ILK
INTERNATIONALE
LÄNDERKOMMISSION
KERNTECHNIK
Baden-Württemberg · Bayern · Hessen




ILK Recommendation

on the Revitalisation of the Repository Projects Gorleben and Konrad

Für deutsche Fassung bitte umdrehen!

November 2005
No.: ILK-25 E

Foreword

The International Committee on Nuclear Technology (Internationale Länderkommission Kerntechnik, ILK) was established by the three German states of Baden-Württemberg, Bavaria and Hesse in October 1999. It currently consists of 13 scientists and experts from Finland, France, Germany, Sweden, Switzerland and USA. The ILK acts as an independent and objective advisory body to the German states on issues related to the safety of nuclear facilities, radioactive waste management and the risk assessment of the use of nuclear power. In this capacity, the Committee's main goal is to contribute to the maintenance and further development of the high, internationally recognised level of safety of nuclear power plants in the southern part of Germany.

The ILK has already addressed the disposal of radioactive waste on several occasions. It has expressed its views in its statements on the final storage of radioactive waste dating from July 2000 (ILK-02), on the potential suitability of the Gorleben site dating from January 2002 (ILK-08), and on the recommendations of the committee on a selection procedure for repository sites (AkEnd) dating from September 2003 (ILK-14). The present recommendation on the revitalisation of the repository projects Gorleben and Konrad, which was adopted at the 38th ILK meeting on November 14th/15th, 2005 in Landshut, is in agreement with the views made in these earlier statements. This recommendation, prepared with the support of external experts Prof. K. Kühn (TU Clausthal) and Mr. P.-E. Ahlström (SKB, Stockholm), aims to contribute to a revitalisation of the German radioactive waste disposal programme and also to bring it back to an international level. The ILK hopes to thereby open up a more realistic approach to the issue of disposing of radioactive waste.

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Executive summary

In Germany, the scientific-technical work on the disposal of radioactive waste has advanced considerably. Nonetheless, no activities on constructing a final repository has been carried out for years. Since the moratorium for underground site exploration in the Gorleben salt dome became effective on October 1, 2000, all activities to investigate the suitability of the Gorleben salt dome to host a repository for radioactive waste have been interrupted. The exploration of the Gorleben salt dome could be concluded within the next three to four years.

In spite of the license granted for the Konrad repository, construction could not yet be started because the license was sued in court. The purpose of this ILK statement is thus to contribute to the revitalisation of the German radioactive waste disposal programme.

This statement describes and discusses various scientific, ethical and legal-organisational issues that are closely associated with the disposal of radioactive waste and views them from an international perspective. By taking into consideration several of its earlier requests, the ILK has reassessed the current situation in Germany and in comparable other countries with programmes for the disposal of radioactive waste and arrives at the following recommendations based on its findings:

The moratorium on the further exploration of the Gorleben salt dome, for which there is no scientific or technical reason, should be lifted as soon as possible.

It is unfortunate that a Total Systems Performance Assessment (TSPA) for the Gorleben project according to the international practice has never been made. Furthermore Germany never asked for an International Peer Review of its nuclear waste disposal programme. ILK recommends that these two omissions are quickly made up for. Additionally, it is to be evaluated if in parallel to the ongoing underground exploration an underground laboratory for salt formations can be established in the exploratory mine Gorleben.

The preparatory work for the Konrad repository should begin immediately in order to start construction as soon as a positive court decision has been obtained.

The present legal, administrative, and organisational structures for disposal of radioactive waste in Germany need to be reviewed, and must be brought in harmony with recent international developments, in particular with regard to compliance with the “Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management”. This demands in particular a clear

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separation between the constructor and operator of the final repository on the one hand and the licensing and regulatory authority on the other.

In order to ameliorate communication with and participation of the local and regional public, a new structure should be established like in Sweden or Finland. The goal is to achieve a constructive and lasting dialogue among all stakeholders.

The ILK takes the view that all recommended steps, in particular the exploration of the Gorleben salt dome, can be realised within the next three to five years.

1 Introduction

After taking over in September 1998, the new Federal Government at the time, consisting of a coalition between the Social Democratic Party (SPD) and the Green Party (Bündnis 90/Die Grünen), decided to phase out nuclear energy in the Federal Republic of Germany. It also declared that the hitherto followed radioactive waste management concept has failed.

The phasing out of nuclear energy was regulated in an Amendment of the German Atomic Act, becoming effective on April 22, 2002 [Germany 2002]. § 1, Para. (1) of this Act now reads: "The purpose of this Act is to orderly end the use of nuclear energy for the commercial production of electricity and to ensure the proper operation until the time of shut-down."

A contract between the Federal Government and the German utilities, operating nuclear power plants, built the basis for this Amendment [Germany 2001]. This contract (initialled on June 14, 2000, and signed on June 11, 2001) also includes several paragraphs on radioactive waste disposal:

"IV. Entsorgung, 4. Gorleben: The exploration of the salt dome in Gorleben is interrupted for minimum three and maximum ten years until conceptual and safety relevant questions will have been clarified.
The Federal Government makes a statement on the exploration of the Gorleben salt dome which is part of this Agreement as Annex 4.
IV. Entsorgung, 6. Konrad: The responsible authorities finalise the licensing procedure for the Konrad mine (Planfeststellungsverfahren) according to the legal regulations."

The moratorium on the Gorleben salt dome, i.e. stopping all exploration activities, became effective October 1, 2000. The license for the Konrad repository was granted on May 22, 2002.

The direct result of the moratorium has been that all activities to investigate the suitability of the Gorleben salt dome to host a repository for radioactive waste are halted since October 1, 2000. Only maintenance of equipment and of safety relevant features underground is permitted.

In the above mentioned Annex 4, however, the Federal Government states that no results have been found during the former exploration of the Gorleben salt dome that would oppose its suitability as a final repository.

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The exploration thus far executed was paid for by the waste generators, i.e. above all by the utilities operating nuclear power plants. Until now, about € 1.3 billion were invested in the Gorleben repository project.

In spite of the license granted for the Konrad repository, construction could not yet be started because the license was sued in court. The investments made to date in the Konrad repository project amount to about € 800 million.

The purpose of this ILK statement is to contribute to the revitalisation of the German radioactive waste disposal programme in particular by restarting the site exploration activities in the Gorleben salt dome and by starting construction activities within the Konrad project as soon as possible. This ILK statement intends also to contribute to the improvement of the roles and responsibilities of the institutions in charge of the implementation of the waste disposal programme on one side and of regulation and licensing on the other side.

2 State of work on the disposal of radioactive waste

2.1 International

International developments in the past years with regard to the deep geological disposal of high level radioactive waste (HLW) and/or spent nuclear fuel (SF) achieved significant progress. A few examples should be mentioned here.

- In Finland, the government took a policy decision in 2000 that a repository for SF may be constructed either at Olkiluoto in the municipality of Eurajoki or at Loviisa [Finland 2000]. This policy decision was also approved by the parliament. The responsible Finnish entity POSIVA selected Olkiluoto site and more detailed site investigations are being performed. The construction of ONKALO, an Underground Research Laboratory (URL), is underway. The schedule of POSIVA foresees construction of an encapsulation facility and of the repository between 2010 and 2020 so that the first waste can be emplaced into the repository in 2020.

- After an extensive screening process and extensive feasibility studies in eight municipalities, two sites are presently being investigated in Sweden by the responsible entity SKB [SKB 2000]:

  1. South of Forsmark nuclear power plant in the municipality of Östhammar
  2. Close to the nuclear power plant and interim spent fuel storage facility Clab in the municipality of Oskarshamn.

Both sites are located – as well as the Finnish one – in deep granite bedrock of the Scandinavian Shield. Site investigations from surface will be completed in 2007. Start of construction of the repository and an encapsulation facility is foreseen for 2010 and emplacement of the first SF canister into the repository for 2017. Besides site investigations, SKB successfully operates an URL at Äspö in Oskarshamn municipality since the early 1990s with international participation (including Germany).

- The US Congress in 1987 by law designated Yucca Mountain, located in the State of Nevada 100 miles northwest of Las Vegas, as the only site to be investigated as a repository for HLW and SF, both of industrial and defence origin [USA 1987]. This site was confirmed by a congressional resolution in 2002 [USA 2002b]. The geological formation at Yucca Mountain consists of welded tuff from Tertiary. Extensive site investigations were performed from the surface and from underground. The responsible Department of Energy (DOE) intends to submit a license application for the construction of the repository to NRC during this year.
  DOE successfully operates the WIPP repository for non-heat generating radioactive TRU (transuranic) waste of defence origin in a Permian salt formation near Carlsbad in the state of New Mexico since 1999.

- In France, a special Act with three lines of research was passed in December 1991 [France 1991a]:

  1. Partitioning and transmutation
  2. Reversible or irreversible disposal in deep geological formations
  3. Waste conditioning and long-term storage

  The industrial and commercial public undertaking Andra was also established through this Act in order to perform all tasks with respect to item 2.
  Meanwhile, Andra has selected a site at Bure in the Départements Meuse / Haute Marne for an URL. The target horizon for the planned repository is the Jurassic clay formation of Callovo-Oxfordian at a depth of about 500 meters. After extensive site investigations from the surface, two shafts are presently being sunk and the first underground experiments were installed in a niche at 450 m depth.
  The 1991 Act says that – based on the results of the three lines – the French Government and Parliament shall decide on the definition of a HLW management strategy in France. Parliament has already begun its deliberations on this topic and is to reach a decision in 2006.

- In Switzerland, Nagra (Swiss National Cooperative for the Disposal of Radioactive Waste) submitted a demonstration of disposal feasibility to the Swiss Federal Government in 1985 [Nagra 1985]. This record, designated as "Projekt Gewähr 1985", referred to a HLW repository in crystalline bedrock in Northern Switzerland. An assessment by the federal authorities concluded that the demonstration of construction feasibility and the safety proof had been given, yet that proof of sufficiently expanded rock areas in crystalline rock (site demonstration) was still missing. In the Federal Government's resolution dating from June 3, 1988 on the "Projekt Gewähr", Nagra was consequently obliged to supply a supplementary site demonstration for HLW in granite and to expand its investigations to non-crystalline host rocks, i.e. to sediments.

  In 1988, within the framework of a study on sedimentary formations, Nagra presented a selection of seven potential host rock formations to the federal authorities [Nagra 1988]. The safety-related features of these seven alternatives were compiled and compared. The main rock properties of interest included sufficient thickness, low permeability and good retention capacity for radionuclides. As a result of these studies, Nagra selected two alternatives for further investigation, namely the Lower Freshwater Molasse and Opalinus Clay. Potential site regions were described in more detail for both sediment formations, including the Zürich Wineland as a target area for Opalinus Clay.

  The findings of further investigations led Nagra to prepare a demonstration of disposal feasibility for the host rock Opalinus Clay in the Zurich Wineland area (region Benken). The results of the investigation were published by Nagra in the form of two technical reports in 2001. Nagra submitted these reports and three further reports on the Project Opalinus Clay (report on construction project, synthesis of geological investigation results and safety-related assessment) to the Swiss authorities at the end of December 2002 as documents for the demonstration of disposal feasibility [Nagra 2002]. A decision of the Swiss Federal Government on the further proceeding is expected to be made in 2006.

In conclusion: The international scientific community is convinced that the safe disposal of high level waste (HLW) and spent fuel (SF) is possible in different deep geological formations and that satisfactory solutions can be implemented for the long-time aspects. This collective opinion is e.g. documented in a publication of OECD/NEA entitled "Confidence in the Long-term Safety of Deep Geological Repositories" [NEA 1999].

2.2 Germany

In Germany, the scientific-technical work on the disposal of radioactive waste has advanced considerably. Investigations were conducted for more than two decades in the Asse Research Mine as well as at the two sites Konrad and Gorleben. The achieved status is as follows:

- The site Konrad has been licensed for non-heat generating waste, i.e., all necessary investigations have been performed, reviewed in a long-winded process by the relevant authorities and assessed as positive.

- For heat-generating waste, the aboveground exploration is complete for the site Gorleben. A part of the planned underground exploration has also been carried out, without coming across findings that might call the suitability of the site in question. The remaining exploration work could be completed within three to four years. Subsequently, a license could be applied for.

Despite these positive preconditions, no work on constructing a final repository has been carried out for years: in the case of Konrad, the outcome of several lawsuits has to be awaited, and in the case of Gorleben, the federal government issued a moratorium. In addition to the conceptual and safety relevant questions mentioned in the Introduction, the critics of the Gorleben salt dome asserted that the site selection procedure for it was not performed with adequate participation of the public (cf. chapter 7) and that no prefixed criteria for site selection were available.

Following those critics, the relevant Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, BMU) established the AkEnd committee (Arbeitskreis Auswahlverfahren Endlagerstandorte) in February 1999. The mission given to AkEnd by BMU was "to develop a procedure and criteria for the identification and selection of the best possible site for the disposal of all types of radioactive waste". At the same time, however, BMU asked AkEnd **not** to include the existing projects of Gorleben and Konrad into its investigations and considerations for the time being. Consequently, AkEnd had to start with a "white map of Germany".

Following these instructions, AkEnd delivered its final report entitled "Site Selection Procedure for Repository Sites" in December 2002 to BMU [AkEnd 2002].

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ILK commented on this new BMU policy on radioactive waste disposal in Germany with two statements:

- ILK Statement on the Potential Suitability of the Gorleben Site as a Deep Repository for Radioactive Waste (ILK-08, January 2002) [ILK 2002]

- ILK Statement on the Recommendations of the Committee on a Selection Procedure for Repository Sites (ILK-14, September 2003) [ILK 2003]

The core messages of these statements were that

- the so-called single repository concept should be dismissed
- the exploration of Gorleben should be continued
- the approach suggested by the AK-End recommendation leads to a sensitive delay of providing a final repository and to clear additional costs.

An international review or evaluation of the AkEnd-Report – as it was announced by BMU – was, however, not yet been performed.

3 Comments and suggestions on some key issues in Germany

3.1 Legal situation

The German Atomic Act, also in its latest version of April 2002, defines the Federal Government as being responsible for site selection as well as for construction and operation of repositories [Germany 2002]. Within the Federal Government, this responsibility was given to BMU. As a result, this explains the strong political influence not only on the radioactive waste disposal policy but also on the project execution. The latter has its disadvantages, as the last seven years have shown. The project can be practically delayed for political reasons and scientific-technical issues can be subject to a strong political influence. A rapid and cost-conscious execution is hampered by this constellation.

Because federal ministries are not equipped either in terms of organisation or staff to handle industrial projects, the Federal task of site selection and construction and operation of radioactive waste repositories was transferred to the Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS) located in Salzgitter in the Federal State of Lower Saxony. BfS has two weak points for successfully fulfilling this task: One, it is also an administrative organisation, and two, it is directly supervised by BMU. Therefore, all activities of BfS are subject to a strong political influence.

Knowing these disadvantages, the Atomic Act already states that third parties could be engaged for these activities. The DBE (Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH), located in Peine, Lower Saxony, has been commissioned to undertake some of these activities. In spite of being industrially organised, DBE is completely dependent on BfS because:

- All contracts for DBE originate from BfS.
- All money for DBE activities comes from BfS.
- All necessary licenses for DBE activities must be applied for through BfS.

All expenses of BfS and DBE for radioactive waste disposal are carried, according to the polluter pays principle, by the waste producers. Details of this issue are fixed in a Federal Ordinance called "Endlagervorausleistungsverordnung - Endlager-VIV". The latest version of this Ordinance dates back to July 2004 [Germany 2004].

The largest producers of radioactive waste certainly are the utilities operating nuclear power plants. Consequently, most of the budget (roughly 83%) for BfS and DBE comes from the utilities. In spite of this large financial contribution, the utilities have none or close to none influence on technical issues. This is a noteworthy difference compared to other countries: SKB in Sweden, POSIVA in Finland, Nagra in Switzerland being industrially operated daughter companies of the respective utilities, Andra in France closely operating with its industrial shareholders.

As already mentioned in the Introduction, the German Federal Government and the utilities operating nuclear power plants signed a contract upon which the phasing out of nuclear power in Germany is based. Besides those paragraphs dealing with repositories, cited in the Introduction, the Federal Government committed itself in the last sentence of mentioned Annex 4 of the contract to secure the Gorleben salt dome against other industrial activities by a separate Federal Ordinance. It took the Federal Government nearly five years to honour this commitment. On May 5, 2005, the "Ordinance of Impediment of Changes for the Gorleben salt dome (Veränderungssperre für den Salzstock Gorleben)" became effective [Germany 2005].

The AkEnd-Committee delivered its final report in December 2002 to BMU. Included in this report is a proposal how to continue with site selection in Germany. BMU, however, was not able to realise this proposal because of political and financial difficulties. Having available the well advanced Gorleben project, BMU could not convince the utilities to pay for a further site selection process. The ILK believes that already three to four years after its complete exploration, a decision on the suitability of the salt dome Gorleben can be reached.

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In order to force the utilities to pay for this process, BMU internally drafted a new law called "Draft of a law of association and site selection (Entwurf eines Verbands- und Standortauswahlgesetzes)". This draft, dated June 16, 2005, was not passed by the last Federal Cabinet. The future of this draft law is completely open from today's point of view.

As already mentioned in the Introduction, the license for the Konrad repository (foreseen for the disposal of non-heat-generating waste) was granted on May 22, 2002. According to the legal system in Germany, it is possible to sue decisions of administrative bodies at special courts (Verwaltungsgericht). As expected and publicly announced, the Konrad license was sued immediately by three municipalities and one individual. The respective court procedures are underway at the Oberverwaltungsgericht Lüneburg.

3.2 Division of responsibility between government, industry and authorities

Some aspects of this issue were already dealt with in the foregoing chapter. In addition, it must be mentioned that there exists a third player besides BfS and DBE for the site exploration at Gorleben: this is the "Federal Geological Survey (Bundesanstalt für Geowissenschaften und Rohstoffe, BGR)" located in Hanover, Lower Saxony. BGR is responsible for all geoscientific aspects in connection with repository projects. Because BGR, being another Federal Office, is supervised by the Federal Ministry for Economics and Labour (Bundesministerium für Wirtschaft und Arbeit, BMWA), this does not simplify organisation and harmonisation of the Gorleben project and clearly points to the necessity for changes.

In addition, there is no central body in Germany being responsible for R&D with regard to radioactive waste disposal.

ILK suggests that industry should play a much stronger role in the German radioactive waste disposal programme than it does today. An industrially structured and operating entity with involvement of the industry should take on responsibility as the planning, constructing and operating party of all repository projects. This also includes responsibility for license applications, TSPA's (cf. Chapter 6), and the necessary relevant R&D-programmes.

The role of the Federal Government should be limited to the definition of radioactive waste disposal policy (cf. Chapter 8).

In all other mentioned countries, extensive scientific and technical communication

and dialogue exist between the implementers and the respective licensing authorities (Finland: POSIVA and STUK; Sweden: SKB and SKI/SSI; USA: DOE and NRC; France: Andra and ASN; Switzerland: Nagra and HSK). Because of the specific legal situation in Germany, this communication does not exist in this country. In addition to the scattered responsibilities on the implementer's side mentioned above, there exists no Federal or Central Licensing Authority for radioactive waste repositories in Germany. According to the legal situation, licensing procedures for all types of nuclear installations are performed by respective State Authorities (Länderministerien).

ILK suggests to discuss this situation with the aims:

- to commission one main contractor for all activities related to the disposal of radioactive waste and
- to transfer responsibility for licensing only to one government instance

or at least to bring about an improvement over the current situation.

A clear division of responsibilities between government – policy and licensing – and industry – implementation and R&D – will certainly contribute to better and more speedy progress of the repository projects.

3.3 Local acceptance

It is meanwhile internationally accepted that a transparent dialogue between all stakeholders of a repository project must be installed. The main stakeholders are the implementer, the licensing authorities, local government (municipality, county, state), public entities like churches and trade unions, and local interest groups. The indispensable prerequisite for this transparent dialogue is, however, that there exists a basic political agreement that the country needs and wants to construct and operate a repository in deep geological formations.

The dialogue must be fair, documented, and transparent [NEA 2002, 2003]. It should be facilitated, encouraged, and promoted by the responsible government as well as by political and industrial bodies. The dialogue must continue throughout the planning, preparation, implementation, and operation phases of the repository. Thus, it should continue for several decades. During such a long period of time, the attitude of local stakeholders may fluctuate from acceptance to rejection and from rejection to acceptance. Important is to never interrupt the dialogue.

This is not to say that there was no public discussion or debate around the Gorleben repository project [Grill 2005]. ILK suggests in a supplementary way to establish a certain frame for the transparent dialogue and for consultations between main stakeholders. The associated rules should be publicly discussed and pay tribute to the concerns of all participants.

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3.4 One single repository for all types of waste

One major requirement of the BMU of the years 1998 - 2005 in its newly defined radioactive waste management policy was that it is sufficient to have one deep geological repository for all types of radioactive waste. This single repository should be operable in 2030.

However, there are many good scientific and technical reasons not to follow this policy. These reasons are given and explained in relevant literature [IEG 2001, Closs 2002]. Shortly said, the main reasons are:

- Aspects of radioactive waste management: The objective of the German classification into heat generating and non-heat generating wastes was to operate two separate repositories for these two waste categories. The further pursuit of this aim enables having a repository for non-heat generating waste at a much earlier point in time. There is a considerable demand for such a repository.

- Long term safety of repositories: The keywords here are long term behaviour and robustness with special emphasis on heat input, gas production, and chemical interactions. Taking these factors into account, separate repositories for heat generating and non-heat generating radioactive waste are appropriate and thus advisable due to the different requirements that the different types of radioactive waste set regarding these points. It would undoubtedly thus also be more difficult to prove the long term safety of a repository containing all types of waste compared to separate repositories with only certain types of waste. In addition to the more complicated layout and design of a single repository and to different time scales for different waste types, all interactions of heat input, gas production and chemical reactions would have to be evaluated.

In international accordance, the optimum solution – also for Germany – is to construct and to operate two different repositories. No single country worldwide exists which is going to use only one deep repository for all types of its waste. Furthermore, the Konrad repository has already been licensed for the disposal of non-heat generating waste. Since a single repository does not provide any advantages while having many disadvantages, there is no reason to abandon the repository project Konrad.

3.5 Finding the best possible site

This request is also part of BMU's waste disposal policy. In the international discussion it is well accepted that it will not be possible to find **the best site**, because the final evaluation of the quality of a site is known only after one or two decades of intensive and very costly underground investigations. But the best site is also not necessary. Site selection should concentrate on the target to find a site which satisfies all requirements from a safety and technical point of view.

For this purpose, a regulatory framework has to be established which specifies the necessary safety and its margins for the operational and especially for the long-term period. There meanwhile exist many examples worldwide for such a framework. Additionally, the tools to prove that an adequate safety level is achieved are available – safety case, Total Systems Performance Assessment (TSPA), safety analyses (cf. Chapter 6).

3.6 Research and development

With regard to research and development for the disposal of radioactive waste, Germany certainly holds a leading position within an international comparison. Nevertheless, some large scale demonstration tests have yet to be performed in an Underground Research Laboratory (URL) in order to finally design and operate a repository for heat generating waste in salt. The reason is that these tests had to be broken off in the early 90's in the Asse Research Mine. Thus, the necessary evidence of these technologies could not be proved. These tests are:

- HLW Test Disposal
- Test disposal of intermediate-level waste and HTR-fuel elements in boreholes
- Construction and test of a prototype dam in salt with regard to sealing off those parts of the repository already filled with waste (also taking into account the theoretically possible inflow of saturated salt solutions)

4 Scientific-technical questions concerning disposal

In their coalition agreement, published in October 1998, the two political parties forming the new Federal Government at the time, namely the Social Democratic Party (SPD) and the Green Party (Bündnis 90/Die Grünen) asserted that there exist "doubts" with regard to the suitability of the Gorleben salt dome to host a repository for radioactive waste. In May 2000, the Federal Government put its "Safety relevant and methodical-conceptual issues" in concrete terms [Germany 2000].

These thirteen issues are:

1. Natural analogues and observations of nature
2. Model calculations
3. Isolation potential and assessment time
4. Safety indicators
5. Geochemical processes
6. Chemotoxic substances
7. Gas generation
8. Criticality
9. Human intrusion
10. Multibarrier concept
11. Retrievability
12. Safeguards
13. Comparison between different host rocks

These issues were under discussion in the international scientific community for a couple of years with contributions from Germany.

BMU gave order to BfS to elaborate on each of these thirteen issues. BfS carried out an international call for tenders for this purpose and chose appropriate contractors. These contractors meanwhile finished their reports. BfS organised a workshop with a limited number of selected experts in September of this year. The objective of this workshop was to discuss the results of the reports in order to get to an evaluation of the present state of each of the issues in a general way. BfS has meanwhile presented a summary report on issue No. 13 "Comparison between different host rocks" [BfS 2005], which also draws on the results of this workshop. The final and summary conclusions for the German radioactive waste disposal programme will eventually be drawn by the Federal Government.

The international requirements as well as recent international discussions and actions on two of the more important issues (no. 3 and no. 11 in the list) are partly accounted for in Annexes 2 and 3, in the sense of a compilation without evaluation by the ILK.

5 International Peer Reviews

In order to be in accordance with the international development it is a well established practice that complete national programmes for radioactive waste disposal or also parts of them are being evaluated by relevant international organisations, like e.g. IAEA or OECD/NEA, with consultation of international experts. This process is normally called an "International Peer Review". Some guidelines for such peer reviews have recently been worked out within NEA [NEA 2005]. Information on the IAEA reviews within their WATRP (Waste Management Assessment and Technical Review)-programme can be found on the IAEA website [IAEA 2005]. The following Table gives a list of examples of such reviews.

Examples of International Peer Reviews of national programmes for the disposal of radioactive waste

Country and programme	Year	Requested by	Performed by
Sweden – KBS-1	1978	Government	24 foreign organisations and experts
Sweden – KBS-3	1983	Government	IAEA, NEA, USNAS, TAC-AECL, IPSN-France, UKAERE, BGS, UKNRPB
Sweden – SKB R&D-programme 86	1986-87	SKN	IAEA, NEA, TAC-AECL, VTT, CEA, UK-Nirex, UKNRPB, BGS
Finland – National programme	1992	STUK	IAEA
Sweden – SKI Site 94	1995	SKI	NEA
Canada - EIS	1995	National Resources Canada	NEA
USA – WIPP-TSPA	1997	USDOE	IAEA/NEA
Sweden – SKB SR-97	1999	SKI-SSI	NEA
Japan – JNC H-12-project	1999	JNC	NEA
Finland – Decision in principle application including TILA-99 and site investigation reports	2000	STUK	International Expert Group
USA – Yucca Mountain TSPA-SR	2002	USDOE	NEA
France – Dossier 2001 Argile	2003	Andra	NEA
Belgium – SAFIR 2	2003	Ondraf/Niras	NEA
Switzerland - Entsorgungsnachweis Opalinuston	2004	Nagra	NEA
France – Dossier 2005 Argile	2005	Andra	NEA

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Reports covering the reviews listed in the above table are included in the list of references.

Germany is not listed in this Table. Reasons for this are unknown.

Consequently, ILK recommends that the responsible German institutions, mainly BMU and BfS, order an International Peer Review of the German radioactive waste disposal programme. A necessary precondition for such a Peer Review with international participation is that the programme itself and all its elements are well documented.

6 Total Systems Performance Assessment (TSPA)

A Total Systems Performance Assessment (TSPA) typically consists of the following elements: system understanding, scenario analysis, development of conceptual and detailed systems models, consequence analysis, uncertainty and sensitivity analysis, and interpretation of calculated results. The scenarios describe a possible combination of specified features, events, and processes (FEPs) affecting the disposal system that could lead to radiological consequences. Analysis of these scenarios helps to understand the role and relative importance of each of the different barriers of the disposal system. This understanding then supports the development of a safety case[1] for analysis and review by the regulatory authorities and helps to establish priorities for research programmes and to define the experiments to be performed in surface laboratories and/or in situ underground. TSPA is used not only for final assessment of radiological safety but also for guiding R&D work and for optimising repository design.

ILK notes that such TSPA has never been applied for the Gorleben salt dome and the planned repository in a systematic state-of-the-art manner. ILK therefore urges BMU and all involved parties, especially the implementer BfS, to start as quickly as possible with the elaboration of a TSPA for a potential repository in the Gorleben salt dome. The necessary knowledge and data for the completion of a TSPA certainly exist in Germany. This Gorleben-TSPA would also be a valuable and suitable

[1] Nagra uses the following definition of a Safety Case:
"The safety case is the set of arguments and analyses used to justify the conclusion that a specific repository system will be safe. It includes, in particular, a presentation of evidence that all relevant regulatory safety criteria can be met. It includes also a series of documents that describe the system design and safety functions, illustrate the performance, present the evidence that supports the arguments and analyses, and that discuss the significance of any uncertainties or open questions in the context of decision making for further repository development."

Nagra, Project Opalinus Clay, Safety Report, December 2002, p. II [Nagra 2002]

instrument in order to finally judge the suitability of the Gorleben salt dome once all results from site exploration will be available. The two most recent examples of a TSPA are that of Nagra [Nagra 2002] and of Andra [2005] both for repositories in clay/shale formations.

7 Involvement of the local and regional population – some examples

In statements of the critics of the Gorleben repository project one can nearly always find the assertion that the Gorleben site was selected and investigated without participation of the public and of the local municipalities. That this assertion is really wrong was again documented in a recent publication [Grill 2005]. Only a few examples of the involvement of the public should be cited here:

- The State Government of Lower Saxony organised a large public meeting – entitled "Rede – Gegenrede" – in March/April 1979 which was chaired by Professor Carl Friedrich von Weizsäcker and in which many national and international scientists participated.
- In the local area of Gorleben, information centers were installed and operated by the Federal as well as by the State Government.
- The councils of the local municipalities and of the county participated in the process of development of intentions.
- In 1978 a special "Gorleben Commission" was established in which all municipalities were represented in order to comment on all ongoing activities.
- Numerous public information and discussion meetings were held.

In the late 70's and early 80's, of course, the available methods and instruments for the involvement of the local and regional population were not that advanced like they are today [NEA 2002, 2003]. Nevertheless, one cannot assert that there was no involvement at all of the local population in the early days of the Gorleben project.

In Sweden, the siting of a deep geologic repository started in 1992 when SKB submitted the third R&D-programme required by the Swedish law. Extensive screening of the country was conducted in parallel to feasibility studies in selected municipalities. SKB wrote letters to all municipalities in the country and informed about the intention to start the siting process. These letters were supplemented by

oral presentations to about 20 municipalities that expressed interest for more information. In eight municipalities agreements were reached to conduct feasibility studies. The purpose of the feasibility studies was to identify potential sites for a repository and to get an overview of the impact (positive and negative) a disposal facility would have in the municipality and its neighbourhood and they were based on existing data. The studies were closely followed by reference groups set up by the municipalities and representing the local interests. The scope of the studies was discussed in these reference groups and with representatives of the municipalities. The results were published in printed reports that were made available free of charge to anyone. The results were also presented at local meetings and to the local press. SKB ran local offices in municipalities's centers that were open to the public. The feasibility studies were lasting from two years to five years. In two municipalities the studies were followed by local referenda, which both resulted in majority votes against continuation with site investigations in those municipalities. In 2000 SKB submitted an integrated report of the progress so far documenting the method and siting of a geologic repository for spent nuclear fuel [SKB 2000]. This report identified three municipalities where SKB wanted to perform site investigations including drilling of deep boreholes. The report was accepted by the authorities and by the government. Two of the three municipalities also accepted the start of site investigations whereas the municipality council in the third municipality said no.

Site investigations started on two sites in 2002 and should be completed in 2007. They will form the bases for preparation of applications for siting permit under the Environmental Code [Sweden 1998] and the Act of Nuclear Activities [Sweden 1984b]. These applications must include an environmental impact statement (EIS). Under the Environmental Code the EIS shall be prepared after extensive consultations with all affected parties. These consultations are organised by the local county board and involve the applicant (SKB), national and local authorities, local interest groups, representatives of affected landowners, neighbour municipalities. All issues brought up in this consultation process must be addressed by the applicant in the EIS. The consultations thus open up a way of formal and content-based influence from the local interests groups.

The process in Finland is similar to the one in Sweden. The main difference in the past was that site investigations with drilling started in five municipalities in the mid-1980's. An additional site was added about ten years later. These investigations were the base for selecting the Olkiluoto site in 2000 for further studies from underground.

It is worth noting that in both Finland and Sweden it has been much easier to get broad local support for the siting of repositories in municipalities that already have nuclear facilities than in other areas.

The objective of Nagra in Switzerland is to site, construct, and operate two types of repository: one for SF, vitrified HLW and long-lived intermediate level waste (HAA) and one for short-lived low and intermediate level waste (SMA). A nation-wide screening process has been performed for SMA over many years. Four sites were finally selected one of which was intensively investigated by geophysical and geological methods (seismic, mapping, boreholes). This was the site of Wellenberg in Kanton Nidwalden. The target geological formation at this site was the Valanginien marl of Tertiary age.

During the whole procedure of site selection and site investigation, Nagra involved the public by complete information on each step. Numerous public discussions were held. The local municipality – Gemeinde Wolfenschiessen – clearly supported the project. At a certain point in the procedure, Nagra had to apply at the Kanton for a permit to construct an exploratory adit at the Wellenberg site. According to the Swiss law system, the population of the concerned Kanton had the opportunity to vote in a referendum on the project.

In spite of all Nagra efforts to explain the necessity and the safety of the project and in spite of the positive attitude of the concerned municipality being in favour of the project, the population of Kanton Nidwalden voted "No" with a majority of 57.5% in the referendum on September 22, 2002. According to this vote, Nagra had to abandon the Wellenberg site.

Taking into account the experiences from this example, the Swiss Federal Parliament changed the relevant law. In the recently new formulation of the Swiss Atomic Act (Kernenergiegesetz), dated March 21, 2003, the site license is now declared to be solely in the sphere of federal competence. Thus, the site canton no longer holds veto rights. Instead, the cantons are to be more strongly involved in the site selection in the sense of a stakeholder involvement.

One lesson to be drawn from this mishap is that the circle of stakeholders to be involved in the continuous dialogue should not be too small, but should definitely include a larger group of organisations.

For other examples and more information see [COWAM 2003].

8 Recommendations to revitalise Gorleben and Konrad

Taking a resolution of the German Federal Council (Bundesrat) dated May 14, 2004 (see Annex 1) into account, confirming earlier ILK requests for a dual repository concept [ILK 2000] and evaluating the present situation in Germany as well as in comparable other countries with radioactive waste disposal programmes, ILK recommends the following steps:

8.1 Gorleben

- There is no scientific or technical reason for the moratorium on underground exploration; it is to be lifted as soon as possible. Only when the results of the underground exploration will be available in total will it be possible to come to a final judgement on the suitability of the Gorleben salt dome to host a repository for radioactive waste.
- In parallel to the resumption of the underground exploration, the implementer of the project – BfS at present – shall immediately start with the elaboration of a TSPA for the Gorleben project:
  - Based on the information already collected a preliminary comprehensive geoscientific descriptive model of the Gorleben site shall be elaborated.
  - A first preliminary design of a repository at Gorleben shall be made based on existing data.
  - The internationally used models for a TSPA shall be evaluated and the best suited models shall be selected and applied for the Gorleben project.
  - After finishing this TSPA it shall be submitted for independent review by German Authorities as well as by a Review Team with international participation.
- The TSPA shall be updated when new data will be available for a stepwise procedure.
- It shall be evaluated if in parallel to the ongoing underground exploration, an URL for salt formations can be established in the Gorleben exploration mine. The objectives of this URL including all necessary experiments have to be newly and clearly defined according to the results of the TSPA (see chapter 6).

8.2 Konrad

- All steps necessary to immediately start construction of the repository in case of a positive court decision shall be prepared from now on with high priority.

8.3 Organisation

The organisation structure for implementation and regulation of radioactive waste disposal in Germany should be revised in the sense of Articles 20 and 21 of the "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management" [IAEA 1997]. This demands in particular a clear separation between the constructor and operator of the final repository on the one hand and the licensing and regulatory authority on the other.

- It is highly recommended that a new industrially organised and operating entity takes on the site selection, license application, construction and operation of final repositories. The utilities operating nuclear power plants should play a central role and take over more responsibilities in this regard.

- The licensing authorities, being trustees of the public and representing institutional continuity, should accompany the site selection process from the beginning and should be involved in the information exchange. This could also ensure that the site selection procedure and the licensing procedure are coordinated.

- In addition to public participation provided for within the licensing procedure, a framework for the transparent dialogue and communication shall be established between stakeholders: implementer, Federal and State authorities, local government (municipality, county, state), affected local and regional interest groups.

8.4 Conclusion

All the recommended steps listed above can be realised within the next three to five years. Using the TSPA methodology, important milestones in the programme can be established and reached.

With the ILK recommendations, the German programme for disposal of radioactive waste in deep geological formations can be revitalised, brought back to a world-wide leading level, and organised and operated in such a form as to start operation of the necessary repositories in due time and not to postpone responsibility to future generations.

Recommendation

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Bilaga 2: Sammandrag av avgivna utlåtanden och de åsikter som framfördes vid ett offentligt möte.
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Recommendation

10 List of Abbreviations

AkEnd	Arbeitskreis Auswahlverfahren Endlagerstandorte (Committee on a Selection Procedure for Repository Sites)
Andra	L'Agence nationale pour la gestion des déchets radioactifs (French National Agency for Radioactive Waste Management)
ASN	Autorité de Sûreté Nucléaire (French safety authority)
BfS	Bundesamt für Strahlenschutz (Federal Office for Radiation Protection)
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Geological Survey)
BGS	British Geological Survey
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
BMWA	Bundesministerium für Wirtschaft und Arbeit (Federal Ministry for Economics and Labour)
CEA	Commisariat à l'Energie Atomique
CFR	Code of Federal Regulations (USA)
COWAM	EU Project: Comparison of decision making processes at the local and regional community level in nuclear waste facility siting
DBE	Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH (German Company for the Construction and Operation of Waste Repositories)
DOE	United States Department of Energy
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (USA)
FEPs	Features, Events and Processes
HAA	hochaktive Abfälle (high level waste)
HLW	High Level Waste
HSK	Hauptabteilung für die Sicherheit der Kernanlagen (Safety authorty in Switzerland)
HTR	Hochtemperaturreaktor (high-temperature reactor)
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IEG	International Expert Group Gorleben

ILK	Internationale Länderkommission Kerntechnik (International Committee on Nuclear Technology)
IPSN	Institut pour Sûreté Nucléaire, France
JNC	Japan Nuclear Development Corporation
Nagra	Nationale Genossenschaft für die Lagerung radioaktiver Abfälle (Swiss National Cooperative for the Disposal of Radioactive Waste)
NEA	Nuclear Energy Agency of the OECD
NRC	Nuclear Regulatory Commission in USA
Ondraf/Niras	Nuclear waste management organisation in Belgium
POSIVA	Finnish Nuclear Fuel and Waste Management Company
SF	Spent Fuel
SKB	Svensk Kärnbränslehantering AB (Swedish Nuclear Fuel and Waste Management Company)
SKI	Swedish Nuclear Power Inspectorate
SKN	Nuclear Waste Management Board in Sweden – merged with SKI in 1992
SMA	schwach- und mittelaktive Abfälle (low and medium level waste)
SSI	Swedish Radiation Protection Authority
STUK	Safety and radiation protection authority in Finland
TAC-AECL	Technical Advisory Committee to the Atomic Energy of Canada Limited
TRU	Transuranic
TSPA	Total Systems Performance Assessment
UKAERA	United Kingdom Atomic Energy Research Establishment
UK-Nirex	Waste disposal organisation in UK
UKNRPB	United Kingdom National Radiation Protection Board
URL	Underground Research Laboratory
USNAS	United States – National Academy of Science
VTT	Technical Research Centre in Finland
WATRAP	Waste management Assessment and Technical Review Programme of the IAEA
WIPP	Waste Isolation Pilot Plant – repository in New Mexico, USA
YM	Yucca Mountain – Site for proposed repository in Nevada, USA

Recommendation

Annex 1: Resolution of the German Federal Council (Bundesrat) dated May 14, 2004

The German Federal Council (Bundesrat) already adopted a resolution on May 14, 2004 [Germany 2004b] with the following main statements:

1. The Bundesrat affirms that the well-ordered and safe disposal of all types of radioactive waste in deep geological formations is a national duty.

2. The Bundesrat rejects the single repository concept pursued by the Federal Government in correspondence with the method of procedure adopted by other European states.

3. The Bundesrat is in favour of the immediate completion and commissioning of the "Konrad mine" as a final repository for wastes generating negligible heat as soon as the land planning decision issued in May 2002 can be executed.

4. The Bundesrat calls upon the Federal Government to ensure that the necessary development works are undertaken to rapidly prepare a final repository for heat generating waste.

5. The Bundesrat therefore calls upon the Federal Government

   - to lift the moratorium on exploratory investigation of the Gorleben salt mine and to undertake exploratory works promptly and without prejudgment, but with the aim of delivering a definitive statement on the suitability of Gorleben as a possible final repository for heat generating waste, and

   - in the event that Gorleben should prove unsuitable, to undertake a selection procedure to determine another location for a final repository for heat generating waste.

6. The Bundesrat calls upon the Federal Government to open the Gorleben exploratory mine in coordination with the state of Lower Saxony as a research and competence center accessible to national and international experts as well as to interested members of the public.

Annex 2: Time horizon and dose to future populations

The following table summarizes the dose limits and/or risk limits prescribed or proposed in some countries and also indicates different time periods for compliance and assessment, respectively.

Time horizon and maximum permissible dose

Country	Dose limit mSv/year	Risk limit (1/year)[5]	Compliance time Years	Assessment time Years
Germany (regulation)	0.3	-	-	-
Germany (draft)	0.1[1] / 1.0[2]		10^6	10^6
Finland	0.1	-	≈ 5,000	-
France	0.25	-	10,000	-
Sweden rep ind[3]	0.015	10^{-6}	> 1,000	10^6
Sweden max ex[4]	0.15	10^{-5}	> 1,000	10^6
Switzerland	0.1	-	unlimited	unlimited
USA-WIPP	0.15	-	10,000	-
USA-YM	0.15	-	10,000	-
USA-YM (draft)	0.15	-	10,000	-
USA-YM (draft)	3.5	-	10^6	-
IAEA (draft)	0.3	≈ 10^{-5}	-	-

[1] for probable scenarios
[2] for less probable scenarios
[3] representative persons in the group subjected to the greatest risk
[4] maximum exposed individual
[5] probability for later development of a radiation-induced major health impairment (cancer/genetic mutation)

The following comments belong to this Table:

- In Germany, the present regulation prescribes a maximum dose limit of 0.3 mSv/year (300 µSv/year) originating from a repository to future individuals [Germany 1983]. No time frame – neither for compliance nor for assessment – was ever fixed in regulations. The "Safety Criteria for Disposal of Radioactive Waste in a Repository" originating from 1983 were revised meanwhile. This new draft dating October 2003 sets a dose limit of 0.1 mSv/year for an individual for the most likely scenario and of 1 mSv/year as a guide number for less likely scenarios. The time frame for compliance and assessment is fixed with 1 million years. This draft, in spite of dating October 2003 was, however, not published until today for unknown reasons.

- Finnish law gives a dose limit of 0.1 mSv/year to be applied for a few thousand years – here interpreted as 5,000 years [Finland 1999]. After that the outflow of radionuclides from the repository is used as a safety indicator in the long-term assessment. Derived values for different groups of radionuclides are given by the authority STUK.

- In France, the safety regulation RFS III.2.f requires a compliance with a 0.25 mSv/year dose constraint up to 10,000 years. For the time beyond 10,000 years the value of 0.25 mSv/year is conserved as a reference value [France 1991b].

- In Sweden the regulation from SSI gives a risk limit of 10^{-6} per year for representative persons in the group exposed to the greatest risk [SSI 1998][1]. For the maximum exposed individual the risk may be permitted to be a factor of ten larger. These risks are converted to dose using the ICRP risk factors of 0.073 per Sievert for cancer and hereditary effects. The compliance time prescribed by SSI is at least 1,000 years but the potential safety impacts must be assessed for longer time periods. The assessment time is limited to 1,000,000 years in the SKI regulation although some general discussion of what happens after that time should also be included in the safety report [SKI 2002].

- In Switzerland, the regulatory guideline HSK-R-21 requests that the release of radionuclides from a sealed repository resulting from processes and events reasonably expected to happen shall at no time give rise to individual doses which exceed 0.1 mSv per year [HSK 1993].

- In the United States, there exist two different sets of regulation, but both with the same dose limit and compliance time:

  - The Waste Isolation Pilot Plant (WIPP) was licensed by EPA with its regulation from 1996 [EPA 1996] which prescribes exact containment standards for each radionuclide, but which also fixes the maximum dose to 0.15 mSv/year for the compliance time of 10,000 years.

[1] SSI`s choice of risk in the regulation reflects the fact that scenarios behind exposure may have a variety of probabilities. The alternative would have been a limit on the expectation value of dose. Also, risk was deemed a quantity easier to convey in a societal context

- In 2001, EPA issued standards specifically for Yucca Mountain [EPA 2001] with the same dose limit of 0.15 mSv/year and the same compliance time of 10,000 years. Within the Environmental Impact Statement (EIS) dose calculations must be performed either until peak dose or for 1,000,000 years. In a decision of the US Court of Appeals in July 2004, however, the 10,000 years compliance time was rejected. The solution for this question is open at present[1].

- The IAEA is presently drafting new Safety Requirements for Geological Disposal of Radioactive Waste. In the latest draft, it is stated: "The estimated average dose or risk to members of the public, who may be exposed as a result of the disposal facilities in the future, shall not exceed a dose constraint of more than 0.3 mSv in a year or a risk constraint of the order of 10^{-5} per year."

There seems to be international agreement that safety assessments may be performed for time periods up to approx. 1 million years, and that the dose to future exposed groups should stay much below 10 - 20 % of the natural background.

[1] EPA has recently proposed a dose limit of 0.15 mSv/year (150 µSv per year) for the timeframe up to 10,000 years and of 3.5 mSv/year (3,500 µSv per year) for the timeframe beyond 10,000 years up to 1,000,000 years

Recommendation

Annex 3: Reversibility and retrievability

The issues of "reversibility" and "retrievability" originate from the discussion of radioactive waste disposal under the viewpoint of **ethics**. These ethical discussions meanwhile generated two "schools" with regard to waste disposal:

- One school takes the viewpoint that the generation which benefited from nuclear power – especially by producing electricity – also has the responsibility and the obligation to safely dispose of all amounts of radioactive waste which were generated through the use of nuclear power. Disposing of waste thus means to take decisions now and not to transfer open questions and undue burdens to future generations.

- The second school takes the view that disposal of radioactive waste should be performed in a reversible manner including the possibility to easily retrieve the emplaced waste from the repository. This procedure shall give the option to future generations to take their own decisions with regard to a possible future use of what is considered waste today and to backfill and seal the repository with technologies to come and at times which will appear appropriate to future generations.

Both schools are represented today with technical concepts. Sweden, Finland, and Germany e.g. include immediate backfilling and sealing in their waste disposal concepts. Disposal approaches including reversibility and retrievability were developed for the Yucca Mountain project in the US and for the French repository project to be located in a shale formation. This last keyword already indicates that the disposal concept – reversible or not – is depending to a certain degree on the geological host formation.

In Germany, it was already decided in the early 60's to investigate salt formations for their suitability to hosting a radioactive waste repository. Salt formations do have two important advantages compared to other possible host rocks:

1. Salt formations do not contain any groundwater – they are free of water.
2. Salt has plastic deformation behaviour – it creeps under load without ruptures. This plasticity even increases with rising temperatures.

The objective of making use of these two advantages – especially for the disposal of heat generating high level waste in salt – would be thwarted by including reversibility into the respective repository concept. Following these same lines of argu-

mentation, the layout and the operation of the WIPP repository in the US, also located in a salt formation, does **not** include reversibility of the emplaced TRU waste.

For the purpose of information, it should be mentioned here that three repositories for the disposal of chemical waste are successfully operated in Germany since many years – all three of them located in salt formations. The respective regulations for operating these repositories even require that they have to be located in salt formations because only these enable the complete inclusion of the waste.

Finally, it should be mentioned here that it also would be possible to retrieve waste packages from a backfilled and sealed repository in salt. Respective technologies are available or can be developed. Retrieving waste is thus an issue of which technology has to be applied and which amount of money one is willing to spend. Additionally, the waste can be relatively easily retrieved during the operating period of the repository as long as shafts and main drifts are still open.

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ILK Publications

ILK-01 ILK Statement on the Transportation of Spent Fuel Elements and Vitrified High Level Waste (July 2000)

ILK-02 ILK Statement on the Final Storage of Radioactive Waste (July 2000)

ILK-03 ILK Statement on the Safety of Nuclear Energy Utilisation in Germany (July 2000)

ILK-04 ILK Recommendations on the Use of Probabilistic Safety Assessments in Nuclear Licensing and Supervision Processes (May 2001)

ILK-05 ILK Recommendation on the Promotion of International Technical and Scientific Contacts of the Nuclear Safety Authorities of the German States (October 2001)

ILK-06 ILK Statement on the Draft Amendment dating from July 5, 2001 to the Atomic Energy Act (October 2001)

ILK-07 ILK Statement on Reprocessing of Spent Fuel Elements (November 2001)

ILK-08 ILK Statement on the Potential Suitability of the Gorleben Site as a Deep Repository for Radioactive Waste (January 2002)

ILK-09 ILK Statement on the General Conclusions Drawn from the KKP 2 Incidents associated with the Refueling Outage of 2001 (May 2002)

ILK-10 ILK Statement on the Handling of the GRS Catalog of Questions on the "Practice of Safety Management in German Nuclear Power Plants" (July 2002)

ILK-11 ILK Recommendation on Performing International Reviews in the Field of Nuclear Safety in Germany (September 2002)

ILK-12 Internal ILK-Report on the Intentional Crash of Commercial Airliners on Nuclear Power Plants (March 2003)

ILK-13 ILK Statement on the Proposals for EU Council Directives on Nuclear Safety and on Radioactive Waste Management (May 2003)

ILK-14 ILK Statement on the Recommendations of the Committee on a Selection Procedure for Repository Sites (AkEnd) (September 2003)

ILK-15 ILK Recommendation on the Avoidance of Dependent Failures of Digital I&C Protection Systems (September 2003)

ILK Publications

ILK-16 ILK Statement on Sustainability Evaluation of Nuclear Energy and other Electricity Supply Technologies (January 2004)

ILK-17 ILK Statement on Maintaining Competence in the Field of Nuclear Engineering in Germany (March 2004)

ILK-18 ILK Summary Report of the 2nd International ILK Symposium „Harmonisation of Nuclear Safety Approaches – A Chance for Achieving more Transparency and Effectiveness?“ (May 2004)

ILK-19 ILK Statement on the Regulator's Management of the Licensee Self-Assessments of Safety Culture (January 2005)

ILK-20 ILK Statement on Requirements on Anticipated Transients without Scram (ATWS) (March 2005)

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ILK-22 ILK Recommendations on Requirements on Updated General Nuclear Regulatory Guidelines in Germany (July 2005)

ILK-23 ILK Statement on determining Operating Periods for Nuclear Power Plants in Germany (September 2005)

ILK-24 ILK Statement on the Utilization of Nuclear Energy in Germany (November 2005)

ILK-25 ILK Recommendation on the Revitalisation of the Repository Projects Gorleben and Konrad (November 2005)

- CD with presentations held at the ILK Symposium "Opportunities and Risks of Nuclear Power" in April 2001
- Proceedings of presentations held at the 2nd ILK Symposium "Harmonisation of Nuclear Safety Approaches – A Chance for Achieving more Transparency and Effectiveness?“ in October 2003

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