

**PRESENT STATUS OF THE NATIONAL GERMAN
WASTE MANAGEMENT CONCEPT**

Dr. B. R. Thomauske
Managing Director
Vattenfall Europe Nuclear Energy GmbH
Überseering 12
D – 22297 Hamburg
Germany

Phone: +49 / 40 – 6396 2420
Fax: +49 / 40 – 6396 3760
E-mail: BThomauske@hew.de

ABSTRACT

In 1998, the newly elected German government has determined a phase out of nuclear power. With respect to the management of spent fuel it decided to terminate transports to the reprocessing plants in France and Great Britain as from July 1, 2005 and to set up interim storage facilities on power plant sites. In addition, the concept for radioactive waste disposal was changed.

The main elements of the disposal concept until 1998 have been to dispose of spent fuel and high active waste in the Gorleben salt dome —if suitable— with an operational start in 2020 and to use the former iron ore mine Konrad as a repository for low and intermediate level waste as soon as possible. In Germany, the Gorleben salt dome had been explored since 1979 with regard to its suitability as a repository for all kinds of radioactive waste, especially for spent fuel and high active waste. The results from the Gorleben above surface investigation and the underground exploration substantiate the potential suitability as a repository. However, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) doubts the suitability of Gorleben. These doubts are not related to the suitability of the Gorleben salt dome itself but to the suitability of salt as a host rock. Its exploration, however, was interrupted in October 2000 for at least 3 years and 10 years at most.

In 2002, twenty years after application, the former iron ore mine Konrad got its license as a repository for low and intermediate level wastes. After an expected duration of four years for the lawsuits and another four years for the conversion to a repository the Konrad facility could start operation in 2010. However, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has the aim to dispose of all types of radioactive wastes in one single repository. The geological repository should start operation by 2030.

Further fundamental points of the new waste management concept are the restriction of the disposal of radioactive waste to direct final disposal and to restart the search for a final disposal site from the very beginning. In order to do this on a scientific basis as well as in a transparent way the Federal Minister for the Environment, Nature Conservation and Reactor Safety (BMU) has installed an independent group of experts (AkEnd). Its main tasks have been the definition of site selection criteria and the development of a decision-making procedure including broad public participation. The AkEnd-group made its final recommendations to BMU by end of 2002. Thereafter no further progresses or decisions took place.

Despite phasing out nuclear power the German government is responsible to solve the problem of final disposal. The government has the aim, to have a final repository in operation by 2030. However it can be shown, that the new site selection procedure would take about 50 years from now.

A critical overview on the new radioactive waste management concept will be given focused on the approach of the German government to restart the search for a disposal site from the very beginning.

INTRODUCTION

With respect to the final disposal of high-level radioactive waste, it seems to be agreed that

- the radioactive waste should be disposed of in Germany
- the repository should be ready for operation in 2030 and
- the radioactive waste should be disposed of in deep geological formations.

Different opinions exist, if

- all types of radioactive waste should be disposed of in one single repository or if it would be more appropriate to dispose of high level waste and low/intermediate level waste in different repositories,
- a new site selection procedure is suitable to come to a repository with public acceptance,
- such a procedure would meet the objective to be ready for operation in 2030,
- the former iron ore mine Konrad should be converted to a repository after the court decision, which is expected in 2005/2006.

PRESENT SITUATION

The German radioactive waste management and disposal concept of 1979 has originally been agreed upon by the heads of the federal government and the governments of the federal states. It was updated with the 1994 amendment of the Atomic Energy Act providing the legal basis for direct disposal of spent nuclear fuel. At that time, two options of spent fuel management have been offered to the waste generators: Reprocessing of spent fuel elements and their direct disposal.

In 1998 the new German government has decided to phase out the commercial use of nuclear power. After difficult negotiations an "Agreement between the Federal Government and the Utilities" was initialled on June 14, 2000, and finally signed on June 11, 2001.

The fundamental points of the agreement are:

- the electricity volume for each nuclear power plant will be restricted to an operating lifetime of 32 calendar years,
- the disposal of radioactive waste shall be restricted to direct final disposal,
- the transports to the reprocessing plants will be prohibited as from July 1, 2005,
- the aim is to establish a geological repository for radioactive waste starting operation by 2030,
- up to this interim storage of spent fuel shall be performed on the site or in the vicinity of nuclear power plants,
- interim storage facilities shall be ready for operation until July 1, 2005,
- to bridge this period of about five years interim storage areas should be installed if necessary.

INTERIM STORAGE OF SPENT FUEL

One of the objectives for the installation of decentralised interim storage facilities was a minimisation of transports. Transports especially to the central interim storage facility at Gorleben give rise to local revolts.

On the other hand the existence of decentralised interim storage facilities reduces the risk to come to a stop of nuclear power plant operation because it might be sometimes difficult to get a transport license or - having a transport license - getting a transport running.

The spent fuel elements are to be stored until they will be disposed of in a repository. On-site interim storage facilities are limited to the storage of spent fuel elements from the neighbouring nuclear power plant. It is not planned to store spent fuel elements from other nuclear power plants or high level radioactive waste from reprocessing.

The storage buildings exist in two technical variants with different wall thickness of 1.2 m or 0.7 m and roof thickness of 1.3 m or 0.55 m.

Since the end of the year 1998, the utilities have applied for permission of on-site interim storage facilities. Until the end of 2003 the 12 applied on-site storage facilities were licensed.

After September 11, 2001, the German licensing authority has decided to include the analysis of a terrorist attack with an aircraft in the examination. Before September 11, 2001, only accidental crashes of military jets with much less amount of jet fuel had been taken into consideration.

To fulfil the protection goals regarding impacts of a forced aircraft crash, the licensing authority has proofed, that this event does not lead to a considerable release of radioactive substances into the environment. This means, that the radiological effects remain under 100 mSv per person.

In the meantime, the erection of several of the interim storage facilities has started. After a time of construction of approximately 1.5 years, the on-site interim storage facilities can start operation in 2005. The licenses for the on-site interim storage facilities are valid for 40 years, starting from emplacement of the first cask.

FINAL DISPOSAL CONCEPT UNTIL 1998

The main elements of the final disposal concept until 1998 have been:

- to dispose of spent fuel and high active waste in the Gorleben salt dome – if suitable – starting operation about 2020,
- to use the former iron ore mine Konrad as a repository for low and intermediate level waste as soon as possible.

Gorleben

In Germany, the Gorleben salt dome had been explored since 1979 with regard to its suitability as a repository for all kinds of radioactive waste, especially for spent fuel and high active waste. However, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has expressed doubts with regard to the suitability of Gorleben. These doubts are not related to the suitability of the Gorleben salt dome itself but to the suitability of salt as a host rock.

The exploration of the Gorleben salt dome was interrupted in October 2000 for at least 3 years and 10 years at most.

The findings of the exploration of the Gorleben salt dome can be summarised as follows:

- the first exploration area is of simple stratigraphic and suitable for final disposal,
- main anhydrite as well as small brine pockets and gas-bearing salt bodies have been determined exactly for proper risk assessment. It has been proved that there is no connection to the geological formations surrounding and overlying the salt dome.

As long as a site is being investigated and there is no final safety assessment checked by the licensing authority within of a plan approval procedure according to Atomic Energy Act, a site can only be considered potentially suitable.

The results from the Gorleben above surface investigation, shaft sinking and the underground exploration in a depth of 840 m substantiate the potential suitability as a repository. In particular, it seems that there are sufficient volumes of homogeneous rock salt which is suitable for the disposal of heat-generating wastes. The German government stated in Appendix 4 to its June-2000-Agreement with the utilities, that the geological results achieved up to now did not contradict the potential suitability of Gorleben.

The questions with regard to doubts at the suitability of Gorleben are still open. The time schedule for their clarification until end of 2004 could not be met and the exploration is still interrupted.

Konrad

In 2002, twenty years after application, the former iron ore mine Konrad got its license as a repository for low and intermediate level wastes. It is allowed to dispose of about 300.000 m³ of radioactive waste. This would meet the demand until 2080.

The iron ore layer is situated in a depth of 800 m to 1300 m below ground. It is well suited as a repository since the iron ore layer is covered by a barrier of limestone with a thickness of up to 400 m.

After an expected duration of four years for the lawsuits and another four years for the conversion to a repository the Konrad facility could start operation about 2010.

NEW DEVELOPMENTS SINCE 1998

The new policy is characterised by the phasing out of nuclear power. This key goal of the German government has been defined in the coalition agreement signed by the social democrats and the greens in October 1998. After negotiations an "Agreement between the German government and the utilities" was initialled in June 2000, and finally signed in June 2001. Based on this a new Atomic Energy Act came into force on April 27, 2002. A key point of the amendment is the restriction of the operational lifetime of the nuclear power plants to 32 years. The 19 nuclear power plants are allowed to generate another 2,600 TWh starting from January 1, 2000.

The waste management objectives of the **Coalition Agreement of October 20, 1998** were:

- A single repository in deep geological formations is sufficient for the final storage of all types of radioactive waste.
- Availability of a repository for high-level waste by around 2030.
- Doubts exist regarding the suitability of the Gorleben salt dome. Therefore its exploration is to be interrupted and the suitability of other sites in different host rocks assessed.

In February 1999 the Federal Minister for the Environment, Nature Conservation and Reactor Safety (BMU) has installed an **expert group "Site Selection Procedure for Repository Sites"** (AkEnd). It completed its work with the submission of its recommendations in December 2002. But up to now, no site selection procedure is carried out and no exploration for alternative repository sites takes place.

The key points of the **Agreement between Federal Government and utilities of June 14, 2000**, ratified on June 11, 2001, with regard to final disposal are:

- The exploration of the Gorleben salt dome is to be interrupted for a minimum of three years to a maximum of 10 years to allow conceptual and safety-related questions to be clarified. The Federal Government has issued a statement on the exploration of the Gorleben salt dome which declares: "... The geological findings made to date do not contradict the potential suitability of the Gorleben salt dome".
- The competent authorities complete the licensing procedure for the Konrad mine. The applicant has to withdraw his application for immediate enforcement in order to enable judicial review of the case.

As a consequence of this agreement, the Gorleben moratorium started on October 1, 2000. The license for the Konrad repository was granted on June 5, 2002.

The goal of the government is to have a final repository for all types of radioactive wastes in operation by 2030. However the foreseen new site selection procedure and the subsequent establishment of a final repository would take about 50 years from now before a repository would be available in the Federal Republic of Germany.

The site selection procedure starting from a "white map" of Germany would take 23 years until the decision about the site could take place. It consists of the following steps:

- Identification of potentially suitable regions 2 years
- Participation of the regions, restriction to 5 areas: 2 years
- Above ground exploration 5 years
- Decision on sites for underground exploration 2 years
- Underground exploration 10 years
- Decision on repository site 2 years

Following this, another 25 years would be required for a profound subsurface exploration in order to collect the data required for the licensing procedure, for the licensing procedure itself and for the construction of the repository.

With this procedure, a repository could not be available by 2030. It would start operation after 2050.

In comparison to this, there are only 5 more years required to complete the underground exploration of the Gorleben salt dome. After another 10 years for licensing and construction of the final repository, Gorleben could start operation by around 2020.

SUMMARY

Despite phasing out nuclear power the German government is responsible to solve the problem of final disposal as soon as possible.

There is an actual need for a repository for low and intermediate level wastes. The former iron ore mine Konrad, licensed in 2002, could solve this problem and start operation about 2010. A repository for spent fuel and high active waste is needed by 2030. Concerning the final disposal site Gorleben, the German government stated in June 2000, that the geological results achieved up to now did contradict the potential suitability of the Gorleben site. On the other hand the German government expressed doubts regarding the suitability of the Gorleben salt dome. The time schedule for answering these questions until end of 2004 could not be met by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. The exploration is still interrupted.

In order to solve the question of final disposal in Germany by 2030, it is necessary to continue the site investigations at Gorleben. After having finished the underground exploration, the licensing procedure and the construction of the repository, the final disposal site Gorleben could start operation about 2020.

However the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety has decided to start the site selection procedure from the very beginning. He has the aim to dispose off of all types of radioactive wastes in just one repository.

Following this procedure, it will not be possible to have a repository in operation before 2050.