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Focusing on SSI's risk and radiation protection criteria

A report based on discussions in focus groups in Östhammar and Oskarshamn municipalities

Statens strålskyddsinstitut
Swedish Radiation Protection Authority

AUTHOR/ FÖRFATTARE: Britt-Marie Drottz-Sjöberg[1)]
[1)]BMD Research

DEPARTMENT/ AVDELNING: Department of Waste Management & Environmental Protection and and Department of Occupational and Medical Exposures/ Avd. för avfall och miljö och Avd. för personal- och patientstrålskydd.

TITLE/ TITEL: Focusing on SSI's risk and radiation protection criteria. A report based on discussions in focus groups in Östhammar and Oskarshamn municipalities/ Med fokus på SSI:s risk- och strålskyddskriterier. En rapport baserad på diskussioner i fokusgrupper i Östhammars och Oskarshamns kommuner.

SUMMARY: The report contains the questions and points of views that emerged in the focus group discussions, from the municipalities participating in site selection investigation, will serve as a basis for the authority's work of producing general guidelines associated with the regulations (SSI FS 1998:1). An expert group at the authority will answer or comment on the issues raised.

SAMMANFATTNING: Rapporten innehåller de frågor och synpunkter som utkristalliserades i fokusgruppsdiskussioner i de kommuner som deltar i platsundersökning ska utgöra ett underlag i myndighetens arbete med att ta fram allmänna råd kopplade till föreskrifterna (SSI FS 1998:1). En expertgrupp inom myndigheten kommer att besvarad eller kommentera frågorna.

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1 Summary

This report to the Swedish Radiation Protection Authority, SSI, is a result of the project "Focus on SSI's risk and radiation protection criteria", contract number 624/2836/02. The project was a result of the agency's continued work on the 1998 regulations on protection of human health and the environment in final disposal of spent nuclear fuel and nuclear waste (*Föreskrifter om skydd av människors hälsa och miljön vid slutligt omhändertagande av använt kärnbränsle och kärnavfall* (SSI FS 1998:1).

The idea behind the project, to involve persons from the municipalities participating in Svensk kärnbränslehantering AB's (SKB) site selection investigation in focus group discussions, was that the questions and points of views that emerged in the discussions could serve as a basis for the authority's work of producing general guidelines associated with the regulations (SSI FS 1998:1). The finished report would then be handed over to an expert group at the authority which answered or commented on the issues raised, and made a report on this to the participating municipalities Oskarshamn and Östhammar.

The result of discussions in two focus groups in Oskarshamn municipality and two in Östhammar municipality in October 2002 is presented here, together with a presentation of the project's purpose and organisation. The results are presented in three main sections. The first concentrates on radiation and radioactivity since the task in the discussion groups was to attempt to clarify the issues and problems observed in this area in order to contribute to the authority's work of developing the general guidelines. The second section, on understanding of concepts, measurement, risk and safety, illustrates that the frequently asked and "simple" knowledge-related questions are only the tip of the iceberg where many of the participants have also thought about the more complex contexts and the fundamental problems in the risk and safety analysis, its validity and use. The third section of the report focuses primarily on content and information aspects. It provides a number of ideas about how information on current problems and important issues can be improved, how knowledge can be deepened in the site selection municipalities and how working methods in the process can be developed. The report mainly consists of a presentation of the questions that need to be clarified but also contains the participants' comments and advice to SSI. The material is summarised in a more overarching way in the discussion and there is a brief evaluation of the main results of the project.

The conclusion is that there is still a strong commitment in the site selection municipalities to contribute to and develop the work in the process of creating a Swedish repository for spent nuclear fuel and nuclear waste. The discussions in the focus groups in the municipalities of Oskarshamn and Östhammar showed a) that people have substantial points of view on the content and formulation of the general guidelines that can be useful for SSI in the ongoing work, and b) that the need for knowledge and points of view of committed people now extend far beyond the framework specifying the work with the general guidelines. They include questions both about general concepts and detailed technical calculations as well as legal, health, organisational and social aspects and consequences of the work, from the present until far into the distant future.

2 Introduction

2.1 Background and purpose

The Swedish Radiation Protection Authority (SSI) arranged a full-day seminar on 21 August 2002 about risk and radiation protection criteria, at which lectures were given on the risk concept and current radiation protection regulations. A summary of the content and conclusions of the seminar is available at the authority (Hedberg, 2002; Blixt, 2002). The project on which a report is to be made in this report deepened the discussions initiated at the seminar and aimed to:

⇒ Clarify questions relating to SSI's radiation protection criteria to enable better consideration to be given to them in the authority's work of producing general guidelines for the regulations (in accordance with SSI FS 1998:1) that the authority is working on.

⇒ Deepen the discussion and investigate what is unclear as regards the criteria and their application in the municipalities affected by SSI's site location investigations for a repository for spent nuclear fuel and nuclear waste.

⇒ Compile and document points of view from the focus group discussions in October 2002 in the municipalities of Östhammar and Oskarshamn.

In supplement to *Föreskrifter om skydd av människors hälsa och miljön vid slutligt omhändertagande av använt kärnbränsle och kärnavfall* (SSI FS 1998:1), SSI published documentation on these regulations (SSI, 2001:02). This documentation was sent to, and made available to, the participants in the focus groups. A number of them also participated in SSI's seminar in August where presentations and group discussions highlighted, among other things, legislation in the area, radiation protection criteria, the risk concept and risk assessment work, as well as various kinds of probabilities, measurement of radiation, the dose concept and radiation protection work within different sectors of society.

3 Organisation of the work

3.1 Focus groups and participants

A "focus group" consists of a small number of people, put together on the basis of the widest possible experience or interest of the problems being examined. The central topic or issues are to be prepared before the discussion although this aims at developing the issues and clarifying different aspects of the topic examined in the best possible way. In the current project, the result should clarify where there are, or are experienced to be, uncertainty and lack of clarity in SSI's risk and radiation protection criteria, and to provide proposals for improvements in information and communication work on this basis. The discussion was led by the author who also took notes during the discussions. An expert from SSI took part in each discussion session to answer questions. The personal anonymity of the participants was guaranteed by an undertaking that their identity would not be disclosed in the report. It was also agreed that the preliminary report would be sent to the municipalities via letter or e-mail, to be circulated to the group participants for comments before the final report was produced.

Participants in the discussions were persons active in municipal politics and administration, for instance, members of the local safety committee and persons who have previously participated in the municipality's pilot study work, for instance, in municipal reference groups. Other interested parties such as landowners and people owning property within the site investigation areas participated. The group size varied between 8 and 12 participants. Everyone put forward points of view and participated actively.

3.2 Implementation and structure

The project work included implementation of two separate group discussions in both Oskarshamn and Östhammar municipalities. The number of discussion groups and participants at each place was determined on the basis of notifications of interest to participate to the municipal executive. Each person participated in one discussion session of approximately 2½ hours. In addition, there was a half-hour coffee break and the participants were invited to lunch either before or after the discussion as part of the arrangement. This time frame was considered to be optimal to allow sufficient time for a thorough discussion while not being excessively time-consuming. In Oskarshamn, the groups met during the afternoon of 7 and morning of 8 October. In Östhammar, the discussions took place in the morning and afternoon of 10 October.

Figure 1 provides an overview of the organisation of the work over time. The figure shows that the final report is to be made to the authority, which, as well as being able to use the results internally, is also expected to provide the municipalities with answers or comments on the points of view put forward. There is no exact time stipulated for the latter exchange of information although it is expected to take place in connection with the authority's work during 2003.

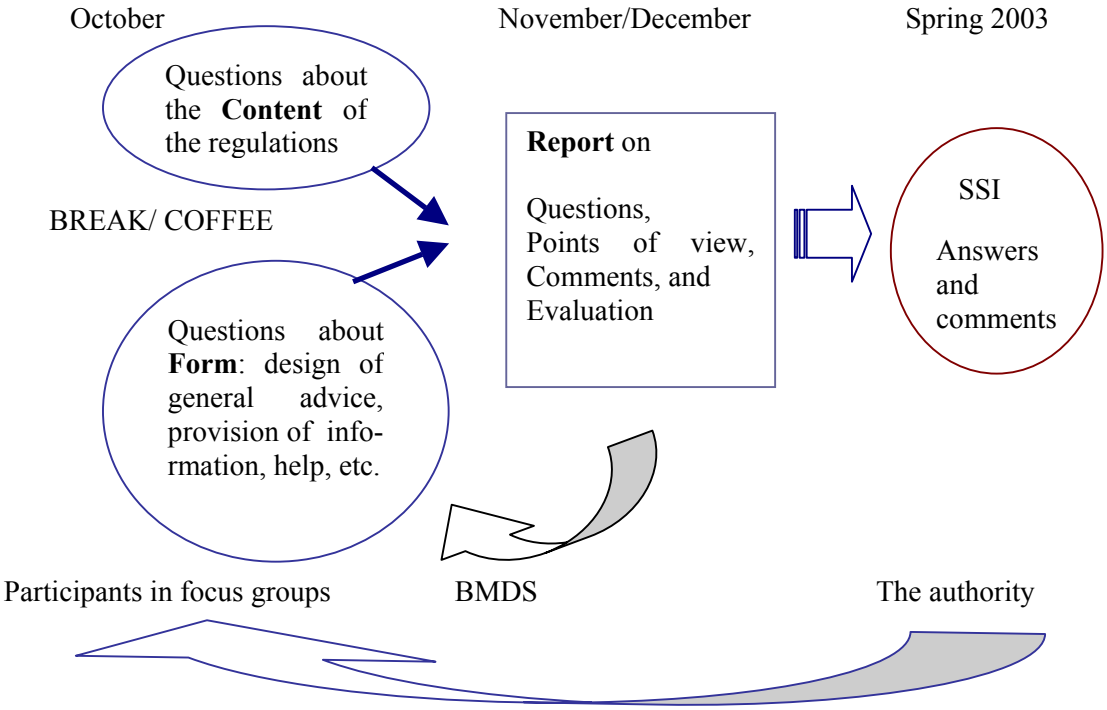


Figure 1. Overview work plan for the project with discussions in focus groups on SSI's radiation protection criteria in the municipalities of Östhammar and Oskarshamn.

The group discussions consisted of two main sections: A. Content of the regulations, concentrating on the questions where the participants think clarification is especially necessary in the field of risk and radiation protection. Examples of this area are "What information about radiation, radiation protection and related risks do the participants/municipality want to have as a basis for their own taking of position or internal work?"

The second part of the discussion concentrated on B. Design of information and provision of information. For instance, "What problems, relating to the regulations, are considered important to provide information about?" The discussion intended to take up ideal or appropriate ways to present or make available information, as well as requests for specific information material.

3.3 Processing of material collected

The questions and comments reported in the result section have been formulated by the participants during the meetings, but written down by the author. A few questions were presented in writing. Taken together, the sections with examples of questions put in the discussions, which are included in the report, are intended to be as comprehensive account of the material that emerged as it was possible to produce. Sometimes, this means the examples include some repetition or similar questions. All notes from the discussions have been typed out and then used as a basis to identity groups of questions. A number of topics have been classified in main and subsidiary groups and the result consisted of three main areas with various sub-divisions. This means that an overall picture of the questions and problems is presented, i.e. the information cannot be related to any particular discussion group or municipality, (with a few exceptions

when someone mentions the name of a place). This means of presentation makes it easier to achieve the purpose of the report, which was to compile and structure the information collected.

The classification of questions, as well as the importance attached to them in the presentation, is, of course, the result of a number of subjective assessments. It would have been possible to classify the material differently, for instance, with the emphasis on the questions that were most to the fore in the respective municipality, or on the basis of interests related to different groups, etc. It would also have been possible to vary the aspects emphasised in the discussion at the end of the report with more or fewer details and perspectives. Against the background of this brief account that all information must be organised in some way, it should none the less be emphasised that the report presents the substance of the material produced in the discussions. The answers that SSI's representatives gave directly to participants at the meetings have been consistently omitted. The reason for this is that it would lead too far from the project's task to also take into account the answers to the questions in this context.

3.4 Presentation of results

The result section consists of three main parts, the first two of which have a number of subsections. Each section starts with a short presentation and summary of the questions and comments contained in the section, followed by the specific questions and then the participants' comments, points of view and advice. The comments and evaluation by the author of the most important points in the documentation are contained in the discussion section after the presentation of results.

4 Results

4.1 Specifically on radiation and radioactivity

This section gathers together questions that taking up radiation and radioactivity more or less directly. Initially, general or basic questions are presented under the heading 1) "Overarching and complex issues". This is followed by compilations of questions concerning radiation conditions that are related in some way to 2) the repository, 3) to people, 4) to the environment and 5) to time aspects. Text in brackets together with questions and comments are clarifications made by the author.

4.1.1 OVERARCHING AND COMPLEX QUESTIONS

What is radiation and what are radioactive substances? What is it that comes out of the repository? Without some understanding of WHAT constitutes a danger, it is difficult to relate to the risk. It is also difficult to understand how the danger is spread or can come to affect people and the environment. Another basic question is: When does a danger become DANGEROUS? When does a release, a leak, a dose or a concentration become such that it has negative effects on health and the environment? Moreover, what does the overall risk scenario look like and how large a part of the risk is associated with radioactivity and radiation? Is there a way of describing this pedagogically? Do we know enough to be able to assess the radiation risks or to be able to deal with them? What might research in this area be able to show in the future? It is suggested that the general guidelines include simple explanations and references to more in-depth presentations, on the phenomena of radioactivity, radiation, dangerousness and risk.

Examples of questions from the discussions:

⇒ How is radioactivity spread from the repository?
⇒ Concerning emissions and effects: How is the danger transmitted? How does it effect human beings and the environment?
⇒ What concentrations might be involved?
⇒ What other sources of radiation exist? What is the aggregate effect on human beings? Also viewed over time?
⇒ How can a distinction be made between radioactive substances and radiation risk, and what really are harmful doses and what is the safety level? Is there any way which one can (use to) make deductions from the arguments put forward? Can, for instance, (the degree of) danger be shown, for instance, from natural radiation up to (nuclear) bomb exposure?
⇒ How are the prerequisites for life protected in SSI's regulations?
⇒ What does the radiation protection variable look like? Can a distinction be made between radiation risks and other risks in radiation protection work?
⇒ What does radiation have to do with the repository?
⇒ Can the "best rock" be defined as that giving the lowest dose?
⇒ What does it mean for the radiation situation (above the repository) that 1 % of the canisters are defective?
⇒ Radiation protection issues are important. But how can the intrusion (by buildings, etc.) for the local population be kept to a minimum? These aspects must also be weighed together with radiation protection issues?
⇒ Are any trend reversals or breakthroughs to be expected in the field of research as regards radiation protection and risk management?

Points of view and comments:

⇒ Describe the substances and particles and gamma radiation and state the respective degree of dangerousness.
⇒ Reference points are important to be able to understand the quantity and quality of radiation.
⇒ Understandable relations are important when talking about radiation risks. Compare the ability of the human being to think in distances. What is a light year? The level of ambition (as regards explaining facts and contexts) must be at a "normal human" level.

4.1.2 THE REPOSITORY, THE SITUATION PRIOR TO SEALING, AFTER SEALING AND RETRIEVABILITY

Exactly WHAT is going to be placed in the repository? Is it conceivable that there will be a change over time in what is to be finally disposed of in the rock chamber now being discussed? Is the size of the repository, or the depth at which it is located important for the radiation situation in the area? What importance may it have or what problems may it entail if there are also other nuclear facilities in the vicinity of the repository?

Despite SSI's work on the general guidelines relating to the period after sealing of the repository, many participants in the discussions considered that questions of immediate interest concern the radiation situation in and around the repository up until it is sealed. The discussion concerned radiation risks in connection with transportation, work in and around the repository, and the openness of the repository, for instance, how it is to be ventilated in the course of work, and how this will affect the surrounding environment. It was also of interest to know how the authority, in particular during this "open period" intended to deal with deliberate encroachment or attacks.

The relation between the design of the repository and the level of safety, in particular as regards radiation risk, was of interest. This might concern the size of the repository, its depth and closeness to other facilities, but also in relation to questions of the retrievability of the stored material in the future. Is there, for instance, a trade-off between the safety level and any of the alternatives mentioned in the design of the repository? For instance, how is safety affected if the content of the repository is to be retrievable? Questions relating to how safety and the radiation situation can be affected by different designs, localisations and the future scenarios of the repository should be answered in connection with SSI's formulation of the general guidelines, as well as questions that particularly concern radiation risks during the period up to the sealing of the repository and concerning radiation conditions and protection criteria in connection with any retrieval (within a reasonable future period).

Examples of questions from the discussions:

⇒ Will the medium-level waste be included in the scenario for the repository that is now being discussed?
⇒ Are reactor components considered as decommissioning waste?
⇒ Is there a difference between the material to be placed in the repository and in SFL 3-5? What classifications of waste are there?
⇒ What does the "whole project" look like for Östhammar municipality? Is it possible that decommissioning waste would be placed in the repository now or in the future?
⇒ As regards sealing, how large will the repository be?
⇒ Is there a greater risk with a repository with a larger surface area?
⇒ How is the radiation dose affected by a larger repository? Or how are radiation doses affected if there are several repositories? If they are concentrated in one place or in separate places?
⇒ How is the repository conceived of as regards its size and are there ideas about industrial large-scale operation?
⇒ How great is the probability that SFR will be located at the same place as the repository? What is the view on the relationship between SFR and the repository?
⇒ How to explain the relationship (is there any trade-off) between risk and size of the repository and any future new repository?
⇒ How deep is the repository to be located? What problems are there at different depths?
⇒ Are there different risks and different kinds of depth (of the repository)? What risks are involved then?
⇒ What happens in the event of a terrorist attack?
⇒ It is of interest for SSI to describe the period <u>before</u> the repository is sealed. What happens then?
⇒ What radiation risks may there be during the course of work? Why doesn't SSI take up the period before sealing?
⇒ What type of ventilation exists (in the repository)?
⇒ Retrieval is an important problem area. Is it to be retrievable or not?
⇒ There are also questions about the retrievability scenario. What does retrievability entail? Can this be made concrete?
⇒ Is there any form of self-check of radioactivity? How does this accord with "retrievability"?
⇒ What rules or criteria exist today for retrievability of parts or the whole repository to be able to take place safely?
⇒ How can retrieval take place without a risk of radiation?

Points of view and comments:

⇒ The issue of retrievability, that there may be two reasons for retrieval, if something goes wrong or if it is wished to use the stored material.
⇒ Radiation protection risks and risk in retrieval work should be clarified better.

4.1.3 QUESTIONS CONCERNING THE RISK FOR HUMAN BEINGS

The questions on radioactivity and radiation put forward in the discussions and which directly related to human beings concerned, among other things, the view of the authorities on the size of the acceptable risk, the effects of radiation doses and how radiation accidents in the course of work would be dealt with. There were also requests to obtain knowledge about some kind of reference points to be able make one's own estimate of the risk for illness or injury. A number of concrete questions have come to the fore for those living in the vicinity in connection with the start of the site investigation. These concerned the future radiation situation, accessibility of measurement instruments, and the ongoing site investigation, as well as the possible effects of work on personal finances. These discussions showed that there were clearly expressed wishes for specific local radiation information and to obtain such information for past periods and for the foreseeable future. It is proposed that SSI in conjunction with the drafting of the general guidelines provide information on radiation protection rules for the general public and for work related to radiation, and inform about causes of radiation doses, measurement of these, and provide examples of effects and dangerousness.

Examples of questions from the discussions:

⇒ How great a radiation dose may a person have according to SSI's radiation protection criteria?
⇒ Can the dose be changed due to how the wind is blowing (from the repository)?
⇒ Is there a threshold value for the effect of radiation on people and the environment?
⇒ What, exactly, can come out of the rock at the depth of 500 metres? What happens to those who live in the vicinity?
⇒ What happens (to the radiation dose) if people change their consumption pattern in some way?
⇒ What and how many can be affected by leukaemia after approximately 10 years at the repository?
⇒ Is it possible to live above the repository? How will it (the repository) affect financial aspects, for instance, if one wishes to sell the farm?
⇒ Is it possible to live in a uranium mine, or use it as an example for purposes of comparison (for radiation risk)?
⇒ During the course of work (of filling the repository), what does the work situation entail for workers and the surroundings?
⇒ If the work of filling the repository takes 30 years, accidents must happen (including radiation accidents), how will these be dealt with?
⇒ Is dose measurement equipment available for those living in the vicinity?
⇒ What was being done in the helicopter flights last week?

Points of view and comments:

⇒ Closeness to the repository (e.g. Misterhult) leads to greater involvement.
⇒ A number of issues can arise from a landowner perspective. These include (change in) groundwater and other water-related problems.
⇒ "Adequate information is needed on questions relating to the general environment, the immediate environment and, for instance, landowners.
⇒ The pie diagram (on different radiation doses) shown at the SSI seminar in August provided a good overview. However, what is of interest to people is what the situation will be like

for them or in their local area. More detailed knowledge needs to be developed to be able to answer this type of questions.

4.1.4 QUESTIONS CONCERNING THE ENVIRONMENT

Questions concerning how radioactivity and radiation affect the environment resemble to some extent the above basic questions on what the phenomena consist of and what they entail, for instance: How is radioactivity noted? How is it spread through rock or water? And what effect does radioactivity have on plants and animals? However, there are also well-thought out questions about how changed conditions in or in the vicinity of the repository could conceivably affect it and thus the radiation situation. One example concerns the change of the groundwater level and thus the efficiency of buffers, and in this way the possible effect on the radiation situation. It would be desirable if the general guidelines both explain and give examples of how flora and fauna are covered by the authority's radiation protection criteria.

Examples of questions from the discussions:

⇒ What happens to the environment, how is radioactivity detected? Can it be like a "mist on the ground"?
⇒ How are berries and fungi in the vicinity (of the repository) affected?
⇒ Which plants die?
⇒ How is radiation or emissions detected in wells?
⇒ Transportation of substances through rock, how does this actually take place? How does radioactivity spread through soil? It would be good to have this explained, including descriptions of what happens in the course of time.
⇒ How is the repository affected when the groundwater changes, and the level can go up or down? What radiation effects can this have? What effects can such changes have on the surrounding nature?
⇒ Caesium still remains after the Chernobyl accident, in particular in lichen. Will reindeer be harmed (by the radioactivity)?

4.1.5 QUESTIONS CONCERNING TIME

The time perspective for radiation risks and the spread of radioactivity are a fascinating but difficult-to-understand area of problems. The questions and discussion topics exemplified below concern, for instance, the desirability of persuading the authority to illustrate incredibly long periods of time in a comprehensible way and of explaining what related radiation risks look like over time. The question of how the relevant expertise is to be maintained over time was brought up as well as what research may conceivably achieve in the foreseeable future. Some emphasised that the short and more comprehensible time period in this context must be considered as being most important and interesting, while others argued that radiation risks in the light of the inconceivable periods of time that were being discussed for the repository are exactly the time perspectives that make SSI's work so important. It could be of interest for the authority to clearly illustrate the types of radiation risks that may be relevant (and for whom or what) over a longer period of time, which also includes the period up to the sealing of the repository. As regards maintaining competence over a longer period, it is naturally more difficult to ask for an overview of development, although shedding light on the problems connected with work on the radiation protection criteria might be of interest.

Examples of questions from the discussions:

⇒ Can SSI make the time period comprehensible, up the next development stage (of the repository work)?
⇒ What does the time perspective mean from day 1 to sealing?
⇒ How will the radiation perspective be changed over 10 years to 100 and 100,000 years, etc.?
⇒ During what periods can it be dangerous to breach the repository?
⇒ What does the time period look like for retrievability, before and after sealing respectively?
⇒ What does the preservation of knowledge over time look like?
⇒ What might happen in research in parallel with the time the material is placed in CLAB?
⇒ Can it be expected that a better model will be found within a relevant time frame (our own generation) to the one proposed by SKB?
⇒ It is difficult to comprehend the long time perspectives. What can happen in the entire time chain, during the whole of this process? And if an accident happens during this period, what effect it will have? How is it at all possible to retain competence in the area over time? How can competence be maintained in general and in particular with regard to future accidents?

Points of view and comments:

⇒ It must be reasonable to understand the time perspective…
⇒ Long-term issues are most important, the 100,000-year perspective. SSI's work is important in this respect.
⇒ In the longer term, the development of competence over time is important, for instance, expertise on radiation protection.
⇒ The time perspective is important; it is important to shed light on radiation risks over time. This also applies to retrievability.
⇒ Perhaps we should talk about "generations" rather than "time". This might be easier to understand.
⇒ The short time-perspective is most interesting (< 5000 years).

4.2 Conceptual understanding, measurement, risk and safety

This section deals more in depth with the problems that are difficult to understand for non-experts, and clarifies the type of information and knowledge required. Questions and discussions from the focus groups also clarify general problems that always exist in research and the development of knowledge. These concern, for instance, the quality of current knowledge, the reliability of the evaluations of dangerousness, what safety really entails, and where the boundary is between knowledge and evaluation. In addition, there are questions concerning who is responsible for what. The answers to this type of questions can form the basis for the position taken by an individual on the danger under consideration, and be relevant for the perception of risk and personal control. The presentation in this part is divided into five sections: 1.Terminology and definition of concepts. 2. Calculations and bases for calculations. 3. Safety, risk and dangerousness. 4. Knowledge and values in safety work, and 5. Status of regulations, responsibility, roles and interests.

4.2.1 TERMINOLOGY AND DEFINITION OF CONCEPTS

Quite a lot of comments and questions in the discussions indicated that the words and concepts used by, for instance, the authorities are unknown or difficult to understand. This could be the case even for persons who have been involved for a long period of time in local government work related to SKB's pilot study and site investigation work. Among the concepts that are difficult to understand are "dose" and "collective dose", and various mathematical presentations of

the calculated risk. Other interesting questions taken up in the discussions concern how, for instance, the authority defines and differentiates concepts such as "risk" and "uncertainty", "biosphere" and "geosphere" and, for instance "final" in "final disposal". The participants often pointed out that the authority should avoid difficult and unclear concepts, and, to the greatest possible extent, clarify or make concrete what is being referred to. Questions and points of view from the discussions are shown below.

Examples of questions from the discussions:

⇒ As regards comprehensibility: what does dose mean?
⇒ Please clarify the concept "collective dose", and how it is related to other similar concepts. What is "collective dose", is it everybody?
⇒ Risk for injury, 10^{-6}, what does this mean? If you compare with BINGO, some people actually do win a VOLVO.
⇒ What is 1 in a million?
⇒ What does, for instance, "corrosion" mean, etc? Explain words.
⇒ What are "harmful effects" in fact?
⇒ What does "dilution principle" mean?
⇒ SSI writes: Not taking care of the waste would eventually entail great risks for society." This is undoubtedly an assertion that is both full of insight and forward-looking, but what does the word "great" mean in this context? Unacceptably great? Quantify or, at least, relate or give examples, if possible.
⇒ The words biosphere and geosphere are used, where is the boundary between them?
⇒ What is the difference between "risk" and "uncertainty"?
⇒ How is the relationship environment-people viewed by the authority?
⇒ What is meant by "environment", people, animal, garden plants, etc? The same definition should be used as that used by the Swedish Environmental Protection Agency.
⇒ Is "production" (the power stations) separate from activity that is subject to licence?
⇒ A better explanation is needed of "final disposal alternatives". What is the exact definition of "final"?

Points of view and comments:

⇒ Make concrete and simple comparisons of risk. Provide information so that it is possible to arrive at one's own position.
⇒ Relate the risk concept to something which is familiar to ordinary people, for since, dental X-rays, lung X-rays, etc. How much is 1 milliSievert? Explain the content of concepts by taking a position on different possible outcomes.
⇒ As regards the size of risks, make comparisons very concrete and express risks in words and figures.
⇒ It would be good to use the risk concept so that comparisons can be made between different types of risks.
⇒ There is a considerable gap between theory and practice and the understanding that people have. For instance, if there is information about an annual risk of one in a million, what is it? However, one must not oversimplify when answering questions. At least not in a way that can be perceived of as if one is making light of the problem.

4.2.2 CALCULATIONS AND BASES FOR CALCULATION

How are calculations made, what is included in the calculations, how are large systems tested and how does one know that very complex calculations are correct? In a nutshell, these are the questions that people want answers to. The questions are of different degrees of difficulty. The simpler questions look for answers as to how one can concretely go about finding a measure of,

or an estimate of, the dose that a person (or a particular environment) is exposed to in particular radiation conditions. The more difficult questions apply to the parameters, components, or systems respectively that are included in the large data material and striking of balances that make up the safety analysis and its results. How are balances struck and is this correct? It is also wanted to know how SSI goes about assessing the reasonableness of SKB's analyses and results.

Examples of questions from the discussions:

⇒ The relation between probability and consequence; small probabilities and possibly large consequences, how is this dealt with?
⇒ Dose over time, how is it calculated? Can it very over different periods of time? How is to be reported by SKB and in later stages (after sealing)?
⇒ Is there any way of describing the size of risk that differs from "zero risk"?
⇒ Does the "packaging issue" (various buffer systems) in the repository differ in different types of safety analyses?
⇒ What parameters are in the "dangerousness-risk"-equation? How are the intrinsic relationships of risks calculated (trade-offs, reinforcements, etc.)?
⇒ How are ecological systems measured? And how does measurement of human beings take place?
⇒ People want guarantees and risks are being discussed. Make a survey of different energy sources (with regard to risks), show the advantages and disadvantages. How are different risk comparisons made?
⇒ How can we understand or grasp the whole; all the parameters included in the documentation and the calculations. What are these parameters?
⇒ Matrices and multifactor models which can really only be handled mathematically are difficult to describe. But how is it possible even there to take all factors into account at the same time?
⇒ What could the procedure with "weighing together risks" look like? Are there alternatives?
⇒ What does the relationship between scenarios, safety analysis and radiation protection assessments look like?
⇒ How can one test that safety is really maintained as long as has been said?
⇒ How are SKB's information and the data documentation validated (quality assured) with respect to what applies to facts?
⇒ What uncertainties does SSI take into consideration in its calculations and what is omitted in its assessment of compliance with radiation protection criteria?

Points of view and comments:

⇒ Compare different methods and clarify briefly the advantages and disadvantages of them (in information material).
⇒ It might be of interest to see a mathematical model with all parameters included, and see how the final figure material is calculated (for risk or safety analyses).
⇒ Make the scenarios concrete, for instance, assuming that x kilos of material y comes out, state the effect this has on a) the surrounding environment, b) larger areas, c) different types of organisms and d) on people.
⇒ Make an impact assessment as a complement to the safety analyses.

4.2.3 SAFETY, RISK AND DANGEROUSNESS

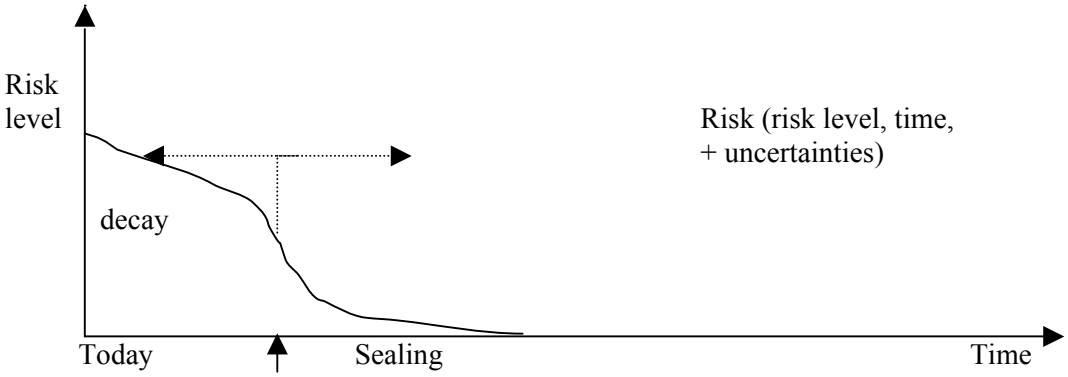
The questions that have been gathered together in this section concern what is to be protected, the safety margins and checks that exist or are conceivable, the risks that may exist with the canister, the concentration of nuclear facilities and, for instance, conditions in CLAB. Questions were also raised about the scenarios that best capture the worst conceivable scenarios. These

questions are more or less directly related to radiation, and, although it is not always clear from the formulations in the examples below, it was the radiation risk that the discussion was based on. In relation to the general guidelines, the questions range from specific knowledge-related questions to takings of position that are fundamental for the whole of radiation protection work. In this way, they show an interest for a presentation of both starting points and the extent of radiation protection work as well as concretisation of details in relation to the general guidelines.

Examples of questions from the discussions:

⇒ What is to be protected? The workers, residents in the vicinity, the environment?
⇒ What is the (safety) level that candidates (for the repository) are to comply with?
⇒ The specified safety margins, are they sufficient?
⇒ Is it meaningful from the point of view of safety and the environment to distinguish between existing and planned Swedish nuclear waste. If the answer is yes, why?
⇒ Why is it impossible to control what happens in the repository for, for instance, a couple of hundred years?
⇒ How large is the margin of safety with max. 100 degrees of the canister?
⇒ Can man change/reduce the safety standard to facilitate subsequent retrieval?
⇒ Will safety be reduced if the retrievability alternative is retained?
⇒ What does a concentration of nuclear facilities entail? Should the entrance to a power station really be located close to the repository?
⇒ How great a risk is there for something breaking at the very beginning (of the existence of the repository)?
⇒ What role does the rock and its characteristics play?
⇒ What does the risk scenario look like assuming that nothing is done (with the nuclear waste)? SSI writes: "SSI considers that it is essential to plan for final disposal now." Every environmentally aware Swede will hopefully agree although some are concerned and ask: How much do the risks increase each month/year that the final disposal is intentionally or unintentionally delayed?
⇒ How to guarantee against defects in the copper in the canister? How serious can such defects be? How large a defect can there be before when it (the canister) is said to be good?
⇒ The welding joints – is this clear?
⇒ Why not measure the leakage at the test canister at ÄSPÖ? Use a radioactive isotope for a test of this kind.
⇒ How long can the fuel remain at CLAB?
⇒ How long can CLAB remain untouched? Ditto the power plants? How are calculations made when arriving at an answer?
⇒ What arguments are there for and against allowing material to remain at CLAB for a long period of time (approximately 100 years)?
⇒ What happens when groundwater refills the repository, after sealing?
⇒ Can the groundwater become polluted?
⇒ Can comparisons be made with Chernobyl data, and, for instance, to describe the risks and doses in a seminar?
⇒ Can regular monitoring be made before the site investigation starts (to have in this way comparable data for subsequent measurements)? Can documentation be obtained of existing radiation levels, in particular for those living within the trial area?

⇒ Could the development be clarified (of the increasingly low) risk level over time by showing a figure such as that below?



⇒ How dangerous is the waste compared with other hazards?
⇒ With regard to the scenarios: Can SSI provide the municipalities with different scenarios and provide information on how they have varied them (the scenarios)? And possibly also provide new scenarios?
⇒ It is demanded that the worst-case scenarios be produced and clarified. How can one calculate this? What is the worst case?
⇒ The worst-case scenario is that the repository is not sealed. That future generations have to take it up.
⇒ What does a Geiger meter cost?
⇒ Can assistance be obtained with expertise on dosimetry?

Points of view and comments:

⇒ As regards the "protection level", this should be proven (not just estimated) for those living close by (the repository).
⇒ The interface (the area) between the biosphere and the geosphere is very important.
⇒ Place the damages in relation to one another; show comparisons, make concrete.
⇒ There are a lot of questions about future earthquakes and how they could affect the repository deep down in the rock.
⇒ Transport is also a safety issue, although little is said about it.
⇒ The Murmansk emissions – place them in relation to the risks with the repository.

4.2.4 KNOWLEDGE AND VALUES IN ANALYTICAL WORK

The category of questions exemplified here concern what is known about safety respective to what has to be assumed in the analytical work. Many questions also concerned how to strike balances where, for instance, a balance is to be struck between finance, costs or "utility" and safety, in general or more specifically as, for instance, in the design of the canister. Explanations of how "optimisation" takes place are requested and, for instance, whether there any absolute limits for safety in this context. The discussions clearly indicated the desirability of increased "transparency" as regards what is known with certainty and what is assumed, and how different

components in material on which decisions are based are weighted or prioritised. A clarification of this problem by the authority would be of great interest.

Examples of questions from the discussions:

⇒ How to distinguish values, estimates and facts? What is known about safety? And where must different hypotheses be used, etc.? It would be desirable if it was clarified when conclusions are based on one or the other so that it is evident whether what is said is something which is known or believed to be the case. Can any form of quality control be demanded in this context?
⇒ As regards assumptions, which has SKB made? Are these credible?
⇒ What is the relationship between quality and quantity as regards safe final disposal?
⇒ How is the first emplacement evaluated in this (final disposal) process?
⇒ It is to be optimised, but optimised with respect to what? Can one say that anything is optimal if costs are taken into consideration in the assessment?
⇒ It is often said that "benefit is to be weighed against the risk" (see also page 3 in "On optimisation"), how is this done?
⇒ Is there any trade-off between safety and finance? For instance, with regard to the thickness of the canister.
⇒ Is it the case that financial considerations take precedence over safety? For instance, with regard to the safety of the canister? If so, when is the case? If the repository is located close to Simpevarp, is this due to financial considerations or safety?
⇒ How is "optimisation" limited?

Points of view and comments:

⇒ People have often listened to "facts" and technical issues but other kinds of information are now becoming available.
⇒ With regard to radiation and risk evaluation: link comparisons to different types of risks and state the advantages and disadvantages of specific measures, both for risks and utility.
⇒ Clarify the link between safety analysis and radiation protection issues.
⇒ Describe how the impact from different sources is weighed together (optimisation).
⇒ How can one know what is included in concepts, for instance "optimisation" or "as far as possible" in documents from authorities? SSI could develop a "SSI's WHAT IS IT" in the style of Martin Luther's Catechism.
⇒ An explanation is needed of the word "reasonable" to present to the municipality.

4.2.5 STATUS OF REGULATIONS, RESPONSIBILITY, ROLES AND INTERESTS

The participants in the group discussions had a large number of questions about how the authority (SSI) and the authority's regulations and general guidelines were to be understood in a legal context. What "status" and function does SSI's regulatory framework have? What are the legal relations of the environmental court, the municipality and the county administrative board respectively? It was also of interest to have specified which facilities and waste products that the regulations and general guidelines apply to, and whether the formulation of the general guidelines could affect the future process, for instance as regards the design of the repository (the KBS-3 method), the environmental impact assessment process or ideas about the sealing of the repository. Questions related to responsibility were expressed by such formulations as "Who owns the problem"? This then related to special responsibility after the repository had been sealed. The questions and thoughts presented below can serve as a basis for the authority for a description of the framework in which the work takes place.

Examples of questions from the discussions:

⇒ Are the radiation protection rules included in any legislation?
⇒ What status does SSI's regulatory framework have? And what role does the authority, or authorities, play in the whole decision-making process?
⇒ What is the function of the "general guidelines"? Are these "should" requirements? What would be the consequence if SKB did not abide by or comply with the general guidelines? What conditions have been imposed?
⇒ What facilities are referred to in section 1 of the regulations?
⇒ What facilities are affected by the general guidelines?
⇒ With regard to "other long-lived waste", the storage issue seems to be neglected. Can different types of waste subsequently mean changes in SSI's regulations and general guidelines?
⇒ Is there anything in SSI's regulations that distinguishes between whether the quantity of waste is 800 or 80,000 tonnes? If the answer is yes, what?
⇒ Is there any mandatory law or equivalent entailing that the rules or criteria must have a certain form?
⇒ Who determines the criteria for the regulations (which SSI works in accordance with)? What is the relationship of SSI to, for instance, the environmental court?
⇒ What is the relationship between the county administrative board and the municipality? Is the Environmental Court free to use another consultant than SSI?
⇒ Can a natural person report a matter in this area to a prosecutor? Public prosecution?
⇒ Points for the future: Is the municipality or the city/ministry respectively prepared to accept the "mammoth" issue? When a decision is made, comprehensive documentation must be available, which should have been prepared for a long period, starting now. The authorities have a key role here.
⇒ Do other countries have corresponding regulations to those SSI works with?
⇒ Will the general guidelines strongly control the proposed KBS3 method? What effects might this have in this case on a future referendum?
⇒ Will demolition waste and, for instance, reactor components be used for a specific environmental impact assessment process, or another type of location process?
⇒ Who is responsible when the repository is sealed? The state, the municipality?
⇒ Questions concerning responsibility arises in connection with sealing. Who is responsible after sealing? The municipality, the state or some other body? Who owns the problem? What procedure exists for handling clarity in this connection?
⇒ Who is responsible for the canisters after sealing, this is one of the most important questions.
⇒ It would be good if SSI and SKI ask SKB questions. And that there is a public report on, for instance, inspections of SKB's activities. Are there new forms of work to be developed here?
⇒ HOW do SSI and SKI discuss with one another to be able to cover the whole spectrum of knowledge, fields of competence and areas of responsibility that exist?
⇒ How can different roles and arenas for division of work (too many different kinds of players who are relevant to the issue of final disposal) be better clarified?
⇒ It is the authorities that are to be answer the questions of decision-makers. What resources do they have to do this?
⇒ What importance do municipal finances and SKB's finances respectively, have in this context?
⇒ The pilot study municipalities have received SEK 4 million per year to cover the municipal work. How can this money be used?

Points of view and comments:

⇒ It is a shared risktaking over the country and the municipalities now in question.
⇒ As regards the division of roles: SSI and SKI have become more visible. As regards final disposal, new ideas and questions continually crop up in this area. The size of the repository is a central issue.
⇒ Increase the clarity of the roles between authorities and entrepreneurs.
⇒ It is important to clarify the roles for all authorities etc. involved so that no material falls between "chairs" in the future process.
⇒ This was a good initiative by SSI, which is also seems to try to keep its distance from SKI, although primarily from SKB.
⇒ Collaboration between authorities is important.
⇒ It is important to continue to be involved in this question in the future. However, this is, of course, associated with values and attitudes.
⇒ A review of legal rules is needed, for instance, what SSI's "general guidelines" mean.
⇒ There is a risk that the environmental movement will not continue to take an interest in these questions.
⇒ Knowledge should sufficiently broad to enable people to take a position in any future referendum.
⇒ With regard to stability in society, it is important that the decision to postpone decisions can entail different types of risks. The "toothache example" shows that the risk of visiting the dentist must be weighed against continued toothache and the future condition of teeth.
⇒ The important choice is between waiting or taking a decision to continue with today's advantages and disadvantages.

4.3 Information and transmission of knowledge

The discussion around what is important information, the spread of information, and what are important target groups contained much more advice than concrete questions. This is an area which participants from the municipalities are very familiar with. They often have long experience of getting to grips with material of varying degrees of difficulty in this area. Among the following examples can be noted recurrent questions related to clarity of terminology, the contents and purpose of information. It is suggested that information material or discussions be based on simple or well-explained use of language, good descriptions of the phenomena or conditions that the information applies to, and clarifications of why the information is important and the purpose it has. Concretisation and clarification were keywords in this context. Use relevant comparisons or examples and develop, for instance, a word list for frequently used, difficult words or concepts. Have "ordinary people" read through the material that is to be distributed more widely. As regards the development of information and the flow of information, there was an interest in having access to experts from authorities, and also the members of the local safety council, for seminars or discussions. The transmission of knowledge over time and future generations was also discussed. In what way could, for instance, young people and children be reached in a better way already today? How could important information be filed, or otherwise kept, in a safe and appropriate way for future use?

Some questions and points of view on forms of work and decision-making processes have also been included in the area "information and transmission of knowledge". This includes questions about what are good future strategies in continued work and here the role of careful consideration has been emphasised in decisions that extend over such a long period of time. Collaboration, dialogue and other forms for exchange of knowledge, experience and ideas have already been mentioned, although the participants also thought here about how authorities could be more actively involved in the municipal work of review. There are additional questions about how the work and decision-making processes developed in general, for instance, in the area of

consultation between regions. Participants pointed out the underlying prerequisites for future work, for instance, the issue of the role of nuclear power in Sweden, and that the matter of final disposal is, or should be, a national concern. It was emphasised that the answers to the questions raised, often on the basis of local government work, were actually important for how citizens locally could be inspired to take an informed position in the site investigation phase and on the issue of a possible location of the repository at the location. This review is therefore concluded with the central and crystal-clear question "Can we (politicians) be credible if we say that it is completely safe"?

Examples of questions from the discussions:

⇒ Who is to be informed? How is it intended to spread the information?
⇒ How is information to be passed on? How to reach relevant groups? Important with seminars where knowledge is spread.
⇒ How can it be made easier for people to understand the consequences of different decisions or alternative decisions?
⇒ As regards education for people in general, what plans exist for this?
⇒ How to provide information in schools, and to children, younger children? How is work being carried out to develop internal information (LKO-projects)?
⇒ How can further information be provided in the municipality? Among other things, the conceptual flora must be made concrete.
⇒ As regards language and the preservation of information. How have the authorities conceived the transmission of information (about the repository) over time?
⇒ SKI/SSI have an information project, can this be used in the municipality?
⇒ As regards radiobiology and radioecology, how can the knowledge of these experts be passed on in the discussion on dangerousness?
⇒ What information does the safety committee have? How can SSI take part in the flow of information to, for instance, the work of the safety committee and other political committees?
⇒ Can course activities be developed? Or TV discussions and popular science elements on local radio, for instance?
⇒ Can a study circle be organised for the general public with experts on radiation?
⇒ How is a sufficiently concrete level to be achieved in the discussion with the authorities (as previously with SKB's consultants) so that the discussion really "lifts off" in terms of knowledge?
⇒ What are good strategies for further work?
⇒ How to get the authorities to participate more actively in the official work of review?
⇒ It is important to get the authorities out on the playing field more (as critical inspectors). That the authorities do not answer questions directed at SKB.
⇒ Important to get the environmental impact assessment work going. Also important to clarify the roles of actors in the field – there is more flexibility than in the Radiation Protection Act.
⇒ What is happening in the area of inter-regional co-ordination? As regards environmental impact assessment, how is this to take place? Directed at large or small groups? What relevance does it have in this context?
⇒ Why is this (final disposal issue) not a national issue?
⇒ Can we (politicians) be credible if we say that it is completely safe?

Points of view and comments:

⇒ This area is becoming increasingly complex with time. It is important to find a way to circulate information that is neither banal, incomprehensible or incorrect.

⇒ It is important (in, for instance, the general guidelines) that the problems are highly concretised, etc.
⇒ It is important to limit a question on risk, to make it concrete.
⇒ It is important to clarify the meaning of the terminology used, to know what the central concepts in the area and know what they mean.
⇒ It should be simple and easy to understand. Everyone must be able to understand.
⇒ There must be easily comprehensible material explained in an easily understood language.
⇒ The material has to be comprehensible, although it can perhaps be developed further in different publications.
⇒ It is important to always relate to something so that information can be dealt with by ordinary people.
⇒ More information is needed, one feels that the municipality does not want to have more discussion. People will not find out more information. Information and communication issues are therefore key issues for further thought.
⇒ The "blue brochure" from SSI about radiation provides a good description of what radiation is.
⇒ As regards information, do not write in too academic a way but preferably as if explaining to children or young people. Compare newspaper article where information is built up in stages, and with different types of degree of difficult in the provision of information.
⇒ Important that information reaches everyone in the vicinity. And that safety comes first, not financial aspects.
⇒ Make sure that information is spread, in particular to the safety group.
⇒ An information brochure on radiation and biological risks should be published.
⇒ Explanations should be given in the general guidelines of legal and content terms and specific references.
⇒ As regards the form of information, it is important to have a lot of time to ask and answer questions. Small groups are preferable to large ones.
⇒ The authorities should take pains to express themselves in an easily understandable way. Supervision is very good.
⇒ Clarify how authorities work with the questions.
⇒ It may be beneficial to get "ordinary people" to examine the final draft of a document.
⇒ "Guidelines" should be drawn to the attention of the general public relatively quickly. They should be attractively designed.
⇒ Information should be followed up in other work. The material will be circulated for comment but will be processed to a great extent in collaboration.
⇒ Dialogue with authorities can only be good, it is appreciated. Information passes on to citizens in increasingly broad circles. It is important that SSI is involved in drafting information from different points of view so that it is accessible to all citizens.
⇒ In general, the role of journalists can be described as being ill-prepared and unknowledgable which is why (authorities) should not rely on this type of information.
⇒ It has to be borne in mind that there is a lack of both knowledge and interest on these issues in the community. Journalists also lack knowledge, and LKO (Local Competence Project) cannot cover.
⇒ Important to make clear the issue of maintenance of knowledge over time.
⇒ Knowledge; it is important to create an international archive for waste disposal.
⇒ A proposal was put forward on the desirability of SSI arranging a seminar day to go through how radiation is measured and how to understand the results. This could clarify various aspects of, for instance, radiation related to water, accidents, background radiation, effects on people and the surrounding environment, how to work with increasing knowledge, and how to co-ordinate authorities, for instance, with the county administrative board. It could be of interest to develop some form of exercises. It is possible that SSI's present control programme could be adapted for measurement or documentation in work. It is an open question who may or can participate. These questions can be developed in future work.

⇒ The general guidelines are to be used by the entrepreneur but before this citizens are to have information before a referendum. The content of the guidelines must therefore be easily understandable for them as well. Examples are very important so that people are sufficiently knowledgeable to be able to take a position.
⇒ Important with a good and open spirit. Large expanses of time are involved. Important with careful consideration prior to important decisions.
⇒ One important issues is the whether nuclear power is to continued.
⇒ Requests were made for future "general guidelines" to be circulated for comment.

5 Discussion

The results have been presented in three main sections. The first with a specific focus on radiation and radioactivity since the information in the discussion groups was to attempt to clarify the issues and problems from the municipal site investigation work which could contribute to the authority's work of developing the general guidelines. Participants indicated the importance of explaining in this context the phenomena that the general guidelines concerned, being clear and pedagogic with respect to how the danger arises, what it consists of and its effects. The following main section clarified that the frequently occurring and "simple" knowledge-related questions are only the tip of the iceberg where many of the participants have also thought about the more complex contexts and basic problems of the risk and safety analysis, its validity and use. Questions were raised here about the components included in analyses, what is actually known and what has to be assumed, how different knowledge or systems of information are weighed together to reach a result and how it is possible to test or, acquire knowledge that the results obtained can actually be regarded as correct.

The participants reflected over the contexts in which they have been invited to participate in discussions. They enquired about the social and legal co-ordinates of the radiation protection criteria and the general guidelines. They wanted to know how the drafting of the general guidelines could affect plans for the design of the repository, the use of the repository over time and the risks associated with alternative courses of action. They wanted to understand and to have access to the considerations that could affect development, in that alternative courses of action were excluded or kept open, by the drafting of the general guidelines. Figure 2 illustrates the different sections of the report and how they are intended to contribute to shedding light on questions concerning the work of developing the general guidelines.

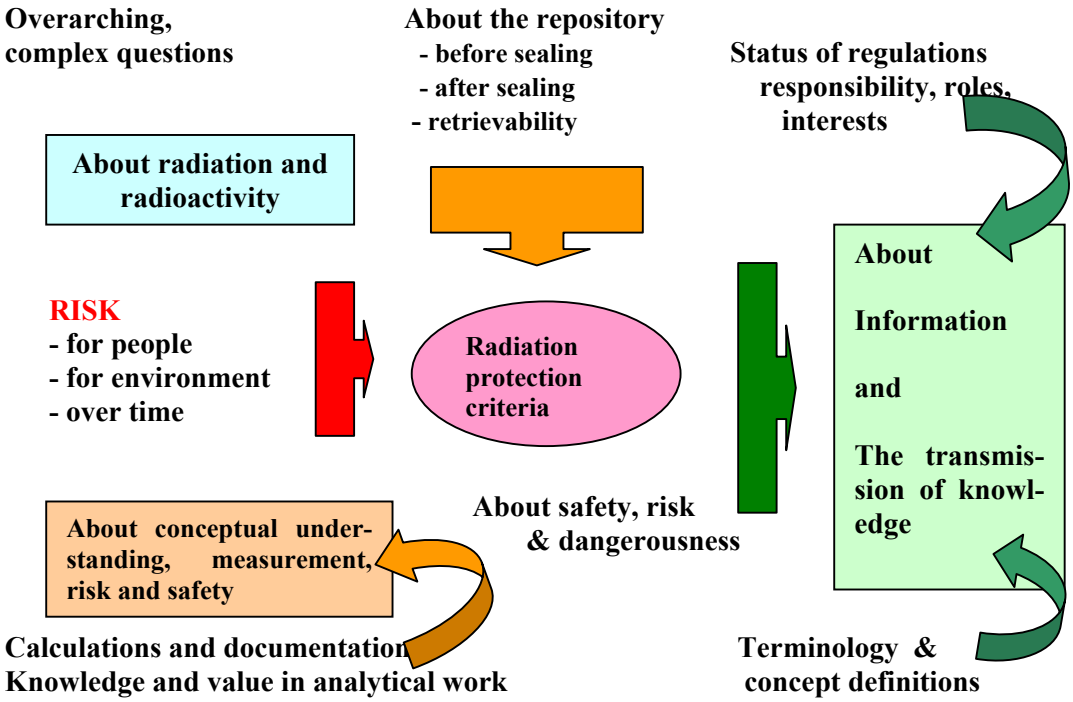


Figure 2. Illustration of how questions concerning radiation and radioactivity, and measurement of risk and security can contribute to the view of risk for people, the environment and over long periods of time, and experiences in the process of establishing a repository and of related radiation protection criteria, can be used design information and information material for further work.

Participants had many reasons for asking questions and displaying interest in this context, although their motivation coincided in a wish to contribute to the development of a safe place of disposal for spent nuclear waste. They expressed commitment and responsibility in relation to their surroundings as representatives of different political groups, organisations and, for instance, as local residents. The third section of the report therefore focuses on the content and information aspects and gathers together a number of ideas as to how information on the relevant problems and important issues can be improved, how knowledge can be deepened in the local areas and how working methods can be developed in the process.

What then are the most important lessons of this work as regards what people in the site selection municipalities will advise SSI to take into consideration and express in connection with the drafting of the general guidelines? *First and foremost,* there is an interest in having certain basic legal prerequisites clarified. This includes the reference to the status of laws and ordinances, regulations and guidelines, and a description of the authority's sphere of responsibility. In addition, there is the specification of and explanation of the task and its intended purpose. It is furthermore of interest to describe the work of monitoring, i.e. how checks of compliance with the general guidelines take place and what happens if this is the case or not the case respectively. *Secondly,* it must be shown that the demands made in the form of radiation protection criteria correspond to a good and acceptable standard of safety for those or that which is to be protected. Requests are made for more knowledge about, and the clarity and transparency of this process. One wanted to know the exact meaning of words, a more exact formulation of vaguely formulated expressions and time specifications. Furthermore, it was desired to know about the aspects taken into account in, for instance, scenarios and the parameters that were included in the "risk equation". Requests were made about what is to be regarded as reliable knowledge in the area, and the assumptions made on which work or conclusions are based. It was wished to have a better understanding of how "optimisation" takes place and the considerations or priorities that may affect this phase of work, and the effects that different considerations can have on future development of work.

Thirdly, it was of interest to try to understand the risks in different time perspectives. It is the long expanses of time, when the spent nuclear fuel must be kept separated from people and the environment, that motivate the unique planning and safety work at present taking place around the process of constructing a repository. These time perspectives are also responsible for the commitment that people feel for this ongoing process. However, it is the time perspective that is difficult to describe and which does not necessarily arouse the same interest or concern for all. A number of participants pointed instead to the importance of clarifying radiation protection work during the period up to the planned sealing of the repository. This applied both to local residents and in connection with the work of constructing and sealing the repository. Besides descriptions of radiation risks over different intervals of time, participants therefore regarded it as important to describe radiation risks in the immediate future. This description was of particular interest since the discussion on the time for sealing is related to the issue of retrievability, or the ability to retrieve deposited material, which is still relevant.

There was interest in learning more about radiation and radioactivity, in particular about measurement of radiation and radiation doses. Among other things, it was proposed that new information material be produced, where "ordinary people" could be more actively involved in its production, and seminars where expertise from, for instance, the authority, could contribute with knowledge.

6 Conclusions

There is still strong commitment in the site investigation municipalities to contribute to and develop work in the process of creating a Swedish repository for spent nuclear fuel. The discussions in the focus groups in Oskarshamn and Östhammar municipalities showed a) that people have substantial points of view on the content and form of the general guidelines that may be of use to SSI in the ongoing work, and b) that the need for knowledge and points of view of committed people extend far beyond the framework that applies to the work on the general guidelines. They include issues relating both to basic concepts and technical calculation details as well as the legal, health-related, organisational and social aspects and consequences, from today until far into the distant future.

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SSI-rapporter 2003

SSI reports 2003

2003:01 Avfall och miljö vid de kärntekniska anläggningarna; tillsynsrapport 2001
Avdelningen för avfall och miljö.
Monica Persson et.al.

2003:02 Stråldoser vid användning av torvbränsle i stora anläggningar
Avdelning för beredskap och miljöövervakning.
Hans Möre och Lynn Marie Hubbard. 80 SEK

2003:03 UV-strålning och underlag för bedömning av befolkningsdos från solarier i en storstadsregion
Avdelning för beredskap och miljöövervakning.
Björn Nilsson, Björn Närlundh och Ulf Wester. 70 SEK

2003:04 Enkätundersökning av entreprenörers inställning till strålning och strålskyddsutbildning vid de svenska kärnkraftverken
Avdelning för personal- och patientstrålskydd
Ingela Thimgren 60 SEK

2003:05 Radiofarmakaterapier i Sverige – kartläggning över metoder
Avdelning för personal- och patientstrålskydd
Helene Jönsson 60 SEK

2003:06 Säkerhets och strålskyddsläget vid de svenska kärnkraftverken 2002

2003:07 Mätning av naturlig radioaktivitet i dricksvatten. Test av mätmetoder och resultat av en pilotundersökning
Avdelning för beredskap och miljöövervakning.
Inger Östergren, Rolf Falk, Lars Mjönes och Britt-Marie Ek 70 SEK

2003:08 Optisk strålning strålskydd
Avdelning för beredskap och miljöövervakning.
Anders Glansholm 70 SEK

2003:09 Årlig kontroll av diagnostisk röntgenutrustning för medicinskt bruk – en utredning av kontrollverksamheten
Avdelning för personal- och patientstrålskydd
Anja Almén och Torsten Cederlund 70 SEK

2003:10 Förändring av stråldoser till patienter vid övergång från konventionell till digital, filmlös teknik vid röntgenundersökning av grovtarm och njurar Slutrapport SSI-projekt P 933
Avdelning för personal- och patientstrålskydd
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SSI Rapport

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SSI är ansvarig myndighet för det av riksdagen beslutade miljömålet *Säker strålmiljö*.

SSI sätter gränser för stråldoser till allmänheten och för dem som arbetar med strålning, utfärdar föreskrifter och kontrollerar att de efterlevs. Myndigheten inspekterar, informerar, utbildar och ger råd för att öka kunskaperna om strålning. SSI bedriver också egen forskning och stöder forskning vid universitet och högskolor.

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Myndigheten har idag ca 110 anställda och är beläget i Stockholm.

THE SWEDISH RADIATION PROTECTION AUTHORITY (SSI) is the government regulatory authority for radiation protection. Its task is to secure good radiation protection for people and the environment both today and in the future.

The Swedish parliament has appointed SSI to be in charge of the implementation of its environmental quality objective *Säker strålmiljö* ("A Safe Radiation Environment").

SSI sets radiation dose limits for the public and for workers exposed to radiation and regulates many other matters dealing with radiation. Compliance with the regulations is ensured through inspections.

SSI also provides information, education, and advice, carries out its own research and administers external research projects.

SSI maintains an around-the-clock preparedness for radiation accidents. Early warning is provided by Swedish and foreign monitoring stations and by international alarm and information systems.

The Authority collaborates with many national and international radiation protection endeavours. It actively supports the on-going improvements of radiation protection in Estonia, Latvia, Lithuania, and Russia.

SSI has about 110 employees and is located in Stockholm.

Statens strålskyddsinstitut
Swedish Radiation Protection Authority

Adress: Statens strålskyddsinstitut; S-17116 Stockholm;
Besöksadress: Karolinska sjukhusets område, Hus Z 5.
Telefon: 08-729 71 00, Fax: 08-729 71 08
Address: Swedish Radiation Protection Authority;
SE-17116 Stockholm; Sweden
Telephone: + 46 8-729 71 00, Fax: + 46 8-729 71 08
www.ssi.se