THE LICENSE APPLICATION FOR THE KBS-3 SYSTEM AS A STEP TOWARDS IMPLEMENTATION OF FINAL DISPOSAL IN SWEDEN

Anders Ström

Olle Olsson

Swedish Nuclear Fuel and Waste Management Co. (SKB): Box 250, SE 101 24 Stockholm, anders.strom@skb.se

ABSTRACT

The nuclear power utilities in Sweden were in 1976 given the responsibility for final disposal of radioactive waste from their power production. The utilities formed the Swedish Nuclear Fuel and Waste Management Co (SKB). A large part of the system that is needed to manage and dispose of the waste from operation of the reactors has been built up since then. The system consists of the interim storage facility for spent nuclear fuel (Clab), the final repository for short-lived radioactive waste (SFR), plus the ship m/s Sigyn and casks for transport. What remains to be done is to build and commission the system of facilities, the KBS-3 system, needed for final disposal. This includes extending Clab with a plant for encapsulation of the spent nuclear fuel, casks for the transport of spent fuel canisters, and the construction of a final repository in which the canisters will be deposited. For the low- and intermediate-level waste, it will be necessary to add an extension to SFR, build a repository for long-lived radioactive waste (SFL) and produce casks for shipments of long-lived waste.

The site selection process for the final repository for spent nuclear fuel was initiated in 1992. In June 2009, SKB announced Forsmark as being the site selected following general siting studies on a national and municipal level and finally comprehensive investigations of two sites. SKB has now submitted license applications in accordance with the Act on Nuclear Activities and the Environmental Code for a geological repository at Forsmark and an encapsulation plant in Oskarshamn. The review by the regulatory bodies has just begun, and a Government decision can be expected after roughly three years. After the necessary licenses have been obtained, construction of the shafts and a ramp to repository depth (almost 500 m) can commence. The idea behind the current plans is to begin construction of the Nuclear Fuel Repository and the encapsulation plant in 2016, and some eight years later to commence trial operation. The first copper canister with spent fuel is expected to be deposited around 2025.

SKB is now ready to change the emphasis of its work towards the industrial realisation of a final repository for spent nuclear fuel in Forsmark. Within a few years, SKB will also have a fairly large-scale construction department. The SKB organisation for the nuclear fuel programme is adapting to this new phase in its progress towards final disposal. Concurrently, for the low and intermediate level programme SKB plans to submit applications under the Nuclear Activities Act and the Environmental Code for the extension of SFR by the end of 2013.

1. SKB AND BACKGROUND INFORMATION ON SWEDEN

1.1 Introduction

The first commercial Swedish nuclear reactor, Oskarshamn 1, went into commercial operation in 1972. The following year, the nuclear power utilities formed SKB (Swedish Nuclear Fuel and Waste Management Co). The company's primary mission was at that time to coordinate the supply of nuclear fuel.

Until then, little attention had been given to issues related to spent fuel and nuclear waste management. The general view was that spent fuel should be reprocessed. Operational low- and medium level waste from the reactors was collected and solidified at the plants, but there had been no long-term planning with respect to its storage and disposal.

In 1976, a new Swedish Government came into power following an election campaign in which nuclear power was a major issue. Now a radical change took place in how nuclear waste management was viewed. The new Government's policy statement declared that "the nuclear power utilities shall demonstrate an absolutely safe method for disposal of the spent fuel." After a few months, new legislation was passed (the Stipulations Act).

The nuclear power utilities in Sweden now bore the responsibility for disposal of the waste from their electricity generation. The industry started the KBS Project with the aim of establishing a method for final disposal of the nuclear waste (KBS stands for KärnBränsleSäkerhet = Nuclear Fuel Safety). During the first few years, work was focused on the concept of vitrified waste from reprocessing. In the third project report, published in 1983, a method for "direct disposal" was presented. This meant that the fuel would not be reprocessed prior to final disposal. The report recommended a final repository in the Swedish crystalline bedrock, with barriers of natural materials. This is the method – the KBS-3 method – which we are still working on.

In 1984, the Government decided that the KBS-3 method "has been found in its entirety to be essentially acceptable with regard to safety and radiation protection." (Government decision of 28 June 1984). The Government accepted direct disposal as a feasible method and acknowledged that the geological conditions necessary for such disposal exist in Sweden.

In 1984, a new Nuclear Activities Act placed full technical and financial responsibility for the waste with the reactor owners. In turn, the owners gave SKB responsibility for all nuclear waste management. Reprocessing was no longer required. From 1985, when an interim storage for spent fuel became operational, there was no longer any practical reason for sending spent nuclear fuel for reprocessing.

Since the early 1980's, everyone who uses electricity generated from nuclear power also bears a financial responsibility for management and disposal of the waste. This money has been deposited in a fund, known as the Nuclear Waste Fund. A process was also set up for the regular reporting and review of results and plans. This contributed significantly to the development of a high scientific quality of the work and an open and transparent review mechanism. The regular review of the SKB R&D-programmes every three years has had a significant impact on the programme in several respects.

Intensive work has been carried out on research, development and demonstration for the deep geological disposal of spent fuel for more than 30 years. It has now reached such a level of maturity that key decisions have been taken concerning the design and siting of an encapsulation plant and a final repository. In March 2011, the full documentation in support of the license application for the KBS-3-system was completed and submitted to the appropriate authorities.

Within the SKB programme for low- and intermediate level waste, the SFR facility will be extended for disposal of the short-lived decommissioning waste and the additional quantity of short-lived operational waste that is being generated as a result of planned longer operating times for the nuclear power plants. We plan to submit the applications under the Nuclear Activities Act and the Environmental Code at the end of 2013. They will include both the existing facility and the completed extension. In connection with the applications for extension, SKB will apply for a license to dispose of both operational and decommissioning waste in the entire facility. Today, the operating license only includes operational waste. According to the plans, construction of the first stage can begin in early 2017 and routine operation at the end of 2020.

Furthermore, SKB plans to dispose of the long-lived waste in a facility that is similar to SFR, but which will probably be located at a greater depth. The repository will be the last facility to be put into operation. A repository concept will be developed during the period up to 2013. Siting of the repository is also an open question today. The volume of SFL will be relatively small compared with SKB's other final repositories. The total storage volume is estimated at 10,000 m^3.

1.2 The KBS-3 system design

The Swedish method for disposing of spent nuclear fuel – the KBS-3 method – entails encapsulating the spent nuclear fuel in copper canisters, which are embedded in bentonite clay at a depth of about 500 metres in the Swedish crystalline bedrock (Fig. 1). Although the KBS-3 concept has served as a basis for the work throughout the entire period, there has in the meantime also been a consolidation and broadening of the knowledge on conceivable alternative ways of storing spent fuel in the Swedish bedrock. Alternative methods have been assessed but have not been found to provide significant advantages compared to KBS-3.

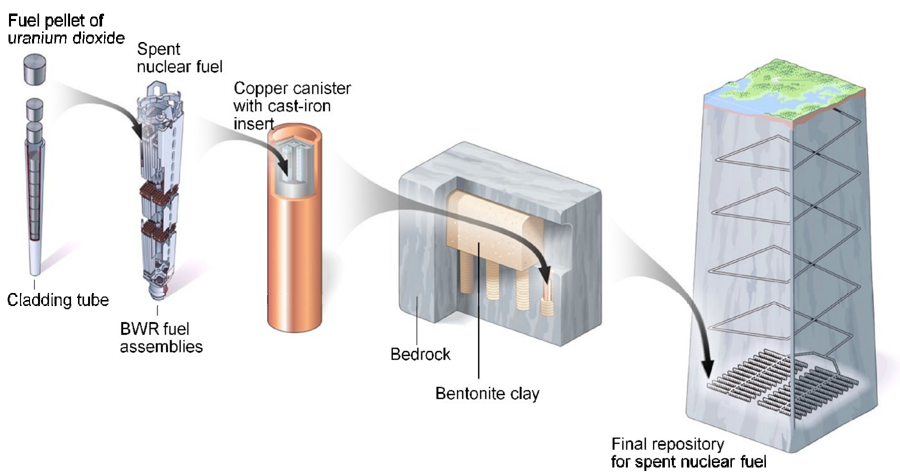


Figure 1. The KBS-3 concept for disposal of spent nuclear fuel.

To meet requirements on long-term safety, the design of the KBS-3 repository is based on the following principles:

- Final disposal at depth in a long-term stable geological environment – the Swedish crystalline bedrock – at a site where the host rock can be assumed to be of limited economic interest.
- The spent fuel is surrounded by several engineered and natural barriers, the multi-barrier principle.
- The primary safety function is containment of the spent fuel within a canister.
- Should containment be breached, the secondary safety function of the barriers is to retard a potential release from the repository.
- Engineered barriers made of natural materials which are stable in the long term.
- Limited temperature, radiation and other impact on the barriers
- The barriers will be passive, i.e. function without human intervention and without an active input of materials or energy.

Based on these principles, the details of the Swedish KBS-3 method have successively developed in the larger context of a total system. The key issues have been:

- Canister design and encapsulation technology
- Design, manufacture and practical emplacement of the bentonite buffer
- The adaption of repository design to the properties of the host rock
- Establishing a scientific basis for understanding the long-term function, e.g. concerning corrosion of the canister, dissolution of the fuel and the migration of radionuclides in the buffer and in rock fractures.

The technical development has progressed by means of unique target-oriented and extensive RD&D work. In addition to SKB's internal research and development staff, a large number of external researchers, technicians and social scientists have been working on this development project. Broad international cooperation has also been essential for the work. Ever since the start of the project in the 1970's, various forms of cooperation with foreign experts and international organizations has been an integral part of SKB's research and development work.

It became apparent at an early stage that it was important to test all aspects of the method under realistic conditions and on a full-scale basis. In time, it also became necessary to show that the method can be employed on an industrial scale.

In 1980, the international Stripa Project was started in the Stripa Mine, an abandoned iron mine in central Sweden, to develop technology for measuring thermo-mechanical, geophysical and geochemical properties in granite. Eight countries participated in the project, which was conducted under the auspices of the OECD/NEA and managed by SKB. The project was concluded in 1992.

Research cooperation with Finland was established within the framework of the Stripa Project and has resulted in a wide range of activities since 1988. SKB now cooperates closely with its corporate counterpart in Finland, Posiva.

Subsequently, SKB has established several laboratories in which experiments are conducted under realistic conditions. The Äspö Hard Rock Laboratory (HRL), which became operational in 1995, has been and still is of central importance for development, demonstration and testing of the KBS method, investigation methods, etc. Planning, construction and operation of the Äspö HRL has yielded important experience which has been used in the site investigations and serves as a basis for planning the construction and operation of the final repository. The activities in the

Äspö HRL attracted considerable international interest from the very beginning. In addition to SKB, organizations from several countries are participating in the research.

The technology for encapsulation and inspection is being developed and tested in the Canister Laboratory located in Oskarshamn. Here, friction stir welding technology – which is being used for fitting the lids on to the copper canisters – is being refined, and the welded joints are checked to make sure there are no defects. Radiographic, ultrasonic and eddy-current inspection techniques have been applied.

In the Bentonite Laboratory testing is carried out to determine how bentonite clay functions as a barrier in different types of water flows. This laboratory complements underground activities and facilitates the large-scale testing of different installation methods under varying conditions. Unique machines and robots are also developed and tested here.

By giving careful consideration to all the RD&D results, the KBS-3 method has been successively modified and refined over the course of time to form the current design that is described in the license application.

2. OVERVIEW OF THE ROAD TO LICENSE APPLICATION

During the period 1977–1985, SKB carried out comprehensive investigations at eight sites, called study sites, distributed throughout Sweden. The investigations met with mixed reactions and in some cases with massive local resistance which forced them to be interrupted. However, a large body of geoscientific data was acquired which showed that there are many places in Sweden with good geological prospects for establishing a final repository.

A principal conclusion from the study site investigations and other studies of the bedrock was that suitable and less suitable areas cannot be attributed to any particular part of the country or any special geological environment within the crystalline bedrock. It is instead local conditions that are of the greatest importance. Another lesson was that the siting work had to be based on the acceptance and trust of the local population. These conclusions formed the points of departure for the programme for siting of the final repository that was developed in the early 1990s and has since guided the work.

SKB reported its plans for a broadly conceived siting process in RD&D (Research Development and Demonstration)-Programme 92. Based on the knowledge that there is considerable freedom to find repository areas with suitable geological conditions, SKB concluded that it was both reasonable and realistic to focus interest on municipalities in which conditions were suitable and where the municipalities themselves were willing to participate – or otherwise showed an interest – in further exploring the potential for a siting of a repository. RD&D-Programme 92 was supplemented in response to Government demands, after which the Government, in a decision dated 18 May 1995, stipulated that "the siting factors and criteria reported by SKB should serve as a point of departure for the continued siting work". It was further stated in the Government decision that the applications for permits to build a final repository for spent nuclear fuel should contain comparative assessments. These assessments should show that feasibility studies had been conducted in 5–10 municipalities and that site investigations had been conducted on at least two of the sites, Furthermore, they should indicate why the sites in question had been chosen.

During the period 1993–2000, SKB conducted feasibility studies in eight municipalities: Storuman, Malå, Östhammar, Nyköping, Oskarshamn, Tierp, Älvkarleby and Hultsfred.

The purpose of the feasibility studies was to determine whether the municipality in question offered the necessary premises for further siting studies for a final repository , while the municipality and its inhabitants were given an opportunity to form an opinion, without commitments, on the final repository project and their possible further participation. A principal task was to identify areas with bedrock that could have potential for a final repository. Geological studies therefore comprised a main component, but no drilling was performed at this point. Technical, environmental and societal conditions were also studied. Within the framework of the feasibility studies, SKB also carried on an active dialogue with both private citizens and the municipality, as well as the county administrative board.

In 2000, SKB presented an "Integrated account of site selection and programme prior to the site investigation phase". Three areas were prioritized for site investigations: Forsmark in the municipality of Östhammar, an area in the northern part of the municipality of Tierp, and the Simpevarp-Laxemar area in the municipality of Oskarshamn. The municipal councils in Östhammar and Oskarshamn consented to further investigations, while Tierp said no.

In 2002, SKB initiated site investigations for the siting of a final repository on two sites: the Simpevarp and Laxemar areas (municipality of Oskarshamn) and the Forsmark area (municipality of Östhammar), Fig. 2. The site investigations carried out at the two sites have included surface and airborne surveys as well as the drilling of a large number of cored and percussion-drilled boreholes in which various types of investigations were made. The information from surface investigations (geological mapping, elevation models and various airborne and detailed surface-based geophysical logs) provided the primary basis for constructing maps of bedrock lithology and lineaments. The drilling programme included cored boreholes to variable depths and percussion drilled boreholes primarily aimed at shallow depths. Important borehole logs included borehole TV imaging (BIPS) and flow logs (PFL), which enabled discrete identification and quantification of individual conductive fractures. The latter information constitutes the cornerstones when developing discrete fracture network models. Borehole data in support of the Forsmark site description come from 25 core-drilled boreholes at 12 drill sites. These boreholes range in depth down to approximately 1,000 m and have an accumulated borehole length of some 17,800 m. The investigations were concluded in 2008.

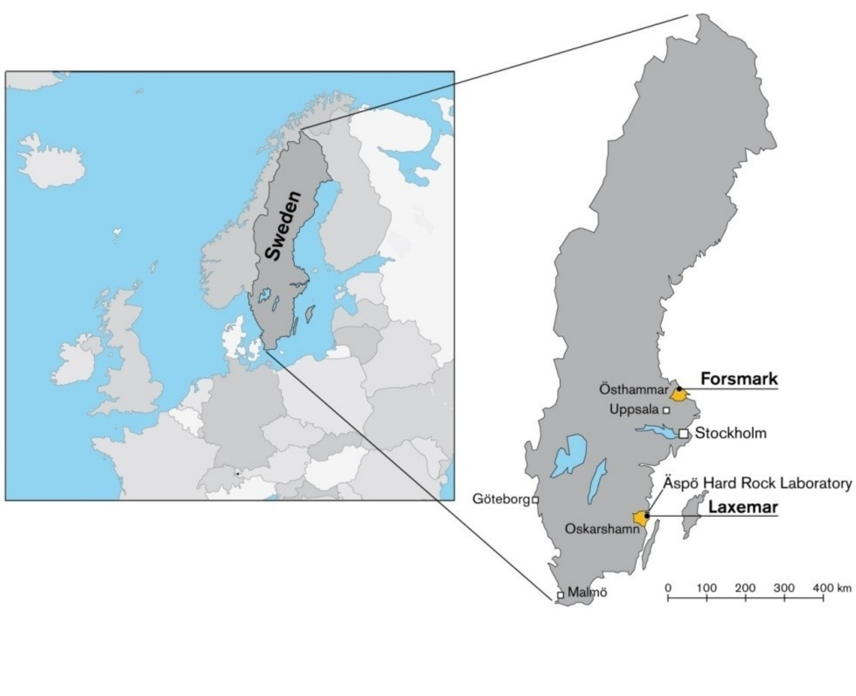


Figure 2. The locations of the two sites, Forsmark and Laxemar, which have been subjected to site investigations. Also indicated is the Äspö Hard Rock Laboratory near Oskarshamn.

Facility designs and site-adapted layouts of the underground excavations have been developed for both sites. Different proposals, both for the surface and underground facilities, have been evaluated. The geological conditions have influenced the placement of deposition tunnels in that a respect distance of 100 m to major deformation zones has been applied. The repository depth was set at approximately 470 m for Forsmark and 520 m for Laxemar.

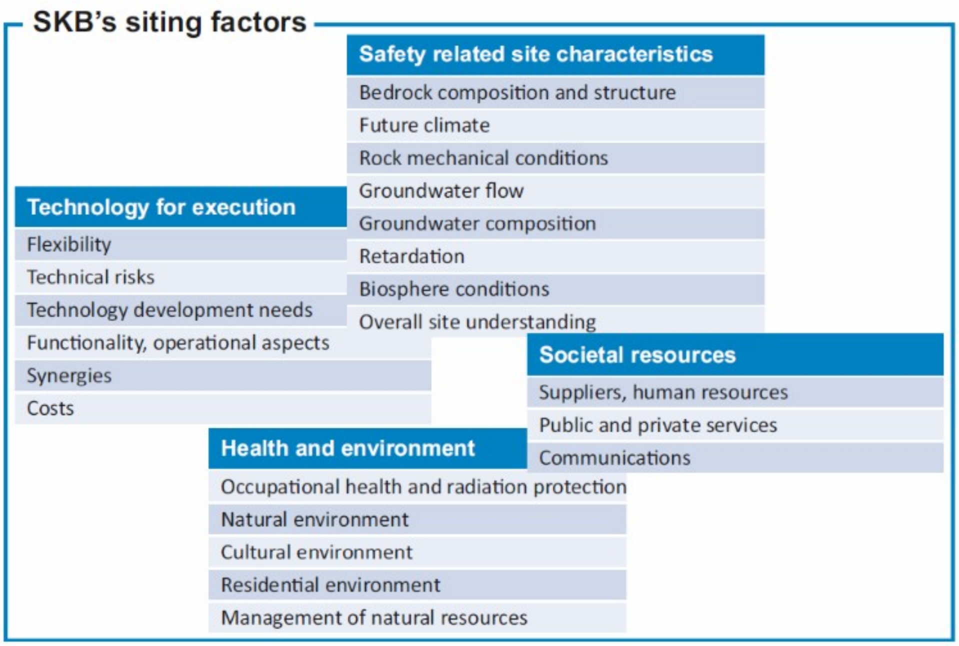
3. SELECTION OF THE FORSMARK SITE

The requirements on siting of the final repository that follow from the legislation mean that the site shall be suitable with a view to the purpose of the activity, i.e. to achieve a long-term safe final repository. Furthermore, the consequences shall be reasonable and, when comparing sites, the one that entails the least damage and detriment shall be chosen.

SKB established its strategy for site selection on this basic point of departure. As a result, SKB placed the greatest emphasis on the prospects for achieving long-term safety. Analyses have been made of the site-related characteristics that are of importance for safety and the prospects of executing the final repository project in a robust manner that takes advantage of the characteristics of the site. In the event that the analyses showed a clear difference between the sites, the one that offered the best prospects for long-term safety would be selected. If the analyses failed to show any decisive difference in the prospects of achieving long-term safety, other site selection factors would be accorded greater importance. Such factors could, for example, be environmental impact during construction and operation or efficiency in the execution of the project.

"Siting factors" is a collective term for properties and conditions that in some respect influence the suitability of a site as an alternative for siting. The fundamental factors that control the siting of the final repository were established in the early 1990s, when the siting work began. Guiding requirements and preferences could then be developed as support for evaluations and prioritizations during the course of the process. The material on which evaluations against requirements and preferences are based depends on the stage in which the evaluations are made, and the criteria must be adjusted accordingly. This applies above all to assessments of the bedrock, which in the early stages – before boreholes have been drilled – must by necessity be preliminary. With the results from the site investigations now available, this body of material is of an entirely different scope and level of detail than before.

Fig. 3 shows the set of siting factors that served as a basis for the comparative evaluations which preceded the decision to select a site for the final repository. It should be emphasized that the factors in themselves do not provide any guidance as to what SKB considers to be more or less important, what determined the site selection, or in what way. The siting factors should be regarded as a framework for structured comparisons between the sites, where different aspects are compared individually and in a systematic fashion. Taken together, these comparisons provided a comprehensive basis for an integrated evaluation and a site selection.



Safety-related site characteristics

Figure 3. Factors that have served as a basis for comparison of the siting alternatives.

The siting factors are divided into four main groups: safety-related site characteristics, technology for execution, health and environment, and societal resources.

The Forsmark site is located in the northern part of the province of Uppland, within the municipality of Östhammar, about 170 km north of Stockholm (Figure 2), and in the immediate vicinity of the Forsmark power plant and the offshore repository for reactor waste (SFR). The area is flat and low-lying, about 10 km^2 in size, and the dominant rock is composed of a metamorphosed medium-grained granite to granodiorite (metagranite). Most of the bedrock was formed between 1,900 and 1,850 million years ago and has been subjected to both ductile and brittle deformation. As a consequence of glacial isostasy, almost the whole area was covered by seawater until some 2,500 years ago, after which the process of land uplift led to the gradual formation of islands in what is now a coastal area. Today's landscape contains many small shallow lakes and bays.

The systematic examination of conditions on the sites shows that Forsmark offers the best prospects for achieving long-term safety in practice. Forsmark's advantages in terms of prospects for satisfying the requirement for long-term safety are very clear. The main reason is that there are few water-conducting fractures in the rock at repository depth. The rock conditions in Forsmark also permit a more robust and efficient execution than in Laxemar.

The industrial prospects for establishing and operating the final repository in a good way are judged to be good at both sites. Those differences that do exist cannot be afforded any decisive importance for site selection. The same applies to the environmental impact which the project will cause.

In view of this, SKB concluded that Forsmark is the most suitable site for the final repository.

The decision that was taken by the Board of Directors on 3 June 2009 to choose Forsmark will now be subjected to formal examination when the license applications are reviewed by the regulatory authorities, the municipalities concerned and the Government.

4. THE LICENCE APPLICATION FOR A KBS-3 REPOSITORY AT FORSMARK

The site selection in 2009 was a milestone for the Swedish nuclear waste programme. SKB has since then been focusing on the work involved in completing the license applications in order to submit them in March 2011. The applications include the environmental impact assessment and a safety analysis for a repository for spent nuclear fuel in Forsmark.

Nuclear facilities require permits in accordance with the Swedish Environmental Code and the Nuclear Activities Act. Both laws require that SKB describe the planned facilities and operations as well as the associated environmental risks and safety issues. SKB will submit two applications to SSM (the Swedish Radiation Safety Authority) in accordance with the Nuclear Activities Act and one to the Environmental Court in line with the Environmental Code.

The Nuclear Activities Act states that this report must address radiation protection and nuclear safety during operation and after closure. The Environmental Code specifically requires a description of the potential impact of the planned operations on human beings and the environment. The Nuclear Activities Act requires an equivalent impact assessment.

The petitions for the application according to the Environmental Code are for the municipality in Oskarshamn to store nuclear fuel and nuclear waste up to 8,000 tonnes in Clab (the central interim storage for spent nuclear fuel) and, adjacent to Clab, to build and operate a plant for the encapsulation of spent nuclear fuel. For the municipality of Östhammar (Forsmark) the petitions are to build and operate a facility for the final disposal of spent nuclear fuel and radioactive waste, all in accordance with the application. The application pursuant to the Environmental Code thus includes the whole KBS-3-system, i.e. the final repository, the existing interim storage facility and the encapsulation plant.

The petitions for the application in line with the Nuclear Activities Act are in Forsmark to build, possess and operate a facility for the final disposal of spent nuclear fuel. In the facility, SKB intends to possess, manage, transport, finally dispose of and in other aspects manage the specified material, all in accordance with the application. Apart from the future repository, an application in accordance with the Nuclear Activities Act for an encapsulation plant adjacent to Clab has already been submitted.

Since the petitions of the applications are different, the supporting documents contain parts that are identical and others parts that differ. The application under the Environmental Code contains about 2,800 pages in total, of which 600 are unique to that application. The remaining 2,200 pages are also included in the application under the Nuclear Activities Act, which in total contains approximately 6,500 pages.

The application in accordance with the Environmental Code includes a top document in which the case is summarized and the claims are accounted for. The top document is supported by eleven subordinate documents, as listed below:

- Environmental Impact Assessment (EIA)
- Operations and fulfilment of general rules of consideration
- Site selection

- Selection of disposal method
- Safety Report Summary (SR)
- SR-Operations
- SR-Site (Long-term safety)
- Technical description
- Environmental control program
- List of Stakeholders, land ownership
- Preliminary safety report for Clink (interim storage and encapsulation plant)

All the documents refer in turn to an abundance of technical and scientific reports. The application pursuant to the Nuclear Activities Act contains a top document which is supported by ten subordinate documents. The first seven documents listed above are also included in this license application. In addition, the application is supported by the following documents

- Preliminary plan for decommissioning
- Activities, organizations and how they are managed – Site investigation stage
- Activities, organizations and how they are managed – Construction stage

5. THE NEXT STEPS TOWARDS IMPLEMENTATION

The review processes under the Nuclear Activities Act and the Environmental Code will now follow. The applications have been submitted to the Environmental Court and to SSM (the Swedish Radiation Safety Authority).

The Environmental Court will prepare the case and review it subject to the provisions of the Environmental Code. Following a number of preparatory procedures, a main hearing will be held. The Court will submit its findings to the Swedish Government, which will then request statements from the municipalities of Östhammar and Oskarshamn. The municipalities will either accept or reject the findings, and have a right of veto. The Government will then make a decision on whether the final disposal system is permissible or not. If the application is accepted, the Environmental Court will hold a new hearing. Thereafter, the Court will grant permits and stipulate conditions pursuant to the Environmental Code.

SSM will prepare the case in accordance with the Nuclear Activities Act and submit a statement to the Government. If the Government grants the permit, the authority will subsequently stipulate conditions pursuant to the Nuclear Activities Act as well as to the Radiation Protection Act.

SKB's current plan for future activities contains a certain element of uncertainty since the company has no influence over the time needed by the authorities to review the submitted license applications. Therefore, the timing of SKB's milestones may be altered. During the review process, the company will be prepared to take up all questions that may be raised during the process.

The principle behind the current plans is then to begin construction of the Nuclear Fuel Repository and the encapsulation plant in 2016, and some eight years later to commence trial operation of the Nuclear Fuel Repository and Clink (which will be the name of the facility when Clab and the encapsulation plant have been integrated).

SKB's planning for the future management of spent nuclear fuel, from interim storage in Clab via encapsulation to final disposal, is taking place within the framework of SKB's Nuclear Fuel Programme. The programme includes licensing, design, construction and commissioning of the encapsulation plant and the final repository for spent nuclear fuel. These two civil engineering projects are beneficiaries of the technology development for the KBS-3 system that is being carried out with the Nuclear Fuel Programme as the client. Other important premises are:

- A total of about 6,000 canisters will be managed and disposed of. In routine operation the deposition rate is 150 canisters per year. The system is designed for a maximum deposition capacity of 200 canisters per year.
- The chosen reference design is KBS-3 with vertical deposition in a final repository at a depth of about 500 metres. A switch to horizontal deposition must be possible.
- The encapsulation plant will be built adjacent to Clab, and the two facilities will be operated as one integrated facility.
- The Spent Fuel Repository will be located at Forsmark and its layout will be adapted to the bedrock and other conditions on the site.
- Operation of the system will start as soon as possible, but with realistic timetables for the licensing process, construction and commissioning.

Figure 4. The Spent Fuel Repository at Forsmark in Östhammar municipality and the Encapsulation facility (photomontage) in Oskarshamn municipality.

6. CONCLUDING REMARKS

SKB has now been working in the site investigation regions for more than 10 years. We feel that in general the residents have confidence in our work. SKB has occasionally commissioned opinion polls on people's attitudes towards a deep repository. One of the clearest tendencies is that those people who know most about SKB and the final disposal method are the ones who are the most positive. This is particularly evident in those municipalities where we have performed feasibility studies and site investigations, and where the issue has been discussed for a long time. Approximately four out of every five residents in Oskarshamn and Östhammar are in favour of building the respective facilities in their municipality. This is clear evidence of their confidence in our project, which must be maintained.

The selection of the site and the license application are the outcome of over 30 years' technical research and development and almost 20 years of siting work. We have during the siting process conducted surveys throughout Sweden, feasibility studies in eight municipalities and site investigations at Forsmark and Laxemar. We are now ready to change the emphasis of our work towards the industrial realisation of a final repository for spent nuclear fuel in Forsmark. Within a few years SKB will also have a fairly large-scale construction department.

At the same time, however, we will continue with and follow up our programme for communication and stakeholder involvement, which we consider to have been a cornerstone behind our successful development and siting work.

7. ACKNOWLEDGMENTS

The work presented in this overview is the outcome of the joint efforts of SKB staff, consultants and contractors over a period of some 30 years. Their contributions are gratefully acknowledged.

8. REFERENCES

This paper contains no references. However, the license application and supporting documents can be found on the Publications page at www.skb.se.