Down to Earth... and below

Sweden's Plans for Nuclear Waste

by Claes Thegerström

Significant progress in the area of nuclear waste management has been made in several countries during the last few years. Siting decisions for deep repositories were taken in Finland — with almost unanimous support in the national parliament as well as locally — and in the USA where the Yucca Mountain project enjoyed a majority vote in the US Congress. In Sweden, the final phase of the voluntary siting process has commenced with site investigations in two municipalities. In France, work on the underground research laboratory (URL) at Bure is progressing.

Several other countries have experienced difficulties or significant delays in their programmes. This means that while many countries still have a long way to go in order to arrive at concrete decisions about implementation of deep disposal, some countries such as Finland and Sweden are now approaching the licensing phase. In the case of Sweden, we plan to be able to start the licensing of the deep disposal system within the next few years.

The Swedish System

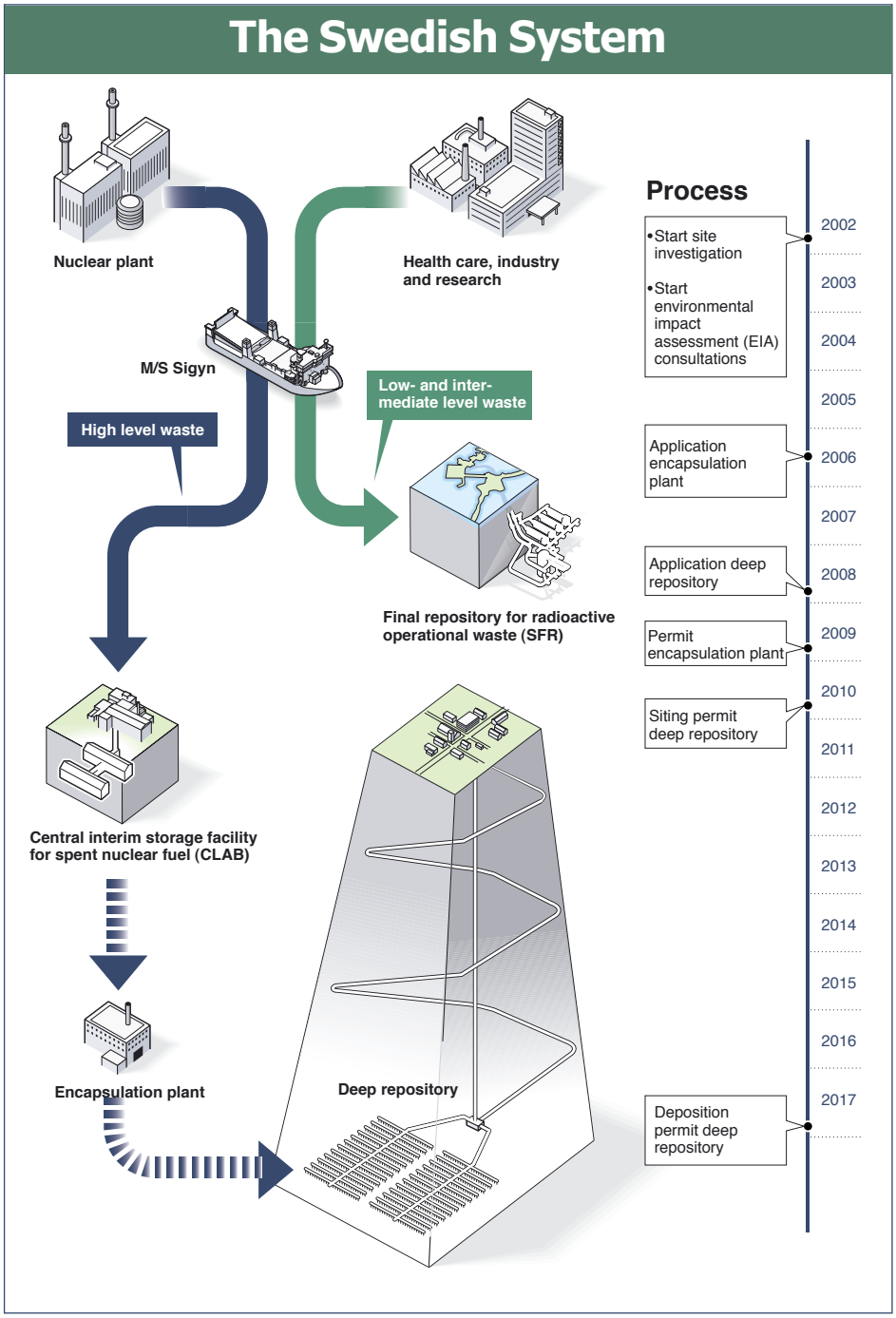
SKB, the Swedish Nuclear Waste Management Organization, has developed a system that ensures the safe handling of all kinds of radioactive waste from Swedish nuclear power plants for the foreseeable future. The cornerstones of this system are:

- A central interim storage facility for spent nuclear fuel, called CLAB, which has been in operation since 1985.
- A final repository for short-lived, low and intermediate level waste (SFR), which has been in operation since 1988.
- A shipping transport system (M/S Sigyn) which has been in operation since 1983.

The missing link in the system is the final approval of a method, and the location of a site, for the final disposal of high-level waste, i.e. the spent fuel, as well as a final repository for long-lived intermediate waste.

The plan for the final disposal of spent nuclear fuel is to encapsulate it in durable copper canisters and place

Air photo of the Äspo Hard Rock Laboratory — one of Sweden's laboratories built to research all the processes involved in deep repository storage. Credit: SKB



it (embedded in betonite clay) in a deep repository approximately 500 metres down in the bedrock (the KBS-3 method). The work on research, development and demonstration of deep geological disposal of spent fuel has been an intensive one lasting for more than 20 years.

Site Investigations and Stakeholder Involvement

Actual siting work on the deep repository began in the early 1990s. SKB concluded that the strong political power of municipalities in Sweden concerning local issues and the special character of the nuclear waste issue will by necessity lead to a need for local understanding and support for the project in order to be able to construct and operate a repository. It was judged necessary to create a participatory and voluntary process in order to achieve such understanding. This approach was well supported by almost all the stakeholders.

In the year 2000, SKB presented an integrated account of the methodology for final disposal of spent nuclear fuel, the selection of sites and programme for the site investigation phase. The proposal was to proceed with site investigations in three of the communities where feasibility studies had been made. After a review by the regulatory agencies, the Swedish Government in 2001 endorsed SKB's proposal. The municipalities of Östhammar and Oskarshamn approved SKB's plans to proceed with site investigations, while the municipality of Tierp rejected further participation in the siting process.

The goal of the site investigation phase is to obtain a permit to build the deep repository for spent nuclear fuel. The permit applications will be based on broad supporting documentation. The investigations of the rock serve as a basis for configuring the underground units of the deep repository. These results will also influence the positioning and layout of the surface units of the repository and provide input for assessment of the environmental impact.

Much experience has been gained by SKB and others over the past 25 years of managing and communicating the nuclear waste programme. They can be summarized as follows:

◆ It is necessary to be clear and open, and it is vital to carefully define the problem to be discussed. Communication should concentrate first on *why* (sharing the problem) and then on *how* nuclear waste should be managed.

◆ Words cannot replace action. Trust or distrust will depend mainly on how an organisation is seen to behave. Thus priority should be given to actions — they speak louder than words. Visits to operational sites are important because people seldom disbelieve what they see with their own eyes, and practical demonstrations of how spent fuel can be handled — like in CLAB, the central interim storage facility — help to enhance confidence in future plans.

◆ It is important to maintain a constant dialogue with all stakeholders and the general public. Trust must be based upon continuity and an open discussion of all issues. Also difficulties and potential problems should be actively communicated to the public and the press by the implementer.

◆ We live in a global village. Events and debates in one country can be picked up literally within seconds by the media in another country. Thus there is a mutual dependence between waste management programmes. For instance, the progress made in neighbouring countries like Finland and Sweden has provided a mutual support between these two programmes. Thus the decision, in principle, in Finland on deep geological disposal (KBS-concept) at Olkiluoto has been most helpful in the Swedish debate. On the other hand some of the international discussions on international or multinational repositories have posed difficulties because such discussions — if they are not well structured — have created doubts about the possibilities of local municipalities to stay in control of the types and origins of the waste to be disposed of in their area.

Multinational Co-operation

However, if it is well structured and focuses on the development of a common basis of knowledge, international co-operation is important and rewarding. For a good number of years, the close international co-operation and co-ordination in R&D as well as safety principles within IAEA and other international fora has been extremely valuable.

I would like in particular to also emphasise IAEA's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. It provides clear statements about the need for well-defined national waste management strategies and programmes as well as underlining that each country has a responsibility for its nuclear waste. The fact that it requires the presentation and international review of the programme documents will be a significant tool in helping all Member States define and develop their nuclear waste management plans.

Increased International Consensus

On the whole, the nuclear waste management arena is now characterized by positive trends and increased effort. When more people are pulling in the same direction, development gathers pace. I believe that there now is a trend towards focusing on national programmes and an increase in consensus, and I would especially like to emphasize the following issues:

◆ There is an increased consensus that deep geological deposits are required. There are certainly different opinions as to how long spent nuclear fuel or reprocessed nuclear fuel should be kept in intermediate storage. But there is increased consensus that, in the end, long-term safety is found through deep geological disposal.

◆ The multi-barrier principle has gained broad support. Different countries have different geological requirements, which in turn demand varying technical solutions. Despite this, there is a common view that robust safety is a matter of deep geological storage, reinforced with several technical and natural barriers.

◆ The importance of stakeholder involvement is becoming more and more self-evident. Dialogue and transparency is essential for a fair and successful decision process. This can be as much of an important and difficult task as the questions concerning geology and technology.

◆ There is also an increased consensus that focused efforts for implementation of long-term safe disposal should not be postponed to future generations. Even with present nuclear waste management plans, the work from construction of a nuclear reactor to a closed final repository will involve three generations.

◆ And finally, we are happy to note that there is an increased consensus that each country should take care of its own waste. If one chooses to co-operate with other countries, this should be made in a clear and transparent way and on a voluntary basis between countries interested in and open to possibly becoming the host of a multinational solution.

Concluding Remarks

The spent fuel disposal programmes in several countries, including Sweden and Finland, are approaching the phase of industrial implementation. At present there is a stable situation both in terms of scientific/technical capabilities to move forward and a broad social trust and confidence in the programmes. Thus, a real breakthrough is possible within the foreseeable future. This would mean that more than 25 years of investment in scientific/technical work, communication and confidence-building could bear fruit.

This is a golden opportunity to provide concrete results and all efforts are now focused on really making use of it when the resources, the know-how and the commitment needed is available. Among the key components for success are a continuous, high quality of scientific/technical work and a broad and open dialogue with all stakeholders.

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