1. Introduction

KASAM, the Swedish National Council for Nuclear Waste, is an independent scientific council attached to the Ministry of Sustainable Development. The members of KASAM are independent scientists within a wide range of areas of importance for the final disposal of radioactive waste, not only within technology and natural sciences but also within areas such as ethics and social sciences.

Swedish nuclear waste management policy and implementation is currently in a protracted phase of planning and decisions. Starting in 2006, the Swedish Nuclear Waste Management Co (SKB) is expected to submit the necessary applications for permits to construct an encapsulation facility and a disposal facility for spent nuclear fuel (in crystalline bedrock about 500 meters below the ground), situated in one of the municipalities of Oskarshamn or Östhammar. According to Swedish legislation, basic permits have to be granted by the Government, but the Government will not grant such permits unless the concerned host municipality accepts the proposal. The Government decision will form the basis for detailed licensing decisions by the regulatory authorities.

The nuclear waste issue has been controversial for more than 30 years. It covers both technical and scientific as well as political, democratic and ethical issues. As the Government may have to make important decisions within the next few years, KASAM has an important role as an independent advisory body to the Ministry of Sustainable Development. Also, KASAM will continue its function of creating forums for dialogue that could contribute to increase knowledge and understanding and improve the knowledge base for decision-making.

There are a number of questions that are relevant. Examples are: Will society have a satisfactory basis for decision-making? What happens if society is not capable of making necessary decisions? Does the decision-making process enable society to
postpone important decisions if more time is needed, to avoid obstacles if they appear, and – if needed – reverse decisions? Considering issues like this, KASAM has set up a plan for its activities in the next few years. These activities are meant to contribute to the ability of society as a whole to arrive at a well-founded decision that is widely accepted.

2. Background - Nuclear Waste Management in Sweden

According to current Swedish legislation (Act on Nuclear Activities) companies licensed to operate nuclear power plants have full responsibility for safely managing radioactive waste and spent nuclear fuel. This responsibility includes constructing and operating facilities for the handling and disposal of this waste, and also to perform the necessary research and development work on methods for final disposal. In addition, these companies must provide comprehensive information as a basis for selecting a site for a repository. Finally, the licensee is responsible for all expenses regarding disposal (Act on Financing for Spent Nuclear Fuel etc).

The nuclear power utilities have formed a jointly owned company, the Swedish Nuclear Fuel and Waste Management Co (SKB) to implement these obligations. The Swedish system for management and disposal of the radioactive waste from the nuclear power plants includes one existing (since 1988) central repository for radioactive operational waste (SFR), located at the Forsmark site in the municipality of Östhammar. There is also (since 1985) a central interim storage facility for spent nuclear fuel (CLAB), located at the site of the Oskarshamn nuclear power plant.

To fulfil the provisions in the legislation, SKB has to present to the Government every third year a comprehensive programme for research and development activities. The Nuclear Power Inspectorate (SKI) is responsible for reviewing the
programme and recommending whether the Government should approve the programme or not. SKI may also propose that the government impose conditions on SKB’s future work. As an integral part of this review, comments on the programme are invited from a wide range of interested and affected parties, including the Swedish Radiation Protection Authority (SSI), other regulatory authorities, and municipalities potentially affected by the activities within the programme. In addition to this comprehensive review, KASAM also reviews SKB’s programme and gives recommendations directly to the Government. The Government then decides if the programme fulfils legal requirements and also stipulates conditions for future work.

Through this system of recurrent reviews, the government has been able to exercise influence on important strategic steps in the development of a system for final disposal of spent nuclear fuel, although the responsibility for taking the necessary measures still rests with the nuclear power operators and SKB. The government has endorsed a particular method, the so-called KBS-3 concept, as a “prerequisite for planning” for the continued work to find a suitable place for the repository. However, it should be stressed that the KBS-3 method is not yet finally approved by the regulatory authorities and the Government. And even if it is up to the Government to make the overall important decisions on the general permissibility of the project, the concerned municipality will have a very important position, a veto, in the decision-making process. Therefore, political decision makers both at the municipal level and at the national level need to be well informed about the issues.

3. The Present Situation
SKB has announced its intention to apply, in mid 2006, for a permit to construct an encapsulation facility, suggested to be located in the municipality of Oskarshamn. An application for a permit to construct a repository for spent fuel (in the municipality of Oskarshamn or Östhammar) is planned to be submitted in 2008.

It is not surprising that people may be worried about the final disposal of spent fuel. The Swedish nuclear waste management programme covers many years. A planning stage started during the 1970’s and could probably end within the next few years by submission of applications for the necessary permits. This planning stage has included many technical and political aspects. If the Government so decides, the next step will cover the implementation of the chosen concept, which may take more than half a century. Within this time frame, an unknown number of technical and political issues will emerge and will have to be addressed.

We are still in an extended planning and decision-making process to achieve a long-term sustainable and safe solution for the final disposal of the spent fuel. However, all questions have not been answered yet. On the other hand, not all questions can be answered in the early phase of a project that has consequences for hundreds of thousands of years. Yet decisions must be taken, and to do nothing is a decision that will transfer burdens and responsibilities to future generations.
4. KASAM’s Terms of Reference and Long Term Strategy

4.1 Terms of Reference
KASAM’s activities include investigating issues related to nuclear waste and providing the Government with advice in these highly controversial issues. The current terms of reference [1] were decided by the Government in 1992. According to these, KASAM is requested to:

- present an independent review of the state of knowledge in the nuclear waste area (the “State of the art reports”) every third year,
- present an independent review of Swedish Nuclear Fuel and Waste Management Co’s (SKB) RD&D Programme (every third year),
- act as an advisory committee – upon request – to the authorities within the nuclear waste field (the Swedish Nuclear Power Inspectorate, SKI, and the Swedish Radiation Protection Authority, SSI) on matters connected with nuclear waste and the decommissioning of nuclear power plants.

Another main activity started already after KASAM was set up in 1985. This activity consists of offering forums for dialogue and information for a broad range of stakeholders interested in issues concerning solutions for the handling of nuclear waste.

4.2 Long Term Strategy
KASAM has adopted a strategy as a basis for more detailed planning of its activities [2].

*General Aspects*
Through its composition and its broad independent scientific competence, KASAM shall be a valued organisation, which provides advice in issues concerning nuclear waste. KASAM’s advice shall be so well supported scientifically that it can form a credible basis for Government policy and decisions.

KASAM regards it as an important task to identify and analyse new or neglected issues within the nuclear waste area that need to be discussed, and to ensure that these issues become the subject of discussions. Examples of important questions that should not be avoided have been mentioned in section 1. Some more issues are discussed in section 5.2.

KASAM strongly believes that there is a clear need for supplementary research that is independent of research initiated and financed by the nuclear power producers. This research should cover a broad field, and include both technical and social issues.

*Communication and Dialogue*
KASAM should be in the forefront of a qualified technical and social discussion on issues regarding final disposal of spent nuclear fuel and nuclear waste as well as the
dismantling and decommissioning of nuclear power plants. KASAM should continue to offer forums for dialogue between concerned stakeholders such as decision makers on the national level, concerned municipalities, regulators and other authorities, implementers, non-governmental organisations and the general public. Subject areas for discussions should be sought among those, which do not obviously fall within the framework for the activities arranged by the implementing or regulating organisations.

5. Current Issues for KASAM

Current issues for KASAM are defined in a working plan for 2006 [3].

5.1 Views and Needs from Other Stakeholders

As important input for KASAM’s work during the next few years, KASAM has initiated a series of dialogues with different stakeholders, including the Ministry of Sustainable Development. One important aim was to clarify existing expectations on KASAM and to identify strategic areas where various stakeholders also saw a need for seminars, hearings etc. Some of these areas can be described as follows:

*Independent Advice*

As a basis for decisions, the Government needs independent advice of high quality. The Ministry of Sustainability has clearly stated that KASAM is expected to play an important role as an independent advisory body, focusing on strategic issues. As KASAM does not have any role in the formal licensing process, it has the potential to act more independently than regulators such as The Nuclear Power Inspectorate and the Radiation Protection Authority. KASAM’s broad scientific competence (ranging from technology and natural sciences to ethics and social sciences) makes a good platform for focusing on discussions, also in controversial issues, in a very broad context.

*Decision-Making Process*

KASAM is expected to identify strategic areas within the decision-making process that need to be studied and discussed. By focussing on such issues the robustness of the decision-making process could be increased.

*Need for Dialogue*

KASAM should continue to offer forums for dialogues and hearings in controversial or other relevant issues, where all stakeholders can participate. KASAM should also develop the format for these dialogues, in cooperation with other stakeholders. Relevant topics are described in the next section.

5.2 Suggested Themes for Seminars and Hearings

*The Decision-Making Process*

There is a need to define the detailed interaction between different applicable legal documents (Environmental Code, Act on Nuclear Activities, Radiation Protection Act, etc.). One specific issue to be clarified is how provisions in the Environmental
Code and in regulations and guidelines issued by the Radiation Protection Authority (based on the Radiation Protection Act) concerning the use of BAT (Best Available Technique), should be interpreted and applied.

There is also a need to clarify the specific roles of such actors as the regulating authorities, the Environmental Courts, the Local County Boards, and the Swedish Environmental Protection Agency.

Other important issues for consideration are how decisions on different democratic levels, (local/municipal and national) should be coordinated during the process, and what type of responsibilities will be delegated to the regulatory authorities and the Environmental courts after a Government decision on the general permissibility of the project.

**Alternative Sites and Methods for Final Disposal of Spent Nuclear Fuel**

There is a need for clarification in the legal requirements of the Environmental Code and other legislation regarding an account of “alternatives” to the method and site that is proposed. How realistic should such alternatives be? Also in this area, the issue of BAT (Best Available Technique) needs to be considered.

**The Safety Case**

Issues for clarifications are e.g. judgements on meaning, scope and legal requirements of choice of scenarios, handling of uncertainties, the risk concept, short vs. long time scales, “risk dilution”, etc.

For a comprehensive understanding of the safety case, identification of the most critical issues regarding a KBS-3 final repository could be discussed.

**Responsibility for a Sealed Final Repository**

The long-term responsibility for a sealed final repository, and the documentation and information strategies for very long time scales, need to be clarified.

**Risk comparisons**

The risks associated with a planned final repository should also be compared to the risks of not making decisions leading to a final repository.

Handling of other risks/environmental problems in society (Climate change, final disposal of mercury and mercury-contaminated waste etc.) and the criteria related to these types of risks – issues by different authorities – could be described and compared.

**5.3 KASAM’s State of the Art Report 2007**

Preparation, including consultations with interested parties, for an outline of the 2007 State-of-the-art report will start during the first half of 2006. Due to SKB’s upcoming licensing applications, there is a special need to identify the focus of this
report. One important theme might be an analysis of possible uncertainties or unclear points in the decision making process.

5.4 Participation in EIA-Consultations
As a basis for identifying strategic areas that need to be studied and discussed, KASAM needs to follow more closely the on-going discussions between the implementer and major stakeholders, especially the different types of EIA-consultations. It should be stressed that KASAM’s role in these consultations is not that of a formal stakeholder, but as an observer.

6. Conclusions for KASAM’s Work in the Near Future
Based on facts presented in section 5, KASAM will focus its work during 2006 on the following issues:

6.1 Seminar on Legal Requirements for Describing Alternative Sites and Methods
The environmental code requires an account of “alternatives” to the method and site that is proposed. The theme for dialogue is; what information should be included in the application according to the environmental code. How should this requirement be interpreted? Could the requirement be that the applicant should present a completely different strategy, or technical method, or some variation of the proposed method for the safe management of the spent fuel? There is also a focus on different stakeholders’ own judgements of to what extent they would see alternative sites or methods described in the EIA (Environment Impact Assessment). A seminar on these issues will be arranged in late February 2006.

6.2 Seminar on The Decision-Making Process
The decision-making process that can be foreseen is very complicated and includes a complex interaction between the Environmental Code and the Act on Nuclear Activities, as well as other legislation. It concerns democratic decision-making in an issue where national interests must be coordinated with local/municipal interests, and landowner interests as well as the opinions by NGOs. Planned themes for dialogue are to clarify the interface between the different laws, and to describe the roles of different stakeholders and decision makers during the process, on a national as well as on a local/municipal level. A seminar on these issues is planned for late 2006.

6.3 Dialogues and Information with National Political Decision Makers
Politicians on the municipal level in the two municipalities affected by SKB’s site investigations, have for many years been actively involved in SKB’s work. There also seems to be a need for dialogue with politicians on the national level. KASAM has recently taken an initiative for dialogue and information with representatives of the political parties represented in the Swedish parliament. However, the outcome of this initiative is still open.
6.4 Independent Research
How should financial resources be “guaranteed” for free, independent research related to final disposal of spent fuel, especially in social sciences? SKB has the responsibility for research and development that is needed for the safe management and disposal of spent fuel and other types of nuclear waste, according to the “polluter pays principle”. SKB has also recently initiated a research programme in social sciences. There are good arguments for this. However, the research initiated by SKB has a limited purpose, to support the applications that SKB is now preparing. KASAM believes there is a need for independent research that can be initiated related to management and final disposal of spent nuclear fuel, which could improve the knowledge base at the time of the important decisions expected) in a few years.

Also, even if SKB’s applications will be granted, it will take about another half century until there is a decision to seal the repository. This is a long period when all types of situations can arise and trigger serious discussions whether of not to seal the repository. Also, during this period social science research could be of importance.

Other potential benefits for this type of research should also be of valuable use for society in the implementation process of other large industrial projects. Some type of seminar on these issues is planned be arranged during 2006.

6.5 Other Issues
As earlier indicated, KASAM will start preparations for its 2007 State-of-the-art-report on nuclear waste issues. KASAM will also follow, as an observer, ongoing EIA-consultations between the implementer and the main stakeholders

References
2. KASAM’s working plan for 2006, KASAM 33/05, (in Swedish) www.kasam.org
3. KASAM’s long term strategy, KASAM 7/05, www.kasam.org