Internationale Expertengruppe

International Expert Group Gorleben:
"Repository Project Gorleben: Evaluation of the Present Situation"

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Table of Contents

Executive Summary

Background to the study

In late 1998, when the newly elected Federal Government of Germany resolved to phase out the use of nuclear power and to restructure the national waste management programme, a key question was whether the quality of the scientific work done at the Gorleben salt dome and the results of the characterisation to date justified proceeding with the project. The International Expert Group on Gorleben (IEG) was established in order to provide the German electricity utilities with an objective scientific judgement on the site investigations of the Gorleben salt dome as a potential waste repository location.

During the course of the year of the IEG's main activities, the Government published claims that there exist substantial problematic scientific issues (referred to as "Zweifel" or "doubts") about the potential suitability of the Gorleben salt dome and concluded that one should stop the underground exploration. The scope of work of the IEG was then extended to include commenting on these doubts. The final conclusions of the IEG on the Gorleben programme and on the issues raised are documented in the present report.

In Germany, as in most other countries today, all issues associated with the use of nuclear power not only have scientific and technical aspects but also raise societal and political questions. In particular, the IEG notes that during the course of the work descirbed in this report, the German Government and the electrical utilities agreed that work should be stopped at Gorleben for three to ten years. The IEG, however, has not taken a position on this wider strategic agreement, but has, in accordance with its mandate, restricted itself to matters directly related to science and technology.

The Origins of the Salt Repository Concept

The concept of utilising deep geologic rock formations to provide permanent isolation of radioactive wastes from the environment arose when in 1957, the National Academy of Science (NAS) of the USA recommended deep geologic disposal and, in particular, cited salt as a preferred medium because of its several perceived advantages. Scientists from Germany participated in the USA experiments and the favourable results provided support for the German decisions to initiate work in the Asse salt mine, at Morsleben and at Gorleben. Other European countries have also studied disposal in salt. All the various studies by countries interested in a salt repository led to the conclusion that salt is an advantageous host rock capable of safely providing long term isolation of the radio-nuclides.

The Gorleben programme

In the early 70's the Federal Government and the Nuclear Industry decided to construct in Germany a "Nuclear Fuel Cycle Centre", including a deep geological waste repository. After an internal selection process, the Federal Government announced in July 1975 the selection of three possible locations in the state of Lower Saxony. The Government of this State, however, did not agree with the specific choices and itself proposed - based on scientific, technical and infra-structural grounds - the site of Gorleben. The Federal Government accepted this proposal in July 1977.

The main results from the Gorleben site exploration have been documented by BGR. The scientists there concluded that the prognosis for the geological model had been confirmed to a large extent, although the structures were partly more complicated than originally expected. They found that the permeability measurements performed confirm the tightness of the salt and that the high convergence rates within the salt give reason to expect a good isolation capability. As predicted no significant inclusions of brine, gas, or condensate were identified in the Staßfurt halite. Large safety distances to the border of the salt dome were found so far to locate a reposiory.

* The in 1998 newly elected The feasibility of using the assembled data in a technical judgement on the potential suitability of the Gorleben site became an important question in 1998, when the newly elected Federal Government decided that:

* A moratorium on the underground exploration of the Gorleben salt dome shall be established for a time span between three and ten years.

* Based on the results of a new established Government advisory group, AkEnd, further possible sites in Germany shall be found and nvestigated.

* The results of investigations at the different sites shall then be compared with one another, and also with those achieved for the Gorleben salt dome. Based upon this comparison, the most suitable site shall be selected.

* Operation of the repository shall start around the year 2030.

In a statement of BMU of May 2000 the Federal Government gave more details of its reasoning for interrupting the exploration at the Gorleben site. The list of issues raised is reproduced in this report. Some are of a very generic nature, some concern the suitability of salt as a host rock, and a few are Gorleben specific.

IEG observations on the problematic issues

The IEG members addressed each issue in turn, weighing it against the current body of evidence or the consensus judgements of the international scientific community and then commenting upon the relevance to the Gorleben programme. General observations which can be made on the problematic issues are that:
* They mostly represent topics which are being actively discussed in the international community

* None of them, however, are new issues; all have been studied, debated and reported upon in the open literature for many years. In fact, German scientists also have been directly involved in these discussions and some of the issues have even been addressed directly in the Gorleben programme

* No issue in the list gives compelling technical grounds for breaking off field investigations aimed at improving the scientific decision basis concerning disposal in salt in general, or at Gorleben in specific.

* None of the issues preclude a safe, deep geologic repository in salt in general, or at Gorleben in particular. For those issues that require further clarification, programmes can, as the IEG has indicated, be developed and carried out.

* The IEG could not identify any obvious scientific arguments for the three tro ten year time frame chosen for the break in the field work and there are no defined conditions for resuming work or abandoning the site.

A sound scientific judgement on the safety of a potential repository at Gorleben could be achieved much more transparently if the current phase of exploration were completed and all the site-specific results were to be used in a complete "Total System Performance Assessment (TSPA)".

Observations of the IEG on Gorleben site selection and characterisation

The structure and the performance of the Gorleben selection process was not transparent in the way which is recommended for siting in most countries today. The events took place, however, 23 years ago, at which time the presently recommended approaches had not been applied or even developed in any country. Furthermore, current assessment methodologies allow a scientific/technical judgement on site suitability independently of how the site in question was originally selected and, in practice, the rigorous procedures developed in the 80's for narrowing in from a range of potential sites to a single candidate have not been an unqualified success internationally. The question of how many sites to consider at each step has no single answer. The differing decisions made in national programmes are based on considerations of geologic diversity, economic constraints and social justice. These issues will all have to be addressed when the AkEnd has produced its siting criteria. From a scientific and technical angle, the IEG has concluded that the Gorleben site should be considered along with any further proposals based on the work of AkEnd.

The investigation programme that has been carried out at Gorleben is more extensive than at any geological repository site world-wide, with the exception only of the US projects at WIPP and Yucca Mountain. An extensive database has been assembled. In its overall assessment, the IEG has not found any scientific or technical arguments which would disqualify the Gorleben salt dome as a candidate site for a repository. This does not imply that all data needed for a license application have been gathered. More investigations are needed, as defined in the site characterisation programme that was broken off by imposing a moratorium. The IEG considers that completing the planned activities would provide a more complete database for judging the suitability of Gorleben as a HLW repository site. This improved database would be valuable also when the time comes to prepare a comparison of Gorleben with additional sites chosen using criteria derived by the AkEnd.

Specific IEG recommendations for the German programme

There is a need to develop a clearer institutional and decision framework. This means defining organisational structures and responsibilities, programme strategies and milestones in a transparent manner not previously obvious in Germany. All relevant stakeholders must be encouraged to participate interactively in the process. A serious omission in the German network of stakeholder connections appears to the IEG to be the lack of direct interactions between waste producers and the implementers at the BfS. Currently, the utilities are responsible only for financing the disposal programme. However, valuable technical input could be provided from the utility side to BfS and, conversely, closer communication could improve understanding in the utilities of the policies and strategies chosen by government authorities. The IEG also believes that the allocation of BMU-responsibilities between implementers (BfS) and regulator (Lower Saxony authorities) could be more clearly defined and made more publicly transparent. Furthermore, the IEG notes that several nations have found that establishment of an independent technical review body to assess and evaluate the activities of the implementing group and the regulatory bodies provides the public with an added measure of assurance that decisions are being based upon the best-available scientific knowledge. The IEG notes that TSPA has not been applied for the planned Gorleben repository in a systematic state-of-the-art manner. The IEG therefore considers it to be important that this type of formal analysis for Gorleben is initiated and that, on its completion, an independent peer review be performed.

A phased or stepwise procedure towards repository implementation should be mapped out. In principle all the steps should be as reversible as is feasible without compromising the long-term safety. Further, some kind of approval to proceed from one step to the next is generally delegated to some authority external to the implementing organisation. Safety reports including TSPAs would provide a basis for the formal reviews by the safety authorities of the successive steps.

IEG conclusions on current German waste management strategy

The new key decisions of the Government are not based purely on scientific and technical arguments. As in all countries, societal and political aspects must also be considered. However, it is important to distinguish as clearly as possible the grounds on which decisions can be legitimately taken. Scientists involved in waste disposal, as in other areas with large impacts on society, have a responsibility to resist objective arguments being mixed too early in the decision process with political viewpoints.
It would be irresponsible for a country like Germany, which will continue to rely on nuclear energy for many years, to unnecessarily slow down the progress towards safe deep geologic disposal. Even with the extended time-scales (2030) now considered by the Government, there is a need to move ahead if one hopes to implement by then a deep repository which will be demonstrably safe and societally acceptable.

A structured and appropriately phased strategy is necessary. The IEG believes, however, that a stepped procedure towards repository implementation can be seriously pursued only if one important initiating step is taken. This key step is a full commitment - also at the political level - to the concept of deep geological disposal. It involves an acknowledgement that a deep repository which is properly sited, designed and operated can provide a safe solution to the nuclear waste problem. Reservations have been expressed at the level of those politically responsible about the feasibility of implementing a safe repository; indications have been made that geologic disposal may be a second-best solution which could perhaps be replaced by some yet-to-be invented technology. This is no basis for initiating a credible programme to be run by motivated scientists and engineers. Public and political support for geological disposal must be won in sufficient measure to allow progress.

Progress is important. The IEG believes firmly that current developments in German nuclear policy must not result in unnecessary delays in technical efforts to move ahead towards an accepted societal solution to waste disposal. We have a responsibility to protect the environment for current and future generations. This should not be pushed aside by political problems of the day.