenberg, Margareta Widén Berggren*<br>SKI – *Holmfridur Bjarnadottir, Bengt Hedberg*<br>SKB – *Ulf Henricsson,* (chairman), *Saida Laârouchi Engström, Gerd Nirvin, Olle Olsson, Erik Setzman, Sofie Tunbrant* (secretary), *Maria Haeger-Eugensson* IVL (Swedish Environmental Research Institute) |
| **Audience** | Representatives from *MKG, Milkas, SERO, Regional Council in Uppsala County, Energy for Östhammar (EfÖ)* and private citizens. Total about 20 persons. |

## 1 Interim storage facility and encapsulation plant

No questions or viewpoints were expressed pertaining solely to the interim storage facility or the encapsulation plant for spent nuclear fuel.

## 2 Final repository

### 2.1 Oss pointed out that, according to SSI, the research on how bentonite erodes is not complete. Research is currently under way. Will SKB select a site before the answers are available?

SKB drew attention to the issue in the work with SR-Can. We have started a research programme which will be carried out during 2008, before site selection. The necessary knowledge will therefore be available at the time of site selection. If unexpected results are obtained, the plans will have to be changed.

This issue has already led to new criteria for the composition of the groundwater.

**2.2 MKG asked whether the rock stresses in the tectonic lens in Forsmark are a problem. The stresses are induced by movements in the continental shelf and are relieved by earthquakes. An ice age leads to enormous stresses on the lens. Could the lens fail? SKB usually replies that the lens has existed for a long time and has withstood many changes. MKG is not content with this answer. How do the regulatory authorities view this issue?**

SKI replied that they will make sure that all questions receive satisfactory answers in the application documents. Certain questions will require supplementary studies.

**2.3 MKG wants clarification regarding how long the nuclear waste is hazardous. Why doesn't SKB state the facts? In SR-Can they write that after 100,000 years the nuclear waste will be as harmless as natural uranium ore. In actual fact, the final repository does not achieve a radiotoxicity comparable to that of uranium ore with a very high (10%) uranium content in 10 – 20 million years. It would take billions of years to approach the radiotoxicity of the uranium ore found in large quantities in Sweden (0.03%).**

**MKG wants SKB to make a relevant comparison. For example, an approximate point in time when the spent nuclear fuel is as hazardous as the waste now being deposited in SFR. MKG believes that this information is of interest in the safety assessment.**

SKB replied that they base their calculation on the quantity of uranium. Uranium in ore is spread out over a larger area than the waste at a depth of 500 metres. SKB has tried to describe this in the Swedish short version of SR-Can, but we clearly have to be more pedagogical.

This is of no essential importance for the final repository and any consequences for man and biota on the ground surface. The times to which the calculations in the safety assessment refer come from government regulations. They state that calculations must be made for a million years and that the risk criterion must be met within 100,000 years.

**2.4 MKG is following with great interest the risks of corrosion of copper in an oxygen-free environment. They are also following the risk of corrosion of copper in an environment with sulphides. Since sulphides are produced by bacteria, MKG is very anxious that a closer look be taken at the latest findings concerning microbiological activity at great depth.**

**Karsten Pedersen, Professor of Microbiology at the University of Gothenburg, has presented new findings showing that viruses play a role in the process and that they have greater activity than has previously been assumed. It is important that the latest microbiological findings be included in SKB's work to understand the risks of corrosion of copper by sulphides.**

**MKG says that SKB does not pay sufficient attention to the connection between geochemical conditions underground and bacterial activity.**

**MKG wants the regulatory authorities to take a closer look at SKB's work with microbiological questions and sulphide production. How do the regulatory authorities view this issue?**

SKI replied that they will make sure that all questions receive satisfactory answers in the application documents. Certain questions will require supplementary studies.

SKB thinks that MKG paints an inaccurate picture of SKB's attitude. It is SKB that has pursued this research. We started in Stripa and engaged this very same Karsten Pedersen. We devote great resources to research on the interaction between viruses and bacteria as well as the consequences in the form of sulphide formation.

## 3 Common issues

**3.1 In connection with the changes of the forms for the meetings, the municipality stated that the meetings should have a predetermined content. Written documents should be distributed for the meetings so there is something to consult about. Information is important, but it is difficult to consult about issues that are presented orally during the meeting. Written material to discuss and respond to would provide structure for the meetings.**

SKB replied that they see the meetings with the Forsmark Consultation and EIA Group as a complement to the public consultation meetings. Material is compiled for these latter meetings that is made available in advance.

**3.2 Östhammar Municipality wondered what is happening with the extra resources for the final repository issue which the County Administrative Board announced are needed.**

The County Administrative Board replied that they have applied for special funds from the Nuclear Waste Fund for coordinated public information efforts in matters of national interest and other important matters regarding harbours, railways, roads etc. The County Administrative Board has not yet received an answer.

**3.3 Östhammar Municipality asked when the new authority (resulting from a merger of SKI and SSI) will be up and running.**

SKI replied that according to the plans, it will be up and running by 1 September.

**3.4 Östhammar Municipality wondered whether the merger of SKI and SSI entails that there will be more or less resources for future work?**

SKI replied that all executive staff will be appointed by the end of March, at which time there will be a more detailed organization with delegation of duties. A merger should lead to better capacity.

**3.5 The chairman asked whether it says specifically in the official timetable that Laxemar is behind?**

SKB says that it is not written so clearly.

**3.6 Östhammar Municipality wondered whether the landowners in Oskarshamn will be given a written option to buy back their land, such as Sveaskog is getting in Forsmark, if the final repository is not sited at Oskarshamn.**

SKB replied that there is no such written option.

**3.7 Östhammar Municipality wondered about the upcoming examination process in the environmental court. If the final repository is sited at Oskarshamn, the court of jurisdiction will be in Växjö, both for the encapsulation plant and for the final repository. If the final repository is sited at Forsmark, the court of jurisdiction for the encapsulation case will be in Växjö and for the final repository case in Stockholm. SKB has raised the question of whether it is possible that an environmental court could in this situation handle both cases. What is happening with this question?**

SKB replied that the legal experts at the Ministry of the Environment have investigated the question. The investigation is being circulated internally for comment at the Ministry and an answer is expected in the spring. Then the Ministry can propose a change in the law. All parties want a single court to examine the cases.

**3.8 Östhammar Municipality raised the question of how the municipality can best prepare for a decision to site at Oskarshamn. How should the municipality become involved as representatives of an alternative site? What studies should they request as an alternative site? Even if Forsmark survives as an alternative site, additional consultations would be good.**

SKB realizes that the municipalities obviously have an interest in finding out how the selection was made and what will happen afterwards. We will discuss this and agree on how it should be handled. Everyone will continue to be involved in the issue until the Government and the regulatory authorities have made a decision.

**3.9 Östhammar Municipality wondered how the question of traffic safety will be handled. For example for schoolchildren who travel along roads where heavy transport is planned.**

SKB replied that aspects of traffic safety are included in the environmental risk analysis. An initial general review of environmental risks has been done and now a more site-specific analysis will be undertaken. It will be started during the year and the impact assessment will be finished sometime next year.

Östhammar Municipality observed that deliberations are being held with the Swedish Road Administration and said that it is urgent for the municipality to obtain adequate information to be able to pursue the matter of improving highway 76.

**3.10 Discussion of dust problem**

Whether crushing of different types of rock gives rise to dust quantities was discussed. In SKB's case it is a question of granite at both sites. The question of dust is also of interest in connection with the handling of backfill materials.

**3.11 Östhammar Municipality wondered how these data [emission and dispersion calculations for respirable particles and nitrogen oxides in the Forsmark area] can be used purely practically.**

IVL replied that they are sample calculations to get an idea of what impact SKB's planned activities may have.

**3.12 Östhammar Municipality asked what impact rock crushing will have at the residential area. There will be greater particulate matter concentrations around the crusher.**

IVL replied that the impact of dust from the crusher is limited to the immediate area. Any problems are therefore judged to be an occupational health issue.

**3.13 Östhammar Municipality said that rock dust is one thing, but will there be more quartz dust here?**

IVL could not answer that, but noted that particles in themselves give rise to irritation.

**3.14 Östhammar Municipality wants to know, with regard to handling and transport of bentonite, what kind of impact bentonite dust might have?**

SKB replied that this has not been studied.

**3.15 Milkas expressed surprise that in the presentation of dispersion calculations there was talk of PM10 and not of terminal grades, which is what results from maximum crushing. But it is really meaningless to spend time on PM10 and NOx. The most important issue is the release of radioactivity. It is amazing that this is not dealt with at this meeting. There are German measurements that show that a health risk exists at a distance of up to five kilometres – even after the conclusion of operation.**

SKB noted that SKB has had a consultation meeting on the theme of safety and radiation protection. The background material for the meeting included a brief description of SKB's work. We cannot discuss all issues at the same meeting. Radioactivity and safety are the fundamental aspects, but no issues are beneath consideration.

Östhammar Municipality pointed out that it must be borne in mind that this is a long process. Anything can be brought up at any time.

**3.16 Milkas said that there are many measurements of radioactivity in sea and lakes and that it would be interesting to find out what the results are.**

SKB replied that SSI regularly conducts measurements and that these results are public. The question of radioactive contamination of the Baltic Sea has come up earlier, and then SSI has said that the Baltic Sea is not as contaminated as has been suggested.

**3.17 Milkas wanted to clarify that as far as the status of the Baltic Sea is concerned, SSI has not rejected Milkas's claims, but merely said that measurements are needed.**

SKB submitted that the radioactivity in the Baltic Sea derives from the accident in Chernobyl and atomic bomb testing. The contribution from the Swedish nuclear power plants is small. Measurements in FKA's external monitoring programme are included, for example.

Milkas retorted that the radioactive contaminants previously derived from the accident in Chernobyl and atomic bomb testing, but that this is not the case anymore.

**3.18 MKG wondered why PM10 and NOx are spread in different directions in the pictures that have been shown.**

IVL replied that this is not true; they are spread in the same direction.

**3.19 Milkas wanted to know if any consultations will be held at a level between those that are held under the Espoo Convention (international level) and those held at the sites (local level).**

SKB said that the public consultation meetings are open to anyone who wants to participate, and we have advertised the most recent ones in the national press.

**3.20 Milkas wondered whether an equivalent environmental medical impact assessment will be done for radiation as for air pollution.**

SKB replied that the environmental medical impact assessment includes the health impact of increased noise levels, air pollution and psychosocial effects. Radiological effects are not included directly, but indirectly via psychosocial effects, anxiety etc.

Östhammar Municipality pointed out that the risk criterion of $10^{-6}$ that is included as a limit in the government regulations is a medical assessment.

EfÖ (Energy for Östhammar) pointed out that LKAB has a large body of material on the frequency of illnesses connected to radon radiation.

### 3.21 SERO wondered about SKB's attitude to transmutation. Västerås Municipality has expressed a willingness to build a transmutation reactor. Does SKB persist in rejecting transmutation?

SKB does not reject transmutation; on the contrary we are curious as to what it may entail. However, we observe that it does not offer a final solution for the disposal of spent nuclear fuel.

SERO commented that they do not believe in transmutation either. The KBS-3 method is not suitable for disposing of the waste products from a transmutation reactor. Furthermore, transmutation requires reprocessing plants, which is not good. There are examples of reprocessing plants that leak radioactivity.

MKG commented that transmutation involves building more nuclear power facilities to transmute the waste. Transmuted waste leads to lower requirements on the long-term safety of a final repository, so it impacts on the ethical debate concerning responsibility for future generations. If nuclear power is phased out, it may be possible to develop a global transmutation project that "solves" the nuclear waste problem due to the fact that the waste is not hazardous for as long a time.

### 3.22 What is the situation regarding the shutdown of SFR?

SKB replied that SSI decided in mid-2007 to stop all deposition in SFR indefinitely. They are not happy with the safety analysis report. The Authority wants to have additional information on how the levels of certain radionuclides are calculated and reported. SKB has answered many of the authority's questions and is now waiting for a decision. The complete new safety assessment is planned to be finished in April. It is important to bear in mind that operational safety is not, and never has been, threatened. Nor has long-term safety.

### 3.23 Östhammar Municipality wondered why SSI is not present at this meeting.

SKI replied that SSI's chief legal counsel Tomas Löfgren, who is most involved in the work with the Forsmark Consultation and EIA Group, has a great deal to do in preparation for the merger of the two authorities.

Östhammar Municipality noted that they, along with Oskarshamn Municipality, have written to the Government and pointed out that it is important that the regulatory authorities be given sufficient resources to carry out their duties.

MKG pointed out that it would be good to know in advance who will attend the meetings so they can prepare the right questions.

SKB said that they consider it important that both of the authorities can be present at the meetings.

## Public meeting with Oskarshamn EIA Forum

| | |
|---|---|
| **Date** | 12 March 2008 |
| **Time** | 9:30–15:30 hrs |
| **Place** | Forum Oskarshamn. |
| **Target group** | Oskarshamn Municipality, County Administrative Board in Kalmar County, SKI and SSI. |
| **Invitation** | The date of the meetings is decided on jointly. SKB summons the regular parties to a meeting via e-mail. The invitation to private citizens was published in Oskarshamns-Tidningen (1 and 8 March) and Nyheterna (1 and 8 March). |
| **Purpose** | The group consults on matters related to SKB's plans to site an encapsulation plant and a final repository for spent nuclear fuel at Oskarshamn. Furthermore, each participating party gives a status report on the work they are taking part in that has a bearing on the disposal of spent nuclear fuel. |
| **Background material** | — |
| **Present** | County Administrative Board in Kalmar County – *Sven Andersson*<br>Oskarshamn Municipality – *Lars Blomberg, Bo Carlsson, Rigmor Eklind, Charlotte Liliemark, Antonio Pereira, Rolf Persson, Lars Tyrberg, Peter Wretlund*<br>SKI – *Holmfridur Bjarnadottir, Bengt Hedberg, Ranald Mac-Donald*<br>SSI – *Tomas Löfgren, Anders Wiebert*<br>SKB – *Ulf Färnhök* (chairman) *Claes Thegerström, Saida Laârouchi Engström, Johan Molin, Olle Olsson, Erik Setzman, Peter Wikberg, Lars Birgersson* (secretary) |
| **Audience** | Representatives from the *Regional Council in Kalmar County, the Swedish National Council for Nuclear Waste, MKG, Milkas* and *SERO.*<br>Total about 10 persons. |

## 1 Interim storage facility and encapsulation plant

### 1.1 Is it included in the safety assessment that terrorists could hijack canisters when they are being transported from the encapsulation plant to Clab?

SKB replied that the encapsulation plant and Clab will be integrated into a single facility. In other words, there will not be any road transport between the facilities. The integrated facility will be provided with physical protection against terrorist actions, for example.

### 1.2 Does Clab 2 have higher safety than Clab 1 in view of terrorists?

SKB replied that safety will be at least as good. Clab 1 and Clab 2 will be integrated into a single facility with the same requirements on safety. The regulation recently issued by SKI imposes tougher requirements on the safety of nuclear facilities than was previously the case.

## 2 Final repository

**2.1 Oskarshamn Municipality stated that it is above all heavy transport that is of interest. The chairman asked if the projected additional heavy transport volume during construction phase 2 is roughly as much as the estimated volume without a final repository?**

SKB replied that it is correct that the heavy transport volume during construction phase 2 will be of the same magnitude as the number of heavy shipments without a final repository.

**2.2 The chairman asked whether the additional transport volume during the 50-year-long operating phase will be relatively small, within the limit of the uncertainties in the Swedish Road Administration's forecasts?**

SKB replied that that is correct.

**2.3 Oskarshamn Municipality asked whether the additional heavy transport volume during the construction phase will amount to roughly one vehicle every 10 minutes?**

SKB replied that that is correct.

**2.4 (Oskarshamn Municipality) SKB's RD&D Programme 2007 says that 100% bentonite clay will be used. Is that correct?**

SKB replied that 100% bentonite will be used in the deposition holes and in the deposition tunnels. Other alternatives are being considered in other openings such as shafts and ramp.

**2.5 The County Administrative Board in Kalmar County asked whether any noise study has been done linked to the reported traffic flows?**

SKB replied that such studies will be performed. Work is under way.

**2.6 Oskarshamn Municipality said that in its transport study, SKB has assumed 1.3 persons per car. This is a fairly low figure. Has SKB looked at the possibility of coordinating passenger transport?**

SKB replied that they have looked at how people travel generally in Sweden. The average is 1.5 persons per car, which means that the assumed figure of 1.3 is conservative. This can be increased by arranging bus transport, for example. Different assumptions can be made in calculations, but this just results in yet another scenario. Since all forecasts are uncertain, the calculations are not done for the most favourable alternative. The calculations are instead based on cases that can be regarded as pessimistic.

**2.7 How many tonnes of rock will be taken out of the final repository?**

SKB replied that about five million tonnes will be extracted.

**2.8 Oskarshamn Municipality said that it could be as much as 5–7 million tonnes.**

SKB said that work is under way on site-specific layouts for the final repository. This work will enable more reliable figures on the quantity of rock to be obtained.

## 2.9 Copper corrosion – Discussion

Copper corrosion was discussed. In conjunction with the discussion, Oskarshamn Municipality submitted EIA question no. 14, which has to do with copper corrosion.

MKG said that they are following with great interest the findings that are being obtained regarding the risks of copper corrosion in an oxygen-free environment and in an environment with sulphides. Since sulphides are produced by bacteria, MKG is very anxious that a closer look be taken at the latest findings concerning microbiological activity at great depth.

MKG noted that Karsten Pedersen, Professor of Microbiology at the University of Gothenburg, has presented new findings showing that viruses play a role in the process and that they have greater activity than has previously been assumed. It is important that the latest microbiological findings be included in SKB's work to understand the risks of corrosion of copper by sulphides. MKG says that SKB does not pay sufficient attention to the connection between geochemical conditions underground and bacterial activity. MKG wants the regulatory authorities to take a closer look at SKB's work with microbiological questions and sulphide production. How do the regulatory authorities view this issue?

Peter Wretlund, Oskarshamn Municipality, submitted EIA question no. 14, which has to do with copper corrosion in oxygen-free water. In the EIA question, the municipality says that the question of which processes can result in corrosion of copper under different conditions, eras and climatic conditions must be clarified by the time the municipality has to submit its statement to the Government in the permissibility assessment under Chapter 17 of the Environmental Code. The copper canister is perhaps the most important barrier for preventing radioactivity from escaping from a final repository. All processes that can influence canister corrosion should be investigated. When the municipality submits its statement to the Government in the permissibility matter, it is important that all questions have been clarified. It is crucial for the municipality's decision that the safety questions have been cleared up. The municipality would like both the regulatory authorities and SKB to describe what steps they are taking to clarify the corrosion process in oxygen-free water.

Peter Wikberg gave SKB's reply to the EIA question. SKB's safety philosophy is based on well founded, scientifically established truths and fundamental conclusions in the fields of geology, materials science etc. Progress and science continue to advance. New research findings are continuously published. If anything is found with a bearing on safety, SKB takes this into account in its continued work. The findings concerning corrosion that have been reported do not affect safety. If corrosion scientists come up with new findings, we will take them into consideration. The scientific discussion goes on.

Olle Olsson, SKB, pointed out that sulphide corrosion is a well known process that is included in the safety assessments. The process is limited by the quantity of available sulphide. As far as knowledge of bacteria underground is concerned, it is SKB that has largely been the driving force behind the research. We started in Stripa and engaged this very same Karsten Pedersen. SKB is devoting great resources to research on the interaction between viruses and bacteria and the consequences in the form of sulphide formation. Microbiology is also an important topic of research for SKB.

Oskarshamn Municipality announced that the Safety Group has met the researchers who have arrived at the conclusion that rapid corrosion can take place in warm, oxygen-free environments. The canister could perhaps corrode away in as short a time as 1,000 years. The Safety Group has got the impression that there appear to be questions that must be thoroughly examined.

SKI said that their expert group (BRITE) is examining the question of copper corrosion in oxygen-free water. The group will look at what KTH researchers have arrived at and what influence their findings could have, if the processes exist. The findings of the expert group will be taken up by SKI in their review of RD&D Programme 2007.

SSI has also looked at what the KTH researchers have arrived at and said that it is a complex issue that cannot be dismissed at this point. SSI's conclusions will also be taken up in the review of RD&D Programme 2007.

Saida Laârouchi Engström, SKB, said that it isn't strange that researchers come up with new findings, in this case Szakálos and Hultquist from KTH. That is the nature of science. When new findings emerge, SKB looks at the matter. Sometimes the new findings can occasion additional research by SKB. This time the discussion has been conducted in the newspapers (DN-debatt), on television (Rapport) etc., but not in the scientific arena.

Torsten Carlsson of the Swedish National Council for Nuclear Waste said that the Council is also looking at the issue of copper corrosion in an oxygen-free environment.

Milkas said that man cannot make perfect structures. If microbes remain in the canister and they are exposed to radiation, what will the result be? Perhaps the microbes will destroy the canister faster. The question of whether there are microbes at a depth of 500 m has been raised before. At that time SKB answered that there are no microbes at such great depth.

MKG said they wanted to allow the scientific process to take its course and didn't want SKB to try to exert pressure on the scientific discourse via its superior resources. SKB should instead use its great resources to contribute to the amassing of knowledge. This is not the case today. MKG has visited the KTH researchers who have been working on the subject of copper corrosion in an oxygen-free environment. These researchers are well reputed and their work is being widely discussed in the scientific community, not just in the media. Nor is the issue of copper corrosion in an oxygen-free environment a new issue. Hultquist conducted experiments in the late 1980s showing that corrosion could occur. Then interest in the matter died out. SKB has the greatest resources to investigate copper corrosion, which is why SKB has to work scientifically with the issue.

Claes Thegerström, SKB, said that SKB has large resources for research, but that these resources must be used for the most important issues. SKB can not act as a public research institute. There are two questions that must be answered with regard to the discussion of copper corrosion:

– does the scientific community believe that the results are true?

– if they are true, are they of any importance?

SKB's view is that a discussion is under way as to whether the results are true, but that these results – even if they are true – are not of any importance for the safety of the final repository.

**2.10 At the consultation meeting at Arlanda in December, MKG raised the question of whether there is a problem understanding what happens to the bentonite clay soon after a deposition hole has been closed. Furthermore, MKG has understood that SKB's safety assessment is a model construction. This means that input data to the model must be as realistic as possible in order for the assessment to yield credible results. At the same time, MKG has realized that SKB's knowledge of how the bentonite clay behaves during the first 100 years is poor. SKB's popular version of RD&D Programme 2007 (RD&D 2007: Programme for research, development and demonstration, p. 48) states:**

**"When the canisters have been deposited, the disposal tunnels are backfilled and plugged and water begins to seep back into the tunnels, whereby the buffer absorbs water, swells and seals all cavities. The saturation process may take hundreds of years and is a complex interaction between thermal, hydraulic and mechanical processes. [As well as hydrological, geochemical and microbiological processes – MKG's comment].**

**We don't know how these processes affect each other during the saturation phase. Nor is this necessary in order to make a safety assessment. However, it is important to be able to predict and understand the properties of the buffer once it has become saturated with water, since this is the point of departure for the calculation of long-term safety."**

**This view of the safety assessment is unsettling and confirms MKG's opinion that the safety assessment is not sufficiently realistic. What does SKB have to say about this? The saturation of the bentonite is highly dependent on the hydrology of the surrounding rock, which is very different in Laxemar and Forsmark. Since saturation is crucial for long-term safety, how will SKB handle this question in the site selection process?**

SKB replied that a great deal of work has been devoted to studying links between different processes, for example how water saturation of the buffer occurs. This has been studied on Äspö in a Prototype Repository. Our assessment is that the water saturation process is not of any great importance for long-term safety. What is important is being able to predict and understand the properties of the buffer once it has become saturated with water, since this is the point of departure for the calculation of long-term safety.

The hydrology of the surrounding rock differs between Laxemar and Forsmark. This is an aspect that is considered in site selection. The KBS-3 method entails that we will have good knowledge of the environment where the canister is deposited. If the environment is unfavourable, for example too high water inflow to the deposition hole, we can reject the deposition hole.

### 2.11 Anders Wiebert, SSI, said that SKB needs to bolster its arguments regarding what long-term tests are needed, especially if the selected site has a different geological environment than Äspö, where the tests are being conducted.

SKB replied that Äspö can for the most part provide the data needed for a final repository, even if it is sited at Forsmark. It is an open question whether additional long-term tests would in this case be needed in that environment.

### 2.12 Can the high rock stresses in Forsmark entail problems for the final repository?

SKB replied that high rock stresses can lead to breakout of rock. This may happen in Forsmark, depending on how the tunnels are oriented. What is more important is what happens with the deposition holes. No rock breakout will occur in them, regardless of whether the final repository is sited at Oskarshamn or Forsmark.

### 2.13 More landowners will be affected if the final repository is sited at Laxemar, compared with Forsmark. Is that a problem?

SKB replied that the landowner situation is very different at the two sites.

In Laxemar more than 40 properties would be affected by a final repository. We see this as a challenge!

### 2.14 Different clays have been mentioned. What will be used in the final repository?

SKB replied that there are clays with different mineral compositions and different properties. Bentonite is the clay that will be used in the deposition holes. Other, simpler and cheaper clays can be used for such purposes as backfilling of tunnels.

## 3 Common issues

### 3.1 Oskarshamn Municipality asked whether SKB's proposed forms for future meetings are similar to the old procedures?

SKB replied that the proposed forms for future meetings are similar to the old procedures. The proposed changes are not very great.

**3.2 The chairman asked what the procedure will be for keeping and checking the minutes of meetings.**

SKB replied that the same procedure will be used as before, which is to say a draft of the minutes will be sent out to all parties for viewpoints and the minutes will be checked by all parties.

**3.3 The chairman asked whether a similar change of the forms for future meetings has been made for the Forsmark Consultation and EIA Group.**

SKB replied that the same proposal for the forms of future meetings was presented at a meeting with the Forsmark Consultation and EIA Group on 27 February. The same changes will be made there. From now on Ulf Henricsson, former deputy county governor in Uppsala County, will be engaged by SKB to chair meetings with the Forsmark Consultation and EIA Group.

**3.4 At the previous meeting of the EIA Forum, on 5 December 2007, Oskarshamn Municipality (the Misterhult Group) submitted EIA question no. 13, plus an appendix with detailed questions to SKB. The question concerns "Need for transport study in connection with a final repository in Laxemar".**

**The EIA question contends that the transport volume in connection with a final repository in Laxemar is expected to be great. It is urgent to study what transportation system is sustainable both economically and environmentally in a long-term perspective. Transportation is the activity that is currently expected to cause the most disturbances in the form of noise, pollution, accidents etc. Transportation is also the issue that causes the most worry among nearby residents and other concerned parties along the roads.**

**The municipality would like to see descriptions based on different transport alternatives and modes that have a clear structure showing the size and frequency of the shipments, when they occur, transport mode, starting point, route and destination. Furthermore, any interim storage sites and activities there (crushing, transloading etc.) should be included.**
**The municipality considers that the transport study should include:**

- **Health and environmental effects of transport**
- **Protective and precautionary measures**
- **Proposed conditions and monitoring programme**

Erik Setzman, SKB, said that descriptions based on different transport alternatives and modes will be presented in the transport study wherever possible. As far as routes and destinations are concerned, they will largely be determined by circumstances that are not known at present.

"Health and environmental effects of transport" and "Protective and precautionary measures" are not described in the transport study, but in separate consequence analyses appended to the EIS. "Proposed conditions and monitoring programme" are not provided in the transport study. Proposed conditions for the environmentally hazardous activity and for the water activity are provided in the top document for the application under the Environmental Code. Proposed monitoring programme for the external environment will be a separate appendix to the application under the Environmental Code.

Erik Setzman submitted written replies to the municipality to EIA question no. 13 and to the Misterhult Group's detailed questions.

**Discussion**

Bo Carlsson, Oskarshamn Municipality, said that SKB had taken the initiative to forming a working group which had recently had a meeting with the Misterhult Group. The meeting was perceived as positive and meetings between the working

group and the Misterhult Group can resolve many questions. Erik Setzman said that SKB also considers the new collaboration with the Misterhult Group to be positive. SKB will share information and receive viewpoints during the course of the work.

Conditions for the activity were discussed. Bo Carlsson, Oskarshamn Municipality, said that the long-term perspective makes the question of conditions somewhat special. The environmental court's decision may be handed down in 2012 and the actual activity may start in around 2020. When the activity begins other standards may apply, not least for noise, than those that exist when the environmental court stipulates conditions for the activity. Sven Andersson, County Administrative Board in Kalmar County, pointed out that conditions can always be re-examined, but that this is a prolonged process. Furthermore, Sven Andersson said that conditions lie outside the environmental impact statement and the consultations. Saida Laârouchi Engström, SKB, concurred with Sven Andersson on the fact that the conditions are associated with the application, not with the EIS.

Erik Setzman, SKB, said that SKB is proceeding according to the conditions that exist today, but is also looking at what can be expected to come in the future. Saida Laârouchi Engström said that the BAT concept imposes exacting demands on the activity. What is BAT today will probably not be BAT in 2020. This is something which SKB, and other activity operators, has to live with and live up to. SKB will carefully consider what conditions will be proposed. Bo Carlsson pointed out that complying with BAT may require that an investment in, for example, a treatment plant has to be redone to comply with BAT if a better technology becomes available. Sven Andersson pointed out that it is possible to put a time limit on a permit. Saida Laârouchi Engström observed that SKB has experience of operating facilities and of the fact that conditions can be changed over time. This has not been a problem. Finally, chairman Ulf Färnhök observed that the question of conditions for the activity is complex, but is not a new problem.

### 3.5 How much carbon dioxide will be emitted?

SKB replied that this will be described in future studies.

### 3.6 During the presentation of the transport study it was mentioned that an expansion and improvement of highway E22 to four lanes from Malmö to Oskarshamn may be necessary. Why? Is this with a view to transport from Barsebäck to Oskarshamn?

SKB replied that improvement and expansion of highway E22 is a part of the Swedish Road Administration's planning and not a part of SKB's work.

### 3.7 MKG said that they had sent a communication to SKI requesting that the Inspectorate extend the deadline for submitting comments on SKB's research programme, RD&D Programme 2007, to one month after the regulatory authorities' report on their review of the SR-Can safety assessment is finished. The reason is that SKI's and SSI's review has taken a longer time than originally expected. MKG believes that the regulatory review report on SR-Can is an important background document for the commenting bodies' review of the industry's research programme RD&D Programme 2007, which was presented in the autumn of 2007. Originally the regulatory review was to have been finished in December 2007, then this deadline was changed to early February 2008. However, the report will not be finished until a few days from now.

**MKG further proposes that SKI consult with SSI on the possibility of applying to the Government for a further extension of the deadline for submitting the statement of comment on RD&D Programme 2007, for example until 31 September 2008.**

SKI said that MKG's communication had been received by SKI earlier during the day. The entire process is regulated by law. The deadline for submitting comments has previously been extended from 15 March until 25 March.

**3.8 When it comes to noise measurements, SKB should not merely report the mean 24-hour level for noise, but also report the noise level during the most intensive period, during the daytime.**

SKB replied that noise measurements are performed for the entire 24-hour period, but that the calculations are not limited to the mean 24-hour value; peak values are also calculated.

**3.9 Can the canisters be hijacked during transport from the encapsulation plant to the final repository?**

SKB replied that the spent nuclear fuel will be encapsulated when it is transported from the encapsulation plant to the final repository. Shipments of unencapsulated spent nuclear fuel have been taking place for a long time now. These are sensitive shipments. In Sweden these shipments take place from the nuclear power plants to Clab. Steps are being taken to ensure that these shipments are carried out safely, and history shows this has been the case.

**3.10 Will SKB describe the consequences of a terrorist attack?**

SKB will study and report the consequences for different scenarios. In previous studies we have looked at what could happen in the event of a fire on board m/s Sigyn.

**3.11 The Misterhult Group believes that it is preferable to locate the encapsulation plant adjacent to Clab, provided that the safety of Clab is not jeopardized. The Misterhult Group believes that a subsystem (the encapsulation plant) that is part of a larger system (the final repository system) cannot be subjected to a separate impact assessment. The EIS only describes the encapsulation plant and nothing else. An integrated impact assessment of the entire final repository system must be done, which could lead to other conclusions than those drawn in the EIS for the encapsulation plant.**

**The Misterhult Group believes that a discussion must be held with the regulatory authorities on where the "system boundaries" for the EIS should be set. This applies, for example, to the consumption of raw materials and energy required by the facility.**

**The Misterhult Group further believes that environmental impacts in certain cases have not been addressed or have been inadequately addressed, for example as regards noise, runoff from the facility and vibration from the blasting work. The Misterhult Group also believes that a discussion is needed concerning, and proposals for, conditions governing the activity.**

Saida Laârouchi Engström, SKB, said that the application for the encapsulation plant will only deal with the encapsulation plant and that the description of the final repository system will come in the application that is planned to be submitted in 2009.

Erik Setzman, SKB, said that SKB will describe the impact in relation to society's guideline values.

The County Administrative Board observed that the question of delimitation is generally difficult and that there is no good practice that can be applied. Difficulties can arise, for example, if fabrication by external suppliers is to be included in the EIS.

**3.12 The County Administrative Board in Kalmar County asked why SKB distinguishes between consultations for a preliminary EIS and the water activity, in view of the fact that the preliminary EIS will deal with the water activity.**

SKB replied that the reason these consultations are held on different occasions is that they are aimed in part at different target groups.

**3.13 In view of the problem of climate change, the possibility of expanding wind power and nuclear power is being discussed. Does the transport study take into account the possibility that such projects may be undertaken in the Oskarshamn area?**

SKB replied that the law prohibits the construction of more nuclear power plants. Existing plants can be updated, however.

The construction of wind turbines has not been taken into consideration in the transport study.

Oskarshamn Municipality announced that there are four areas within the municipality that meet the criteria for suitability for wind power. Interest in establishing wind turbines has been shown by Eon, among others. The municipality views with interest the possibility of expanding activities that entail energy production, and wind power can be an interesting alternative.

**3.14 Why do you only consider the carbon dioxide emissions that take place before the E22 motorway? The entire transport route must be taken into consideration. The same applies to different materials. It doesn't matter whether they are manufactured here or elsewhere in the world.**

SKB replied that an environmental impact statement, EIS, will be prepared describing relevant environmental consequences. The EIS will cover the area where transport can be attributed to SKB's activities, which means to the E22 motorway and to the harbour in Oskarshamn. Further away it is not possible to distinguish the environmental impact caused by transport associated with SKB's activities. This delimitation is according to accepted rules.

Oskarshamn Municipality said that transport will be taken into consideration within the area where it has a significant impact, which agrees with what SKB says.

**3.15 The question of deep boreholes has recently been debated in the Riksdag (Swedish parliament). What was the result of this debate?**

SKB said that Per Bolund of the Green Party has submitted a motion that SKI should carry out test drilling of deep boreholes so that the different methods can be compared in a relevant manner. The Committee on Defence proposes in its report that the Riksdag reject the motion, which the Riksdag did. The Committee on Defence's response to the motion supports the present division of roles.

**3.16 Why are the canisters 5 metres long? If they were instead, say, 1 metre long they would be easier to handle and perhaps also to retrieve. They could perhaps then even be vitrified.**

SKB replied that the length of the canisters is determined by the length of the encapsulated fuel assemblies. If a shorter canister were used, the fuel assemblies would have to be chopped up, which entails an additional operation. If it is possible to retrieve canisters that are one metre long from the final repository, it is also possible to retrieve canisters that are five metres long. The problem will rather be to get at the canisters.

## Public meeting with Forsmark Consultation and EIA Group

| | |
|---|---|
| **Date** | 23 May 2008 |
| **Time** | 9:00 – 13:00 hrs |
| **Place** | Municipal office, Östhammar. |
| **Target group** | Östhammar Municipality, County Administrative Board in Uppsala County, SKI and SSI. |
| **Invitation** | The date of the meetings is decided on jointly. SKB summons the regular parties to a meeting via e-mail. The invitation to private citizens was published in Upsala Nya Tidning (3 and 17 May), Östhammars Nyheter (30 April and 22 May), Annonsbladet (30 April and 21 May) and Upplands Nyheter (2 and 16 May). |
| **Purpose** | The group consults on matters related to SKB's plans to site an encapsulation plant and a final repository for spent nuclear fuel at Forsmark. Furthermore, each participating party gives a status report on the work they are taking part in that has a bearing on the disposal of spent nuclear fuel. |
| **Background material** | — |
| **Present** | County Administrative Board in Uppsala County – *Mats Lindman*<br>Östhammar Municipality – *Bertil Alm, Peter Andersson, Barbro Andersson Öhrn, Christina Haaga, Hans Jivander, Virpi Lindfors, Jacob Spangenberg, Lennart Sunnerholm, Anna-Lena Söderblom, Margareta Widén Berggren*<br>SKI – *Josefin P Jonsson*<br>SSI – *Anders Wiebert*<br>SKB – *Ulf Henricsson,* (chairman), *Kaj Ahlbom, Saida Laârouchi Engström, Gerd Nirvin, Erik Setzman, Claes Thegerström, Sofie Tunbrant* (secretary), *Kristina Skagius* (Kemakta) |
| **Audience** | Representatives from *MKG, Milkas, Energy* for Östhammar *(EfÖ)* and private citizens. Total about 15 persons. |

## 1 Interim storage facility and encapsulation plant

No questions or viewpoints were expressed pertaining solely to the interim storage facility or the encapsulation plant for spent nuclear fuel.

## 2 Final repository

### 2.1 MKG wondered about the delimitations in the EIS. The canister factory is not included. How can the canisters then be quality-assured?

SKB replied that the quality of the canisters is a central issue that must be addressed. This is done in the production line reports. They trace the entire handling chain for each barrier to assure the initial state of the final repository. The handling of the canisters is followed from fabrication of inserts and copper components to completed deposition.

**2.2 MKG wondered about the Forsmark lens. The lens is more than two billion years old. Is it the metagranite (the rock) or the lens that is so old? How has the fracturing developed? The rock stresses will presumably increase during an ice age, won't they?**

SKB replied that the metagranite there has been dated at 1,870 million years old and that the tectonic lens came into being at this time or shortly thereafter. By dating of fracture-filling minerals it has been found that the fractures at greater depth are around 900 million years old or older.

An ice age can lead to a three kilometre thick ice cap. The vertical rock stresses increase with the weight of the overlying ice, while the increase in the horizontal stresses is much less.

This will probably result in a situation where the differences between stresses in different directions at repository depth are less than those that exist today.

**2.3 MKG notes that the sulphide concentrations have been difficult to measure. Can the measurements be disturbed by the pumping? What long-term effects does the sulphide concentration have on the copper canisters and the bentonite clay?**

Kemakta replied that it is possible that the pumping could disturb the measurements.

SKB said that investigations are being conducted to see why and how the sulphide concentrations vary and how this is connected to the microbial environment.

## 3 Common issues

**3.1 Östhammar Municipality wondered whether the merger of SKI and SSI entails a strengthening of the authorities' resources. The actual merger with organizational changes and the physical move will sap the strength of the employees.**

SKI replied that the purpose of the merger is to strengthen the supervision of existing facilities and activities and to become better equipped for future challenges. The new authority will have the capacity to do what it is supposed to do, and will be given greater resources to deal with the final repository matter.

**3.2 Östhammar Municipality pointed out once again that they have, together with Oskarshamn Municipality, written to the Government and expressed their view that it is particularly urgent that the regulatory authorities be given sufficient resources to carry out their tasks.**

SKI said that they want more resources themselves, but cannot promise this will be so. The petition to the Government requesting funds will be discussed once the new authority has been launched in the autumn, and the question can be raised again at the next meeting.

**3.3 The municipality wondered how the consultations regarding the extension of SFR will be conducted?**

SKB replied that they will be conducted in the usual manner. According to SKB's planning, they will start at the turn of the year.

**3.4 The municipality asked whether Swedish actors will be allowed to participate at a consultation meeting under the Espoo Convention?**

SKB replied yes, and minutes will be kept in the usual manner. The contact person at the Swedish Environmental Protection Agency is Egon Enoksson.

**3.5 The municipality wondered whether Estonia and Latvia have permanently disqualified themselves from participating, since they declined the invitation?**

SKB said that the countries have expressed a desire not to participate, and that this will be respected. As a matter of courtesy, information and minutes from any meeting can be sent to them anyway.

**3.6 The municipality wondered how many pages the report [SDM – Site Descriptive Model] is and how the review is being conducted.**

Kemakta replied that the report comprises approximately 500 pages. Similar work is being done for Laxemar.

SKB's review panel (Sierg) is currently conducting a review and will submit its viewpoints in June.

INSITE (SKI's expert panel) has continuously followed the work in preparation for its review of the final report.

**3.7 The County Administrative Board asked SKB whether they intend to omit the broad alternatives report in the EIS to which they have referred in the "Scoping report" (SKB Report R-05-63, Scope, delimitations and studies for environmental impact assessments (EIAs) for encapsulation plant and final repository for spent nuclear fuel; Forsmark, in Swedish only) dated October 2005?**

SKB replied that they have not omitted anything. Everything they have said will be reported will in fact be reported.

The only question is in which documents.

**3.8 The municipality said that they have never doubted that everything will be reported but wonder how this is consistent with SKI's communication to SKB about alternatives reporting in the EIS?**

SKB explained that the lawyers will be satisfied despite SKI's communication. We have heeded what SKI pointed out. I am convinced that everyone will be satisfied with the material SKB will put forward.

SKI said that after SKB had presented its new plan in the spring of 2006, the Inspectorate found that too narrow boundaries had been set for the reporting of alternatives. SKI has subsequently in two letters to SKB said that the methods reported in the context of the RD&D work should be taken up in the EIS. It is our role as the preparatory authority to provide applicants with guidance on how the authority wants the material to be presented in applications. SKI has not made demands on scope in the letters sent to SKB. Today's discussions show that SKB has listened to our requests. SKI's lawyers have written the memo that supports our positions in the letters, and unfortunately they were not able to be with us today and report their conclusions. If the municipality still wishes, we can bring the lawyers to the next meeting.

The County Administrative Board concluded by asserting that there is an important purpose in the Environmental Code's requirement that alternatives with respect to technology and site should be presented in the EIS. The County Administrative Board said that this is a prerequisite for understanding the selection process and for the licensing.

**3.9 (Municipality) I have never seen the material SKB has presented, so it is difficult to offer viewpoints now. We have to get help to interpret SKI's memo. The basic question is whether SKB has chosen the right method, and there must be enough background material to determine this. Has the BAT principle been applied?**

SKB replied that there will be 3–5 pages on other methods in the EIS and around 500 pages in reference material.

**3.10 The County Administrative Board pointed out that it is good to have background material prior to the meetings. For example, it would be good to have the draft of the EIS for the next meeting. Oss agreed that it is important to have background material prior to the meetings. However, the structure of the EIS was recently posted on SKB's website.**

**Question to the municipality: You say you want to reach a conclusion in the final repository matter in the immediate future and not delay the process. If everyone has an opportunity to do their job it will be concluded faster. It is only if SKB does a poor job and furnishes incomplete background material that the process will be delayed.**

The municipality replied that of course the applications from SKB must be complete, but there is another cause for concern. It is that the regulatory authorities are not being given enough resources in the form of personnel and expertise.

SKB gave further thought to what might delay the process. SKB's job yes – but we have high ambitions and we are not the only ones whose efforts can influence the process.

The applications may also be held up on the desks of the authorities or the ministries.

**3.11 MKG wondered, regarding the structure of the EIS, how alternative methods will be compared with the KBS-3 method.**

SKB replied that lawyers have been brought in and they all say (including Peggy Lerman) that those methods that do not fulfil the purpose do not have to be impact-assessed. We will, however, provide a background in the EIS as to why the applications apply for the KBS-3 method. The scope may be extended to 8–10 pages if warranted.

**3.12 EfÖ wondered whether the overhead transparencies that have been shown today will be posted in colour on SKB's website? If they are only in black and white they are sometimes difficult to interpret.**

SKB replied that all overhead transparencies will be posted in colour, as appendices to the minutes.

**3.13 Milkas wondered who is participating in the Safir programme.**

SKB replied that some individuals and/or organizations in Sweden are participating, but Sweden as a nation is not participating in the programme. SKB is following the work via the programme's website and other information.

The municipality clarified that Safir is a structured programme for small countries with nuclear power programmes where the possibilities of cooperating in the management of radioactive waste are being discussed.

**3.14 Oss started by expressing their appreciation of an interesting presentation of SDM-Forsmark. There have been meetings between the regulatory authorities and SKB during the course of the work. The report for Forsmark will be reviewed by the end of the year and the report for Laxemar later. Will SKI publish a statement on the review? Could viewpoints be expressed that affect the time for site selection?**

SKI replied that the Inspectorate's expert panel INSITE is following SKB's site investigations and continuously poses questions to SKB's experts working with the site investigations. It is not impossible that SKI could come up with questions that entail further investigations and that could thereby affect the time for site selection. SKI will not publish a review report on the site selection, which will instead be examined in the application process.

SKB explained that when the experts compare the sites, a picture gradually emerges. When we feel we have sufficient data for preferring one site over the other, we will present it. The clearer the difference is, the earlier the selection can be made.

**3.15 MKG wondered about alternative designs. Will SKB continue studying horizontal deposition (KBS-3H)? It would involve an investment on the order of SEK 100 million.**

SKB replied that they will review their plans for further study of KBS-3H during the year. No investments will be made before the applications. Or if they are it would be in parallel with the licensing process.

**3.16 MKG wondered how much of KBS-3H will be included in the applications. MKG is trying to figure out how SKB is thinking.**

SKB replied that the application will be made for KBS-3V [Vertical deposition].

**3.17 MKG has a question for SKI with respect to SSI's RD&D review statement, where SKI proposes that the Government should request supplementary studies in a few areas: Will SKI pass on the request for supplementary studies in its statement of comment to the Government?**

SKI replied that they do not wish to anticipate their reply to the Government. The reply will come on 26 June.

**3.18 Oss wondered regarding the Espoo consultations: shouldn't the viewpoints that have emerged from the Swedish consultations be included in the background material that is sent to the participating countries? If there is a consultation meeting, it would be good if Swedish organizations were invited to participate.**

SKB replied that if a country asks to see the viewpoints expressed in the Swedish consultations, we will furnish them.

**3.19 Milkas wanted to know if any consultations will be held at a level between those that are held under the Espoo Convention (international level) and those held at the sites (local level).**

SKB said that the public consultation meetings are open to anyone who wants to participate, and we have advertised the most recent ones in the national press.

**3.20 Milkas asked whether water samples have really been taken at 500 metres depth? How are diverging opinions handled in the work with the SDM?**

Kemakta replied that yes, water has been sampled at 500 metres depth. As far as diverging opinions are concerned, an iterative approach is used and the content of the SDM has emerged in consensus. In cases where results point in the other direction, this is handled as an uncertainty.

**3.21 MKG wondered about the formulation in the Ministry of the Environment's statement about the examination forum – that the applicant should decide which court should examine the matter. How did that formulation get in?**

SKB replied that they have had a dialogue with the Ministry of the Environment on how the matter can be brought before an environmental court. It is not necessarily the siting of the final repository that should be the main matter. SKB does not believe it is of any importance which environmental court hears the matter, as long as it is an environmental court. The matters regarding power increases at the nuclear power plants show that the parties involved – the Ministry of the Environment, the environmental court and the regulatory authorities – do not automatically talk so much with each other.

## Public meeting with Oskarshamn EIA Forum

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|---|---|
| **Date** | 28 May 2008 |
| **Time** | 9:30 – 12:30 hrs |
| **Place** | Figeholms Fritid och Konferens (Figeholm Leisure and Conference), Hägnad, Figeholm. |
| **Target group** | Oskarshamn Municipality, County Administrative Board in Kalmar County, SKI and SSI. |
| **Invitation** | The date of the meetings is decided on jointly. SKB summons the regular parties to a meeting via e-mail. The invitation to private citizens was published in Oskarshamns-Tidningen (10 and 24 May) and in Nyheterna (10 and 24 May). |
| **Purpose** | The group consults on matters related to SKB's plans to site an encapsulation plant and a final repository for spent nuclear fuel at Oskarshamn. Furthermore, each participating party gives a status report on the work they are taking part in that has a bearing on the disposal of spent nuclear fuel. |
| **Background material** | — |
| **Present** | County Administrative Board in Kalmar County – *Sven Andersson*<br>Oskarshamn Municipality – *Lars Blomberg, Bo Carlsson, Göran Edsbäcker, Rigmor Eklind, Elisabeth Englund, Charlotte Liliemark, Kaj Nilsson, Antonio Pereira, Rolf Persson, Lars Tyrberg, Peter Wretlund*<br>SKI – *Josefin Päiviö Jonsson*<br>SSI – *Tomas Löfgren*<br>SKB – *Ulf Färnhök* (chairman), *Saida Laârouchi Engström, Katarina Odéhn, Olle Olsson, Erik Setzman, Peter Wikberg, Olle Zellman, Lars Birgersson* (secretary) |
| **Audience** | Representatives from the *Regional Council in Kalmar County, the Swedish National Council for Nuclear Waste, MKG, the Döderhult Nature Conservation Society, Milkas and SERO.* Total about 10 persons. |

## 1 Interim storage facility and encapsulation plant

### 1.1 SERO asked in reference to the picture shown by Saida Laârouchi Engström whether what is managed in Clab is to be regarded as fuel or waste?

SKB replied that spent nuclear fuel is managed in Clab.

## 2 Final repository

### 2.1 The Swedish National Council for Nuclear Waste asked whether the site selection will be made in the autumn of 2008?

SKB replied that it is only a declaration of intent regarding other investments in connection with the site selection that will be made in the autumn. The actual site selection is planned to be made in about one year and the applications will be submitted in two years.

### 2.2 MKG has got the impression that SKB takes a more serious view of copper corrosion in oxygen-free water nowadays than it did before. Is that right?

SKB replied that new findings are not taken lightly, but are followed up. The findings recently obtained regarding corrosion of copper in oxygen-free water are still the subject of scientific review. In other words, SKB is monitoring the issue and doing some work of its own, for example calculations.

(MKG, comment) MKG has had contact with one of the researchers at KTH, who said that they have not yet presented data from the higher temperatures where measurements are being performed since they do not want to interrupt the test prematurely.

(SKI, Comment) SKI's expert panel BRITE has met the researchers at KTH who are working on corrosion of copper. SKI will address the issue of copper corrosion in its RD&D statement.

## 3 Common issues

### 3.1 The municipality asked whether SKB has postponed the deadline for applications?

SKB replied that now that the authorities' viewpoints on the SR-Can safety assessment have been received, there will not be enough time for the applications to be completed in 2009. The deadline for submitting the applications is therefore being postponed about six months.

### 3.2 Oskarshamn Municipality observed that the material compiled by SKB in its research is of great interest. How will the material be handled in the future?

SKB replied that the research activities will not be concluded when the applications are submitted, but will continue for a long time to come, in view of the fact that the facilities will be in operation until at least 2050-60. Discussions are being held on how the research results can be utilized, for example sold internationally.

### 3.3 The County Administrative Board in Kalmar County asked whether the postponement will affect the consultation process?

SKB replied that information on future consultations will be provided later during the meeting.

### 3.4 The chairman asked whether Oskarshamn Municipality has also adopted a detailed development plan for the area?

Oskarshamn Municipality replied that an in-depth comprehensive plan has been adopted for the Simpevarp and Laxemar areas.

### 3.5 SKB related that colleagues in France had posed a question concerning SKB's societal studies. They wonder whether these studies have been useful to the municipalities, and if so how useful?

Oskarshamn Municipality observed that the societal studies had contributed a great deal of useful information, but that it was not initially simple to assimilate all the information and to put it to good purpose in the municipality's regular work. Recently, however, the material has been put to good use in the municipality's work. It can also be noted that the initial studies were retrospective, while later studies have been more concrete from an Oskarshamn perspective.

### 3.6 Account of other methods – discussion

The County Administrative Board asked whether the description of other methods will be presented in an appendix to the applications or in the EIS. SKB clarified that a full account will be provided in the appendix: "The activity and the general rules of consideration". All in all the account will amount to several hundred pages. The EIS will contain a summary of this account. The summary in the EIS may amount to 10 – 20 pages.

The County Administrative Board said that the consultations will deal with the EIS, but not the application.

Where will SKB describe the strategic choices that have been made with regard to the method?

If they are presented in the EIS they should also be dealt with in the consultations. If they are only presented in an appendix to the applications, they are not a part of the consultations.

SKB said that the background material compiled for an earlier consultation occasion – May/June 2006 – focused on other methods than KBS-3 that have been studied within the RD&D process and reasons why SKB has rejected them. During these consultations, SKB also explained how these other methods enter into the RD&D process and the licensing process. There has been and still is great interest in the methods SKB has studied in the RD&D process. SKB will therefore describe these methods in the EIS as well, even though that are not alternatives in accordance with the Environmental Code or the purpose SKB has defined for the activity. In this connection it can be noted that SKB has been advised by legal experts, such as Peggy Lerman, that those methods that do not fulfil the purpose do not have to be impact-assessed. However, SKB will provide a background in the EIS as to why the applications apply for the KBS-3 method.

Oskarshamn Municipality asked how this viewpoint agrees with the viewpoints offered by SKI in February 2008 regarding reporting of alternatives in the EIS. SKB said that they had heeded what SKI had said by including a summary in the EIS of the methods that had been studied in the RD&D process. SKB believes that this fulfils SKI's wishes. SKI stated that the methods described within the framework of the RD&D work should be taken up in the EIS. SKI's lawyers have written a memo in which we explain why SKI thinks the EIS should present all the alternatives that have been discussed, and if desired SKI's lawyers can participate in a future meeting and give an account of the contents of the memo.

### 3.7 Oskarshamn Municipality wondered what responsibility SKB has for the impact statements that will be presented in the applications. Assessments and conclusions will change, which means it is important to follow up the impact statements. What will be followed up? How will this be done? Who will do what?

SKB said that what SKB proposes will be done and that it is SKB's responsibility to make sure this happens. It is true that the impact statements will change as advances are made. The intention is that what is described in the EIS should be a "lower limit" with a view towards follow-up, protective measures etc.

SKI pointed out that the Swedish Radiation Safety Authority will be given a big mandate to prescribe what SKB should do with a view to nuclear safety radiation protection aspects after a permit has been granted.

SKB pointed out that there are requirements in the Nuclear Activities Act for repeated follow-ups with regard to safety analysis reports. Furthermore, SKB has experience of following up projects, since we already have facilities that are in operation such as Clab and SFR.

**3.8 Oskarshamn Municipality said that the overall structure of the EIS that was presented lacks sections that deal with protective measures. The descriptions must not be limited to effects and consequences. It is also important to include measures. It is also important to look at protective measures if it should turn out that the consequences are greater than is now expected, or if limit values change.**

SKB explained that the proposed table of contents that was shown is very general. There will be sections that deal with protective measures, such as noise barriers. Furthermore, the studies and assessments of consequences and effects are generally conservative, i.e. based on the worst case.

**3.9 Oskarshamn Municipality observed that SKB has published 4,000–5,000 studies, of which about 100 are societal studies. The municipality is grateful for the material, but how should it be transformed into a basis for decision-making by the municipality? Can SKB help with this?**

SKB noted that the societal studies that have been produced are not a part of future applications, but constitute a broadened basis for decision-making by the municipality. During the autumn SKB will issue a declaration of intent on how they want to work with the municipality in the future, for example how findings can be put to use.

**3.10 The County Administrative Board asked whether by "the application" SKI only means the application under the Nuclear Activities Act?**

(SKI) Yes.

**3.11 SKB asked what has emerged at the Swedish National Council for Nuclear Waste's hearing about deep boreholes that carries more weight than laws and regulations and could thereby warrant a comparative evaluation between KBS-3 and deep boreholes.**

SSI replied that it emerged during the Swedish National Council for Nuclear Waste's hearing that sufficiently deep holes with the necessary diameter are not as complicated as has previously been thought.

(SKB, reply) SKB's perception is that the technology for drilling these holes is complicated.

**3.12 SKB asked how many people will be working at the Swedish Radiation Safety Authority.**

SKI replied that the negotiations are not finished yet, but that so far positions have neither been eliminated nor added and that any additional positions will be discussed when the authority is up and running.

SSI said that it would for the present time be difficult to reduce the number of employees, considering the work load.

**3.13 Oskarshamn Municipality wondered whether the total radiation effect of siting several facilities in the same area has been taken into consideration.**

SKB said that the total radiation effect was taken into account when the risk limit for the final repository was stipulated in SSI's regulations 1998:1, which deal with the protection of human health and the environment in connection with the final disposal of spent nuclear fuel and nuclear waste.

SSI said that the risk limit in SSI FS 1998:1 was increased by a factor of 10 to make it possible to have other nuclear activities in the vicinity of the final repository.

**3.14 How are the consultations under the Espoo Convention managed? Do SKB and the Swedish Environmental Protection Agency handle them? Or are other authorities involved?**

SKB replied that SKB is compiling the background material for the consultations and that contact with the different countries is handled by the Swedish EPA. So far the consultations have been in writing.

**3.15 Milkas said that many countries are choosing to emplace the waste in dry and accessible repositories instead of disposing of it at great depth in the bedrock. We in Sweden should also investigate the possibility of using a dry repository.**

SKB said that they have previously looked at dry repositories. A dry repository is a type of interim storage facility. We already have an interim storage facility in Sweden, namely Clab. Swedish legislation mandates final disposal of the waste, not interim storage.

**3.16 Milkas said that there are incorrect data in old SKB reports. Those who have read these reports have therefore got wrong information. SKB should update old reports.**

SKB replied that it is only natural that new findings are made and that new reports are published that do not agree in all respects with the contents of previous reports. When it comes to long-term safety, SKB will compile the current state of knowledge in the upcoming safety assessment SR-Site.

(Milkas, reply) It is true that new findings are constantly being made. In 100–200 years, people will know more, for example about how to manage the waste.

**3.17 It is important that the County Administrative Board should have sufficient resources to review the EIS. Do you have the resources to do this?**

Chairman Ulf Färnhök (former deputy county governor in Kalmar County) replied that there may be a shortage of resources at the County Administrative Board as a whole, but that the most important issues are always given priority.

**3.18 MKG stated that the preliminary EIS that is to serve as a basis for one of the future consultations will probably be extensive. It is therefore desirable that it be made available in plenty of time before the consultation meeting. MKG pointed out the necessity making all material to be included in the EIS, including the reasons for strategic choices of method and site, available for consultations. MKG noted that SKB had chosen the KBS-3 method back in the 1970s.**

SKB made note of MKG's wish to have access to the preliminary EIS as early as possible. SKB pointed out that the applications will apply for KBS-3. The choice that has been made will be described in the applications, in other words the choice of the KBS-3 method.

We explain the reasons for our choice in an appendix to the applications. The EIS will contain a description of the environmental impact of the applied-for activity.

**3.19 SERO asked why SKB is separating the applications for spent nuclear fuel and spent reactor internals. Why isn't a joint application submitted?**

SKB replied that plans are being made for an extension of SFR (final repository for low- and intermediate-level short-lived waste) and that a final repository for long-lived low- and intermediate-level waste, for example spent reactor internals, and does not need to be in operation until 2045. The programme for low- and intermediate-level

waste is dealt with in RD&D Programme 2007 and is planned to be given a much more exhaustive description in RD&D Programme 2010. In its review of RD&D Programme 2007, SSI has stated that they consider the account of the programme for low- and intermediate-level waste and for decommissioning of the country's nuclear power plants to be incomplete.

### 3.20 Operations control centre – Discussion

The need for an operations control centre was discussed. SERO said that there should be an operations control centre that is manned round the clock in view of the recent incident with explosives at the Oskarshamn Nuclear Power Plant. If, for example, the cooling water channel to Clab were sabotaged, this could lead to a total loss of water at Clab in a few days.

SKB said that it would take more than a few days for a total loss of water to occur at Clab, in fact about eight weeks. SKI said that there is an emergency function in the event of accidents or intrusions. SKI and SSI have joint emergency preparedness and procedures exist for this work. SKI always has someone on call. Furthermore, SKI recently published new regulations that tighten the requirements on physical protection.

Chairman Ulf Färnhök (former deputy county governor in Kalmar County) said that the County Administrative Board has coordinating responsibility outside the actual facility in the event of a serious nuclear accident. SERO said that it is important to be proactive, to plan ahead, instead of just reacting when something has happened. For example, wind turbines are monitored continuously for the purpose of predicting, staying one step ahead. SKI said that daily and weekly reports are made to SKI on the activities at nuclear facilities. Furthermore, the requirements on physical protection have been increased in the new regulations.

### 3.21 MKG said that SSI proposes in its RD&D review statement that the Government should request supplementary studies in some areas. It is important that the new Radiation Safety Authority can continue to work with the issues that both SKI and SSI consider important. Will SKI pass on SSI's proposal for decision conditions to the Government in its upcoming statement?

SKI replied that they do not wish to anticipate the statement to the Government which will come on 26 June.

## Consultation meeting in connection with nearby resident meeting in Forsmark

| | |
|---|---|
| **Date** | 23 August 2008 |
| **Time** | 12:00 – 14:00 hrs |
| **Place** | The Forsmark Nuclear Power Plant's information building, Forsmark. |
| **Target group** | Nearby residents |
| **Invitation** | A written invitation to the nearby resident meeting was sent to all residents (about 250 households) within a radius of ten kilometres from the Forsmark nuclear power plant, which is located adjacent to the site investigations. It said in the invitation that a formal consultation meeting was going to be held in connection with the nearby resident meeting. |
| **Background material** | — |
| **Presentations** | At the nearby resident meeting, SKB gave an overall description of the work of managing the radioactive waste from the Swedish nuclear power plants and related the latest news from the activities in Forsmark. Furthermore, information was provided about the study work, for example the transport and traffic study and the study that was recently completed about property prices in the municipality. Finally, an account was given of the structure and content of the EIS and of what studies had been conducted as a basis for assessing the environmental impact. The formal consultation meeting focused on the questions and viewpoints of the participants. All questions and viewpoints, even those that were raised during the information portion, are included in this compilation. |
| **Present** | About 80 persons in all.<br>Private citizens: approximately 70 persons.<br>SKB: *Kaj Ahlbom, Bengt Leijon, Gerd Nirvin, Inger Nordholm, Erik Setzman* and *Sofie Tunbrant* (secretary)<br>Representatives from *Östhammar Municipality, the Opinion Group for Safe Final Disposal in Östhammar,* representatives from the *Regional Council in Kalmar County, the Swedish National Council for Nuclear Waste, MKG, the Döderhult Nature Conservation Society, Milkas* and *SERO.*<br>Total about 10 persons. |

# 1 Interim storage facility and encapsulation plant

No questions or viewpoints were expressed pertaining solely to the interim storage facility or the encapsulation plant for spent nuclear fuel.

# 2 Final repository

## 2.1 When is the start of construction of a final repository for spent nuclear fuel?

(SKB) By the middle of next year we expect to have evaluated the material from the site investigations sufficiently to be able to select one of the sites. Then we plan to submit the applications one year later, in mid-2010. After that it depends on how long the environmental court, the Swedish Radiation Safety Authority and the Government need for their deliberations and reviews; SKB reckons on three to four years. Thus, we can expect the start of construction to be no earlier than in 2013 and the start of operation no earlier than in 2020.

**2.2 Why won't there be a *deep repository*? It would probably be easier to accept than a *final repository*.**

(SKB) The designation "final repository" is the only one used in legal and regulatory texts. We have followed this practice. It emphasizes the purpose of achieving long-term safety without any institutional controls or monitoring.

**2.3 Will it be wet or dry in the final repository after closure?**

(SKB) During operation, tunnels and rock chambers are kept dry by drainage pumping. After closure the groundwater level will slowly but surely be restored.

**2.4 Is it good or bad if the rock is wet?**

(SKB) Wet is fine if it's not too wet. Conditions in Forsmark are good.

**2.5 The final repository is planned to hold about 12,000 tonnes of spent nuclear fuel, equivalent to about 6,000 canisters, but the nuclear power plants may continue operating, creating more waste. How much can Forsmark hold?**

(SKB) We don't know the maximum capacity. We are working based on the premises we have today, 6000 canisters. There is more than enough room for them.

**2.6 How many of the "number of vehicles" in the traffic forecasts are trucks?**

(SKB) About 100.

**2.7 The current proposal is to locate the facility in Söderviken. How much of the barracks village will disappear then?**

(SKB) The part of the barracks village nearest Söderviken will disappear. Parts at the other end may remain for another ten years or so.

**2.8 What will happen with the sports facility?**

(SKB) It will immediately be moved to Igelgrundet.

**2.9 When you talk about noise it is only noise from the work site and you show graphs with noise levels up to four kilometres away. But the trucks also make noise along the routes they travel.**

(SKB) This is included in the recently completed noise study. The report is in production and covers both noise and dust.

**2.10 What rock conditions are actually acceptable? The rock in Oskarshamn is fractured and wet, while the rock in Forsmark is hard and dry. One site will be the other site's alternative in the applications. This raises another question: The most important component is the clay. If the rock is wet the clay could erode away, and if the rock is too dry it will take a long time before the clay is sufficiently wet. How can one site be the other site's alternative with such different conditions?**

(SKB) The important thing for the choice of site is long-term safety. The site-specific safety report, SR-Site, is not finished yet.

**2.11 Based on the assumption that the final repository will contain twelve broken canisters after 100,000/260,000 years, can it be said that the consequences for the environment will be equally great or even smaller than now in Billingen?**

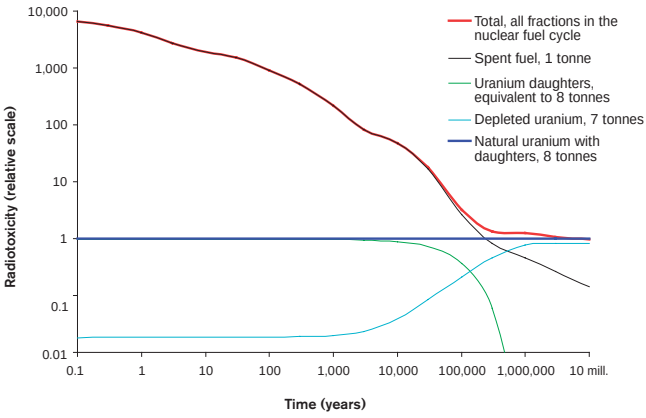
(SKB, the question was answered in writing following the meeting.) After 300,000 years the radiotoxicity of a tonne of spent nuclear fuel is roughly equal to that of the eight tonnes of natural uranium that was once mined to fabricate the fuel, see figure.

The thin black line (one tonne of spent fuel) intersects the horizontal blue line (eight tonnes of natural uranium) at about 300,000 years. The 24 tonnes of uranium are therefore more nearly equivalent to the radiotoxicity of 24/8 = three tonnes of fuel after 300,000 years, i.e. the contents of one canister.

There are two reasons for this: Firstly, there are still significant quantities of non-natural isotopes left after 300,000 years that continue to decay. These isotopes are above all neptunium-237 (18% of the radiotoxicity), thorium-229 (10%) and plutonium-242 (16%).

Secondly, the natural uranium isotopes in the spent nuclear fuel are not yet in balance after 300,000 years. The spent nuclear fuel then still contains a disproportionately high concentration of uranium-234 from the enrichment of the uranium prior to fuel fabrication and thereby also disproportionately high concentrations of the isotopes that come after uranium-234 in the decay chain, for example thorium-230.

In actuality it takes roughly 10 million years before the radiotoxicity of a tonne of spent fuel is equivalent to one tonne of natural uranium. The black curve in the figure levels out around a value of 0.125 (one-eighth of the radiotoxicity of the eight tonnes of natural uranium with a radiotoxicity of 1 in the figure) after about 10 million years.




*Radiotoxicity on ingestion via food for uranium ore (blue line) and all fractions that arise when the same quantity of uranium ore is used in the nuclear fuel cycle (red line). The different fractions are the spent nuclear fuel, the depleted uranium and the uranium daughters that are separated in the uranium mill.*

## 3 Common issues

### 3.1 If the final repository is sited at Oskarshamn that's good, but it if ends up in Forsmark I will appeal. We shouldn't transport waste around unnecessarily. It would have been better to first investigate whether the rock in Oskarshamn is good enough and start looking at other sites if it wasn't.

(SKB) The viewpoint is noted. According to a Government decision, however, SKB has to carry out site investigations at at least two sites.

### 3.2 I think the whole system appears to be based on yesterday's technology. According to Professor Janne Wallenius at KTH it is possible to utilize the energy contained in the spent nuclear fuel.

(SKB) We have to comply with today's political decisions and legislation. They say that Sweden's spent nuclear fuel must be disposed of without reprocessing or partitioning, which is required in order to further utilize the fuel in our reactors.

SKB continues to keep track of the development of other methods through our RD&D (Research, Development and Demonstration) programmes, of which accounts are published every three years.

In this context I would also like to mention that transmutation is not a long-term solution to the problem of long-lived radioactive waste. Even after transmutation there is a waste product that must be disposed of. Furthermore, reprocessing and transmutation require continued operation of the nuclear power plants.

## Public meeting with Oskarshamn EIA Forum and Forsmark Consultation and EIA Group

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|---|---|
| **Date** | 6 October 2008 |
| **Time** | 9:30 – 14:30 hrs |
| **Place** | Arlanda Conference & Business Center. |
| **Target group** | Oskarshamn Municipality, Östhammar Municipality, County Administrative Board in Kalmar County, County Administrative Board in Uppsala County and SSM. |
| **Invitation** | The date of the meetings is decided on jointly. SKB summons the regular parties to a meeting via e-mail. The invitation to private citizens was published in Upsala Nya Tidning (30 September and 4 October), Östhammars Nyheter (18 September and 2 October), Annonsbladet (17 September and 1 October) and Upplands Nyheter (19 September and 3 October), as well as in Oskarshamns-Tidningen (20 September and 4 October) and Nyheterna (20 September and 4 October). |
| **Purpose** | The groups consult on matters related to SKB's plans to site an encapsulation plant and a final repository for spent nuclear fuel in Oskarshamn and Forsmark, respectively. Furthermore, each participating party gives a status report on the work they are taking part in that has a bearing on the disposal of spent nuclear fuel. |
| **Background material** | — |
| **Present** | County Administrative Board in Kalmar County – *Sven Andersson*<br><br>County Administrative Board in Uppsala County – *Mats Lindman*<br><br>Oskarshamn Municipality – *Bo Carlsson, Göran Edsbäcker, Rigmor Eklind, Elisabeth Englund, Charlotte Liliemark, Kaj Nilsson, Rolf Persson, Lars Tyrberg, Peter Wretlund*<br><br>Östhammar Municipality – *Barbro Andersson Öhrn, Peter Andersson, Marie Berggren, Hans Jivander, Virpi Lindfors, Jacob Spangenberg, Lennart Sunnerholm, Anna-Lena Söderblom, Margareta Widén Berggren*<br><br>SSM – *Ann-Louise Eksborg, Taina Bäckström, Josefin Päiviö Jonsson, Carina Wetzel*<br><br>SKB – *Ulf Henricsson* (chairman), *Kaj Ahlbom, Lars Birgersson* (sekreterare), *Saida Laârouchi Engström, Ulf Färnhök, Roland Johansson, Gerd Nirvin, Olle Olsson, Erik Setzman, Christer Svemar, Claes Thegerström, Sofie Tunbrant* (secretary), *Peter Wikberg, Olle Zellman, Monica Bowen-Schrire* (Vattenfall Power Consultants, VPC) |
| **Audience** | Representatives from the *Regional Council in Kalmar County*, the *Swedish National Council for Nuclear Waste, MKG, Milkas, SERO, Environmentalists for Nuclear Power, Energy for Östhammar (EfÖ), the Opinion Group for Safe Final Disposal (Oss)* and *Högsby municipality*. Total about 15 persons. |

## 1 Interim storage facility and encapsulation plant

### 1.1 Regarding psychosocial effects, it may be possible to draw parallels with "EML" (estimated maximal losses) which is used in research. What happens, for example, if cooling is lost at Clab? Will dryout occur?

SKB stated that dryout of Clab is not a rapid process. If the cooling system is rendered inoperable, it takes in any case about 8 weeks to heat up the water in the pools to boiling and vaporize the water. This is plenty of time to adopt other measures. In other words, dryout is not something that can occur suddenly and without warning.

## 2 Final repository

### 2.1 Oskarshamn Municipality asked whether some government authority is not responsible for inspecting the final repository after closure.

SKB replied that monitoring and inspection will take place while the repository is in operation. After closure monitoring and inspection should not longer be needed.

### 2.2 Östhammar Municipality asked whether there are any legal requirements regarding preservation of information besides the regulations from SSI? How will SSI's regulations be handled by the new authority? Will anything about information preservation be incorporated into the Nuclear Activities Act and the Radiation Protection Act in connection with the review of these laws?

SSM replied that all previous regulations will continue to apply. What should be regulated by law will be considered in conjunction with the review of the Nuclear Activities Act and the Radiation Protection Act. Information preservation may be an aspect that is taken up.

SKB said that they regard what is said in the regulations as mandatory, even if it is not embodied in law.

### 2.3 Oskarshamn Municipality asked whether there is any example of documentation that has been preserved over long periods of time.

SKB mentioned that the Vatican archives have been preserved for a very long time despite fire, war, pandemic and relocation of the archives. It is therefore possible to preserve information for a long time.

VPC pointed out that even if the information is preserved it may eventually become difficult to interpret. An example of this is the Bible.

### 2.4 Oskarshamn Municipality asked whether the gradient during resaturation affects the erosion of the buffer.

SKB replied that it does, in a positive sense if water runs into the tunnel, i.e. wets the backfill material, and in a negative sense if water runs into the deposition holes and further up to the tunnel, carrying bentonite along with it. A rapid wetting of the backfill material in the deposition tunnel is preferable from the viewpoint of buffer erosion.

### 2.5 (Östhammar Municipality) Bedrock and water flows are different in Oskarshamn and Östhammar. Is it possible to use the same bentonite at both of these sites?

SKB replied that it is possible to use the same bentonite regardless of whether the final repository is built in Oskarshamn or in Östhammar. SKB's work is based on the use of the same reference material at both of these sites.

**2.6 Östhammar Municipality asked whether it is possible to use other bentonite grades.**

SKB replied that it is possible. The reference bentonite assumed by SKB comes from the USA. SKB is currently studying a number of types of bentonite from other countries in order to create flexibility when it comes to choosing supplier(s) for the final repository.

**2.7 Östhammar Municipality asked how far SKB has come in the work of developing techniques for handling the buffer. Are there any questions remaining?**

SKB replied that they have now come so far that it is possible to define a reference method. However, the margins could perhaps be improved when it comes to costs, technology and long-term safety. For example, the compaction of bentonite blocks could perhaps be improved by refinements in the technology of the big press that is now being built in Japan.

**2.8 Östhammar Municipality asked whether it will be necessary to temporarily store the bentonite blocks in enclosures.**

SKB replied that temporary storage of bentonite blocks will take place in enclosures, for example of the kind shown in one of the pictures. Temporary storage of bentonite blocks will be necessary both at different stations in the handling chain and in a storeroom.

**2.9 (Östhammar Municipality) One of the pictures showed a concrete base at the bottom of the deposition hole. Is this something that will be used "for real" or was it just used in the experiment at Äspö?**

SKB replied that a concrete base at the bottom of the deposition hole has been tested and found to work well. The concrete base is included in the reference method.

**2.10 The Vatican archives were mentioned previously as an example of how information can be preserved for a long time. However, the Vatican archives are only about 2,000 years old, which is not very long compared to how long the information on the final repository must be preserved.**

SKB replied that 2,000 years is not a long time when you are talking about information that will be preserved for about 100,000 years. An important lesson learned from the Vatican archives, however, is that it is possible to preserve information physically for a long time, despite fire, war etc.

**Comment:** SERO said that there are examples of 35,000 year old cave drawings made with charcoal.

**2.11 Corrosion of copper in oxygen-free water – Discussion**

MKG said that researchers at KTH have studied corrosion of copper in oxygen-free water. A recent article reports an experiment that has been going on for more than 15 years and that shows that corrosion of copper can occur in oxygen-free water.

SKB said that they always look at new findings, including these tests of corrosion of copper in oxygen-free water. SKB's impression is that there is a discussion in the scientific community and that everyone is not convinced that the results are correct, but that even if they are true, they do not have a bearing on the long-term safety of the final repository.

SSM said that their expert panel BRITE has met the researchers at KTH who are studying copper corrosion and looked at their results. Furthermore, SSM has discussed the matter with SKB, who is addressing the question. SKB pointed out that the results

of the review by BRITE support SKB's conclusions.

The Swedish National Council for Nuclear Waste has also looked at the issue of copper corrosion in an oxygen-free environment and commented on the matter in their review statement on SKB's research programme, RD&D 2007. The Swedish National Council for Nuclear Waste noted that a motion had been presented in the Riksdag dealing with copper corrosion. SKB commented that while it is good that society is involved, issues such as copper corrosion are examples of subjects that should be discussed within the scientific community.

### 2.12 SKB will apply for a permit for final disposal with vertically deposited canisters. Further, SKB wants to have the option of changing to horizontally deposited canisters without submitting a new application. How is this possible? What does SSM say about this?

SKB replied that future applications will pertain to the KBS-3 method. Vertical deposition will be described in the applications, since this material has been compiled. The safety analysis report that is being written will apply for vertical deposition. The final repository project will go on for many years to come and must then be open to changes and improvements that occur during this time. SKB has come far when it comes to horizontal deposition of canisters, for example we have conducted tests in the Äspö HRL. If it turns out in the future that horizontal deposition is better than vertical, it is possible to switch methods. If it is decided to switch to horizontal deposition, a new safety analysis report will be written for horizontal deposition on the selected site. The report will be examined by SSM.

SSM said that a discussion is being held with SKB regarding how the text in the application should be worded with a view to vertical versus horizontal deposition. SKB will not receive a permit for horizontal deposition without SSM having obtained relevant material for consideration.

### 2.13 SKB says that they will not produce two safety analysis reports, i.e. one each for Forsmark and Oskarshamn. Is that right? In that case, how can the sites be compared?

SKB replied that according to the Nuclear Activities Act, a safety analysis report shall be produced for the selected site. The Environmental Code requires a justification of the choice of site. In this justification, safety is an important factor. SKB will go through important aspects such as safety matters for the two sites, but will not produce more than one complete safety analysis report.

SSM mentioned that according to the Nuclear Activities Act, SKB is obliged to find a good site and method for final disposal. SKB's choice must be justified, which means that both sites must be described.

### 2.14 Stigmatization of the site the final repository – Discussion

Oss concluded that it was clear from the presentation of psychosocial factors that those who had been interviewed in the municipalities of Oskarshamn and Östhammar did not see any great risk for stigmatization, while residents in the reference municipality of Finspång and the nation as a whole see this risk. This is in fact the problem, that society as a whole views the final repository as a stigma. Furthermore, it was mentioned during the presentation about information preservation that the site of the final repository may be marked out in some way. This can lead to stigmatization.

SKB commented that neither Oskarshamn nor Östhammar is stigmatized, despite the fact that the spent nuclear fuel is currently being stored in Clab and that there is a final repository (SFR) and three reactors in Forsmark.

Oss said that SKB would never admit that the site is stigmatized. Further, what SKB just said is correct, provided that prevailing attitudes don't change. But if an accident that can be connected to nuclear waste occurs, public attitudes could change quickly

and result in a stigmatization. It is necessary to remain humble in these matters.

Milkas said that the high confidence figures for SKB presented in the report on psychosocial effects are due to the fact that the information that has been spread has not been objective. It is dangerous if the municipalities do not realize this. Many people are poorly informed on the matter and are not aware of the relationship between nuclear power and nuclear weapons.

Oskarshamn Municipality pointed out that they have been working with the final repository issue for about 15 years. The work is very wide-ranging and engages a large number of people from all political parties, the business community, trade unions, nearby residents, etc. They have critically scrutinized the final repository project and are well informed on the matter. There is a well functioning labour market in the municipality and its development is fully comparable with that of other municipalities.

Östhammar Municipality said that Oss's viewpoints regarding public opinion, attitudes and stigmatization are important. The municipality has chosen to meet the risks by building confidence through consistent and systematic efforts. The municipality is well aware of the bluntness of the surveys that have been conducted.

## 3 Common issues

### 3.1 Processing times – Discussion

The Swedish Radiation Safety Authority's processing times for SKB's future applications were discussed. Oskarshamn Municipality said they were interested in knowing how the merger has gone. It is important that the Authority provides local support in the municipalities. How does the Authority view the processing times for future applications? Josefin Päiviö Jonsson, SSM, said that work is underway at the Authority to develop an examination strategy with the aim of carrying out the examinations efficiently. The strategy work will be concluded at the end of this year. Experience exists from reviews of SKB's assessments of long-term safety, which will be one of the most important parts of future applications.

Östhammar Municipality noted that SKI previously estimated that the Inspectorate's processing of SKB's applications would take 2–2.5 years. Does this estimate still apply? SSM said that they had never promised to process the matter within a given time. The time the process takes will depend on, among other things, how complete the material submitted by SKB is. But a reasonable estimate is that it will take 2–2.5 years. Östhammar Municipality stressed that they are anxious that SSM should have enough resources so that they can keep to the timetable. SSM said that the budget bill calls for extra resources for the Authority. But even if an appropriation is obtained for extra resources, recruitment of suitable personnel can be a problem.

Östhammar Municipality said that they wish to be kept informed of SSM's work with development of an examination strategy.

### 3.2 Oskarshamn Municipality asked whether the 4–5 persons who are lacking at the unit for final disposal of radioactive waste are vacancies or new positions to be filled.

SSM replied that ten people currently work at the unit and there are four vacancies that can be filled with existing resources.

### 3.3 (Östhammar Municipality) The final repository will be sited in one of the municipalities. How do SSM and SKB view the need for the municipality not selected to retain its expertise and remain an active actor? For example, SFR will be extended, which will require the participation of Östhammar Municipality, regardless of where the final repository is sited.

SSM said that it is too early to say how the dialogue with the municipality not selected

will proceed.

SKB emphasized that no matter which municipality is selected for siting of the final repository, SKB will pursue activities in both municipalities for a long time to come. In Oskarshamn, the activity at Clab will continue and the encapsulation plant will be built. In Forsmark, SFR will be extended.

**3.4 It is worth noting that the financial risks have not been mentioned. Is there a possibility that nuclear waste will be accepted from other countries?**

No one replied to that question.

**3.5 It was previously mentioned that work is under way on a revision of the Nuclear Activities Act and the Radiation Protection Act. Will the Environmental Code be revised?**

SSM replied that the Government will issue directives as to whether and if so how the Environmental Code is to be revised.

**3.6 SSM mentioned previously that they have written a national report in accordance with the Nuclear Waste Convention. How is SSM working with national reports from other countries?**

SSM replied that all countries with a nuclear waste programme write national reports on waste management and that SSM has reviewed the other countries' reports. Questions and viewpoints concerning the national reports will be gone through at an international meetings next year.

**3.7 Why has the consultation meeting that was intended to be held in November in Oskarshamn been cancelled?**

(SKB) The consultation meetings was intended to be held in November, but has been postponed until February 2009 because more time is needed for the design work for Laxemar. In other words, the meeting has not been cancelled, but rescheduled.

**3.8 In Yucca Mountain, USA, the plan is to use a canister of chromium and nickel instead of copper, which will be used by SKB. The repository in Yucca Mountain will be built in unsaturated rock, in contrast to the one in Sweden which will be built in water-saturated rock. What is the reason for these differences in concept?**

SKB replied that the big difference is that the final repository in Yucca Mountain will be built above the water table, while the final repository in Sweden will be located below the water table. It is due to this difference that different materials will be used in the canisters. The fundamental principles are the same, however, i.e. the waste is encapsulated and permanently emplaced in the bedrock.

**3.9 SKB asked about the interview study that has been conducted of women's concerns about a final repository. What kind of study is it and what results have been obtained?**

(Oskarshamn Municipality) On behalf of the Regional Council and LKO, Malin Nicklasson at NOVA Högskolecentrum has conducted an interview study of nine women living in the municipalities of Oskarshamn, Hultsfred, Västervik and Borgholm. The interview study was aimed at shedding light on their attitude towards a final repository for spent nuclear fuel Oskarshamn. The study is part of the work of getting a public health perspective on the final disposal issue. The report has been

published in the University of Gothenburg's report series.

### 3.10 The County Administrative Board in Kalmar County observed that separate consultations will be held on water activities and asked whether a separate application will be submitted for the water activity.

SKB replied that a separate application will not be submitted for water activities, but that these aspects will be included in the main application under the Environmental Code.

### 3.11 Objectivity in the research – Discussion

MKG said that research results do not have to be objective, they can be partial. An example of this is the research results published by the tobacco industry.

Milkas noted that when it comes to final disposal, it is always the industry that furnishes information. Is that objective? This also means that a certain type of research does not get sufficient funding, for example research on the impact of low-dose radiation on human beings.

SKB asserted that this is a question of responsibility and the division of roles in the research. Research concerning low-dose radiation is for the most part not conducted by the industry, but by medical researchers. It is fundamentally a question of faith in official bodies and regulatory systems.

Environmentalists for Nuclear Power stated that research on low-dose radiation has been conducted for about 70 years. The correlation between dose and risk that is used by the regulatory authorities is linear and is presented in reports.

Milkas claimed that new research shows that radiation from radioactive substances present in the body can lead to effects that were previously unknown.

## Public meeting in Östhammar Municipality

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|---|---|
| **Date** | 22 October 2008 |
| **Time** | Presentations, 16:00 – 18:00 hrs<br>Consultation meeting, 19:00 – 20:15 hrs |
| **Place** | The Forsmark Nuclear Power Plant's information building, Östhammar. |
| **Target group** | Private citizens, organizations, government agencies. |
| **Invitation** | The meeting was advertised locally in Upsala Nya Tidning (4 and 18 October), Östhammars Nyheter (2 and 16 October), Annonsbladet (1 and 15 October) and Upplands Nyheter (3 and 17 October).<br><br>A written invitation went to the organizations that receive funding from the Nuclear Waste Fund to follow the consultations, Östhammar Municipality, the County Administrative Board in Uppsala County and to all government agencies. A list of all those who have obtained a written invitation plus a summary of viewpoints received in writing entitled "Summary of written viewpoints and questions plus SKB's replies" is found on page 64. |
| **Background material** | Specially produced background material: Background material for consultations under Chapter 6 of the Environmental Code for licensing review under the Environmental Code and the Nuclear Activities Act. Interim storage, encapsulation and final disposal of spent nuclear fuel. Forsmark – Siting, aesthetics and transportation. SKB, September 2008.<br><br>The background material contained a brief description of SKB's work with siting, aesthetics and transportation for a final repository for spent nuclear fuel located in Forsmark. It dealt with environmental aspects associated with construction, operation and decommissioning of the final repository and with transport to and from the facility. The descriptions focused on the impact expected to occur. A draft of a general structure of the EIS was presented in an appendix.<br><br>The material was available on SKB's website on 2 October 2008. |
| **Presentations** | The meeting was preceded by presentations, where *Bengt Leijon* (SKB) gave an overview of the siting in the Forsmark area. *Kjell Mårtensson* (SKB) provided information on planned activities and *Fredrik Moberg* (Lange Art) on the architectural design of the facility. *Jonas Nimfeldt* (SKB) gave an account of additional transport and its environmental impact. |
| **Present** | About 50 persons in all.<br><br>Private citizens and organizations: about 30 persons.<br><br>SSM – *Josefin Päiviö Jonsson*<br><br>SKB – *Erik Setzman, Bengt Leijon, Saida Laârouchi Engström, Fredrik Moberg* (Lange Art)*, Kjell Mårtensson, Jonas Nimfeldt, Gerd Nirvin, Olle Olsson* and others.<br><br>Representatives from *MKG, Milkas, Energy for Östhammar (EFÖ), the County Administrative Board in Uppsala County* and *Östhammar Municipality.* |
| **Moderator** | *Ulf Henricsson* |
| **Minutes signed by** | *Eva-Britt Karlsson* och *Gunnar Lindberg.* |

Questions and answers from the consultation meeting are given below. Written viewpoints received regarding this meeting are presented in a separate compilation entitled "Summary of written viewpoints and questions plus SKB's replies" on page 64.

## 1 Interim storage facility and encapsulation plant

No questions or viewpoints were expressed pertaining solely to the interim storage facility or the encapsulation plant for spent nuclear fuel.

## 2 Final repository

### 2.1 Regarding long-term environmental consequences and siting of the final repository in Forsmark. The lens in Forsmark has special properties; it is dry and fracture-poor. How can the clay expand if the rock is dry? How long will it take for the clay to resume its initial state?

(SKB) We are in the process of analyzing and calculating this in our work on the long-term safety assessment. It could take more than 100 years. But nothing can be transported out from a dry hole, so we don't see this as a problem.

### 2.2 The canisters are hot. How will the combination of the heat and the clay work with a dry rock? Doesn't the heat change the properties of the clay?

(SKB) This is also included in the analyses we are doing for the long-term safety assessment. The heat calculations are based on a dry hole, and the impact of heat on the properties of the clay are known. We don't see any problem with this.

### 2.3 The regulatory authorities must surely see it as a problem, especially after what happened in the experiment in the Äspö HRL?

(SKB) They don't see it as a problem, but they want further light shed on the question.

### 2.4 For how long a time does the clay fill an important function? Is it 10,000 years, 100,000 years or a million years? What does SSM think?

(SKB) The clay is of importance all the time.

(SSM) I don't have a good answer to give today, but can get back on it.

### 2.5 Isn't the clay only of importance up until the first glaciation? Then it erodes away.

(SKB) One scenario in the most recent assessment of long-term safety, SR-Can, deals with bentonite erosion in connection with melting of the ice.

### 2.6 Another aspect of long-term safety is copper corrosion. Is SKB doing anything to verify or refute KTH's studies of copper corrosion and hydrogen embrittlement of the canister?

SKB is conducting both theoretical and experimental studies of the processes that have been mentioned. We have geological evidence that copper has existed for millions of years.

## 3 Common issues

### 3.1 Which reviewing bodies get SKB's application for comment?

(SSM) Affected municipalities, county administrative boards, regulatory authorities and environmental organizations.

### 3.2 What is happening in the consultations under the Espoo Convention?

(SSM) They are being handled by the Swedish Environmental Protection Agency and are mainly concerned with long-term safety, on which the regulations from the two former regulatory authorities have a bearing. Operational safety and safety during construction are also included.

(SKB) The first part of the consultations was concluded when Finland, as the last country, submitted its viewpoints last summer. According to the Swedish EPA, the consultations on a final repository for spent nuclear fuel concern all countries around the Baltic Sea. Half of the countries have replied that they are interested in participating in the consultations. They are mainly interested in the risk of transboundary transport of radioactive substances. The second part of the consultations will be conducted in parallel with the circulation of the applications for comment in Sweden. The background material will mainly consist of the long-term safety assessment. A meeting may possibly be arranged.

### 3.3 What about the possibility of shipping rock spoil from the Forsmark harbour by barge up to Öregrund for reuse in building a breakwater?

(SKB) The activity extends over a long time. SKB estimates that rock excavation will begin in 2013 at the earliest, and will continue for about 60 years. We cannot commit ourselves now to one solution for the handling of the rock spoil. But in today's perspective, the Forsmark harbour is too small and the channel is too narrow for a large-scale shipping operation. A small campaign might be possible.

### 3.4 Has SKB examined the possibility of providing the buildings with green roofs, which would lower the temperature indoors?

SKB has not looked at that possibility, but notes the viewpoint.

### 3.5 A picture of a view from the sea where the existing nuclear power plant and the additional facilities can be seen clearly was shown in the presentation in the afternoon.

**The nuclear power plant will probably be demolished in 20–30 years, but this activity will be pursued for many years and the shoreline will thereby be ruined for the next 60 years. Why not locate the final repository's facilities further inland so that the shoreline can be restored to its original condition and a nature reserve can be created? Or at least the facilities can be given a lower and more elongated shape?**

(SKB) The possibility of creating a nature reserve is merely speculation. If the nuclear power plant is removed, the site will probably be used for other energy production.

It is not possible to make the buildings lower. It is the production activities that determine the height of the buildings. The height of the skip is determined by its function as a rock hoist.

We will describe the change and the impact on the landscape in the environmental impact statement (EIS). It has never been a question of transforming the area for the final repository's surface facilities into a nature reserve. On the other hand, Sveaskog had or has plans to transform the land they have sold to SKB, or adjoining areas which they still own, into an ecopark, which entails forestry with greater environmental consideration than before.

**3.6 A national park is not planned today, but since the area in the vicinity of the nuclear power plant is not being used and could therefore be allowed to evolve naturally, it could be set aside as a national park in the future. If an environmentally hazardous activity is started – the final repository – this will create a large impact area and spoil the chances of creating a nature reserve. The area is of national interest for nature conservation today.**

(SKB) We will take existing interests into consideration and will give an account of our deliberations in the EIS. Consideration is given to the fact that surrounding areas are of national interest for nature conservation in connection with the existing activity. The fact that an area is of national interest does not mean that it is "out of bounds", but that the national interest should be taken into consideration.

(The municipality) The area has also been singled out as being of national interest for energy production.

**3.7 Is it possible that the nuclear power plant could be preserved as a historical industrial project?**

(SKB) Yes, that is quite conceivable. There have been similar discussions of turning Sweden's first nuclear power plant in Ågesta into a museum, but the proposal met with little interest.

On the other hand, it is highly likely that we will need to replace the output of the nuclear power plant with other energy production. It is difficult to find places to site new industrial facilities, so we may need to use existing sites.

**3.8 How should we regard the background material we got for the consultation, with the appendix "General structure of the EIS for the final repository system." Is the appendix a part of the material on which viewpoints can be submitted within fourteen days?**

(SKB) Yes, the appendix is a part of the background material for the consultation and it is possible to submit viewpoints on it.

**3.9 In the appendix to the background material, under point 7.2 Forsmark, there are no subheadings, as there are under point 7.1 Laxemar/Simpevarp. Shouldn't there be subheadings for Forsmark as well?**

(SKB) Yes, there should be the same subheadings for Forsmark as for Laxemar/Simpevarp.

**3.10 Why wasn't there a presentation of the contents of the EIS?**

(SKB) This is not the first time an opportunity has been provided to submit viewpoints on the contents of the EIS.

**3.11 Is the intention of today's consultation to go through the contents of the background material that was distributed?**

(SKB) We have had consultations on the contents of the EIS in various contexts. One of the future consultations will be concerned with a preliminary EIS for the final repository system. The background material for this meeting has focused on the siting and aesthetics of the facilities, since that material is now so mature that it can be presented. The contents of the EIS are included to show the status of the work. The final outline of the EIS is still not completely determined.

**3.12 The first time I visited Forsmark the KBS-3 method was presented. Why haven't other disposal methods been discussed and talked about?**

(SKB) We have described other methods and discussed them on numerous occasions over the years in the consultations. There will be an exhaustive description of other

methods in the documentation included with the applications. We will explain why the applications apply for the KBS-3 method, in compliance with the requirements of the Environmental Code.

**3.13 Back when the National Franchise Board for Environment Protection had a meeting about SFR in 1983, the possibility of delivering crushed rock to the breakwater in Öregrund was taken up, but no stone was ever delivered – most of it went to SJ (Swedish Rail). How large fractions of crushed rock will be shipped from the construction of the final repository?**

(SKB) First it will be uncrushed rock containing everything from fine to coarse fractions. During the operating period, the rock will be coarsely crushed underground to a maximum size of 150 millimetres.

**3.14 In the information provided on the final repository there are many figures and limit values that are difficult to understand and easy to mix up. How can you make your information easier to understand? An example that everyone understands is that a radiation dose of one millisievert is equivalent to the same risk as smoking 40 cigarettes a year.**

(SKB) I agree, it is difficult to provide information on radiation risks in a way that is easy to understand. This is confirmed by the contacts I have had with the regulatory authorities that provided information on the effects of the accident in Chernobyl. Everything they said was correct, but difficult to understand the implications of. We have to make an effort to be more comprehensible. Your example is good.

**3.15 In the background material for the meeting it is difficult to obtain figures for transport volumes of heavy vehicles during the construction period that are comparable with the number of vehicles that pass today. Trucks are compared with cars.**

(SKB) Today about 2,000 vehicles per day pass Johannisfors and about 6,000 pass Börstil, of which 10 percent are trucks. That proportion will increase to 11–12 percent with a final repository.

**3.16 Why can't you hold the consultation meetings in Östhammar? More participants would presumably come then.**

(SKB) We always try to find the most suitable location for the different consultation meetings. We considered today's theme for the background material – siting, aesthetics and transportation – as being of particular interest to nearby residents and therefore chose to be in Forsmark.

**3.17 Surely the traffic on highway 76 is a matter of interest to all residents of the municipality?**

(SKB) Traffic issues are a matter of interest to all municipal inhabitants, but the large traffic streams from a final repository will be most noticeable in the immediate area.

**3.18 Will the trucks leave with a load and return empty, or will the same vehicles that haul away the rock spoil bring in bentonite clay?**

(SKB) It isn't possible to do it that way. Quite different demands are made on vehicles for rock haulage and vehicles for clay haulage. In our calculations of traffic volumes we have assumed that the trucks drive empty in one direction.

**3.19 The final repository will be located at the geologically best site. How is it possible that in such a big country as ours, both of the candidate sites are situated on the coast and close to suitable harbours?**

(SKB) It is not by chance, but has been preceded by general siting studies throughout the country, feasibility studies in a number of municipalities and site investigations in the municipalities of Oskarshamn and Östhammar. We don't claim that Forsmark or Laxemar are the most suitable sites in the whole country, but we will show the Swedish Radiation Safety Authority and the environmental court that the site we select meets the regulatory requirements and is suitable for building a long-term safe final repository.

**3.20 What emergency preparedness is there for transport incidents, for example if a boat with iron ore sinks at Hargshamn and the bridge at Hargshamn collapses?**

(SKB) We have no preparedness for that, but on the other hand there is no hurry with our shipments. In the event of an accident that blocks the transport routes we can wait until the situation is resolved.

**3.21 The map on page 14 in the background material for the consultations is incomplete. It does not show highway 77 and shipping channels.**

(SKB) It is correct that they are not marked on the map.

## Summary of written viewpoints and questions plus SKB's replies from the public meeting in Östhammar Municipality on 22 October

Written invitations to participate at the consultation meeting and/or to submit written viewpoints were sent to the following organizations (which obtain funds from the Nuclear Waste Fund to follow the consultations), government agencies and concerned municipalities. The table also shows who replied.

| | |
|---|---|
| Swedish Work Environment Authority | No reply |
| National Board of Housing, Building and Planning | No reply |
| Swedish Energy Agency | No reply |
| National Board of Fisheries | Viewpoints expressed |
| National Institute of Public health | Abstains |
| Forsmarks Kraftgrupp AB | No reply |
| Swedish Armed Forces | No reply |
| National Rural Development Agency | No reply |
| Swedish Board of Agriculture | No viewpoints |
| Legal, Financial and Administrative Services Agency | No reply |
| National Chemicals Inspectorate | No reply |
| Swedish Emergency Management Agency | No reply |
| Swedish Coast Guard | No reply |
| Swedish National Council for Nuclear Waste | No reply |
| Swedish Environmental Protection Agency | No reply |
| Swedish Agency for Economic and Regional Growth (Nutek) | No viewpoints |
| National Heritage Board | No reply |
| National Police Board | No reply |
| Swedish Rescue Services Agency | Viewpoints expressed |
| Geological Survey of Sweden, SGU | No reply |
| Swedish Maritime Administration | No reply |
| National Board of Forestry | No reply |
| National Board of Health and Welfare | No reply |
| Swedish Radiation Safety Authority | No reply |
| Svenska kraftnät | No viewpoints |
| Vattenfall Vindkraft | No reply |
| Swedish Road Administration | No viewpoints |
| Östhammar Municipality | No reply |
| Environmental Health Committee, Östhammar Municipality | No reply |
| County Administrative Board in Uppsala County | No reply |
| Regional Council in Uppsala County | No reply |
| Swedish NGO Office for Nuclear Waste Review (MKG) | Viewpoints expressed |
| Swedish Environmental Movement's Nuclear Waste Secretariat (Milkas) | Viewpoints expressed |
| Swedish Renewable Energies Association (SERO) | No reply |

In addition, viewpoints were received from the following individuals and organizations in connection with the consultation meeting:

Gunnar Melin, Stockholm

Catharina Clinton Melin, Stockholm

Private person via e-mail

Gunnar Melin sent in a communication with viewpoints, comments and questions concerning SKB's final repository project and consultation meetings as well as safety at the Forsmark Nuclear Power Plant, the price of electricity and the electricity market. SKB replies to or comments on only those questions and viewpoints which Gunnar Melin has and which in one way or another have to do with the management of the radioactive waste from the nuclear power plants.

## 1 Interim storage facility and encapsulation plant

No questions or viewpoints were expressed pertaining solely to the interim storage facility or the encapsulation plant for spent nuclear fuel.

## 2 Final repository

### 2.1 If the final repository for spent nuclear power fuel is sited at Forsmark, the copper canisters containing the fuel rods will be transported by boat from the encapsulation plant at the Oskarshamn Nuclear Power Plant. What type of canister transport container will be used to transport the canisters from Oskarshamn to Forsmark? Have these transport containers been developed yet? What will the total weight of the container be compared with the casks used today to transport spent nuclear power fuel? Is the design of the boat to transport the containers finished? How many containers will the transport boat carry each time? (MKG)

(SKB) As a basis for an application under the Nuclear Activities Act for the encapsulation plant, SKB published a report that describes a hypothetical transportation system for encapsulated spent nuclear fuel – with requirements, technical data for canister transport casks, description of function of the transportation system and safety aspects, SKB-report R-05-65. Each transport cask for encapsulated spent nuclear fuel holds one copper canister and weighs about 80 tonnes, including load. This can be compared with a cask for spent nuclear fuel, which weighs about 76 tonnes, including load.

Transportation of casks with encapsulated fuel will take place in the same manner as transportation of the casks with spent nuclear fuel to Clab or casks with packaged operational waste to SFR which SKB carries out today and which started in the 1980s. The specially built ship m/s Sigyn is used for transportation of spent fuel and operational waste. The ship's annual capacity is sufficient to handle the additional shipments of filled copper canisters to a final repository in Forsmark. It is possible to transport up to ten casks of encapsulated fuel at once on m/s Sigyn.

The transport casks that are used today for the shipments of spent nuclear fuel from the nuclear power plants to Clab meet the requirements for "type B packages" according to IAEA rules. The transport casks for encapsulated fuel will resemble those we use today, even though encapsulated fuel has much less need for cooling. The detailed design of the canister transport casks will not be finalized until it is nearly time for fabrication. The canister transport casks will also meet the requirements for "Type B" packages, entailing very high safety during transport, even in the event of improbably serious accidents.

### 2.2 When the transport cask has arrived at the final repository, the canister will be moved over to a deposition machine. How will the canister be moved from the transport cask to the deposition machine in a safe manner? (MKG)

(SKB) At the deposition level in the final repository's central area there will be a special hall for transloading of the canister from the transport cask to the deposition machine's radiation-shielding tube. The hall has an overhead crane that can lift the transport cask from the ramp vehicle to a shaft in the hall that connects to a radiation-shielded corridor that leads to a transloading position. The transport cask is placed vertically on a conveyor on the floor in the shaft and then transported upright in the culvert to a position at which the cask's radiation-shielding lid can be removed by remote control. Before that the deposition machine has been placed in the transloading position, the radiation-shielding tube has been rotated to a vertical position and the lifting equipment for the canister has been connected to the radiation-shielding tube. The deposition machine is now ready to transfer the canister from the transport cask. The opened transport cask is then moved so that it is located directly beneath the deposition machine in the transloading position. The lifting equipment in the

deposition machine now lowers the canister lifting tool and grips the canister in the transport cask and lifts it up into the radiation-shielding tube. This move is completely radiation-shielded, and both the transport cask and the radiation-shielding tube are vertical and centred in relation to each other. This operation can therefore be carried out with high safety and no radiation dose to the personnel.

**2.3 People will not be able to come near the deposition machine when the copper canister is in the machine due to excessive radiation levels. This means that the deposition machine will be remote-controlled. Since no one can come near or walk past the machine, what will the industry do if the machine breaks down, for example on the ramp down to the final repository? (MKG)**

(SKB) The deposition machine's radiation-shielding tube will be designed so that it will be possible to fix any problems even if the canister is in the radiation-shielding tube. The fact that the machine will be remote-controlled (what we normally call autonomous operation) is not due to the radiation level at the deposition machine. Autonomous operation provides higher safety during travel and deposition than if these operations were to be carried out by an operator seated in the deposition machine.

**2.4 Placing the copper canister in the deposition hole is an advanced operation. There is very little space between the canister and the rings of bentonite that line the hole. The retrieval trials that have been conducted in the Äspö HRL were done without simulating radiation protection. What will the industry do if the canister does not go all the way down into the hole and cannot be taken out again? (MKG)**

(SKB) Deposition of the canister in the deposition hole is in principle the same operation as removal of the canister from the transport cask, but in reverse. The deposition machine will be equipped with a navigation system that enables us to operate it without a driver and a positioning system that oversees the final positioning of the radiation-shielding tube in the centre of the stack of bentonite rings. This equipment will be the subject of extensive testing at Äspö to demonstrate safety in these operations.

**2.5 The nuclear power industry's planned final repository according to the KBS method is dependent on artificial barriers for long-term safety. It is therefore of the utmost importance to have as good an understanding as possible of how copper and bentonite clay behave over long periods of time in actual conditions in the chemical and microbiological environment that will exist in the final repository. Why is it that there will be so few results from realistic long-term tests in the Äspö Hard Rock Laboratory before 2010 when the application is planned to be submitted? (MKG)**

(SKB) All testing conducted at SKB's underground Hard Rock Laboratory on Äspö is not planned to be finished either before the applications are submitted in 2010 or before the start of construction of the final repository. Several tests will continue beyond those times, and the results will be analyzed as they come in and be used for further development of the method.

The research at the Äspö HRL and other laboratories around the world is generating knowledge about the processes that can affect a final repository. Our site investigations furnish information about the geological conditions on the investigated sites. SKB believes that there are enough results from the research and the site investigations to be able to carry out the safety assessments that are required in conjunction with the applications in 2010.

In conclusion, SKB would like to point out that copper and bentonite are not artificial barriers, but barriers of naturally occurring materials.

**2.6 Let us take an example. New experiments (MiniCan) to investigate corrosion in the final repository were begun as late as 2007 and will continue until 2012. Report SKB TR-08-10, the annual report for the Äspö HRL, states: "The evolution of the environment inside a copper canister with a cast iron insert after failure is of great importance for assessing the release of radionuclides from the canister. [...] The corrosion will take place under reducing, oxygen-free conditions in the presence of microbial activity present in the groundwater; such conditions are very difficult to create and maintain for longer periods of time in the laboratory. Consequently the in situ experiments at Äspö HRL will be invaluable for understanding the development of the environment inside the canister after initial penetration of the outer copper shell."**

**Why aren't data from this experiment needed in the SR-Site safety assessment, which will be appended to the application for a permit to build a final repository? (MKG)**

(SKB) All testing conducted at SKB's underground Hard Rock Laboratory on Äspö is not planned to be finished either before the applications are submitted in 2010 or before the start of construction of the final repository. Several tests will continue beyond those times, and the results will be analyzed as they come in and be used for further development of the method.

The research at the Äspö HRL and other laboratories around the world is generating knowledge about the processes that can affect a final repository. Our site investigations furnish information on the geological conditions on the investigated sites. SKB believes that there are enough results from the research and the site investigations to be able to carry out the safety assessments that are required in conjunction with the applications in 2010.

**2.7 The industry says it is difficult to create environments in the laboratories to simulate conditions in the final repository. How great efforts have nevertheless been made to try to create such research environments?**

**If these efforts so far have been limited, why haven't more tests been conducted in laboratories to simulate conditions in the final repository? (MKG)**

SKB is making great efforts to recreate in the laboratory environment the conditions in the rock and finds that it is difficult. It is above all difficult to simulate the chemical conditions in the groundwater. It is particularly difficult to keep oxygen out, and to have the right microbe and colloid levels.

**2.8 Can an application be submitted to the Swedish Radiation Safety Authority and the environmental court before long-term tests whose results are important for the safety assessment are finished? (MKG)**

(SKB) All testing conducted at SKB's underground Hard Rock Laboratory on Äspö is not planned to be finished either before the applications are submitted in 2010 or before the start of construction of the final repository. Several tests will continue beyond those times, and the results will be analyzed as they come in and be used for further development of the method.

The research at the Äspö HRL and other laboratories around the world is generating knowledge about the processes that can affect a final repository. Our site investigations furnish information on the geological conditions on the investigated sites. SKB believes that there are enough results from the research and the site investigations to be able to carry out the safety assessments that are required in conjunction with the applications in 2010.

**2.9 Researchers at the Royal Institute of Technology have during the past year repeated and verified experiments which 20 years ago showed that copper**

**can corrode in oxygen-free water. Furthermore, they have published a long-term experiment that verifies the process. To this can be added that when they got access to all the reports produced by the industry and the nuclear power inspectorate 20 years ago to disprove the original results, the researchers were easily able to explain what mistakes the industry and the regulatory authority's scientists made at that time. How could the industry have missed such an important question? How will the Swedish Radiation Safety Authority, other actors and private citizens be able to trust that other important questions have not been missed? How can other actors and private citizens trust a research and development process that is controlled by the industry and where the difficult questions are not always asked or studied? (MKG)**

SKB did not miss the question. Copper corrosion has been studied for a long time, and by SKB for 30 years. The issue of copper corrosion in oxygen-free water is not a new one either. In the 1980s, one of the researchers involved now (Hultquist) presented test results similar to the results of the long-term tests now presented. These results have not been verified by other researchers, however.

By means of the safety assessment, SKB can put processes in their proper context and study their importance for long-term safety. New issues or new knowledge about old issues can be discovered by SKB, the radiation safety authority, the scientific community, private citizens or other actors and then included in the safety assessment in a manner appropriate to their importance. SKB's role is to pose difficult questions that are of importance for long-term safety.

Every three years SKB publishes an RD&D programme that is reviewed by the Swedish Radiation Safety Authority, which in turn solicits viewpoints from a large number of organizations, including universities and institutes of technology. This procedure means that the research executed and planned by SKB is thoroughly scrutinized. SKB also conducts assessments of the final repository's long-term safety, which are to a very great extent supported by and based on research results. The safety assessments are also a way to identify questions that require further study. The radiation safety authority performs a critical review of the safety assessments and has in several cases also made use of international experts (which SKB also does in carrying out the assessments), and in this way international experience is brought into the project. Furthermore, SKB is participating in a number of international research projects that are helping to identify and study questions of importance for the function of the final repository.

### 2.10 How does the industry plan to study this corrosion process [copper corrosion in an oxygen-free environment] and its consequences for the long-term safety of the final repository? (MKG)

(SKB) Researchers at KTH (Szakálos, Hultqvist and Wikmark) published two articles about copper corrosion in oxygen-free water in 2008. The first article presents experiments where gas evolution is measured, while the second presents a 15-year test with copper specimens that have stood in water.

The first article contains observations and measurements of gas evolution and water consumption, plus formation of an oxide layer on copper specimens. SKB does not question this. However, the interpretations of the results and the explanations provided by the researchers contradict fundamental materials science and have not been verified by other researchers. The KTH researchers have also argued that a higher temperature (which arises in the final repository during an initial period) could lead to a considerably higher corrosion rate, which also conflicts with accepted knowledge.

During the summer (2008), the Swedish Radiation Safety Authority (SSM) had its expert panel for engineered barriers (the BRITE panel) review the first article. Their conclusions are that the experiments cannot verify that copper corrosion occurs accord-

ing to the proposed mechanism. The BRITE panel also believes that the researchers exaggerate the importance of corrosion for the safety of the final repository.

SKB has done calculations of how much copper could corrode with that hypothetical mechanism, taking into account the canister's environment in the final repository (groundwater, bentonite and rock). The conclusion is that the quantity of corroded copper has very little impact on the life of the canister.

**2.11 In the case of copper corrosion in oxygen-free water, it is important to carry out experiments at high temperatures, since the process is temperature-dependent and the final repository is initially hot. Are such experiments being conducted? (MKG)**

SKB is conducting experiments to study corrosion mechanisms, and tests are also being done at high temperatures. The time during which the canister will be exposed to high temperatures is relatively short (a couple of hundred years), which reduces the importance of the impact of temperature in the long term. The KTH researchers' argument that high temperature causes a much higher corrosion rate conflicts with accepted knowledge.

**2.12 How far has the industry come in its analysis of the importance of this process [corrosion of copper in an oxygen-free environment] for the long-term safety of the final repository? (MKG)**

SKB is using the safety assessment as a tool, and corrosion processes are being studied both by means of fundamental studies to understand the process and by means of analyses of its importance for repository safety. At present SKB is studying the proposed mechanism by means of both theoretical calculations and electrochemical experiments in an attempt to understand whether the mechanism could exist, and if so under what conditions. So far, however, SKB has not managed to verify the KTH researchers' results. The importance of the mechanism for long-term safety is being studied by modelling of corrosion (see also reply to 2.13).

**2.13 So far we have only heard the industry make different versions of the statement that "even if they [the KTH researchers] are right, it doesn't jeopardize the final repository in any way". How can the industry draw this conclusion before the study of the consequences of this copper corrosion process [copper corrosion in an oxygen-free environment] has even begun? (MKG)**

SKB has been working on an assessment of the long-term safety of the final repository for a long time and therefore has a system for how different processes can be analyzed. Calculation models for corrosion were developed previously, and since it is the supply or removal of corroding substances that controls the corrosion rate, the same models can be used for different corrosion mechanisms, regardless of whether all the details of the actual corrosion process are known or not. In the case of the mechanism proposed by the KTH researchers, removal of hydrogen gas is the factor that controls the corrosion rate. In a realistic environment, the natural concentration of hydrogen gas in the groundwater will prevent the reaction from taking place. The hydrogen gas concentration is a parameter that has been studied in the site investigations, and these data will be used.

If it is pessimistically assumed that there is no hydrogen gas in the groundwater to prevent the reaction from occurring, bentonite and rock will nevertheless limit the removal of evolved hydrogen gas, causing the reaction to stop. This is being analyzed using the most recent hydrology models from the site investigations. If the bentonite buffer were to disappear, the copper canister would be affected. However, corrosion would not be the most serious threat in this case, but sulphide reactions. SKB's conclusion is therefore that the corrosion process, if it can take place at all, would proceed so slowly and to such a limited extent that it would have no effect on safety.

**2.14 When bentonite clay is exposed to high temperature at the same time as there is not enough water in the clay, the properties of the clay are altered. Where are the results of the tests the industry has conducted that investigate this phenomenon, in particular from the long-term tests being conducted on Äspö at the Oskarshamn nuclear power plant? (MKG)**

(SKB) This assertion is not really true. Bentonite clay can take elevated temperatures much better if it is dry. Virtually all bentonite on the market has been dried in an oven. It is water-saturated bentonite, exposed to high temperatures, that could give rise to a problem. Transformation of bentonite (montmorillonite) to a non-swelling mineral (illite) is a well documented process in different geological media. The process has also been verified in laboratory studies.

Transformation of montmorillonite in nature is of importance for the oil industry and has been studied for a long time. The sediments in the Gulf of Mexico and other oil fields are of special interest to SKB, since both timescales and temperatures are relevant for a final repository for spent nuclear fuel. A summary of some studies that are available, along with a description of how they can be used in the safety assessment, is presented in SKB TR-06-11.

The results that are available to date from the project "Long term test of buffer material" on Äspö (LOT A2 parcel) will be reported in an SKB report, which is currently being reviewed. The results from the test will then most likely be reported in the scientific literature. A large number of organizations are involved in the analyses following the test, and they will presumably report their results themselves to a varying extent.

**2.15 In the long-term tests being conducted on Äspö to investigate the long-term behaviour of the bentonite clay, has the clay behaved as expected according to the models that existed before the tests, especially at high temperatures? (MKG)**

(SKB) Nothing has emerged to alter the picture of the long-term performance of the bentonite in a final repository. But some data have not been fully evaluated yet. The most recent parcel to be retrieved has only been there for five years, which is a very short time in the repository context. However, the results of the Äspö tests are just one piece of the puzzle to describe the long-term performance of the bentonite. Studies of natural systems and laboratory tests are at least as important.

**2.16 The Äspö tests concern a rock with relatively large groundwater flows compared with the relatively dry rock in Forsmark. How long will it take before canister and clay achieve the initial state in the much drier deposition holes Forsmark? How does the industry view the modelling done by the Swedish Radiation Safety Authority showing that it may take up to 30,000 years for the clay to achieve saturation? If it takes a very long time, how can you be sure that the state assumed by the theoretical safety assessment will be achieved? (MKG)**

SKB in the process of analyzing and calculating this in our work on the long-term safety assessment. It could take more than 100 years for the clay to achieve the initial state, which SKB does not see as a problem.

On Äspö as well there is a great difference in water flow between different deposition holes. Most are actually nearly completely dry. Regardless of which site SKB selects for the final repository for spent nuclear fuel, there will be great variation in water flow between different deposition holes. In the tests in Stripa in the 1980s, the buffer in three holes was virtually water-saturated after four years, while the other three had hardly absorbed any water at all.

If the water flow is low, the sealing properties of the bentonite are not needed since there is no water to transport corrosive substances to the canister (and radioactive substances from the canister).

In the first report describing bentonite as a buffer material, it was written: "In view of the very low groundwater flow and the low permeability of the buffer material and the surrounding, grouted rock, it will take a very long time (probably hundreds of years) before all bentonite is water-saturated" /KBS-2, 1978/. Thus, it was clear already in the original concept for disposal of spent nuclear fuel that it would take a very long time to saturate the buffer with water. This was not regarded then, and has never been regarded since, as a drawback for the concept, but rather as an advantage.

However, a misunderstanding has existed (exists) regarding this in the industry. Since the buffer's most important safety function is associated with its swelling pressure, it is easy to believe that it is an advantage that the swelling pressure is built up quickly; but no water transport takes place in a dry deposition hole, so there is no need for any swelling pressure.

There is thus no "ideal" flow of groundwater, but a lower flow is always better than a higher one. In this respect, dry rock can be compared with a repository in a clay formation where the groundwater flow is always near zero.

### 2.17 The annual report from the Äspö HRL for 2007 (SKB TR-08-10) says that saturation around the canisters and between different canisters in the Prototype Repository is very different. How do these results relate to the industry's own statements that there are no problems with saturation of the clay in a final repository? (MKG)

(SKB) It may take a long time, more than 100 years, before the clay achieves the initial state. However, SKB does not see this as either a surprise or a problem. The tests in Stripa showed the same behaviour. It is a misunderstanding that rapid water saturation is so important. Having as little water as possible in a deposition hole is always an advantage, when it comes to both the installation process and long-term performance. The temperature criteria are based on the assumption that no water will be supplied. As long as the holes are "dry" the canisters are completely isolated from the groundwater. However, the repository is located below the groundwater level, and sooner or later all buffer will become water-saturated.

### 2.18 The choice of material for closure of the deposition tunnels has been changed several times during the past year, from a mixture of bentonite clay and crushed rock to Friedland Clay to pure bentonite clay. Why have these changes been made and why hasn't the industry made more progress in this work, which is crucial for the long-term safety of the final repository? (MKG)

SKB has proposed material for closure that meets the long-term safety requirements, but changes occur as a natural part of the development process. Closure of the tunnels lies at least 60 years in the future, and the development work will continue.

### 2.19 How far has the industry come in the work of material selection in other tunnels and in shafts and ramps down to repository level? (MKG)

SKB has not made a decision on what material to use for backfilling. At present there are two alternatives for closure of the main and transport tunnels, the central area and the accesses to the underground part the final repository.

| | |
|---|---|
| Alternative A | Blocks consisting of 100 percent clay and pellets.<br>The blocks are assumed to constitute 80 percent of the volume, and the rest is filled with clay pellets. |
| Alternative B | Blocks consisting of a mixture of 50 percent crushed rock and 50 percent bentonite. |

The blocks are assumed to constitute 80 percent of the volume, and the rest is filled out with bentonite pallets.

**2.20 How will the industry investigate how the rock moves over a larger surface area around so that satisfactory analyses can be made of the risk that the lens will fracture during an ice age? (MKG)**

(SKB) An earthquake scenario is included as a prioritized component of the safety assessment. Based on site descriptions and supplementary analyses, the risk that the integrity of the canister will be jeopardized by any earthquakes in the immediate area is calculated. This risk is integrated with other risks resulting from the safety assessment.

SKB has ongoing analyses intended to give us the stress fields that are expected when a glacier forms. They will serve as input to the earthquake analyses. In contrast to previous analyses, which have been based on the assumption that all zones have the same probability of causing earthquakes, we intend to carry out a more realistic analysis focusing on the zones whose geometry and other properties are conducive to quakes.

**2.21 How is the risk that a final repository in Forsmark will fail in the event of a future ice age because the lens splits apart being investigated? How is this risk affected by perforation of the lens by a final repository? What measurements are being performed to provide the data needed for such modelling? (MKG)**

SKB has performed analyses that bound the conditions that must exist in order for the repository itself to constitute a plane of weakness. The analyses are complete, but reporting of the results has been delayed due to other priorities. See also reply to question 2.20.

**2.22 Furthermore, 50–150 metres of this surface rock was to be blasted into blocks. The blocks were to be used for backfill in Söderviken to make room for the project's above-ground buildings. Rock volume about 100,000 m3 according to an unknown expert (from SKB?) (Gunnar Melin)**

(SKB) An estimated 300,000 tonnes of rock, equivalent to nearly 200,000 cubic metres (loose measure) will be needed for fill at the construction site at Söderviken. Some of this will have to be obtained from outside, since some fill is needed before the rock excavation works for the descents get started. It has not been determined where this rock fill will be taken from.

**2.23 The response to the question of whether any calculations had been performed regarding the impact of vibration on the nuclear power reactors and the halls was NO. Was this going to be done later? WHEN, since this is a very unusual method? (Gunnar Melin)**

SKB has engaged experts to forecast vibrations from both construction and transport operations at the final repository for spent nuclear fuel. Possible consequences for buildings and installations are then evaluated, along with disturbances to people in the vicinity. Forecasts and evaluations will then be presented in report form and serve as a basis for the EIS that is compiled for an application for siting at Forsmark.

**2.24 The volume of the rock chamber was not reported AT ALL, but looked enormous in the pictures! Dimensions and data on how many canisters can be deposited are desired! (Gunnar Melin)**

(SKB) The total rock volume that needs to be extracted for the final repository is estimated to be about 1.9 million cubic metres (solid measure). Of this total, nearly a quarter is blasted out during the construction phase, and the remainder during the long operating phase. The total rock volume is distributed among about 45 kilometres of tunnels and other rock chambers. Most are deposition tunnels about 5 metres wide and 5.5 metres high at a depth of about 470 metres. Holes are bored in the floor of the tunnels for a total of about 6,000 canisters of spent nuclear fuel. The

largest individual rock chambers in the repository (vehicle and workshop halls) will be about 15 metres wide and 10 metres high.

## 3 Common issues

**3.1 The National Board of Fisheries assumes that the coming environmental impact statement will shed more light on possible effects on the fish fauna and fishing in the areas. Fishing includes recreational fishing, subsistence fishing and professional fishing. Furthermore, the Board points out that adequate treatment plants and monitoring programmes should be put in place to ensure that harmful substances in the effluent from the construction works does not pollute the receiving waters. Examples of foreign substances that should be monitored are drilling chemicals, rock flour from drilling in drainage water, and concrete and other products used as building materials. It should also be noted that discharging groundwater with a high iron content into surface water can result in precipitation of iron and manganese compounds, and that leachate from rock heaps can contaminate the surface water.**

In the environmental impact statement, SKB will provide information on the possible impact of the activity on receiving waters in the area.

**3.2 The Swedish Rescue Services Agency currently prioritizes matters involving permit applications for the higher level of protection of the Seveso II directive (large-scale chemical management). The Agency's viewpoint in this consultation is, however, that identified accident scenarios in the activity and their potential impact on the environment and the surrounding area should be thoroughly described in the EIS. Further, there should be a description of how these accidents can be prevented and what emergency preparedness exists and what other measures can be adopted in the event of an accident.**

In the environmental impact statement, SKB will describe identified environmental risks associated with accidents in the activity and their potential impact on the environment and people in the surrounding area. Further, there will be a description of how these accidents can be prevented, what emergency preparedness exists and what other measures can be adopted in the event of an accident.

**3.3 The Swedish Road Administration has at this point no viewpoints on the consultation material in question, but will return to this in the continued processing of the matter. The Agency notes that consultations must be held with the Swedish Road Administration if spent nuclear fuel is to be transported on public roads.**

(SKB) Transport of spent nuclear fuel on public roads will not be an issue if the final repository is sited at Forsmark. However, transport on public roads may be an issue if it is sited at Oskarshamn. This will be addressed in the background material for the next consultation in Oskarshamn (February 2009), which will also deal with siting, aesthetics and transportation. The Swedish Road Administration will be sent this material as well.

**3.4 Prior to the consultation meeting, viewpoints have been received indicating that some people are so afraid of nuclear power and radiation that they don't want to come to a nuclear power plant. Due to regular operating releases, the environs of a nuclear power plant are more exposed to ionizing radiation than other areas.**

**Under normal circumstances the radiation levels are below the limits set by the Swedish Radiation Safety Authority. At the same time there is no lowest radiation dose that is considered safe, and someone who applies the precautionary principle might avoid the area surrounding a nuclear power plant. Has the industry considered this aspect when choosing a place for the consultation meeting? (MKG)**

SKB considers it natural and important that consultations be held near the potential establishment site so that affected persons in the area and in the immediate surroundings can participate without inconvenience. Furthermore, SKB has considered it particularly important on this occasion to hold the meeting on the site in Forsmark, since the theme during the afternoon was the location and design of the facilities in the terrain and the landscape. Since there are no releases of radioactivity from the activities in Forsmark that could affect people who work there or visit the facilities, this particular aspect was of no importance for the choice of the place for the consultation meeting.

**3.5 One of the topics of the consultation was the increase in truck transport that will occur along the entire route from Forsmark down to Hargshamn for a period of more than 60 years. It could therefore be of interest for a number of people who live along the route to be easily able to participate in the consultation meeting, including those who live in the town of Östhammar. Forsmark is not centrally located for this group. It was not possible to get to the consultation meeting by public transport. Even though one of the subjects dealt with at the consultation was the aesthetic design of the facility, does the industry think this was a strong enough reason to hold the meeting in such an inaccessible place? (MKG)**

SKB considers it natural and important that the consultations be held near the potential establishment site so that affected persons in the area and in the immediate surroundings can participate without inconvenience. SKB has never received any negative comments from nearby residents when consultation meetings and nearby resident meetings have been held at the Forsmark plant or at SKB's site office in Forsmark. On the contrary, the information meetings for nearby residents have been very well attended.

**3.6 According to the background material that was available prior to the consultation meeting, the industry's reports SKB R-08-64, SKB R-08-66 and SKB R-08-78 were background reports to the consultation material. None of these reports was available prior to the meeting, not even in draft form. One of the reports (R-08-64) deals with noise from the transport activities and its contents could have been of great interest for the consultation meeting. Why weren't these background reports available prior to the consultation meeting? (MKG)**

(SKB) Prior to the consultation meetings we compile background material concerning relevant studies. The material for the consultation meeting on 22 October 2008 was compiled during the summer and reflects the state of knowledge at that time. It is based both on previously done work and ongoing work that has not yet been published. The purpose of the consultations is not that they should be an occasion for review of SKB's reports, but rather an opportunity for discussion and an exchange of ideas.

At the information meeting on transportation and noise prior to the consultation meeting on 22 October, parts of the results from background reports were presented, some of which were available and a couple were in preparation. SKB's goal is that any background reports should have been printed prior to the consultations. But this will not always be the case. The reports referred to will be printed not later than the spring of 2009. If there are questions concerning these reports/studies, other reports/studies or SKB's work in general, they can be taken up at a future consultation meeting, for example. The consultations will continue until at least the first quarter of 2009.

**3.7 A draft of the table of contents of an environmental impact statement is included as an appendix to the consultation material. It does not say in the background material or in the invitations to the consultation meeting that the industry intends to consult on the environmental impact statement at the meeting. Was it the industry's intention to consult on the draft environmental impact statement appended to the consultation material at the consultation meeting? (MKG)**

SKB's intention with the consultation meetings is to provide an opportunity to consult on everything concerning the final disposal of the spent nuclear fuel. SKB has a great deal of information to convey as a basis for the discussions. We therefore choose one or more themes for the meeting, depending on how far we have come in our work and what information is called for. The main theme of the background material for this consultation meeting was "Siting, aesthetics and transportation", but since the structure of the EIS for the final repository system has been developed since we last presented it, we chose to append it to the consultation material as an account of the status of the work. Regardless of whether the presentations deal with certain themes or not, questions and discussions that are directly related to final disposal of spent nuclear fuel are always welcome at all meetings.

The background material for the next consultation meeting will be the preliminary EIS, and it will be available in both an abridged version and an unabridged version about three weeks before the meeting.

**3.8 Both the area where the surface facility is planned to be located and above the final repository are areas of national interest for nature conservation. Did the industry take this into account earlier in the siting process when choosing the site for a site investigation in Östhammar Municipality? (MKG)**

(SKB) In the feasibility studies conducted by SKB in Östhammar Municipality, among other places, Land and Environment was a main subject area (along with Safety, Technology and Society). It was determined there that site selection and design of the facilities should be done so that conflicts with competing interests are minimized. Consideration should be given in a broad sense to the natural and cultural environment. Factors that are taken into consideration are environmental protection, recreation, hunting, fishing and other outdoor activities, cultural monuments, important natural resources, and agricultural and forestry.

Facility parts and transport routes must blend in with the terrain in a pleasing way.

In summary, the site for the final repository must:

– Be selected and designed with consideration given to protected and valuable areas.

– Provide good opportunities for building and operating the facilities and meet environmental protection requirements.

The area where the facility parts on the ground surface are planned to be located are of national interest for nature conservation. However, the area is also of national interest for facilities for final disposal of spent nuclear fuel and nuclear waste. Different national interests can be compatible within an area.

**3.9 Even though the industry's intention has been to set aside a separate industrial area, in its presentations prior to the consultation meeting the industry made comparisons with the aesthetic appearance of the nuclear power plant's buildings when both facilities are regarded from a location out at sea. The power plant causes a similar disturbance in the coastline, and an above-ground facility for a final repository that resembles the power plant will also cause a disturbance. The final repository will be in operation for at least 60 years, and 30–40 years after the power plant has been shut down. If the above-ground facility has the aesthetic appearance proposed by the industry, the shoreline will not be able to be completely restored when**

**the reactors are dismantled and demolished, since the final repository's surface facility will remain. Is this a good reason to try to give the facility as low a profile as possible and locate it a bit in from the shoreline? (MKG)**

(SKB) Even if the planned site is separated from the nuclear power plant by the cooling water channel, the final repository and the power plant will be perceived as a single industrial establishment. Because of its size, the nuclear power plant is a landmark for the site, and SKB's ambition is to adapt the new facility architecturally to the power plant via its form and choice of materials and colour.

It is not possible to make the buildings for the final repository lower. It is the production activities that determine the height of the buildings. The skip building is the tallest one, and its height is determined by its function as a rock elevator.

The area for the final repository on the ground surface has primarily been determined on the basis of geological premises for the final repository, but also existing requirements with regard to natural and cultural environment, infrastructure and industrial aspects. Another premise has been that the operations area should be built within the existing industrial area. The placement of the facilities must also take into account good constructability via the bedrock down to the repository. An important aspect in judging the different siting alternatives in Forsmark is the highly conductive upper part of the bedrock. After an overall assessment of conditions on the ground surface and in the bedrock, SKB has decided that Söderviken is the location they wish to proceed with.

**3.10 A study of the consultation material leads to the conclusion that a siting of the final repository in Forsmark would lead to an extra 60–70 truck passages along highway 76 per day, or 6–7 trucks an hour over a period of 10 hours. This is equivalent to one extra truck every 10 minutes. This extra traffic will continue for up to 60 years. Does the industry consider this to be a negligible environmental impact such as it is described in the consultation material? (MKG)**

(SKB) The 60–70 truck passages per day apply during the most intensive construction phase, which has a duration of about three years. During the operating phase, which is estimated to last for about 50 years, the number of truck passages is estimated to be about 38 per day. This must be compared with the Swedish Road Administration's forecast for traffic on the same road section, which is presented in the consultation material (Table 4. 4 and Figure 24). On page 38 in the consultation material it is concluded that after highway 76, the additional traffic at Johannisfors will be considerable, while it will be much less at the level of Börstil and scarcely noticeable at Harg. It is not until at Rasbo, after county road 288, that the additional traffic is judged to be negligible.

**3.11 It says in the consultation material that only a dozen or so persons will be appreciably affected by the noise from the truck traffic.**

**Are the noise limits used by the industry equally relevant in the quiet environment in Östhammar Municipality along highway 76 as if it were Hornsgatan in Stockholm? (MKG)**

SKB states in the consultation material that the increase in traffic resulting from the final repository will give rise to an increase in noise along the transport routes. The traffic increase will be greatest during construction phase 2. Calculations show that if the entire traffic increase during construction phase 2 goes southward on highway 76 (see consultation material, Table 4. 4 and Figures 24 and 25), the number of residents exposed to noise above the guideline value of 55 dBA daily equivalent sound level will increase by 19 persons. The guideline values of 55 dBA equivalent level outdoors (at facade) has been stipulated by the Riksdag and is applied regardless of whether it is

in Östhammar Municipality or on Hornsgatan in Stockholm. It isn't SKB that decides whether the guideline values is relevant or not. Furthermore, the Swedish Road Administration is in charge of road construction and maintenance and thereby responsible for any noise protection.

**3.12 There are statements from the industry suggesting that a complete safety assessment will not be published for the site that is not selected for a final repository. If not, it will be more difficult for the Swedish Radiation Safety Authority and other actors to review the industry's site selection in a long-term environmental perspective. Does the industry in its application present an equally comprehensive safety assessment for the alternative site, for which it has also performed a site investigation? (MKG)**

(SKB) The procedure for site selection will be that we will first determine whether the two sites – Forsmark and Laxemar – are suitable for the purpose. In other words, we will determine whether it is possible to dispose of the spent nuclear fuel in a safe manner for a very long time. If both sites are found to be suitable, they will then be compared with each other. The evaluation is made from an overall perspective taking into account many different factors, where long-term safety is the most important factor.

As soon as SKB has a body of evidence that clearly points to one of the sites we will announce this. Today we estimate this will occur in the summer of 2009.

According to the Nuclear Activities Act, a safety analysis report shall be produced for the selected site. The Environmental Code requires a justification of the choice of site. In this justification, safety is an important factor. SKB will go through important aspects such as safety issues for the two sites, enabling the regulatory authorities to judge SKB's justification of the selected site. The complete safety analysis report is only produced for the selected site.

**3.13 At this stage it can be observed that SKB is working to produce documentation in preparation for its application to the environmental court. This is particularly clear from the "general structure of the EIS" which is presented in an appendix. The actual background document is also of a general nature, although not only in bulleted form like the appendix.**

**Milkas takes a positive view of the fact that SKB provides information on its activities and publishes general and preliminary documentation. However, Milkas regards this information as a preparation for a consultation according to the Environmental Code, and not as information that can serve as a basis for conducting a consultation. The background material for the meeting on 22 October 2008 in Forsmark is not of the character that Milkas can use it for a thorough review in accordance with its mission. (Milkas)**

(SKB) The purpose of the consultations is not that they should be an occasion for review of SKB's work. The consultations shall, according to the Environmental Code (Chap. 6, Sec. 4), be concerned with the siting, scope, design and environmental impact of the applied-for activity and the form and content of the environmental impact statement.

SKB has a great deal of information to convey as a basis for the discussions. We therefore choose one or more themes for the meeting, depending on how far we have come in our work and what information is called for. The main theme of the background material for this consultation meeting was "Siting, aesthetics and transportation", but since the structure of the EIS for the final repository system has been developed since we last presented it, we chose to include it with the consultation material as an account of the status of the work.

The background material for the next consultation meeting will be the "Preliminary EIS", and it will be available in both an abridged version and an unabridged version about three weeks before the meeting.

**3.14 Furthermore, Milkas claims that the location of the meeting at the Forsmark nuclear power plant was inappropriate since there is no bus there and because of the health risk posed by release of radioactive material to air during normal operation. In SSI Report 2005:19 it says on page 55 that the 21 isotopes that have been measured in release to air during 2004 from the three nuclear power plants in Forsmark together comprise a very large quantity of becquerels. If the total quantity is divided by the number of seconds per year, you get up to nearly four hundred thousand becquerels per second. Due to the fact that health surveys in several countries show serious health effects downwind of nuclear power plants, some people simply do not want to be in the vicinity of a nuclear power plant.**

**(Appendices: SSI Report 2005:19, page 55, Total becquerels Forsmark units 1–3, figure showing where different isotopes collect in the body.) (Milkas)**

SKB considers it natural and important that the consultations be held near the potential site for establishment, so that affected persons in the area and in the immediate surroundings can participate without inconvenience. Furthermore, SKB has considered it particularly important on this occasion to hold the meeting on the site in Forsmark, since the theme during the afternoon was the location and design of the facilities in the terrain and the landscape.

SKB has never received any negative comments from nearby residents when consultation meetings and nearby resident meetings have been held at the Forsmark plant or at SKB's site office in Forsmark. On the contrary, the information meetings for nearby residents have been very well attended.

Since there are no releases of radioactivity from the activities in Forsmark that could affect people who work there or visit the facilities, this particular aspect was of no importance for the choice of the place for the consultation meeting.

**3.15 No accounting whatsoever was given of the costs of the project! However, at the information meeting on Gräsö in September 2008 the test drilling had so far cost SEK 1.3 billion, which is SEK 300 million more than in June of the same year! Test drilling is being conducted in Oskarshamn and Forsmark. The reference group requested SEK 5 million this year from the Nuclear Waste Fund for its participation. The Swedish National Audit Office has been informed, since there is clearly a need for audit and financial inspection. (Gunnar Melin)**

(SKB) Everyone who produces electricity from nuclear power pays a fee, determined by the Government, to the Nuclear Waste Fund. At the beginning of 2009, the Fund contained about SEK 40 billion. The money is used to finance research, technology development, facilities and other investments that are needed in the future to manage and dispose of the radioactive waste and the spent nuclear fuel from the nuclear power plants. The Fund is also supposed to finance the decommissioning of the nuclear power plants and other nuclear installations.

Within the framework of the costs for managing and disposing of the spent nuclear fuel, money is also paid to the municipalities where site investigations have been conducted to finance their extra expenditures for actively following the work. Money is also paid to environmental organizations to finance their costs for participating in the consultations. The money is disbursed by the Swedish Radiation Safety Authority. Its use is checked by auditors who report to the Swedish Radiation Safety Authority.

The cost of SKB's work in compiling the material needed for the applications to be submitted in 2010 is estimated at SEK 2.5 billion, including site investigations in the municipalities of Östhammar and Oskarshamn.

**3.16 To whom do you send critical viewpoints? Who is the official recipient? You have called for a "debate". How can this goal be realized if critical viewpoints are never published? (Gunnar Melin)**

(SKB) Questions and viewpoints emerging from the consultations and SKB's replies and comments are published on our website and in the yearbooks from the consultations.

The end product of the consultations is the consultation report that is appended to the environmental impact statement, which is in turn an appendix to the applications under both the Environmental Code and the Nuclear Activities Act. Everything that has been expressed in the consultations and how SKB has responded is reported there. The applications are dealt with by the environmental court and the Swedish Radiation Safety Authority, both of whom circulate the material widely for comment.

**3.17 Consultations were held in Forsmark on 22 October 2008, and in Oskarshamn they will reportedly be held "in the spring", hopefully before supposedly "voluntary" local political decisions on the final repository during the first half of 2009. (Catharina Clinton Melin)**

(SKB) Building and operating a final repository for spent nuclear fuel requires permits and a licence under the Environmental Code and the Nuclear Activities Act. Applications under the Environmental Code are reviewed by the environmental court in preparation for the Government's pronouncement on the permissibility of the activity. After the Government rules on permissibility, the matter is returned to the environmental court, which establishes conditions. The Government grants a permit under the Nuclear Activities Act after the matter has been reviewed by the Swedish Radiation Safety Authority, which also issues conditions. Before the Government makes any decisions the selected municipality will be consulted and the matter will be circulated to numerous reviewing bodies for comment.

Site Investigations in Oskarshamn and Östhammar were more or less concluded in 2007. SKB expects to have evaluated the results of the site investigations sufficiently during the first half of 2009 to be able to select a site for the final repository. In the middle of 2010, SKB plans to apply for permits under the Environmental Code for the encapsulation plant, Clab and the final repository. At the same time, SKB will apply for a permit under the Nuclear Activities Act to build the final repository and a licence to operate it.

**3.18 It is reasonable THAT EVERY COUNTRY should manage its own "shit" (read: nuclear fuel waste). The Swedish waste in Sweden… BUT what about elsewhere – in today's EU, to start with? There is reportedly spent nuclear waste "stored" both on the ground surface next to the nuclear power plants or in a shallow repository, even in technically advanced countries such as France and Germany. WHO keeps a watch over things there? WHAT does the EU say? WHAT will happen after a possible enlargement of the EU? Ignalina, Chernobyl – not to mention Sellafield. There's a lot of "shit" to manage, and WHO will manage it? (Catharina Clinton Melin)**

SKB's mission is to manage and dispose of the spent nuclear fuel and the radioactive waste from the Swedish nuclear power plants. Under current legislation and international treaties we are not allowed to take care of other countries' waste. The Nuclear Activities Act prohibits "disposal of spent nuclear fuel in Sweden or nuclear waste from a nuclear facility or another nuclear activity in another country without a special permit".

In the Nuclear Waste Convention is says that "...radioactive waste should, as far as is compatible with the safety of the management of such material, be disposed of in the State in which it was generated...". Thus, each country is responsible for managing its own radioactive waste.

**3.19 Incidentally, what happened to the much-publicized seal enclosure in Forsmark? Did things get too hot for the cute little pups? Did they get sick, or did they reproduce too much, in the highly unnatural environment? I for one have not heard any credible explanation of what happened to them! (Catharina Clinton Melin)**

(SKB) The seal enclosure in the biotest basin offshore from the nuclear power plant in Forsmark was shut down early in 2006. Seals had been bred there since 1980 and then released to build up the seal population in the Baltic Sea. When the seal population had grown sufficiently (especially in the central and northern Baltic), the seal enclosure was shut down. A total of 30 seal pups were released. The project was run by the Swedish Museum of Natural History, the World Wide Fund for Nature and Forsmarks Kraftgrupp AB.

**3.20 SWEDEN INVESTS perhaps hundreds of billions of kronor in the search for a (somewhat) safe final repository. Some thought must be given to recovering some of this money. Sell final repository space to anyone who needs/wants/can afford it in these times of crisis – or in the future??? In any case, there are plans for an ENORMOUS final repository in Sweden. (Catharina Clinton Melin)**

(SKB) Everyone who produces electricity from nuclear power pays a fee, determined by the Government, to the Nuclear Waste Fund. At the beginning of 2009, the Fund contained about SEK 40 billion. Money will continue to be paid in at the necessary rate as long as there are nuclear power plants in operation. The money is used to finance research, technology development and other investments needed in the future to manage and dispose of the radioactive waste and the spent nuclear fuel from the nuclear power plants. The Fund is also supposed to finance the decommissioning of the nuclear power plants and other nuclear installations.

The total cost of the nuclear waste programme is estimated at just over SEK 100 billion at current prices. The site investigations in Forsmark and Oskarshamn have cost a total of about SEK two billion.

The final repository is being designed to hold the quantity of spent nuclear fuel produced by the Swedish nuclear power plants, i.e. the amount generated by the operation of Barsebäck and the amount that arises during an operating period of 50 years at the reactors in Forsmark and Ringhals and 60 years at the reactors in Oskarshamn. That gives about 6,000 canisters to be deposited in the final repository.

**3.21 WHAT ABOUT THE ENVIRONMENT? Whether Sigyn travels with or without a load in one direction or the other between Forsmark and OKG hardly makes any difference. But WHAT will happen WHEN more countries want to get rid of their "shit" outside their own borders? Then it will have to be shipped! Never mind that sea transport is relatively environmentally friendly, it also requires adequate harbours. Forsmark lacks such a harbour, I don't know about Oskarshamn. The background material hints at sea transport to Hargshamn, and there transloading to a smaller ship or truck. As if we don't already have enough heavy traffic on highway 76 to and from Kapellskär and timber transport to and from Hallstavik. Or is a new eight-lane highway being planned along the coast? (Catharina Clinton Melin)**

SKB has been assigned the task of managing and disposing of the radioactive waste from the Swedish nuclear power plants, see the reply to question 3.18.

The shipments of spent nuclear fuel from the nuclear power plant to Clab take place by m/s Sigyn from the Forsmark harbour. If the final repository is sited at Forsmark, m/s Sigyn can be used for transport of encapsulated nuclear fuel from the encapsulation plant in Oskarshamn to the harbour at Forsmark. The Forsmark harbour does not, however, have the capacity for the larger ships that will bring in clay material for the final repository. The plan is therefore to ship the clay to the harbour at Hargshamn. From there it will be hauled to Forsmark by truck on highway 76. This road has the highest load-bearing class, BK1, and capacity for these shipments.

**3.22 GOOD, that the concept MELTDOWN has been reintroduced to the news reports/info. Even a half-hearted denial says something. Like that it was only**

**1 1/2 hours away... or that there was no risk of a meltdown (in conjunction with other incidents with control rods or whatever the case may be). (Catharina Clinton Melin)**

SKB has been assigned the task of managing and disposing of the radioactive waste from the Swedish nuclear power plants. We note the opinion, but have no comment on this matter.

**3.23 ISN'T there really any more SENSIBLE Swedish alternative than locating the interim/final repository on the coast, partially underwater, even under reactors??? It doesn't seem so smart. Malå Municipality said NJET, but otherwise? WHERE has drilling been done? Selection principles? WHOSE? Is it still short-sighted municipal political interests, supposedly "voluntary", that the creation of new jobs at any price should rule the process? HOW long? (Catharina Clinton Melin)**

(SKB) A step-by-step siting process for the final repository for spent nuclear fuel has been pursued since 1992. By means of general siting studies, SKB explored the general prospects in different parts of the country. These studies show that good prospects exist for finding suitable sites for the final repository at many places in the Swedish crystalline bedrock. The prospects in a total of eight municipalities were evaluated in the feasibility studies: Storuman, Malå, Östhammar, Nyköping, Oskarshamn, Tierp, Älvkarleby and Hultsfred. In 2002, SKB initiated site investigations for siting of the final repository in two municipalities: Oskarshamn and Östhammar. The investigations were concluded in 2007. SKB expects to have evaluated the results of the site investigations sufficiently during the first half of 2009 to be able to select a site for the final repository.

As far as the interest of the municipalities in job creation is concerned, SKB will pursue activities in both Östhammar and Oskarshamn municipalities for a long time, regardless of where the final repository for spent nuclear fuel is sited. SFR in Östhammar will continue to be operated and will in fact be expanded. In Oskarshamn, in addition to the encapsulation plant, activities will continue at Clab, Äspö and the Canister Laboratory.

Finally, SKB would like to point out that there are no plans to locate the final repository for spent nuclear fuel beneath the nuclear power reactors.

**3.24 THE SPENT nuclear fuel is said to be MOST DANGEROUS AFTER ABOUT 5 YEARS – WHY will it be removed from the reactor at that time? Why not wait longer? The question is HOW LONG, no one seems to know... (Catharina Clinton Melin)**

(SKB) With the reactors that are in use in Sweden today, the spent nuclear fuel can only be used for about five years. Then its radioactive isotope composition is such that longer utilization is not efficient and the fuel is discharged from the reactor.

The nuclear fuel is most dangerous when it is removed from the reactor. This would be true even if the fuel were taken out after, for example, two or ten years of operation. Radiation is caused by the radioactive decay of various substances, radionuclides, in the fuel. Decay also causes the quantity of radionuclides, and thereby the radiotoxicity of the fuel, to decline with time.

**3.25 There is talk of a final repository that "/.../ remains *safe without maintenance or monitoring*" (my italics). UTOPIA – or just FRAUD? And aren't jobs needed in the future at Forsmark/OKG??? (Catharina Clinton Melin)**

(SKB) According to the requirements on final disposal of spent nuclear fuel made by the Nuclear Activities Act with associated regulations, the final repository must be designed so that it will be safe after closure without monitoring or maintenance.

As far as jobs are concerned, SKB will pursue activities in both Östhammar and Oskarshamn municipalities for a long time, regardless of where the final repository for spent nuclear fuel is sited. SFR in Östhammar will continue to be operated and

will in fact be expanded. In Oskarshamn, in addition to the encapsulation plant, activities will continue at Clab, Äspö and the Canister Laboratory.

**3.26 Nobody says anything about INFORMATION TO FUTURE generations. None of us today will be alive in 100,000 years, or even 100 years. HOW then should we convey to posterity that there is radioactive "shit" stored somewhere??? And will people then even understand our present-day Swenglish? (UNT took up the question recently in any case.) (Catharina Clinton Melin)**

(SKB) Preserving information about the final repository for spent nuclear fuel is important. Partly to avoid accidental injury and partly to enable future generations to make decisions (for example on use of the site and possible retrieval of spent fuel) based on correct information. SKB cooperates internationally with other countries and organizations in this matter.

Last year SKB published a report describing work with information preservation in other countries. The report, Kunskapsbevarande för framtiden – Fas 1 ("Knowledge preservation for the future – Phase 1", in Swedish only), P-07-220, is available on our website.

In conjunction with the applications we plan to submit in 2010, SKB will present a draft plan of action describing how we work with information preservation. An initial proposal of what should be taken into consideration in a plan of action has been drafted. This report, Bevarande av information om slutförvar av använt kärnbränsle – förslag till handlingsplan ("Preservation of information on a final repository for spent nuclear fuel – draft plan of action", in Swedish only), P-08-76, is available on our website.

The issue of information preservation far into the future will, however, not become urgent until the final repository is to be closed, which is expected to be in around 2085. Then society can decide which type of information it wants to preserve and how.

**3.27 I am worried about our legacy to future generations, not because of a lack of knowledge, but because how can we know that people in the future or whoever comes after us will not simply open the canisters, just like we do with prehistoric finds?**

**I haven't seen any discussion of that question anywhere. How will SKB communicate the risks to whoever finds the garbage in, say, 13,000 years? Will they be more intelligent than us or not? (Private person)**

(SKB) Preserving information about the final repository for spent nuclear fuel is important. Partly to avoid accidental injury and partly to enable future generations to make decisions (for example on use of the site and possible retrieval of spent fuel) based on correct information. SKB cooperates internationally with other countries and organizations in this matter.

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## Consultation with the Baltic Sea countries according to the Espoo Convention

| | |
|---|---|
| **Date** | February – June 2008 |
| **Target group** | The countries around the Baltic Sea that were interested to take part in consultations: Finland, Lithuania, Poland, Russia and Germany. |
| **Purpose** | Consultation with the Baltic Sea countries regarding transboundary environmental impact. |
| **Background material** | The following background material was distributed:<br>• Proposed table of contents in the coming EIS for the final disposal system<br>• Updated version of the document "Encapsulation plant and final repository for spent nuclear fuel"<br>• SR-Can safety assessment<br>• Extract from the SR-Can safety assessment |

## 1 Interim storage facility and encapsulation plant

### 1.1 Is the encapsulation plant designed for a plane crash? (Germany)

(SKB) The encapsulation plant is not designed to withstand a plane crash. The magnitude of a possible leakage in the event of various types of mishap is described in safety reports. There will be relatively little spent nuclear fuel in the encapsulation plant.

## 2 The final repository

### 2.1 Lithuania is especially interested in emission of radionuclides into water and the air. The EIA must thus include a detailed analysis of any effect on the Baltic Sea and long-distance transport of radioactive emissions. (Lithuania)

(SKB) The SR-Site safety analysis that is to be carried out for the final repository will concern the final repository's long-term safety and thus also deal with issues associated with any emissions from radionuclides in the Baltic Sea.

### 2.2 How strong is the throughflow of water in the bedrock? What will be the resultant flowpaths of water into the Baltic? (Germany)

(SKB) Water that precipitates as rain and snow only partially infiltrates into the rock. The deeper part of the rock, where the repository is located, has a very slow groundwater flow, with a flux in the order of $10^{-11}$ m/s (0,3 mm/year). Some of the flowpaths will end up in the Baltic Sea.

## 3 Common issues

### 3.1 The Ministry of the Environment received seven statements. These came from: The Ministry of Employment and the Economy, the Ministry of the Interior, the Radiation and Nuclear Safety Authority, Southwest Finland Regional Environment Centre, the State Provincial Office of Western Finland and the Government of Åland. The Ministry for Foreign Affairs stated that they do not have any viewspoints.

**The Ministry of the Environment made a compilation based on the received statements with reference to the Ministry of the Environment's own opinions. The compilation states that Finland wishes to stress the importance of thorough analyses of the risk and safety issues, and want a full and clear description of them in the environmental impact statement (EIS). It is important that the results of the analyses show what transboundary environmental impact the project may entail.**

**The Ministry of the Environment requests that other factors presented will be given sufficient consideration. The Ministry of the Interior states that the EIS should include an evaluation of possible effects on the emergency services' arrangements in the area and the possible regional risks of the project during both building and operation. The need for protection of the population and evacuation in the event of an accident and effects of the emergency services should also be evaluated. The Ministry of the Interior stresses the importance of close collaboration between the local emergency services and the project manager in these issues. (Finland)**

(SKB) The risk and safety issues, including the question of transboundary environmental impact, will be thoroughly analysed and described. Summarising results will be reproduced in the environmental impact statement (EIS), whilst the detailed analyses and descriptions will be reported in separate documents. An important document in this context is the SR-Site safety assessment, in which the final repository's long-term safety will be described.

With regard to radiological risk and safety issues during construction and operation, SKB will be preparing preliminary safety reports (PSAR) for the facility in question. In these we will analyse the extent to which the surroundings could be affected by disturbances or mishaps during operation of the encapsulation plant and the final repository.

Construction and operation of the encapsulation plant and the final repository are also associated with risks that are not only connected with radiation from spent nuclear fuel. Accidents of various kinds may occur. Work is in progress on investigating these so called non-radiological risks, describing the possible consequences and proposing preventive measures. SKB will also take this into consideration in the work on describing the environmental impact.

It can furthermore be stated that in Sweden it is the Radiation Safety Authority´s task to protect people and the environment from the consequences of radiation accidents. The authority thus has a preparedness plan for dealing with events such as accidents when transporting radioactive material and nuclear accidents. As an expert in the field of radiation protection and nuclear technology the authority gives advice and offers recommendations, primarily to those in charge of handling the event or accident.

The Swedish preparedness plan comprises a network of authorities at all levels in the society. They have different areas of responsibility and roles, and in the event of accidents they will collaborate to best protect people and the environment against any unnecessary effects of radiation.

In Sweden it is the county administrative board in the county in question that is responsible for a programme for the emergency services in the event of an accident involving emission of radioactive substances from a nuclear facility, whether this is in Sweden or abroad. The county administrative board is responsible for the emergency services in the event of such an accident, and it appoints an emergency manager and sets up emergency management and the relevant staff. On the basis of documentation from various expert authorities the county administrative board decides on warnings, information and advice to the general public, and on measures to protect people, animals and the environment. The county administrative board decides on radiation measurements and decontamination. The county administrative board is also responsible for issuing alarms, distributing iodine tablets, evacuation and organising staff standby.

### 3.2 Lithuania also state an interested in a consultation meeting regarding the proposed activities' effect on the environment, and that such a meeting should ideally be held after the environmental impact assessment has been reviewed by the general public and the authorities in Lithuania. (Lithuania)

(SKB) Lithuania's proposal is very much in line with SKB's planning.

In June 2009 SKB selected Forsmark in Östhammars municipality for the location of the final repository for spent nuclear fuel. (Note: Prior to the site selection SKB published a compilation of questions and answers from the consultations in 2008. The wording regarding the site selection has been changed after the selection.) SKB is planning to submit an application in mid-2010 for permits in accordance with the Swedish Environmental Code for the encapsulation plant and the interim storage facility in Oskarshamn municipality and for the final repository in Östhammars municipatility. SKB is simultaneously applying for permits in accordance with the Nuclear Activities Act to build and run the final repository.

A joint environmental impact statement (EIS) is being attached to the applications. An analysis of the final repository's long term safety (SR-Site) will be submitted in connection with the applications. The intention is for that analysis and extracts from the EIS attached to the applications to constitute the main documentation for the second and concluding part of the consultations with the Baltic Sea countries, the start of which is planned for the latter part of 2010. A meeting may be arranged in conjunction with this consultation. This would probably be during 2011.

### 3.3 Poland does not feel the need to be involved in the assessment of the effect on the environment, but is interested to receive information on planned activities and the results of the meetings. Poland also requests the opportunity to take part in meetings, depending on which subjects are dealt with. (Poland)

(SKB) Poland will be kept informed of planned activities and the continued consultation. And Poland is of course welcome to take part in the continued consultation, including the meeting planned for after submission of the applications.

### 3.4 I need statements about a possible release of radioactive substances when accidents occur during transportation and storage of fuel (e.g. in the event of a plane crash). (Germany)

(SKB) The magnitude of a possible leakage in the event of various types of mishap is described in safety reports. Safety reports have been drawn up for the transport system, interim storage (Clab) and the encapsulation plant. The safety report for the joint facility Clab and the encapsulation plant will be submitted to the authority during 2009. The safety report for the final repository for spent nuclear fuel will be attached to the application, submission of which is planned for mid 2010.

The analysis of environmental safety for the transport system includes a description for the environment impact due to a radiological accident. Such an eventuality would require a barrier breakthrough, i.e. the transport cask would need to be damaged, causing dissemination of radioactive substances. Such damage to the cask is not envisaged in the design criteria, but it must be assumed so as to facilitate a listing of radiological consequences. Thus occurrence of this type of event is presupposed, and is called a hypothetical accident. The hypothetical accident scenarios that have been analysed are mechanical damage to the cask, prolonged fire and the cask sinking to the bottom of the sea. The analysis shows that the consequence for people's health and the environment is negligible, despite very conservative assumptions regarding emission of radioactivity.

The safety report for Clab includes analysis of a worst-case scenario, assuming loss of about 25 fuel assemblies containing fuel far fresher than the fuel that will be handled in the encapsulation plant. These analyses show that the emissions into the environment would not be high.

With waste deposited in a final repository at a depth of 500 metres in the bedrock, a plane crash would not have any consequences for the final repository.

### 3.5 What are the ocean currents in the Baltic Sea between Sweden (Forsmark and Oskarshamn) and Germany (in particular the Mecklenburg West Pomeranian coast)? To what extent could radioactive substances affect us? (Germany)

(SKB) The currents in the Baltic Sea are largely governed by prevailing winds. There can be currents between Forsmark/Oskarshamn and the German coast. There is not, however, any constant direct current linking Forsmark or Oskarshamn with the German coast.

Future emissions to the water recipient from a fully developed Clab, including the encapsulation plant, are estimated to about 2 GBq/year. This can be compared with measured emissions from the current Clab, which during the period 1997–2007 have averaged 0,55 GBq/year, with a downward trend. The estimated emission of 2 GBq/year is equivalent to an annual dose of about $2\times10^{-6}$ mSv to members of the critical group. This dose is more than one order of magnitude lower than the initial licensing value for Clab. The radionuclides that give dominant contribution to the dose are Co-60 and Cs-137.

SKB must show that the final repository will meet the risk criterion forming part of one of the regulations of the Swedish Radiation Safety Authority (SSM). The risk criterion states that the annual risk of harmful effects must not exceed $10^{-6}$ for a representative individual in the group who is exposed to the biggest risk. 'Harmful effects' means cancer and hereditary damage. According to SSM the risk limit corresponds to a dose limit of about $1.4\times10^{-2}$ mSv/year, i.e. about one per cent of the natural background radiation in Sweden.

### 3.6 Can one define the main wind directions between the areas concerned? If so, to what extent could radioactive substances affect us? (Germany)

(SKB) The predominant wind direction in both Forsmark and Oskarshamn is south southwesterly.

Air emissions from Clab including the encapsulation plant are through ventilation chimneys. The estimated future annual airborne emission of radioactivity is about 840 GBq, which is 50% higher than the measured average from Clab during the period 1997–2007.

The activity emission is dominated by the noble gas Kr-85, which however has a relatively small radiological environmental impact. The expected annual air emission excluding Kr-85 is about 27 MBq. The estimated activity-related emission means an average annual dose of about $3\times10^{-6}$ mSv to members of the critical group. The dose is dominated by contributions from the radionuclides Co-60 and Cs-137. The contribution from the encapsulation plant is considered to be small, the expected future weak growth, in comparison with previous experience from Clab, is mainly due to an increase of Cs-137 activity in the storage pools in Clab.

The final repository will be sited far below the water table. Any emission of radionuclides from the final repository will be into the groundwater, not into the air.

### 3.7 I would appreciate answers to our questions in German. Or I would like German translations of the EIA documents, especially the parts referring to my questions. (Germany)

(SKB) The replies to Germany's questions have been translated into German.

The EIS will be written in Swedish. The summary of the EIS will be translated into English. SKB has no plans for translations into other languages.

### 3.8 A consultation meeting could be helpful. (Germany)

(SKB) Germany's questions are associated with the transboundary environmental impact caused by emissions into air and water.

In June 2009 SKB selected Forsmark in Östhammars municipality for the location of the final repository for spent nuclear fuel. (Note: Prior to the site selection SKB published a compilation of questions and answers from the consultations in 2008. The wording regarding the site selection has been changed after the selection.) SKB is planning to make an application in mid-2010 for permits in accordance with the Swedish Environmental Code for the encapsulation plant and the interim storage facility in Oskarshamn municipality and for the final repository in Östhammars municipatility. SKB is simultaneously applying for permits in accordance with the Nuclear Activities Act to build and run the final repository.

A joint environmental impact statement (EIS) will be attached to the applications. In connection with the applications a long-term safety assessment of the final repository (SR-Site) will be submitted. The intention is that SR-Site and extracts from the EIS attached to the applications will constitute the main documentation for the second and concluding part of the consultations with the Baltic Sea countries, the start of which is planned for the latter part of 2010. A meeting may be arranged in conjunction with this consultation. This would then probably take place during 2011.


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