

Perspectives of Radioactive Waste Disposal in Germany – 10448 rev.

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ABSTRACT

In the Federal Republic of Germany the disposal of all types of solid and solidified radioactive waste in deep geological formations is still the preferred option. Within the last decade the principal issues in radioactive waste disposal may be subdivided into activities further developing and detailing the revised German radioactive waste disposal concept as well as activities concerning the operation of the Konrad, Gorleben, Morsleben and Asse II sites. Of this, the Safety Requirements on the Disposal of Heat-Generating Radioactive Waste presented by the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU - Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) in July 2009, the licensing of the Konrad repository in May 2002 and, subsequent to the rejection of all lawsuits, the start of its construction in May 2007, as well as taking over of the responsibility for the Asse II mine by the Federal Office for Radiation Protection (BfS - Bundesamt für Strahlenschutz) in January 2009 are the most important topics. Future developments in the German radioactive waste disposal policy are indicated in the October 2009 coalition agreement of the new Federal Government.

INTRODUCTION

In the Federal Republic of Germany, the agreement between the Federal Government and the nuclear utilities which was initialled on June 14, 2000, and signed on June 14, 2001, served as basis for nuclear energy use and radioactive waste management issues during the last decade. According to this document, the former Government and the utilities agreed to limit the future utilization of the existing nuclear power plants. The most important regulations refer to operational restrictions. In addition, the management of spent nuclear fuel was restricted to direct disposal and no further to reprocessing. The agreement was enforced by the latest amendment of the Atomic Energy Act (AtG - Atomgesetz) which became effective on April 27, 2002.

With respect to radioactive waste disposal the agreement states that the licensing procedure for the Konrad repository has to be completed. Furthermore, BfS has to withdraw the application for immediate enforcement of the license. This withdrawal means that the construction of the Konrad repository will only be possible after final court decision.

Though the former Federal Government expressed doubts regarding the suitability of the Gorleben site to host a repository, in particular for heat-generating radioactive waste, this site is not considered to be unsuitable by the Government. According to the agreement with the nuclear utilities, further exploration of the Gorleben salt dome would contribute nothing to clarify the doubts of the Federal Government. For this reason the underground exploration would remain suspended for at least 3 years and at maximum 10 years (Gorleben Moratorium). The moratorium became effective on October 01, 2000.

THE GERMAN RADIOACTIVE WASTE DISPOSAL CONCEPT

Radioactive waste disposal policy in Germany is based on the Government decision that all types of radioactive waste with short-lived and long-lived radionuclides are to be disposed of in deep geological formations within the country. This decision entails the necessity to condition (i.e., to process and to package) the waste. Only solid and solidified radioactive waste is accepted for disposal;

liquid and gaseous radioactive waste is excluded from disposal except when appropriately be conditioned. The Atomic Energy Act gives the responsibility for disposal of radioactive waste to the Federal Government with BfS as the legally responsible authority.

According to the German approach to disposal, radioactive waste is basically subdivided into waste with negligible heat generation (i.e., low level waste (LLW) and intermediate-level waste (ILW)) and heat-generating waste (i.e., high-level waste (HLW) and spent nuclear fuel (SNF)). Radioactive waste with negligible heat generation comprises all types of radioactive waste originating from the operation, decommissioning and/or dismantling of nuclear facilities, e.g., nuclear power plants, reprocessing facilities, nuclear industry, research and development establishments, as well as smaller waste generators such as hospitals, industry and universities. Heat-generating radioactive waste comprises in particular waste originating from reprocessing such as vitrified fission product solution and high-pressure compacted hulls and ends, as well as spent nuclear fuel when declared to be waste. As to radioactive waste arisings, BfS carries out on annual inquiry into the amounts of radioactive waste in Germany. According to the latest inquiry, about 20,100 m³ of radioactive residues, about 7,400 m³ of preconditioned waste and about 94,000 m³ of conditioned waste with negligible heat generation (i.e., LLW and ILW) had been accumulated by the end of December 2008. The amount of unconditioned/preconditioned and conditioned heat-generating waste (i.e., HLW and SNF) by the end of December 2008 was about 1,300 m³ and about 600 m³, respectively (without spent nuclear fuel). The amount of conditioned heat-generating waste comprises vitrified waste already repatriated from reprocessing German spent fuel in France.

Forecast waste amounts for the future are for approximately 280,000 m³ of conditioned waste with negligible heat generation and for approximately 28,000 m³ of conditioned heat-generating waste accumulated up to 2080.

Within the last decade the principal issues in radioactive waste disposal may be subdivided into activities further developing and detailing the German disposal concept being revised due to political decisions and findings as well as activities concerning the operation of the Konrad, Gorleben, Morsleben and Asse II sites.

DEVELOPMENTS OF THE GERMAN DISPOSAL CONCEPT

Site Selection Procedure for Repository Sites

With the establishment of the Committee on a Site Selection Procedure for Repository Sites (AkEnd - Arbeitskreis Auswahlverfahren Endlagerstandorte) in February 1999, the BMU set up a discussion forum on radioactive waste disposal. Experts of different fields of specialization, in particular scientists and engineers, were nominated. The Committee discussed the topic of radioactive waste disposal, irrespective of the different positions of the individual members concerning nuclear energy, in a constructive atmosphere contributing to find new scientific and societal approaches to solve the waste disposal problem.

A central intention of the Committee was to transfer its open attitude and the awareness to assume responsibility for the safe disposal of radioactive waste to the broad public. To this end, the Committee recommends to conduct a societal discourse, before searching a repository site, in which the relevant stakeholders and the general public develop a consensus on the procedure for selecting a repository site. The Committee expects that the result of this discussion will be validated politically and statutorily in order to achieve maximum possible legitimacy for the siting procedure.

The fears and concerns of the public have to be taken seriously. Giving priority to safety, the participation of the public in all steps of the siting process, the integration of the repository in a regional development concept and the transparency of the selection procedure as such have therefore been guiding principles in the development of both the siting criteria and the siting procedure. In accordance with the strategy of BMU at that time, to identify a site for the disposal of all types of radioactive waste in Germany, the Committee formulated the following basic requirements [1]:

- The repository shall be constructed and operated at a site which provides long-term safety and which is to be identified in a criteria-based selection procedure as the relatively best site resulting from a comparison of several potential sites.
- The repository shall meet the highest safety requirements, i.e., it will be designed as not to impose undue burdens on future generations. A waste retrieval concept will not be considered in site selection, since technical provisions on this line could degrade the favourable characteristics of rocks and geotechnical barriers aiming at the long-term safety.
- A maximum possible willingness of the regional population to participate in the process is striven for from the outset. The investigation of a site depends on public assent. If the population does not declare its willingness at least at two sites, the Federal Government and the German Federal Parliament (Deutscher Bundestag) have to take a decision on a subsequent procedure.
- From the outset, the site selection procedure shall be closely related to the perspectives of regional development. The analysis of the given possibilities of regional development and the envisaged concepts for a future "repository region", to be established with the participation of the public, are essential elements in the identification and selection of a repository site.

Highest priority is given to the aspect of long-term safety of the repository, since the population of today as well as future generations must be protected sustainably against hazards from radioactive material. Safety cases shall be prepared for potential sites. These safety cases are to show the isolating capacity of the isolating rock zone in interaction with the technical and geotechnical barriers. Thus, the interaction between waste packages, backfill, shaft seals, and geological barriers can be assessed.

The recommendations of the Committee were presented to BMU and published in December 2002 [1]. Phase II of the proposed site selection procedure envisaged a national debate to agree on the Committee's recommendations. However, several stakeholders refused to participate in this debate; in particular the nuclear utilities actually rejected the procedure. Therefore, the proposed national debate never took place.

Conceptual and Safety-Related Issues

As already mentioned, a clarification of the Federal Government doubts with regard to the suitability of the Gorleben site was initiated. The respective investigations aim to clarify conceptual and safety related issues. Twelve crucial topics have been identified:

- Nature Observations
- Model Calculations
- Isolation Potential and Period of Proof
- Safety Indicators
- Geochemical Processes
- Chemotoxic Substances
- Gas Production
- Criticality
- Human Impacts
- Multi-Barrier Concept
- Retrievability
- Safeguarding of Fissile Material

Work was finished in the autumn of 2005 and documented in twelve reports that are available at http://www.bfs.de/Endlager/publikationen/Einzelfragen_Endlagerung.html. These reports were peer reviewed by independent experts and the results discussed by approximately 80 experts from various countries during a workshop organised by BfS in September 2005. Based on the reports, the peer reviews, and the results of the workshop BfS summarised the work in a synthesis report [2].

The state-of-the-art of science and technology for repository development has comprehensively been documented by the overall project. The results are of generic nature and are not aimed at a specific

repository site (host rock) but do apply to all potential repository formations being available in Germany. The limits and possibilities of generic comparisons of host rocks are highlighted. No essential gaps in knowledge on the generic level could be identified. It became apparent that in the initial no particular host rock in Germany can be preferred to another, i.e., no type of host rock provides a priori the highest level of repository safety. Numerous safety questions can only be answered site-specifically and thus require a comparison of sites. While with regard to some questions a need for regulation has been recognized, the need for basic research is limited. The studies have clarified the scientific limits and possibilities of answering the conceptual and safety-related questions, identified the need for further research, as well as the regulatory decisions that must be made.

To sum up, four key statements can be made:

- There are no clear benefits of a particular host rock in Germany (salt, clay, granite).
- Benefits of host rocks can only be determined in a comparison of sites.
- There is regulatory need for the protection goals of disposal.
- Need for research results from site-specific safety assessments.

Safety Requirements on the Disposal of Heat-Generating Radioactive Waste

Disposal of heat-generating radioactive waste is still a great challenge. So far, no repository specifically for heat-generating radioactive waste is world-wide in operation. Safety requirements for the disposal of heat-generating radioactive waste provide the safety-related frame that must be complied with in planning, constructing, operating, decommissioning and sealing a repository for this type of waste. In Germany, the then responsible Ministry for the Interior (BMI - Bundesministerium des Innern) published in 1983 the "Safety Criteria for the Disposal of Radioactive Waste in a Mine" [3].

The safety criteria of 1983 had to be revised with respect to the present state of science and technology and to latest international recommendations. The Company for Plant and Reactor Safety (GRS - Gesellschaft für Anlagen- und Reaktorsicherheit mbH) was charged by BMU with the preparation of a proposal for an update of the 1983 safety criteria. The GRS draft proposal of January 2007, which was intensively supported by BfS, considers both the further development of the state-of-the-art of science and technology as well as international recommendations published in particular by IAEA and ICRP most recently [4]. Its main features are the isolation of the heat-generating waste in the isolating rock zone, demonstration of safety (i.e., appropriate containment of radionuclides) for approximately 1 million years, conducting a stepwise approach, and executing a continuous safety-related optimization process.

On the occasion of the workshop „Safety Requirements on the Final Disposal of High-level Radioactive Waste“ which took place at Hannover on March 06 and 07, 2007, the GRS draft was scientifically discussed and a statement requested by BMU was prepared. The workshop was organised by BfS and served to get to know the ideas of various experts regarding the disposal of high-level radioactive wastes in deep geological formations, and to obtain further suggestions [5]. Participants in the workshop made contributions to the evaluation of the GRS proposal with respect to the state-of-the-art of science and technology and to applicability as well as to the supplementation, extension and level of detail of single requirements. Key factors of the GRS proposal of January 2007 were confirmed in the discussions. Apart from this, the workshop offered a multitude of suggestions and references on this topic. In addition, the GRS draft proposal was in particular examined and evaluated in detail by the advisory bodies of BMU, i.e., the Reactor Safety Commission (RSK - Reaktor-Sicherheitskommission) and the Radiation Safety Commission (SSK - Strahlenschutzkommission).

Using the results of all these discussions and evaluations, BMU prepared a first draft of the "Safety Requirements Governing the Final Disposal of Heat-Generating Radioactive Waste". This document was the main topic of the International Radioactive Waste Disposal Symposium organised by BMU which took place at Berlin from October 30 to November 01, 2008. Subsequent to further discussions and evaluations of the Waste Management Commission (ESK - Entsorgungskommission), BMU finally issued the "Safety Requirements Governing the Final Disposal of Radioactive Waste" as of July 2009 [6], available at http://www.bmu.de/english/nuclear_safety/downloads/doc/44839.php. These requirements do address and regulate the following topics:

- Protection objectives.
- Safety principles.
- The step-by-step approach and optimization with respect to radiation protection, operational safety and reliability of the safe long-term containment/isolation of radioactive waste.
- Protection from damage caused by ionising radiation.
- Safety assessments and proof of operational and long-term safety.
- Repository design requirements.
- Safety management.
- Documentation.

The final preparation and publication of the Safety Requirements, e.g., in the Federal Gazette, are still pending.

Comparison of Potential Repository Sites - The VerSi Project

According to the revised radioactive waste disposal concept further sites in various host rocks had to be investigated for their suitability to host a repository. The final site should be selected on the basis of a safety-related comparison of potential sites, including the Gorleben site.

Such a comparison of different sites, i.e. different host rock formations such as salt, clay and granite, has not been carried out in Germany so far. Thus, BfS launched in 2006 the project Comparative Safety Assessments for Repository Systems to Evaluate Methodologies and Instruments (Vergleichende Sicherheitsanalysen für Endlagerstandorte zur Bewertung der Methoden und Instrumentarien) - the VerSi Project. The objective of this project is to enable a comparison of repository sites in different host rocks and to provide appropriate means. Therefore, the required tools, i.e., the safety-analytical instruments and methodologies for a comparison of different repository sites, are intended to be developed and tested accordingly. Work is being performed on the basis of long-term safety assessments taking into account geoscientific databases, radioactive waste inventories, corresponding disposal concepts, as well as appropriate backfilling and closure concepts. Regarding the probability of applicable scenarios affecting the isolating rock zone and, therewith, the release of radionuclides, a sole consideration and comparison of dose or risk is not appropriate for a ranking of potential repository sites. Thus, the development and definition of appropriate safety-related parameters are required, i.e., the provision of measures other than dose and risk for the evaluation of the level of safety.

With this objective in mind, in a first step, the question is addressed as to whether it is possible to develop a comparative methodology on the basis of safety assessments and, if so, which capabilities are offered or enhanced by such a methodology. The results of the comparative performance assessment are intended to serve as basis for the selection of the final repository site. All sites taking part in such a future comparison procedure have to fulfil:

- AkEnd recommendations for the site selection, and
- BMU safety requirements governing the final disposal of radioactive waste.

The method should be developed by applying data that are as close to reality as possible. This includes repository concepts as well as site-specific parameters. However, it is not intended to prove the long-term safety of the studied site cases within the VerSi Project. The method is focused on long-term safety assessments in the post-operational phase of a repository. The operational phase of a repository, data uncertainties, the optimisation of the repository, and human intrusion issues remain unconsidered in the development of the method. Thus, within the VerSi Project, only a part of a complete comparison is considered, namely the comparison of safety assessments under given simplifying boundary conditions. Also, socio-scientific and planning-scientific aspects cannot be taken into account in this method development.

Within the scope of the VerSi Project, rock salt and clay stone are examined as potential host rocks. These host rocks exist in Germany and, due to the AkEnd recommendations [1], are basically considered suitable to host a repository for heat-generating radioactive waste. For testing the tools, a HLW repository hosted in a salt dome (Gorleben) will be compared with a generic HLW repository in consolidated clay as host rock. Since in Germany no clay site has been investigated for hosting a HLW repository until now, the required data for comparison are transferred from international research projects and repository concepts. The VerSi Project does not comprise any geoscientific exploration at a distinct site nor a long-term safety analysis for a distinct site or a site selection itself.

DISPOSAL OF RADIOACTIVE WASTE

An outline of the most relevant activities concerning the operation of the Konrad, Gorleben, Morsleben and Asse II sites is provided in the following section.

The KONRAD Repository

The abandoned Konrad iron ore mine was investigated for the disposal of all types of short-lived and long-lived radioactive waste with negligible heat generation, i.e., waste packages which do not increase the host rock temperature by more than 3 K on an average (LLW and ILW). The most essential waste-related planning data comprise an emplacement of waste packages up to 650,000 m³ with a total beta/gamma activity of 5.0×10^{18} Bq and an alpha emitter activity of 1.5×10^{17} Bq. Planning work and site-specific safety assessments also include the emplacement of decommissioning and dismantling waste from various types of nuclear facilities. Waste packages are intended to be emplaced at a depth of 800 m to 1,300 m in disposal rooms with a cross-section of 40 m² and a length of up to 1,000 m using the stacking technique.

The licensing procedure for the Konrad repository was started on August 31, 1982. The license was issued on May 22, 2002, for the emplacement of waste packages of 303,000 m³ at maximum. Of this, approximately 150,000 m³ will originate from decommissioning and dismantling of nuclear facilities. The license was immediately challenged in court. In accordance with the agreement between the Federal Government and the nuclear utilities, BfS withdrew the application for immediate enforcement of the license on July 17, 2000, thus enabling court examination of the license. This withdrawal means that the re-construction of the Konrad mine into a repository for all types of radioactive waste with negligible heat generation will only be possible after final court decision. The Konrad license became finalised on March 26, 2007, after non-acceptance of all claims and rejection of all appeals lodged against it by the Federal Administrative Court. On May 30, 2007, BMU charged BfS with the conversion of the Konrad mine into a repository. The main operating plan according to the Federal Mining Law for the construction of the Konrad repository was approved on January 15, 2008.

Activities for keeping the mine open and for maintaining its safety are carried out above ground and underground including preservation and reconstruction of buildings, shafts, and mine openings. This type of work has always been carried out in such a way that it will not interfere with a later conversion

of the abandoned Konrad mine into a repository. Subsequent to further preparatory measures the actual construction work started in the beginning of October 2009. Continuous and comprehensive information of the public is ensured by BfS. The start up of operations in the Konrad repository is envisaged for 2014.

GORLEBEN Exploration Mine

Since the end of the 1970s, the Gorleben salt dome has been investigated for its suitability to host a repository at depths between 840 m and 1,200 m for all types of radioactive waste, in particular for heat-generating waste originating from reprocessing and for spent nuclear fuel elements (direct disposal). The accumulated inventory of beta/gamma and alpha emitters was planned to be in the order of magnitude of 10^{21} Bq and 10^{19} Bq, respectively. Site-specific investigations were started in 1979. The above-ground investigation programme was finished and two shafts were completed. The underground investigation of the Gorleben salt dome was in progress, in particular the first exploration area (EB1 - Erkundungsbereich 1) in the north-eastern part of the Gorleben salt dome.

With the beginning of the Gorleben Moratorium, the underground exploration by heading, exploration drillings, and geotechnical measurements was stopped on October 01, 2000, and remains suspended up to now. Since that time only measurements and work have been carried out that are necessary to ensure mining safety and for operational reasons to maintain the exploration mine in a reliable state, even for a longer period of time.

MORSLEBEN Repository

Since 1971, low and intermediate level radioactive waste with mainly short-lived radionuclides and an alpha emitter concentration of up to 4.0×10^{11} Bq/m³ originating from the operation of nuclear power plants and the application of radioisotopes in research, medicine and industry in the former German Democratic Republic was disposed of in the Morsleben repository, an abandoned salt mine re-used for radioactive waste disposal. Since German unity on October 03, 1990, this facility has the status of a federal repository. Operated by BfS as licensee the Morsleben facility received radioactive waste from a broad range of origins and/or sources, in particular from nuclear power plants, research establishments and from smaller waste generators. From 1971 through 1998 radioactive waste with a total volume of about 36,800 m³ including about 6,600 spent sealed radiation sources was disposed of. The total activity of beta/gamma emitters amounts to about 5.0×10^{14} Bq (relating to 2005), that of alpha emitters to about 7.5×10^{11} Bq. According to September 25, 1998, as the result of a court order, BfS had to immediately stop further radioactive waste disposal in the eastern emplacement field. Thus, last waste emplacement operations were carried out on September 28, 1998.

The Morsleben repository will not resume emplacement operations. BfS stated on April 12, 2001, that this facility will definitely never again be used for radioactive waste disposal (renunciation of those parts of the Morsleben repository operation license dealing with the emplacement of radioactive waste). An application for the licensing procedure for decommissioning and closure was already filed on October 13, 1992. On May 09, 1997, BfS renewed this application. The main licensing document, the so-called Plan, has been provided - together with the Environmental Impact Assessment and further important documents - to the competent regulatory body (licensing authority) on September 13, 2005, and - in revised version - on January 26, 2009. On October 15, 2009, the involvement of the public started and the respective documents on the closure of the Morsleben repository were made available to the public from October 22 to December 21, 2009. The public inquiry may be expected to take place in 2010.

As to the closure of the Morsleben repository, it is planned to backfill large parts of the underground facilities and the shafts. The emplacement areas will be sealed by specially tailored dams in the access galleries. Altogether, the concept provides for an amount of backfill of about four million cubic metres of salt concrete. The shafts will be sealed with special shaft sealing materials. Backfilling and sealing are anticipated to last for about 15 years. Closure costs will probably amount to at least 840 million Euros.

With respect to closure, a very important measure is the backfilling of the central part of the Morsleben repository. The backfilling of selected rooms of this part, which has not been used for radioactive waste disposal, is being undertaken to enhance geomechanical stability and integrity. Thus, an important safety-related prerequisite with respect to the future backfilling and sealing of the Morsleben repository will be provided by this action. The backfilling measures were carried out from October 2003 until November 2009. In total, 24 rooms with a volume of approx. 800,000 m³ were backfilled.

ASSE II Repository

From 1965 to 2008, Gesellschaft für Strahlen- und Umweltforschung (today: HMGU - Helmholtz Zentrum München - German Research Center for Environmental Health) operated the Asse II mine near Remlingen on behalf of the Federal Ministry of Education and Research (BMBF - Bundesministerium für Bildung und Forschung). From 1967 until 1978, about 125,000 drums of LLW were emplaced in 12 chambers at depths from 725 m to 750 m and about 1,300 drums of MLW in a chamber at a depth of 511 m. The total activity inventory amounts to 3.1×10^{15} Bq (as of January 01, 2002), about 40 % of the inventory being contained in MLW. Subsequent to waste emplacement, the Asse II mine served as underground research laboratory to perform investigations on the disposal of radioactive waste (e.g., [7]) and of non-radioactive chemotoxic waste (e.g., [8]).

In 1988, in the range of the southern flank at the 537 m level, a first influx of salt solution was observed. It was triggered by movement of the salt rock strata induced by mining activities. The solution, which presently enters at a quantity of 12.5 m³ per day [9], is fully collected and pumped to the surface.

In order to stabilise the mine, old chambers in the southern flank were filled between August 1995 and December 2003. A total of about 2.1 million Mg (corresponding to 1.75 million m³) backfill material was inserted into the southern flank of the Asse II mine. Then HMGU started to fill the shafts and drifts below the disposal areas which are not affected by the filling actions taken so far.

Insufficient information of the public, deficiencies in radiation protection issues, and lacking transparency in the planning of the Asse II closure gave rise to more and more criticism. Finally, on September 04, 2008, the competent Federal Ministries BMU and BMBF and the Ministry for the Environment and Climate Protection of Lower Saxony (NMU - Niedersächsisches Ministerium für Umwelt und Klimaschutz) agreed that BfS should take over responsibility for the decommissioning as future operator. The Asse II mine would be subjected to the legal procedure applying to repositories.

Since January 01, 2009 the Asse II mine has been under the responsibility of the BfS. The mine is run by the Asse GmbH which was founded at the beginning of 2009.

Initial BfS activities were focused on the improvement of radiation protection issues and on the salt solution management. Measures to improve the safety situation of the mine will be the stabilisation of the southern flank by means of backfilling roof clefts. In the process of this measure, the cavities having occurred in the chambers of the southern flank due to the backfill material's large pore volume will be backfilled with special Sorel concrete. Following preparatory planning work, the backfilling of roof clefts has started in the beginning of December 2009.

With respect to the final closure concept for the Asse II facility complementary and alternative closure concepts were prepared and evaluated. A basic decision was made on January 15, 2010. Accordingly, BfS' designated closure concept focuses on the retrieval/ recovery of the waste packages disposed of. Final decisions on the closure of the Asse II repository are still to be taken.

FUTURE DEVELOPMENTS

In the Federal Republic of Germany, the latest federal elections took place on September 27, 2009. As a result, a coalition of the Christian Democratic Parties (CDU and CSU) and the Liberal Democratic Party (FDP) came into power. The political aims of the Federal Government are given in the coalition agreement of CDU/CSU and FDP dated October 26, 2009 [10].

In chapter 4.2 Climate Protection, Energy and Environment of this document, Nuclear Energy and Radioactive Waste Disposal are addressed. It is stated that nuclear energy is considered to be a bridging technology, that nuclear power plant operational life time will be extended, and that there will be no construction of new nuclear power plants. With respect to radioactive waste disposal the coalition partners have agreed upon the following:

- Immediate termination of the Gorleben Moratorium,
- Open-ended continuation of the Gorleben salt dome exploration,
- International Peer Review Group to accompany the Gorleben exploration work,
- Closing and sealing the Morsleben and Asse II repositories in a timely and transparent process,
- Nuclear utilities shall contribute to the Asse II closure costs, and
- Fair compensation for those regions which are willing to host a repository site.

First steps in the realization of these radioactive waste disposal issues are expected to be initiated in the beginning of 2010, e.g., the basic decision on the closure concept for the Asse II repository has already been made. With respect to Gorleben-related activities, the performance of a preliminary safety assessment to determine lacking geoscientific and safety-related data is of importance. The envisaged international peer review process may result in more detailed recommendations and requirements on further exploration work. Even in case that a comparison of potential repository sites within a site selection procedure is no more intended, the VerSi project supplies a sound basis for those tasks to be faced in future regarding the performance of preliminary safety assessments. Thus, the results of this project will serve as an important safety-related tool in future decision making.

REFERENCES

1. Arbeitskreis Auswahlverfahren Endlagerstandorte (AkEnd), "Site Selection Procedure for Repository Sites", AkEnd (2002).
2. "Konzeptionelle und sicherheitstechnische Fragen der Endlagerung radioaktiver Abfälle - Wirtsgesteine im Vergleich - Synthesebericht des Bundesamtes für Strahlenschutz", BfS-17/05, Bundesamt für Strahlenschutz (2005).
3. Bundesministerium des Innern, "Sicherheitskriterien für die Endlagerung radioaktiver Abfälle in einem Bergwerk", Bundesanzeiger 35 (1983) no. 2, p. 45-46.
4. B. BALTES, and P. BRENNECKE, "Safety Requirements on Heat-Generating Radioactive Waste - Ongoing Development Process of Regulations", Proc. Int. Conf. Radioactive Waste Disposal in Geological Formations, Braunschweig, Germany, November 06-09, 2007, GRS-S-49, Bundesamt für Strahlenschutz/Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH (2008).
5. P. BRENNECKE, U. KLEEMANN, M. RANFT, G. STIER-FRIEDLAND, and J. WOLLRATH, "Sicherheitsanforderungen an die Endlagerung hochradioaktiver Abfälle - Dokumentation und Ergebnisse des Workshops am 6. und 7. März 2007", SE-IB-21/07, Bundesamt für Strahlenschutz (2007).

6. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, "Safety Requirements Governing the Final Disposal of Heat-Generating Radioactive Waste", BMU (2009).
http://www.bmu.de/english/nuclear_safety/downloads/doc/42047.php
7. T. ROTHFUCHS, K. WIECZOREK, H.K. FEDDERSEN, G. STAUPENDAHL, A.J. COYLE, H. KALIA, and J. ECKERT, "Brine Migration Test – Asse Salt Mine, Federal Republic of Germany", GSF 6/88, Gesellschaft für Strahlen- und Umweltforschung München (1988).
8. T. BRASSER, W. BREWITZ, F. GLÄSS, G. JAKOB, W. KALLMERTEN, T. KÜHLE, T. MEYER, U. MÜHLENWEG, H. PITTRICH, M.W. SCHMIDT, and C. STARKE, "Die untertägige Ablagerung von Abfällen im Salzgestein", GSF 6/91, GSF-Forschungszentrum für Umwelt und Gesundheit (1991).
9. "Zutrittswässer und Laugen" BfS-ASSE II press release, May 12, 2009.
http://www.endlager-asse.de/cln_135/DE/WasIst/Bergwerk/ZutrittswaesserLaugen.html
10. "Wachstum. Bildung. Zusammenhalt. - Der Koalitionsvertrag zwischen CDU,CSU und FDP."
<http://www.cdu.de/portal2009/29145.htm>