

S C O R E

STOCKHOLM CENTRE FOR ORGANIZATIONAL RESEARCH

See for yourself!
**- Enrolling the public in nuclear
waste management**

Linda Soneryd
Hanna Sofia Johansson

See for yourself!:
Enrolling the public in nuclear waste management

Linda Soneryd and Hanna Sofia Johansson

e-post: linda.soneryd@score.su.se
hanna.johansson@sociology.su.se

Scores rapportserie 2010:8
ISBN 978-91-89658-70-7
ISSN 1404-5052

Stockholms centrum för forskning om offentlig sektor
106 91 Stockholm

Abstract

This paper explores exhibitions of nuclear waste facilities and their use as a tool for enrolling the public in the Swedish nuclear waste programme. We argue that the planning process for the final disposal of nuclear waste has dual purposes. On one hand, the consultation meetings provide opportunities for dialogue among a broader set of actors – at least to some extent. The goal of the exhibitions, on the other hand, is to highlight the state of nuclear waste management today and the future goals for nuclear waste. Based on our observations of study visits to existing nuclear waste facilities and exhibitions of existing and planned facilities, we analyse the framing of the nuclear waste issue, how experiences are structured, and the type of visitor that is expected to attend the exhibits. The framing of nuclear waste management in the exhibitions should not be seen as separate from the public consultations, but as a critical tool for generating public interest in nuclear waste. Citizens need to be informed about the issue in order to become involved. The fact that the exhibitions are characterised by a ‘see for yourself’ logic, however, can be contrary to the aims of stimulating a dialogue on the future environmental impact.

Keywords: nuclear waste; exhibitions; public consultations; enrolling publics

Introduction

It is a rainy day in July 2004, and the MS Sigyn¹, built to transport radioactive waste from nuclear power stations, is out on a summer tour. When we arrive at the harbour in Öregrund, on the east coast of Sweden, we immediately spot a bright red vessel. At the quay next to the MS Sigyn, a temporary amusement park offers everything from cotton candy and carousels to lottery wheels. But many people seem to be visiting the MS Sigyn rather than the amusement park – probably because the vessel provides some shelter from the pouring rain. Inside, visitors can watch a movie about spent nuclear fuel, walk through exhibition rooms built to resemble some of the existing nuclear waste facilities in Sweden, and learn about nuclear waste management today and about plans for the future.

This paper explores exhibitions of nuclear waste facilities. We argue that exhibitions of these facilities constitute a way of enrolling the public in the Swedish nuclear waste programme – a programme that has otherwise attracted little attention. In comparison with many other nuclear power countries, Sweden has a well-developed programme for handling its high-level nuclear waste (Dawson and Darst, 2006). According to Swedish law, the nuclear power producers are responsible for handling the waste, and they established the Swedish Nuclear Fuel and Waste Management Co. (SKB) to aid them in this task. Between 2002 and 2008, SKB conducted site investigations in Oskarshamn and Östhammar – two municipalities that currently host nuclear facilities.

An important part of the siting process is the public consultations that the Environmental Code obliges SKB to hold. These legislative demands require the developer to inform the public about its plans, and provide concerned parties and interested members of the public with the opportunity to discuss the expected environmental impact. The public consultation process is a potential arena for open dialogue between the developer and concerned parties on the expected environmental impact. SKB organizes public consultation meetings with authorities, representatives from Oskarshamn and Östhammar, and residents and interest organizations, but anyone is welcome to attend. SKB representatives sometimes argue that part of its consultation process is the other activities it organises: open-house meetings at SKB's local offices in Oskarshamn and Östhammar, for example; study visits to nuclear facilities in these municipalities; and exhibitions at the nuclear waste ship, the MS Sigyn.

We argue in this paper that the exhibitions and study visits more effectively demonstrate the reality of nuclear waste management than public consultation meetings do. Thus one could say that the planning process for a final disposal of nuclear waste has dual purposes. On the one hand are consultation meetings at which representatives of the nuclear waste company address their audience with: 'This is what we think. What do you think?' On the other hand are exhibitions and study visits at which SKB demonstrates, 'This is how it is. See for yourself'.

Although SKB presents its study visits programme as being open and transparent, and featuring other such supporting democratic values, we argue that the democratic qualities of the planning process is at least partly a matter of balancing these dual purposes. Thus, if the purpose of the exhibitions is to present indubitable facts and demonstrate a nonnegotiable nuclear waste reality, it may counteract the purpose of leaving things open for a wider public to discuss in consultations. In our study of the exhibitions and study visits, we ask, ‘What type of information is presented to the visitors? How is the nuclear waste issue framed? What aspects are included or excluded? What type of visitor is expected and enrolled in these activities?’

The second section of the paper provides a brief background on nuclear waste management in Sweden and to SKB’s information activities. In a third section, we analyse SKB’s information activities, based on our observations of a number of exhibitions and study visits. The fourth and concluding section addresses the creation of a stable framework through these activities, how the experiences of the exhibitions are structured and the type of visitor that is expected to attend. Finally, we discuss how these dimensions can be seen as a significant part of nuclear waste management in Sweden.

Background to nuclear waste management in Sweden

Nuclear waste management can be seen as an example of ‘delegated democracy’ (Johansson, 2008). The planning phase, including consultations with concerned parties and the public, has been delegated to a private company, SKB. Although SKB is privately owned, however, there is a connection between SKB’s work and parliamentary democracy: according to Swedish law, SKB is responsible for presenting a solution to the nuclear waste issue. Moreover, SKB’s research, development and demonstration (RD&D) work is reviewed by government authorities and finally approved by government every third year. The municipal councils in the two municipalities that are subject to site investigations also have a voice in deciding if they want a repository in the municipality. Thus there are several connections between SKB’s work on the one hand and the work of the Government of Sweden and local parliamentary decision-making bodies on the other.

Handling of the nuclear waste issue is not unique; contemporary politics is increasingly dependent on co-operation among politicians, private firms and NGOs. Such collaborations take politics into non-parliamentary arenas and allocate a significant role to such experts as geologists and engineers. A final repository that is both technically safe and politically legitimate requires more than expertise, however; it requires broad public support. For an overview of SKB information and consultation activities see table 1.

Activity	Time frame	Frequency	Format	Participants
Site investigations	2002-2008	On a daily basis	Research activities (environmental impact, safety long-short term, social aspects etc.) and drilling.	SKB staff and SKB commissioned consultants
			Small scale meetings (settling issues related to ownership and nuisance in relation to site investigations) A	SKB and local residents
			Individual encounters (informal chats at the grocery, social events etc.) B	SKB and local residents
Public consultation process	2003-2009	1-2/year	Public meetings in Oskarshamn and Östhammar 2 hours in the afternoon/early evening Moderator: SKB or hired by SKB C	Open to all (on average 50 people in the audience, including local officials, representatives of the national authorities, NGOs and around 10 local residents)
		3-4/year	Regional meetings in Oskarshamn and Östhammar, 4 hours, day time Roundtable discussions Chair: the County Administration Board D	<i>Participants:</i> SKB, the County Administrative Board, representatives from municipalities and authorities. <i>Observers:</i> open to all
Study visits by coach	1993 -	Over the years more than 100 study visits	2-day programme (all expenses paid by SKB) Coach travel to Oskarshamn or Östhammar, occasionally SKB has shown films and given information at the coach. Stops for coffee and lunch Guided tours at nuclear waste facilities (includes some exhibitions in the facilities) Information by SKB staff and film. Restaurant visit and informal chats E	SKB staff and local residents Main target group: citizens in municipalities subject to site investigations. More than 10% of the population in Östhammar and Oskarshamn has been to a study visit.
Sigyn exhibitions	1989 -	(information missing)	Guided tour on board the freighter. Several exhibition rooms, some including posters, artefacts, and sometimes a film is shown. F	Summer guests, tourists, community residents, and to some extent experts from other countries

Table 1. SKB's information and consultation activities (A-F our empirical data, see appendix)

Besides regular contact with people in the municipalities that are subject to site investigations, SKB invests resources for presenting its work to a broad set of visitors. One such example is SKB's study visit programme, through which the public is invited to see exhibitions and full-scale tests on plans for Swedish nuclear waste and where it is to be deposited.

One example of such an activity is the demonstration of the freighter MS Sigyn (Figure 1) in a number of municipalities that have been involved in SKB's siting process and at several holiday resorts. The ship is easy to access, and SKB personnel have the opportunity to meet people outside the municipalities who participate in the siting process.



Figure 1. The MS Sigyn out on summer tour. Visby, Gotland.

Another example of SKB's broad educational approach is the study trips to nuclear facilities that it has been providing since 1993: the Central interim storage facility for spent nuclear fuel (CLAB), the Äspö Hard Rock Laboratory (HRL), the Canister Laboratory in Oskarshamn and the Final repository for radioactive operational waste (SFR) in Östhammar.

CLAB temporarily stores the spent nuclear fuel. When visitors enter the facilities at CLAB they must pass through security checks and show their IDs, and when they leave they must again pass through security checks to be screened for radioactivity. Inside CLAB, visitors can walk along the edge of the water basins and look down on the spent nuclear fuel stored beneath the water.

At Äspö, HRL a coach takes visitors down 500 metres into a tunnel where they can see ongoing field experiments on such things as the life of microbes or

water flows. Underground full-scale tests are also being conducted on the technical solutions to a final repository. Above ground there is an exhibition of the research being conducted and various aspects of nuclear waste management.

The Canister Laboratory is the development centre for encapsulation technology. According to SKB's suggested method for a final repository, the spent fuel will be placed in copper canisters. In the Canister Laboratory, visitors are offered a guided walk through the various activities that take place here: the sealing, inspecting and testing of canisters.

Low and intermediate-level waste is stored at SFR. Just as for the visits at Äspö HRL, visitors to SFR are driven down into a tunnel by coach. Underground visitors can see the silo in which the most radioactive waste at SFR is stored and display cases containing information and artefacts.

The public seems more interested in these study trips than in the public consultation meetings. In some municipalities about *ten per cent* of the inhabitants participates in a study trip, compared to as few as *ten people* representing the local community at a consultation meeting.

SKB has changed its organizational culture over the years from that of a typical closed expert organization to that of a company in which most staff members are expected to communicate the firm's work to a wider audience (Eriksson 2003). The steps towards more outreaching activities have been combined with a constant fear of being perceived as manipulative, however. In the early 1990s, SKB was concerned that its information activities not be seen as too expensive or lavish. During the first MS Sigyn tour in 1989, there were also fears about attacks and demonstrations, given Greenpeace's earlier actions against the freighter (Eriksson 2003:100). But according to SKB representatives, the tour was successful, and during the 1990s they became central to SKB's information activities.

Since the late 1980s and early 1990s, SKB's communication strategy has not featured professional lecturers; rather the public meets with ordinary SKB staff members who talk about their work. A combination of fact-based information and natural analogies has characterised the exhibitions from the beginning (Eriksson 2003).

The empirical material for this study consists of notes from our participant observations and interviews with the SKB staff members responsible for exhibitions and study visits.² Invitations to and programmes for the study visits have also been used, as well as SKB's annual reports of its public consultation process.

We participated in three study trips to nuclear facilities and one follow-up meeting in connection to one of the facilities, all arranged and financed by SKB. One of these study trips occurred in 2003, and was directed at people living in

Misterhult Parish in Oskarshamn, close to the planned nuclear waste disposal. The goal of this trip was to arrange visits to Östhammar and its nuclear facility – the final repository for radioactive operational waste (SFR) and the sites being drilled in connection to site investigations. A few months later, SKB organized a follow-up meeting with the same participants, which included visits to drilling sites in Oskarshamn Municipality. The second trip that we observed occurred in 2004, and was addressed to the general public and high school students in Östhammar Municipality. The goal for this trip was Oskarshamn, and included study visits to CLAB; the Äspö Hard Rock Laboratory; the nuclear power station; and the Canister Laboratory. In 2006, we also participated in and observed a study trip designed for the citizens of Östhammar, which included visits to the Canister Laboratory, CLAB and the Äspö Hard Rock Laboratory in Oskarshamn. Finally, two observations of exhibitions were conducted on the MS Sigyn: one in Öregrund in Östhammar Municipality in 2004 and one in Visby, Gotland, in 2009.

During observations, we took notes from the presentations held on the guided tours and films shown at these tours. We also took notes on parts of the facilities and artefacts shown, and on some of the discussions among participants during exhibitions and at coffee and lunch breaks. During our last observation – of the exhibitions on the MS Sigyn in 2009 – we also photographed and tape-recorded the guided tours.

Exhibiting nuclear waste facilities: creating a stable framework

Places for public displays of science and technology can be understood as ‘demonstration facilities’ (Schmid, 2006). The nuclear waste facilities that SKB is showing the public can be included in this category. We borrow our conceptual framework from museum theory in order to understand the exhibitions on the MS Sigyn and the nuclear waste facilities. The MS Sigyn exhibits constitute more obvious cases of ‘demonstration facilities’, as they are designed specifically for demonstration. The nuclear waste facilities already existed for other purposes, and were opened only later for public display. Sonja D. Schmid (2006) argues that the way an exhibition is organized can display the organizers’ view of the ideal visitors, and affects how the actors, both visitors and guides, can interact with each other. To some extent, exhibitions mirror their intended public, allowing demonstrations of nuclear facilities to be studied as places for negotiating nuclear identities. Demonstrations of the nuclear waste facilities are also ‘designed’, in that SKB has a clear idea of what they are showing, for what purpose and for whom. As such they are also political, in the broad sense of the word. When knowledge and politics are seen as intertwined, what are often viewed as apparently “non-political and even ‘minor’ details, such as the architecture of buildings, the classification and juxtaposition of

artefacts in an exhibition” (Macdonald 2001:3) are of interest to the analyst who wants to explore the beliefs and rationalities, and hence the politics, behind them.

The organization of exhibitions involves ‘facilitated mediation by others’ (Falk and Storksdieck, 2005: 124), which includes visitors’ interactions with museum guides and performers. Whereas Falk and Storksdieck (2005) discuss mediation in terms of its facilitation of learning, we suggest a somewhat different conceptualisation of mediation by introducing a distinction between ‘mediation through demonstration’ and ‘mediation through dialogue’ (Elam et al. 2009:6f). Mediation through demonstration allows the demonstrator to show, display and highlight. Andrew Barry (2001) views demonstrations as being both sights and sites for truth. Mediation through dialogue, on the other hand, acknowledges the contingency of facts and realities. It means that standards of truth, reliability and safety are potentially opened up for broader and more inclusive negotiations. We argue that the exhibitions of nuclear facilities are characterised by mediation through demonstration; they are intended to show a nonnegotiable nuclear waste reality. In our case, SKB personnel represent the mediators, who can act as guides by interacting with the visitors – by telling them approved stories, for example, and by showing short popular scientific movies and distributing brochures. Guides can also act as mediators by helping the visitors orient themselves in the physical environment. A successful demonstration requires that the mediator succeed in maintaining a boundary between itself and the audience – in this case, the visitors. The more people visiting the facilities, the greater the demonstrator’s success, as a demonstration requires a large audience in order to be successful. Schmid (2006:337) argues, for example, that visitors are expected to function as ‘multipliers’ and spread their experiences to others.

We may be able to cast some light on SKB’s nuclear waste facilities and exhibitions through museum theory, by arguing that, similar to museums of science, nuclear waste facilities can be seen as defining “both certain kinds of ‘knowledge’ ...and certain kinds of publics” (Macdonald 2001:5). But there are also significant differences. In particular, we must highlight the difference in cultural authority: museums are generally regarded as trustworthy, impartial and genuinely apolitical institutions (cf. Gieryn 2001). SKB is owned by the power companies, yet is an implementer of nuclear waste safety. The organization has, in contrast, struggled with deadlocks in the siting programme because of massive local protests in the 1980s and the fact that its information campaigns of the 1990s were accused of manipulation. These experiences lead to one of the core messages in the communication strategy adopted by SKB in 2001, however: “what we do and how we do it, is more important than what we say” (SKB 1999:7 in Eriksson 2003:143). The centrality of SKB’s study visits programme is thus partly explained by the simple strategy of showing people what SKB staff do in their day-to-day activities – which highlights the relevance

of our choice of conceptual framework for understanding ‘what they do, when they show what they do’.

We now discuss the themes through which SKB manages to create a stable framework in its exhibitions of nuclear waste facilities.

Thematising nuclear waste

During the exhibitions, and especially during the two-day study visits, visitors receive massive amounts of information about nuclear waste management. How the nuclear waste issue is framed on these occasions is determined by SKB’s decisions about what to tell the public and how the exhibitions are organized to accentuate some aspects of nuclear waste management and minimize others.

Visitors to the exhibitions receive a great deal of *technical information* – often on the measurement of items – presented as simple and straightforward facts. At the Canister laboratory, for example, visitors are told the length, breadth and weight of the copper canisters and the thickness of the copper. At the site investigations, visitors are told the depth and breadth of the drilling holes and the length of the drilling kernels. When the coach drives down into the underground laboratory at Äspö, visitors are informed about the slope of the tunnel; and at the interim storage CLAB, the guide informs participants about the size of the water basins in which the waste is currently stored, beneath 8 metres of water. The number of simple technical facts accentuates the reality that the visitors are passive receivers of information; these are not topics designed to generate discussion.

Some of the technical information at the exhibitions is explicitly related to *safety*. Safety issues are also related to nature, however, and to natural qualities. The combination of technical and natural qualities in the framing of safety is captured in SKB’s ‘multi-barrier system’. At one of the exhibitions on the MS Sigyn, the guide described the multi-barrier system as comprising the canister made from “real, solid copper, which can be found in nature”; the second barrier is the bentonite clay, which “expands and isolates, protects the canister from water and fixates the canisters” in the deposition holes; and the third barrier is “the excellent” two-million-year-old bedrock, which provides a highly “stable environment”. The entire technical system – with its three barriers and the natural qualities of the copper and bedrock – is emphasised as being important for long-term safety. The technical aspects are further explained in the next room.

“Now we move from nature to technology,” says the guide. During this presentation, the visitors stand in a circle around a cross-section of a real copper canister, allowing them to see the cast iron inserts. The guide tells us that they are required because of the enormous pressure that would be caused by an ice age, and that the system must be prepared for such an eventuality. In this room,

which, the guide has told us, represents “technology”, the cross-section of the copper canister is the sole artefact. At other facilities, safety issues are thematised by the guides and in films shown to visitors before they enter. At the capsule laboratory for instance, the guide describes the methods used for testing the robustness of the canisters and says that the routine of multiple testing is like “using both belt and brace” (being doubly cautious).

The basis of knowledge represents a third theme that recurs at exhibitions and study visits. Longitudinal research and full-scale experiments are highlighted as providing a solid knowledge base. The underground laboratory at Äspö is one of the facilities open to visitors, who are invited to the laboratory to witness the full-scale tests of technical aspects of the method for a final storage and other ongoing activities. At other facilities and exhibitions, SKB emphasises the knowledge base for its method and choice of site, which they claim to be thorough and founded upon many years of research, tests and international reviews. Posters adorn the walls of the exhibition rooms at the MS Sigyn. The text of one of them reads:

In all directions, crossways, at the surface and in depth. One of Sweden’s biggest environmental protection projects. For seven years we have explored, studied and reported. We have drilled, measured, calculated, sketched and analysed. All for the sake of finding a good place to store the spent nuclear fuel in order to minimize the risks for human beings and the environment.

Finally, visitors are informed about *the process of finding a site and method* for the final repository. At the exhibitions and during study visits, a narrative is created about the history and development of this process, the important actors, and the urgent decisions and developments that lay ahead. The exhibitions themselves are characterised less by dialogue than by one-way communications from the guides and posters and brochures. At the exhibitions, however, visitors are informed that the siting process is based upon dialogue between SKB and concerned parties.

A recurring message in the narrative of the siting process refers to the importance of acting now, as emphasised by a guide on the Sigyn tour in 2004: “To wait and see is not an alternative”. And similarly, the guide on the Sigyn tour in 2009 raised warnings about handing our problems over to future generations:

We had the gains from nuclear power...It would be good if we could run this programme for the repository, the worst-case scenario is that we hand over both the waste and the money in the nuclear waste fond to future generations.

The framing of nuclear waste and nuclear waste management is not merely a matter of content; it constitutes tours, posters and brochures, to be sure, but it also comprises the way in which space and experiences are structured.

Ordering space

All visits to the nuclear facilities and to the exhibitions on the MS Sigyn are guided walks, which helps to maintain a stable framework as the guide directs visitors through the facilities and exhibitions, highlighting the various rooms, activities and artefacts in a certain order.

At the facilities, visitors watch films about the facilities and about the activities at the MS Sigyn, CLAB, the Canister and Äspö laboratories and about the planned encapsulation plant. Other films focus on the transportation of waste, the history of the development of nuclear power in Sweden, and the search for a waste disposal site. The films were shown either on the coach on the way to the facilities or at the facilities – but always before the guided tour: an example of SKB's ordering of space.

The study visits to the nuclear waste facilities demonstrate the everyday activities of SKB in a real-life setting; the ordering of space consists primarily of guiding, controlling the walks, and determining a suitable time for study visits at these facilities. The exhibitions on the MS Sigyn are different, however; the exhibition rooms exist only for the purpose of exhibition – to resemble a visit to a nuclear facility. During one of our visits to the MS Sigyn, for example, we saw an exhibition room designed to represent the interim storage, CLAB. In the middle of the room a water basin had been projected via film projector onto the floor, and the guide described the basins at CLAB as being about the size of a football field and 13 metres deep. The next room resembled the Äspö laboratory, with the sound of murmuring water in the background, and here visitors are informed about the bedrock and its importance for the final repository. On another visit to the MS Sigyn, we were shown a dark, downward-sloping corridor between two of the exhibition rooms. It took 30 seconds to walk the corridor, and when we entered the next room, the guide said: "Now we have walked down 500 metres."

Structuring experience

On one study visit from Östhammar to Oskarshamn, participants were taken to the Canister laboratory, Äspö laboratory and CLAB. The visit in the Canister laboratory is a guided walking tour that gives visitors the opportunity to examine several artefacts that are used in the nuclear waste programme or as a pedagogical tool to explain the nuclear waste programme. We were invited to look into a room where canisters are x-rayed to determine if the welds are tight enough, and we could also see pictures of the planned encapsulation facility.

The study visit continued in the Äspö laboratory, where a guide showed us various disposal holes and explained the experiments in progress and the machines that are used in the testing. We look at a deposit hole with a canister sealed in it – one of the full-scale tests that are being conducted in the laboratory. During the walk, visitors have the opportunity to examine the experiments, touch the various artefacts and the bedrock down in the tunnel. Water from the Litorina Sea, which is 7000 years old and preceded the Baltic Sea, trickles from fractures in the bedrock. Visitors can taste the salty water and on one of our observed study visits all visitors were given a little bottle with water to bring home.

After the Canister and Äspö laboratories, we visit CLAB and the water basins that contain high-level radioactive waste. Some study visits include the drilling sites in the site investigation areas outside of Oskarshamn and Östhammar. In connection to one such visit, SKB staff informs us that one drilling site is approximately 20-30 metres in diameter and that holes are drilled to a depth of 1000 metres. The drilling sites need electricity and because of this some summer residents could get electricity in their summer cottages that did not have this before.

During study visits to the nuclear waste facilities, visitors' experiences are structured largely according to the logic of "see for yourself". At the facilities for nuclear management, visitors are able to view the actual activities. Exhibitions on the MS Sigyn are not displays of activities that occur on the vessel, however, but replicas of activities that occur at other nuclear waste facilities – a cross-section of a full-scale canister, for example (Figure 2). These exhibitions are organized in such a way that they allow visitors the feeling of having been at the facility represented or inspire them to visit these facilities in the future.



Figure 2. A section of a full-scale copper canister



Figure 3. Three materials exposed: the bedrock, the betonite and the copper

Besides references to thorough investigations, artefacts are displayed as proofs in themselves. The quality of the copper is not discussed at the exhibitions, for example; rather a 300-year-old copper cannon is shown to visitors at the canister laboratory. The guide informs us that half of the cannon was under water and half buried under sand, and that the halves have been differentially subjected to the verdigris process. Similarly, a lump of copper is displayed at the exhibitions on the MS Sigyn, and the guide points out that it is “200 million years old” (Figure 3). Thus references to thorough investigations seem to be used as an appeal to the public to trust science as a solid base for knowledge, yet the display of copper is used for a virtually opposite reason – as an appeal to the senses and as a natural analogy, allowing visitors to see for themselves the impact of the verdigris process.

Imagined visitors

SKB has designed its exhibitions for more than one type of visitor: summer guests; community residents; and, potentially, experts from other countries using nuclear power.

The exhibitions and guided tours on the MS Sigyn seem to be designed for vacationers who are merely passing by – SKB’s attempt to expose visitors who may never have heard about the nuclear waste programme otherwise. In order to capture this group, the MS Sigyn visits typical holiday resorts in Sweden. It took us approximately 30 to 40 minutes to complete the tour, and the presentations were short and easy to understand.

People who are willing to spend two full days at nuclear waste facilities comprise another category of visitors. These two-day study visits are arranged especially for citizens living in the municipalities subject to site investigations, and for any foreign expert with an interest in exploring the Swedish facilities. These better-informed visitors are usually citizens of a municipality that will host the final disposal of nuclear waste in the future. The study visits for people in Oskarshamn and Östhammar are designed for a completely different purpose than are the MS Sigyn visits for people on holiday. The municipality study visits stress the similarities of the SKB work in the two communities: “The idea is that you should be able to see that there’s a site investigation in another municipality and that you work in a similar way” (Interview).

Members of SKB that participate as lecturers encourage visitors to pose questions, suggesting to visitors who participate more actively that ‘the study visits are better’. The questions that visitors pose often relate directly to information that the guides have just provided, or to the artefacts that have just been demonstrated. These questions may relate to the quality of the bentonite clay, the weight of the silos or the depth of the drilling holes. SKB staff members address all such questions, sometimes with reference to one of SKB’s reports. The organization of the exhibitions thus shapes the way in which visitors can interact with each other and the guides and shapes the way for the topics that are and are not open for dialogue. The exhibitions and study visits usually involve one-way conversations. When it comes to the question of building a repository that is safe for 100 thousand years, however, the guide at the MS Sigyn poses an open question:

If you compare 100 thousand years with 2 million years [the age of the bedrock], 100 thousand years is relatively short. But it’s still tricky to think about it...How should we tell people 20 generations later that we’ve done this? And that it is dangerous? Do you have any good ideas?

The visitors at MS Sigyn are thus encouraged to discuss the potential of communicating with future generations, an area which is obviously beyond the expertise of SKB; yet discussions of SKB’s plans, investigations and results are not encouraged. This is hardly surprising. The guided tours are short, and are designed primarily to give a pedagogical overview of nuclear waste management. Publicly available information is important in any planning process for a project of this size. In order to evaluate the role of the public as active participants in planning for a final disposal, however, it is crucial to know about the balance between the resources that SKB invests in information activities and the consultation activities at which discussions about SKB’s plans *are* encouraged.

According to the SKB staff responsible for exhibitions, the purpose is to have “an open process. It is our task to be open and capable of accepting visitors, so

that they can ask their questions and see with their own eyes. It is a big part of our activities” (Interview).

According to SKB staff members, Sweden is unique in allowing the public to visit its nuclear waste facilities:

It is an enormous asset for Sweden, because the programme doesn't get more real than this ...because it's a technically complicated issue, and you need to show 'this is what we meant'. When we talk about canisters, it's good to be able to show what a canister looks like. It's important for the legitimacy of the process, that not just decision makers, but others as well, can see with their own eyes (Interview).

The exhibitions of nuclear waste facilities are characterised by a 'see for yourself' logic and in the concluding section we discuss the implications of this logic and the dual purposes of the planning: to 'show how it is' and to discuss other potential nuclear waste realities.

Conclusions

The framing of nuclear waste management in the exhibitions should not be seen as separate from the public consultations. Partly because the exhibitions are characterised by a 'see for yourself' logic, they serve as an important tool for enrolling the public in nuclear waste management. The exhibitions attract far more people than the consultation meetings do, and the visitors may even act as 'multipliers', spreading the word to others. Despite SKB's presentations of the information activities as an important part of the consultation process, there is a clear separation of the 'siting process' from the exhibitions and study visits. Visitors are informed that there is a siting process based on dialogue, but they are not encouraged to be part of this dialogue by participating in the exhibitions. The exhibitions and study visits are organized as something other than a public consultation process, and there is no clear link between the two.

During our last observation of the exhibition at the MS Sigyn in 2009, the consultation process was nearly over. SKB's analyses of the site investigations had pointed to better quality bedrock in Östhammar than in Oskarshamn, and SKB had announced a few weeks previously that it would be applying for permission to build the final disposal in the Municipality of Östhammar. When the MS Sigyn tour started in 1989, the planning process was far from settled, and many issues remained open to discussion. Yet the exhibitions had been designed from the beginning according to the same logic: 'see for yourself'.

Regular SKB staff act as guides and inform visitors about the daily activities of SKB, technical details about the facilities and artefacts shown, and the process of finding a site for final disposal. Guided tours are short at the MS Sigyn exhibitions; there is little time for discussion, and the information is, by necessity, simplified and overarching. Visitors wanting to engage in further

discussion with SKB personnel before or after the tours are able to do so, however. And there is plenty of time during the two-day study visits for participants to discuss aspects of nuclear waste management with representatives of SKB and other participants. Yet the study visits tend to generate questions that are directly related to SKB's presentations, or discussions with other participants about mutual friends or other things unrelated to nuclear waste. Thus SKB clearly sets the agenda, and the guided tours at Sigyn and the other facilities do not stimulate dialogue over aspects of the planning process that are unsettled or connected with uncertainties. This, we argue, points to some crucial elements of the balance between demonstration and dialogue.

Both mediation by demonstration and mediation by dialogue should be understood as indispensable in the formation of the nuclear waste programme. SKB needs to demonstrate that its nuclear waste management is safe, as required by Swedish law since the 1970s. From the late 1980s onwards, SKB has realized that the national regulators cannot be the sole witnesses to its safety demonstrations; SKB is also dependent upon the acceptance of the wider society. A successful demonstration depends upon witnesses who can evaluate what they are being shown. Visitors at demonstrations of 'safe nuclear waste management' therefore evaluated them as either trustworthy or untrustworthy. When demonstrations break down – when they fail to generate trust – the clear division between the demonstrator and the audience breaks down, raising the opportunity for dialogue and an opportunity to unsettle and destabilise these established roles.

Mediation by dialogue may occur when alternative expertise presents counteracting results that challenge SKB's programme and open it for discussions about other potential nuclear waste realities, which emphasise a stronger connection between the siting programme and the continuation of nuclear power or alternative disposal methods. Such discussions, at least on alternative disposal methods, have occurred on the initiative of both SKB and national regulators (Eriksson 2003, Elam *et al.* 2009). Nuclear waste management in Sweden has been dominated by mediation by demonstration, however, and the exhibitions and the study visits to nuclear waste facilities are forceful examples.

Notes

1. The name of the vessel alludes to the Nordic myth of Loki and his wife Sigyn. Loki is captured and placed in chains, with a venomous serpent hung above his face, allowing its poison to drip on him. Sigyn sits faithfully by his side and holds a bowl under the snake to prevent its poison from reaching Loki's face.
2. *Observations conducted by Linda Soneryd*
 - Study visit, 2006: coach trip from Östhammar to visit nuclear facilities in Oskarshamn Municipality
 - Open house, 2009, on the MS Sigyn, Visby, Gotland

Observations and interviews conducted by Hanna Sofia Johansson

 - Interviews with SKB staff
 - Open house, 2004, on the MS Sigyn, Öregrund, in Östhammar Municipality
 - Study visit, 2003: coach trip from Oskarshamn to visit nuclear facilities in Östhammar Municipality
 - Study visit, 2004, coach trip from Östhammar to visit nuclear facilities in Oskarshamn Municipality

References

- Barry, A. (2001) *Political Machines: Governing a Technological Society*. London: Athlone Press.
- Dawson, J. I. & Darst, R. G. (2006) "Meeting the Challenge of Permanent Nuclear Waste Disposal in an Expanding Europe: Transparency, Trust and Democracy", *Environmental Politics*, 15 (4): 610-627.
- Elam, M. Lidberg, M, Soneryd, L and Sundqvist, G. (2009) Demonstration and Dialogue: Mediation in Swedish Nuclear Waste Management, Score Working Paper 2009:3
- Eriksson. M. (2003) *Från ingenjörskonst till informatörskonst. Studier av PR och riskkommunikation [From Engineering to Public Relations: Studies of PR and risk communication]* Örebro studies in Media and Communication 2. Örebro University
- Falk, J. H. & Storksdieck, M. (2005) "Learning science from museums" in *História, Ciências, Saúde – Manguinhos*, vol. 12 (supplement): 117-43.
- Gieryn, T. F. (2001) "Balancing acts: science, *Enola Gay* and History Wars at the Smithsonian" in Macdonald, S. (ed) *The Politics of Display. Museums, Science, Culture*, New York: Routledge: 197-228.
- Johansson, H S. (2008) *Demokrati på delegation. Lokaliseringen av det svenska kärnavfallet [Delegated Democracy. The Siting of Swedish Nuclear Waste]* Gothenburg: Gothenburg Research Reports in Science and Technology Studies 16.
- Macdonald, S. (2001) *The Politics of Display. Museums, Science, Culture*, New York: Routledge
- Schmid, S. D. (2006) "Celebrating Tomorrow Today: The Peaceful Atom on Display in the Soviet Union", *Social Studies of Science* 36 (3) 331-65.

Appendix

A-B

Interviews

SKB local office (working with communication and citizens contacts)

Informal interviews (conducted without tape-recorder, in connection with consultation meetings or coach trip):

- Oskarshamn April -05
- Forsmark November-05 and April -06

C

Interviews

SKB central office (staff working with consultations)

- Interview May -05
- Informal interviews, from January to June 2006, 10 occasions
- Access to transcribed interview with head of communication and citizens contacts, (conducted by Misse Wester-Herber 2001)

Observations (public consultation meetings):

Allmänt samrådsmöte, april 2005. Inkapsling och slutförvaring i Oskarshamn, 5 april 2005, kl. 15.00-18.00, öppet hus på SKB:s platsundersökningskontor på Simpevarp, Samrådsmöte, kl. 19.00-21.00, Hägnad, Figeholm, Oskarshamns kommun

Allmänt samrådsmöte, juni 2005. Slutförvaring och inkapsling i Forsmark, möte särskilt riktat till fritidsboende, 4 juni, kl. 11.00-14.00, Börstils Norra Bygdegård, Östhammars kommun, tillgång till transkriberad observation, genomförd av Ebba Lisberg Jensen

Allmänt samrådsmöte, november 2005, MKB för inkapslingsanläggningen, 14 november 2005, Presentationer kl. 15.30- ca 18.00, Samrådsmöte kl. 19-21, Klockarbacken i Alunda, Östhammars kommun.

Allmänt samrådsmöte, november 2005, MKB för inkapslingsanläggningen, 17 november 2005, Presentationer kl. 15.30- ca 18.00, Samrådsmöte kl.19-21, Badholmen, Oskarshamn

Allmänt samrådsmöte, maj 2006, Inkapsling och slutförvaring av använt kärnbränsle. Metod, lokalisering, framtid. Presentationer kl. 16-18, Samrådsmöte kl. 19-21, 31 maj, Hägnad, Figeholm, Oskarshamns kommun

Allmänt samrådsmöte, juni 2006, Inkapsling och slutförvaring av använt kärnbränsle. Metod, lokalisering, framtid, 1 juni, Samrådsmöte kl. 19-21 (presentationer ägde rum från 16.00, dessa observerades inte) Forsmarksverkets informationsbyggnad, Forsmark, Östhammars kommun

D

Observations

MKB-forum i Oskarshamn, 17 november 2005, kl. 9.30 - 15.00, Badholmen, Oskarshamn

MKB-forum i Oskarshamn, 22 mars 2006, kl. 9.30 - 15.30, Oskarshamns Folkhögskola

Samråds- och MKB-grupp Forsmark, 18 november 2005, kl. 9.30 - 15.00, Olandsgården i Alunda, Östhammars kommun.

Samråds- och MKB-grupp Forsmark, 10 mars 2006, kl. 9.00–12.45, kommunhuset, Östhammar

E

Observations, study visits:

Study visit, 2003: coach trip from Oskarshamn to visit nuclear facilities in Östhammar Municipality

Study visit, 2004, coach trip from Östhammar to visit nuclear facilities in Oskarshamn Municipality

Study visit, 2006: coach trip from Östhammar to visit nuclear facilities in Oskarshamn Municipality

F

Observations, Sigyn:

Open house, 2004, on the MS Sigyn, Öregrund, in Östhammar Municipality

Open house, 2009, on the MS Sigyn, Visby, Gotland

Interviews:

SKB staff, working with Sigyn exhibitions, April 2009

The empirical data used for this paper is mainly related to E and F. A-D has however been important for our understanding of the entire process.