
Siting of a Geological Repository for Radioactive Waste in Germany

- Latest Results of the AkEnd Regarding a New Site Selection Procedure -

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Abstract: At EUROSAFE 2001 an interim report was presented on the findings of the AkEnd regarding the development of a new approach in siting a geological repository for radioactive waste in Germany. Due to the fact that there is a high interest in this work and that the work is to be finished by end of 2002 further information will be given on the latest findings and the drafting of the recommendation to BMU. The information is based on the results of the 2nd interim report, which was published in February 2002 in English, and the draft recommendation, which was published recently and which was presented to the public in a open workshop held in Berlin on 18th and 19th of October, 2002. For this year's EUROSAFE it was decided to give more information on the geologic and socioeconomic criteria and on the role both play in a stepwise siting process. Finally the subject of public participation will be addressed showing in what way and at what stage it becomes an essential part not only in site selection but also in confidence building. Since the draft recommendation is not available in English yet the written text will be restricted to some introductory remarks only.

1. Introduction

The AkEnd has been commissioned to develop a structured site selection procedure for the final disposal of all types of radioactive waste in Germany in one repository. The procedure shall be based on geologic and socioeconomic criteria and shall make provisions for public participation in an appropriate way. The work of AkEnd is scientifically based and shall take place in an objective and unprejudiced manner without exclusion of relevant aspects. Further, the developments and experiences in other countries shall be taken into account. The AkEnd shall discuss its findings with corresponding national and international experts as well as with the general public in the developing stage already. The overall objective is to find potential repository sites in a scientifically traceable manner and with the participation of the general public. By means of criteria, which are to be specified prior to the siting procedure, regions, sub-regions and sites shall be identified step by step, which offer particularly favourable conditions for the long term isolation of radioactive waste.

2. Stepwise Selection Procedure

The selection procedure is subdivided into five **procedure steps**, which follow a logical order. This fulfils the requirement regarding traceability and transparency. Each step comprises specified **criteria** according to which it is decided which areas remain for further consideration, which will not be considered for the time being, and which will be excluded.

In the procedure, both exclusion and weighing criteria are provided. The **exclusion criteria** are used to exclude less favourable areas. They still have to be kept in mind during the entire procedure. This is necessary in order to prove that the areas remaining in the selection procedure were identified by meeting certain minimum requirements.

The **weighing criteria** are applied for making a comparative assessment of areas. They are needed for the identification of areas with favourable conditions. The areas which seem to be favourable continue to be considered, the others not for the time being. The procedure provides a **return option**, in which areas worth of further investigation have been selected. This means that it is possible to return to a previous step, if required. This would be the case if a procedure step has come to a dead end. In such a case, deferred areas could be considered again. This is justified, since these areas fulfil the minimum criteria and do not have to be less suitable than those which first seemed to be more suitable, which, however, has not been confirmed after more detailed investigation.

For the site-identification procedure, there is **no preselection** of a certain **host rock**, since a suitable repository site is not only made up by the host rock itself, but also by a favourable geological overall situation. Starting point of the search is the whole Germany territory, i.e. there is **no regional pre-selection** or **pre-exclusion** either.

3. Selection Criteria

The criteria serve to assess findings and therefore to establish the basics for decisions within the individual steps of the procedure. With increasing progress of the procedure, further requirements may become necessary. On the one hand, the criteria have to be specified sufficiently to enable the justification of plausible selection decisions. On the other hand, however, the criteria also have to provide a scope of discretion so that a site, found to be suitable after further examination, does not have to be abandoned too early due to non-compliance with an individual criterion.

The AkEnd is of the opinion that not only the host rock is decisive for the suitability of a site, but also a favourable geological overall situation, which ensures a longest possible isolation of the waste and also gives reason to assume that there will be no inadmissible releases thereafter. It was agreed that before selection of sites with particularly favourable conditions, those areas shall be identified which clearly show the following particularly unfavourable conditions:

- ? bedrock uplift of some mm/year
- ? active fracturing due to neotectonic events
- ? seismic activity large than zone 1 (DIN 4149)
- ? quaternary and/or recent volcanism

Accordingly any site qualified for detailed site investigation has to meet some basic requirements which in total are making up a **favourable geological setting**. Very low groundwater movement in low permeable rock formations is of utmost importance. For this reason the rock mass permeability should not exceed 10^{-10} m/s. Furthermore the site should have a fairly simple geological configuration with a minimum lateral extension of about 3 km² in rock salt and about 10 km² in granite or argillaceous rocks for the development of sufficient disposal rooms. A minimum thickness of 100 m is required for the actual isolating rock formations.

In order to provide adequate protection against external events the minimum depth should be at least 300 m below surface. Due to mining experiences and the acting rock stresses in greater depth should be constructed not deeper than 1500 m. The rock mechanical stability of the repository as well as the entire favourable situation of the site must be maintained in such a way that the required isolation time of about one million years is met. Additional site specific geological features may contribute to the long term safety.

Despite the geological criteria there is a number of socioecological criteria which have to be applied at the various stages of the selection procedure. They refer to sociological development of the regions concerned as well as to regional planning and nature conservation. For the AkEnd the issue of public participation is a corner stone in the new approach for disposal site selection in Germany.