INTERIM STORAGE OF SPENT NUCLEAR FUEL IN GERMANY – SITUATION, STATE OF LICENSING PROCEDURES, PROSPECTS –

Bruno R. Thomauske
Federal Office for Radiation Protection (BfS)
P. O. Box 10 01 49
D – 38201 Salzgitter, Germany

ABSTRACT

The German Government has decided, in accordance with the utilities, a phase out of nuclear power. In context with this change in energy policy, a new waste management concept was developed. An "Agreement between the Federal Government and the Utility Companies" was initialled on June 14, 2000 and finally signed on June 11, 2001. The disposal of radioactive waste shall be restricted to direct final disposal. As from July 1, 2005, transports to the reprocessing plants at La Hague in France and Sellafield in Great Britain will be prohibited. The goal is to establish a geological repository for radioactive waste starting operation by 2030. Up to this, interim storage of spent fuel shall be performed. Both sides agreed, that the utilities shall set up interim storage facilities on the site or in the vicinity of the power plants as soon as possible. Both parties assume that the on-site interim storage facilities will be ready for operation within a period of time of five years at the most.

From end of 1998 to end of 2000, eighteen new applications for on-site interim storage facilities have been filed (12 storage buildings, one storage tunnel and 5 interim storage areas) at 13 nuclear power plant sites in five federal states. One application for the interim storage facility at Stade has been withdrawn in August 2001. The final shut down of Stade nuclear power plant is foreseen for 2003. An application for the decommissioning has been submitted in June, 2001. As a consequence, there is no further need for a on-site storage facility at Stade. The mass of heavy metal (HM) applied varies between 300 Mg and 2,250 Mg for on-site storage facilities and between 120 Mg and 300 Mg for interim storage areas.

The applications represent three design concepts. The storage building concept exists in two technical variants, the WTI concept (a storage hall designed by the company of consulting engineers **W**issenschaftlich-**T**echnische **I**ngenieurberatung GmbH) and the STEAG concept (a storage hall designed by the company STEAG encotec GmbH). The tunnel concept at Neckarwestheim was developed as a special solution due to site-specific conditions. The purpose of the interim storage area as the third technical concept is to bridge the period of about five years until the final on-site storage facility will be available.

The involvement of the public is an important element of the licensing procedure. There are significant regional differences in public interest and opposition. The number of objections varies between less than 2,000 against the storage facility at Brunsbüttel (Northern Germany) and more than 75,000 against the storage facility at Gundremmingen (Southern Germany). All together 250,000 objections have been raised against the on-site interim storage facilities.

A public participation for citizens of the Republic of Austria is carried out for the six interim storage projects located in the south of Germany with regard to transboundary environmental impact assessment.

In 2001, three on-site interim storage areas at Neckarwestheim, Philippsburg and Biblis have been licensed. It is the objective of the BfS to decide on the approvals by either granting or refusing a license for the interim storage facilities successively in the years 2002 and 2003. With an assumed construction period for the storage buildings of about two years, the on-site interim storage facilities could then be available around 2005.

INTRODUCTION

The German Government has decided, in accordance with the utilities, a phase out of nuclear power by limiting the standard lifetime of the nuclear power plants to 32 years from the date of commissioning. In context with this change in energy policy, a new waste management concept was developed. An "Agreement between the Federal Government and the Utility Companies" was initialled on June 14, 2000 and finally signed on June 11, 2001. An amendment of the German Atomic Energy Act was decided by the German Parliament (Bundestag) on December 14, 2001. It is expected to come into force during the next weeks. According to this so-called "Act for the Regulated Termination of the Commercial Use of Nuclear Power " (Gesetz zur geordneten Beendigung der Kernenergienutzung zur gewerblichen Erzeugung von Elektrizität) the disposal of radioactive waste shall be restricted to direct final disposal. As from July 1, 2005, transports to the reprocessing plants at La Hague in France and Sellafield in Great Britain will be prohibited. The goal is to establish a geological repository for radioactive waste starting operation by 2030.

Up to this, interim storage of spent fuel has to be performed. Both sides agreed, that the utilities will set up interim storage facilities on the site or in the vicinity of nuclear power plants as soon as possible. Both parties assume that the on-site interim storage facilities will be ready for operation within a period of time of five years at the most.

Spent fuel elements are intermediately stored in Germany in cooling basins under water inside the power plants as well as in external central or decentralized interim storage facilities. The internal storage facilities in cooling basins are licensed pursuant to § 7 Atomic Energy Act. The Federal Office for Radiation Protection (BfS) is responsible for the licensing of external interim storage facilities pursuant to § 6 Atomic Energy Act.

In Germany, there are currently two central and two decentralized interim storage facilities in operation. The central interim storage facilities Gorleben and Ahaus are able to take about 8,000 Mg heavy metal (Gorleben: 3,800 Mg heavy metal, Ahaus: 3,960 Mg heavy metal). The interim storage facility at Gorleben is the only one in the Federal Republic of Germany that has a license for the storage of vitrified high level radioactive waste from reprocessing of German fuel rods abroad.

At two sites decentralized interim storage facilities for spent fuel elements from power reactors have been in operation since 1999, one wet storage facility near Obrigheim as well as the Interim Storage Facility North (ZLN, 585 Mg heavy metal) at Rubenow at Greifswald for spent fuel originating from the decommissioned nuclear power plants at Greifswald and Rheinsberg. Another decentralized interim storage facility for spent fuel elements from the decommissioned AVR research reactor is located at Jülich.

The interim storage facility at Obrigheim was not licensed as independent nuclear facility pursuant to § 6 Atomic Energy Act but as part of the power plant pursuant to § 7 Atomic Energy Act. Unlike the cooling basins that are licensed pursuant to § 7 Atomic Energy Act as well, this wet storage facility is located outside the reactor building.

From the 19 German nuclear power plants approximately 500 Mg of spent fuel elements are annually discharged. All together spent fuel of approximately 12,000 Mg of heavy metal is produced – besides the spent fuel elements transported to reprocessing – during the phase of nuclear energy use, which is clearly limited now. A capacity of altogether 7,760 Mg of heavy metal exists in the central interim storage facilities Ahaus and Gorleben. This makes additional storage capacity for fuel elements necessary. The question is, therefore, not “if” but only “how” or with which technical design and at which sites further interim storage capacity will be created (1).

To avoid transports, it would make sense to establish new interim storage capacity at the site of a future repository. By that time it cannot be known however, at which site a repository suitable for high level waste will be set up.

Since 1979 the Gorleben salt dome has been explored. In the opinion of the Federal Government, there are doubts with regard to the suitability as a final repository. Until planning and safety-related issues have been clarified, its exploration has been interrupted in October 2000 for at least 3 years, at most however 10 years. This time is also used to determine criteria and a selection procedure for a repository site. The Federal Ministry for the Environment, Nature Conservation and Reactor Safety has appointed a group of scientists (called AkEnd) to develop scientifically founded criteria as well as a selection procedure for appropriate siting of a repository for radioactive waste. The recommendation of the AkEnd is expected by end of this year. After a phase of political and legal implementation, the site selection is expected to start in 2005.

CONCEPT OF DECENTRALIZED INTERIM STORAGE

The set up of interim storage capacity at the site of production of spent fuel results in a minimization of the number of transports (2). When a repository will be available, the spent fuel elements can be transported directly from the site of their production to the site of the final repository. With central storage facilities, additional transports from the power plant to the central storage facility and from there to the future repository site would be necessary.

From end of 1998 to end of 2000, new applications have been filed for on-site storage facilities (12 storage buildings, one storage tunnel and 5 interim storage areas) at 13 nuclear power plant sites in five federal states (see Figure 1).

Already in December 1998 the Kernkraftwerk Lippe-Ems GmbH applied to BfS for the granting of a license for an interim storage facility for the storage of spent fuel elements at Lingen (Emsland). From November 1999 until November 2000 another seventeen applications for the granting of a license pursuant to § 6 Atomic Energy Act for interim storage of spent fuel elements in decentralized interim storage facilities were submitted to BfS. One application for the interim storage facility at Stade has been withdrawn in August 2001. The final shut down of Stade nuclear power plant is foreseen for 2003. An application for the decommissioning has been submitted in June, 2001. As a consequence, there is no further need for a on-site storage facility at Stade. The mass of heavy metal applied varies between 300 Mg and 2,250 Mg for on-site storage facilities and between 120 Mg and 300 Mg for interim storage areas (see Table I and Table II).

The spent fuel elements are to be stored until they will be disposed of in a repository, at the most, however, for 40 years. Since the plans of the Federal Government aim at having a repository ready for operation around the year 2030, the applications for on-site interim storage facilities have been adapted by the utilities from originally without time restriction of the operational phase to 40 years, beginning with the emplacement of a first cask of spent fuel elements. The aim of this reduction was an increase of acceptance by the people living in the area of nuclear power plant sites. There it is feared that the interim storage facilities will end as "repositories".

On-site interim storage facilities are limited to the storage of spent fuel elements from the neighboring nuclear power plant. It is not planned to store spent fuel elements from other plants or high-level radioactive waste from reprocessing. The application for the Biblis interim storage facility, where fuel elements from Biblis as well as fuel elements from the decommissioned Mülheim-Kärlich power plant shall be stored, is an exception to this.

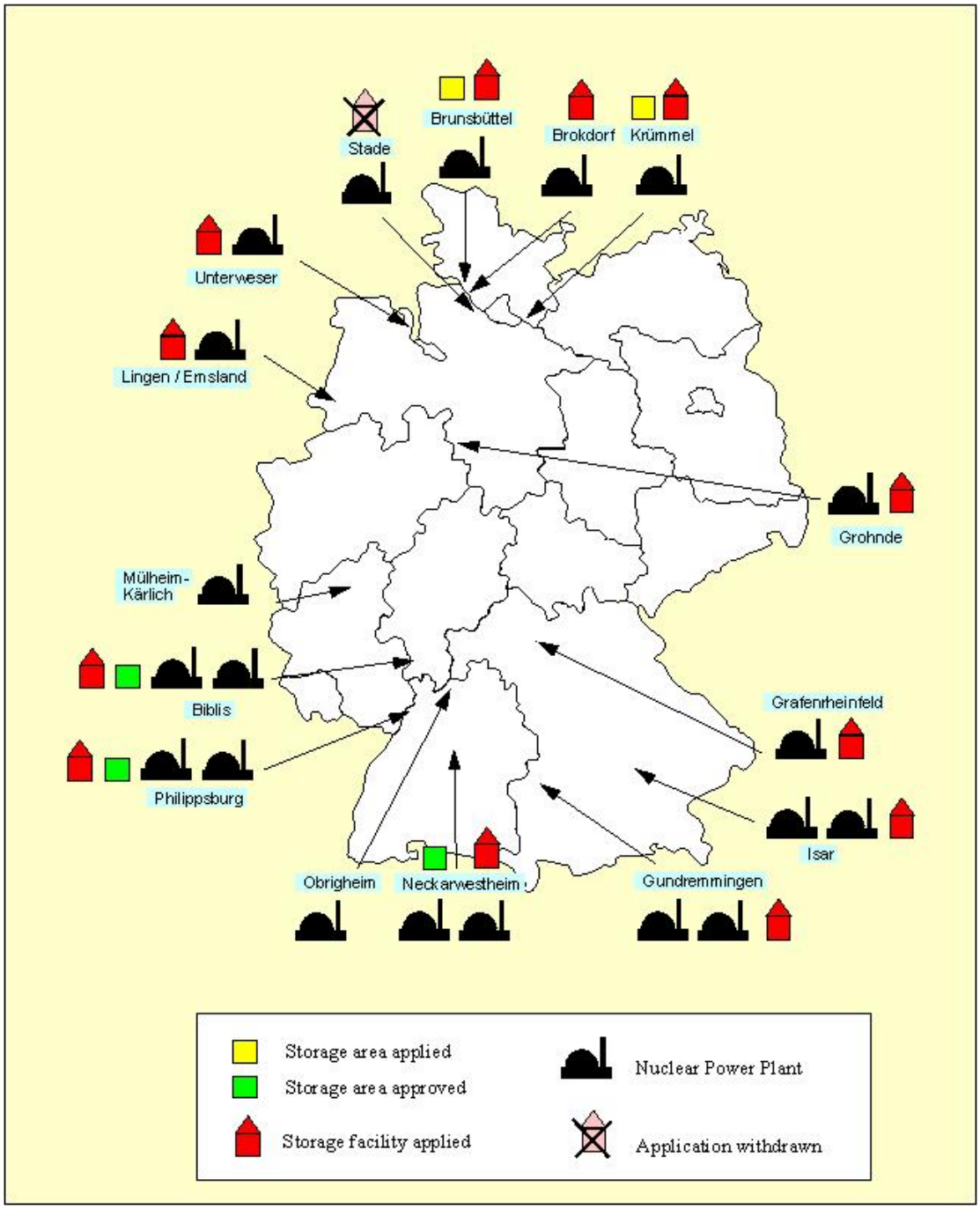

Fig. 1. On-Site Dry Interim Storage in Germany

Table I. Applications for On-Site Interim Storage Facilities

Nuclear power plant Federal state	Applicant Date of application	Mass HM [Mg]	Activity [Bq]	Thermal Capacity [MW]	Number of positions for casks
Biblis Hesse	RWE Power AG 23.12.1999	1,600	8.5×10^{19}	6.3	135
Brokdorf Schleswig-Holstein	E.ON Kernkraft GmbH 20.12.1999	1,000	8.0×10^{19}	3.75	100
Brunsbüttel Schleswig-Holstein	Kernkraftwerk Brunsbüttel GmbH 30.11.1999	300	4×10^{19}	1,2	80
Grafenrheinfeld Bavaria	E.ON Kernkraft GmbH 23.2.2000	800	5×10^{19}	3.9	88
Grohnde Lower Saxony	E.ON Kernkraft GmbH 20.12.1999	1,000	8.0×10^{19}	3.75	100
Gundremmingen Bavaria	RWE Energie AG 25.2.2000	2,250	2.7×10^{20}	7.4	192
Isar (Ohu) Bavaria	E.ON Kernkraft GmbH 23.2.2000	1,500	1.5×10^{20}	6.4	152
Krümmel Schleswig-Holstein	Kernkraftwerk Krümmel GmbH 30.11.1999	800	1.2×10^{20}	3.2	80
Emsland (Lingen) Lower Saxony	Kernkraftwerke Lippe-Ems GmbH 22.12.1998	1,250	1×10^{20}	5	130
Neckarwestheim Baden-Württemberg	Gemeinschaftskernkraft-werk Neckar GmbH 20.12.1999	1,600	1×10^{20}	3.5	151
Philippsburg Baden-Württemberg	EnBW Kraftwerke AG 20.12.1999	1,600	1.5×10^{20}	6.4	152
Unterweser (Esenshamm) Lower Saxony	E.ON Kraftwerk GmbH 20.12.1999	800	6.4×10^{19}	3.0	80

HM = Heavy Metal

Table II. Applications for On-Site Interim Storage Areas

Nuclear power plant Federal state	Applicant Date of application	Mass HM [Mg]	Activity [Bq]	Thermal Capacity [MW]	Number of positions for casks
Neckarwestheim Baden-Württemberg	Gemeinschaftskernkraft-werk Neckar GmbH 20.12.1999	250	1.5×10^{19}	0.95	24
Philippsburg Baden-Württemberg	EnBW Kraftwerke AG 20.12.1999	260	3×10^{19}	0.96	24
Krümmel Schleswig-Holstein	Kernkraftwerk Krümmel GmbH 15.8.2000	120	1.5×10^{19}	0.48	12
Brunsbüttel Schleswig-Holstein	Kernkraftwerk Brunsbüttel GmbH 15.8.2000	140	1.6×10^{19}	0.67	18
Biblis Hesse	RWE Power AG 30.11.2000	300	7.6×10^{18}	0.7	28

TECHNICAL CONCEPTS FOR ON-SITE INTERIM STORAGE FACILITIES

The applications for a license represent three basic concepts:

Storage Building

The storage building concept exists in two technical variants (see Figure 2), the WTI concept (3, 4) and the STEAG concept (5, 6, 7):

a) STEAG concept (a storage hall designed by the company STEAG encotec GmbH), characteristic: thick concrete structures, wall thickness approximately 1.2 m, roof thickness approximately 1.3 m, one-nave building,

b) WTI concept (a storage hall designed by the company of consulting engineers **W**issenschaftlich-**T**echnische **I**ngenieurberatung GmbH), hall similar to the storage facilities at Gorleben, Ahaus and Lubmin/Greifswald, characteristic: wall thickness approximately 0.7 m or approximately 0.85 m, respectively, roof thickness approximately 55 cm, two-nave building, consisting of two halls separated by a wall.

The STEAG concept has been applied for the 6 North German sites of Brokdorf, Krümmel, Brunsbüttel, Grohnde, Lingen and Unterweser. The WTI concept has been applied for the 5 sites of Biblis, Philippsburg, Grafenrheinfeld, Isar and Gundremmingen located in the southern part of Germany.

Supporters of the WTI concept argue that the concept has proved worthwhile for approximately 15 years. Operational experience has been gained for many years on the basis of which technical and economic optimizations could be made (3). The STEAG concept was developed with regard to the use of future and may be cheaper generations of casks. While today transport and storage casks shall already guarantee safety in the case of an airplane crash, the utilities plan to take credit of the thick concrete structure of the STEAG concept when using future cask designs. The strengthened building structure should serve as an additional barrier corresponding to the multiple barrier principle in nuclear engineering.

As in the existing central storage facilities, the control of the pressure and, thus, the tightness of the storage casks is guaranteed in on-site storage facilities and storage areas as well.

From the point of view of licensing and safety there is no difference in the requirements for decentralized and central interim storage facilities. In the case of decentralized storage facilities, however, possible interactions with the neighboring nuclear power plant must be examined and verified additionally.

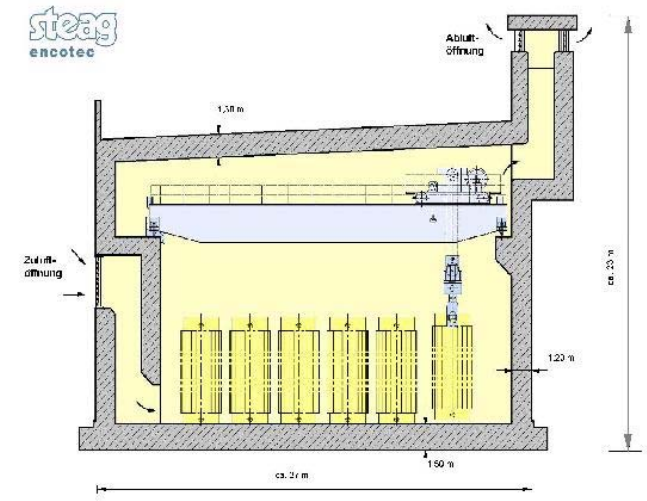

Fig. 2. Concept Variants for On-Site Interim Storage Buildings (Cross Section)

Storage Tunnel

In Neckarwestheim, on-site storage in two tunnel tubes lined with concrete is planned (8). This special solution below ground was developed due to site-specific conditions. It has the advantage that no increase of radiation exposure will occur in the environment, in spite of the increase of activity at the site. This solution, nevertheless, does not mean at all final disposal – as is feared in the region . At this site neither the rock formation is suitable nor is there a depth of several hundred meters in the underground that would be necessary for a repository.

Interim Storage Area

In interim storage areas the storage casks (type CASTOR or type TN) are stored on an defined area on the power plant terrain. In contrast to storage in upright positions in interim storage buildings, horizontal storage of the casks on concrete slabs has been applied for interim storage areas. To shield gamma and neutron radiation and as protection against the weather, each cask is covered by prefabricated concrete elements (see Figure 3).

Since the only purpose of the interim storage area is to bridge the period until the 40-year on-site storage facility is ready for operation, a low number of 12 to 28 casks is characteristic. Due to the flat storage and the covering of the single storage container this concept requires relatively much space and is, thus, only suitable for a low number of casks, because of the narrow space available at power plant sites. It has the advantage of a short construction period of about 1 to 2 months.

Fig. 3. Interim Storage Area Neckarwestheim

LEGAL BASIS AND LICENSING PROCEDURE

The basis for the licensing of decentralized and central interim storage facilities is § 6 Atomic Energy Act. The license for the storage pursuant to § 6 Atomic Energy Act must be granted if the licensing requirements are met.

The license pursuant to § 6 Atomic Energy Act is a pure storage license. For the construction of the storage facility a license pursuant to planning and building law according to the respective federal state building regulations is required additionally. Both interim and on-site storage facilities undergo an environmental impact assessment (EIA) when applied for after March 15, 1999.

The course of the licensing procedure pursuant to § 6 Atomic Energy Act is shown in Figure 4. It mainly consists of:

1. Procedure for the involvement of the public,
2. Verification of the licensing requirements,
3. Issuing of the notice of approval.

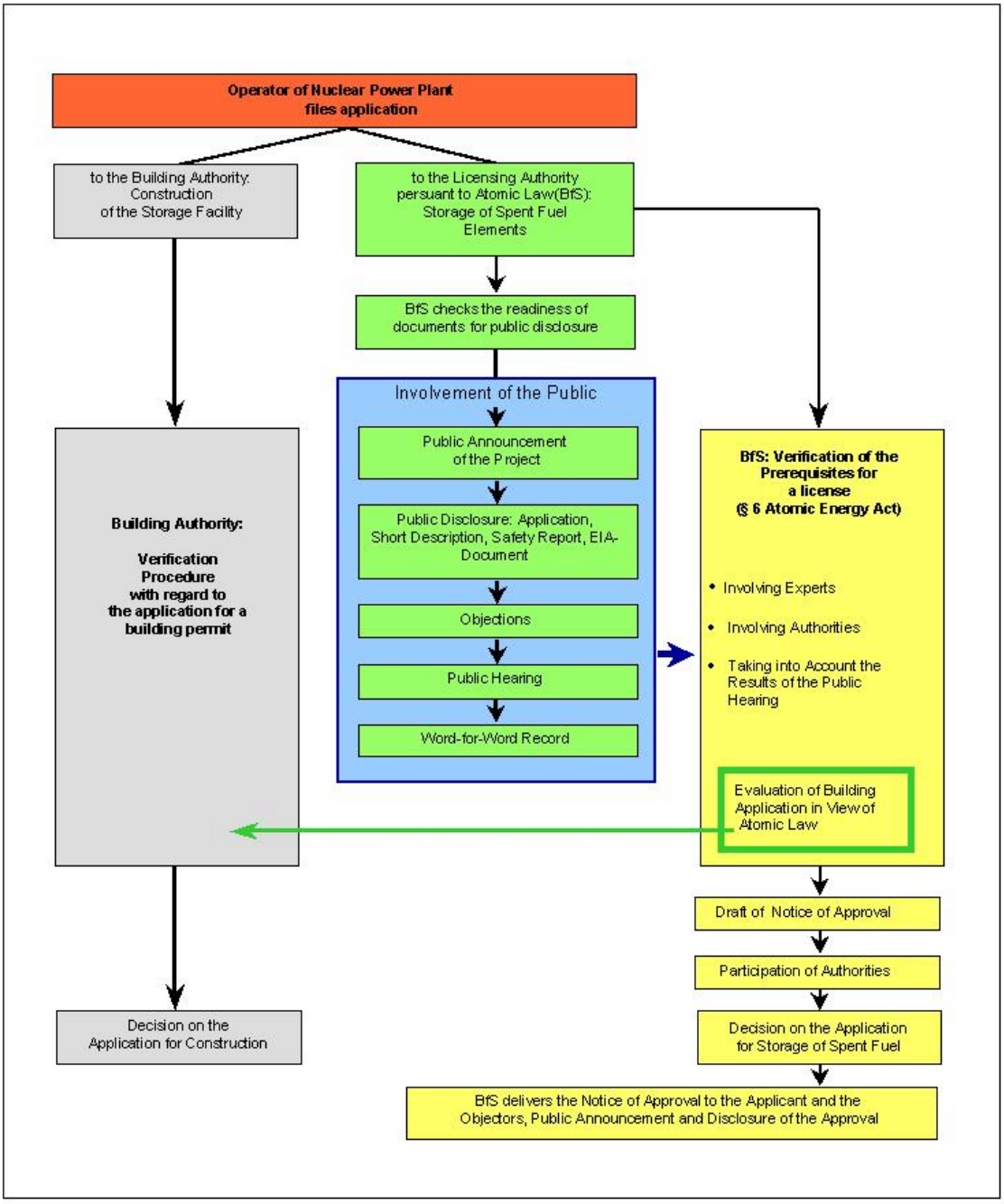

Fig. 4. Course of Licensing Procedure

Responsibilities in interim storage

The utilities as producers of radioactive waste are responsible for the development, construction and operation of interim storage facilities. They decide and determine

- when
- at which site and
- with which concept

they file an application for the licensing of an interim storage facility to the competent authority.

Responsible

- for the licensing of nuclear fuel storage is BfS;
- for the licensing of construction of a facility (storage building, storage tunnel, storage area and concrete encasements) is the respective federal state building authority and
- for the supervision during operation is the supervisory authority of the respective federal state.

Verification of the Prerequisites for Licensing

Pursuant to § 6 Atomic Energy Act the following prerequisites are required for a license:

1. Necessity for the storage of spent fuel.
2. Reliability of the applicant and the persons responsible for the direction and supervision of storage.
3. Necessary expert knowledge of the persons responsible for the direction and supervision of storage.
4. Necessary precaution against damages according to the state-of-the-art in science and technology.
5. Necessary precaution for the fulfilling of legal claims for damages.
6. Necessary protection against interference or other impacts by third parties.

With the amendment of the Atomic Energy Act, the necessity will be abolished as a prerequisite for licensing.

The "precaution against damages according to the state-of-the-art" is the most extensive complex to be verified. The following subjects have to be regarded, examined and verified:

- Safe enclosure of the radioactive inventory,
- Sufficient shielding,
- Subcriticality,
- Sufficient dissipation of decay heat.

Aircraft crashes and – following September 11, 2001– attacks with a highjacked big passenger plane are examined as well. Before September 11, 2001, only the crash of smaller military jets with much less amounts of kerosene have been put into consideration.

ENVIRONMENTAL IMPACT ASSESSMENT

At the beginning of the procedures it had been discussed controversially if an environmental impact assessment had to be carried out for on-site storage facilities and interim storage areas pursuant to § 6 Atomic Energy Act.

The legal verification performed by the Federal Office for Radiation Protection has revealed that according to the Amending Guideline 97/11/EC of the European Council of March 3, 1997, the implementation of an environmental impact assessment for the projects is compulsory. This results from the direct applicability of the EIA Amending Guideline after expiry of the implementation duty on March 15, 1999. Since the application for the Lingen on-site storage facility had been filed prior to this date, it does not require an environmental impact assessment.

The Act on the Assessment of Environmental Impacts (UVPG) and the EIA Amending Guideline 97/11/EC already mentioned are the legal bases for the implementation of the environmental impact assessment.

Possible effects of the project on man, animals, plants and their habitat as well as on soil, water, air and climate are verified. Possible effects on the scenery and cultural assets as well as interactions are to be considered additionally.

As already mentioned an interim storage facility requires a building permit pursuant to the respective federal state planning and building regulations as well as a license to store nuclear fuel pursuant to § 6 Atomic Energy Act. According to the European guidelines a standardized environmental impact assessment is required in the licensing procedures. Since the duty to perform an environmental impact assessment results from the storage of nuclear fuel and not from the construction of a building, BfS acts in overall charge pursuant to § 14 of the Act on the Assessment of Environmental Impacts. This leads to a standardized consideration of environmental impacts in the various licensing procedures (9).

Since only one environmental impact assessment has to be performed for the project as a whole, and a unique decision (regarding the assessment of environmental impacts) has to be made, both licensing procedures pursuant to Atomic Law and to Planning and Building Law are linked and completed almost simultaneously.

In the case of the procedure for the Interim Storage Facility North at Lubmin, where no environmental impact assessment was required, the building permit was granted in July 1994, the storage license pursuant to Atomic Energy Act was granted in November 1999. Such an early setting-up phase far before granting the license pursuant to Atomic Energy Act is not possible in procedures requiring an environmental impact assessment.

INVOLVEMENT OF THE PUBLIC

The public is involved in the performance of licensing procedures for interim storage of spent fuel on the basis of the Ordinance on Procedures under Atomic Law (AtVfV). The following steps are required:

- Announcement of the project in the Federal Gazette (Bundesanzeiger) and in local daily papers,
- Disclosure for public inspection: Certain documents concerning the project (application, short description, safety report and the EIA-report) have to be disclosed for public inspection for a period of two months. During the period of disclosure for public inspection objections against the project can be raised.
- Public hearing: The licensing authority must discuss the objections with the applicant and the objectors. The objectors have the opportunity to extend their objections and to explain them in greater detail. The discussion is not public.

The objections expressed and reinforced in the public hearing are considered by BfS and taken into account for the examination of the prerequisites and the decision expressed in the notice of approval.

INVOLVEMENT OF THE REPUBLIC OF AUSTRIA

A public participation for citizens of the Republic of Austria is carried out for the six interim storage facilities located in the south of Germany with regard to transboundary environmental impact assessment. The public disclosure in Austria for the storage facility at Isar nuclear power plant took place from September 10 to November 11, 2001. Austrian citizens have raised about 26,500 objections against this project, which is located at a distance of 60 km from the Austrian border. Following this, the Republic of Austria also asked for a participation in the procedures for the on-site storage facilities at Gundremmingen, Grafenrheinfeld, Neckarwestheim, Philippsburg and Biblis. The disclosures in Austria take place from November 26, 2001, to January 28, 2002, for Gundremmingen and from December 27, 2001, to February 26, 2002, for the other projects. BfS plans to carry out a public hearing for Austrian citizens in April, 2002, in Munich, Germany. The objections from Austrian or other foreign citizens will be considered in the same way as objections from German citizens.

STATUS OF LICENSING PROCEDURES

With the establishing of a project team BfS has created the personnel and organizational prerequisites for an effective, largely parallel and rapid performance of the licensing procedures (1). Up to now, cooperation with the applicants, experts and objectors has been good. The same applies to the cooperation with the federal state authorities competent for the building permits as well as for the competent supervisory authorities for the respective nuclear power plant as well as with the supervisory authorities that will in future be competent for the interim storage facilities .

Three Interim Storage Areas have been Licensed

In the year of 2001, BfS has granted three licenses according to § 6 Atomic Energy Act for interim storage areas at the sites of the nuclear power plants Neckarwestheim (on April 10), Philippsburg (on July 31) and Biblis (on December 20). As applied, each license comprehends only a first licensing step. As a consequence, the work for the licensing authority is not finished with the permission of the approval since the excluded parts of the application remain to be pursued. BfS has limited the time of storage of spent fuel to five years. The storage areas at Neckarwestheim and Philippsburg are already in operation. By this time, 6 casks of the type CASTOR V/19 loaded with spent fuel are stored at Neckarwestheim. At Philippsburg 2 casks of the same type have been emplaced.

The building permit for the storage area at Biblis has been granted in January 2002. According to the time schedule, the facility will start operation in March 2002.

The early realization of on-site interim storage capacity by erecting interim storage areas leads to an early minimization of CASTOR-transports to the central interim storage facilities Ahaus and Gorleben as well as to the possibility to avoid transports to La Hague.

Involvement of the Public in Germany has been Concluded

The public disclosures and hearings have been performed for all of the 17 procedures. The public hearing for the Lingen on-site storage facility took place in December 1999, the hearings for the storage areas Neckarwestheim and Philippsburg in October and November 2000. A relatively high number of 14 public hearings for nuclear facilities took place from May to November 2001. The atmosphere during the discussions was matter-of-fact and the hearings were completed properly as required by law.

Table III gives a comparative survey about the number of objectors and the duration of the public hearings.

Table III. Public Particpation Procedures, Statistics

Licensing Procedure	Public Disclosure		Public Hearing	
	Number of Objectors	Number of different forms of Letters of Objection	Duration in Days	Number of Objectors Attending the Hearing
Storage Facility Lingen	3,500	12	5	110
Storage Area Neckarwestheim	4,100	81	3	81
Storage Area Philippsburg	5,200	95	4	121
Storage Facility Brokdorf	1,700	30	2	26
Storage Area Brunsbüttel	1,900	13	2	24
Storage Facility Brunsbüttel	2,300	16	2	16
Storage Area Biblis	4,100	36	3	60
Storage Facility Biblis	5,800	43	4	49
Storage Facility Grohnde	9,600	36	3	83
Storage Facility Unterweser	17,400	63	6	138
Storage Area Krümmel	5,900	28	3	37
Storage Facility Krümmel	5,700	34	4	35
Storage Facility Isar	45,000	47	4	114
Storage Facility Grafenrheinfeld	44,500	41	3	67
Storage Facility Gundremmingen	76,000	252	7	566
Storage Facility Neckarwestheim	3,500	27	3	48
Storage Facility Philippsburg	7,800	43	5	97

The number of objections against the projects varies between 1,700 against the storage facility Brunsbüttel (located in Northern Germany) and 76,000 against the storage facility Gundremmingen (located in Southern Germany). Most objections have been raised against the Bavarian facilities. In total, about 250,000 objections have been raised against the 17 on-site storage facilities (without objections from Austrian citizens raised during the public disclosures in Austria). The duration of the public hearings varied between 2 and 7 days. The total duration of the17 hearings amounts to 63 days. The discussions have been attended by a total of 1,670 objectors. In addition, other persons took part in the public hearings such as representatives of site communities and political parties, reporters, legal advisors and experts engaged by objectors as well as interested citizens (not having raised an objection) and guests.

The following topics played a main role in the discussions at public hearings:

- The competence of the BfS as licensing authority combined with the question, whether § 6 or § 7 Atomic Energy Act would be the appropriate legal basis for on-site storage,
- Reliability and expert knowledge of the applicant,
- The necessary precaution against damages due to the storage of spent fuel,
- Safety and tightness of the storing casks, especially in the case of incidents / accidents,
- Aircraft crashes and terroristic attacks, and - following September 11, 2001 - attacks with a hijacked aircraft.

The objectors emphasized positively the good atmosphere during the discussions which was mainly matter-of-fact as well as the good equipment and infrastructure of the rooms provided for the objectors.

The discussed objections are now being verified by BfS and taken into account when evaluating the respective project.

Status of Verification of Licensing Prerequisites

The verification of the licensing prerequisites was started for all projects and is carried out in parallel as far as possible. The duration of licensing procedures mainly depends on the timing of submission of verifiable licensing documents by the applicants.

BfS has involved experts and ordered expert opinions for all projects with regard to safety of the facility, safety of the storage casks and environmental impact assessment. If expedient, the evaluation is performed in task complexes either for all projects or for the same type of projects (convoy evaluation).

Status of Elaboration of Notices of Approval

As already mentioned, BfS has granted three licenses for interim storage areas in 2001. Currently, BfS is elaborating the notices of approval for the storage facility Lingen (STEAG concept) and for the interim storage areas at the sites of Krümmel and Brunsbüttel. In addition, BfS started to elaborate the notice of approval for the storage facility at Grohnde (STEAG concept), Grafenrheinfeld (WTI concept) and Neckarwestheim (tunnel concept). It is the objective of BfS to decide on the approvals by either granting or refusing a license successively in the years 2002 and 2003.

Recently, more and more applicants took measures in order to expedite the issuing of a license by applying for a step-wise approval. Examples for this are the step-wise approval of storing in different transport and storage cask types, the step-wise approval of different loading procedures, specific thermal outputs or burn-up rates. The applicant of the Neckarwestheim interim storage area, for instance, limited the first approval step to one single variant of the CASTOR V/19. A restriction of the application volume leads to an earlier granting of the license and, thus, to an earlier possibility to erect and commission the on-site storage facility.

PUBLIC RELATIONS ACTIVITIES

In Germany like in many other countries, every nuclear facility and every licensing procedure pursuant to Atomic Law gives rise to criticism and protests in the public. BfS therefore performs an active and transparent public relations work accompanying the licensing procedures (10). BfS stays in continuous dialogue with the public and offers comprehensive information in the Internet (www.bfs.de). This includes the presentation of the actual status for each procedure as well as the publication of the notices of approval.

SUMMARY AND PROSPECTS

The goal of BfS to conclude all procedures for the involvement of the public in Germany in this year 2001 could be met. Another objective is to submit the notices of approval during the years 2002 and 2003. Essential prerequisite for this is, however, that the applicants submit verifiable licensing and verification documents in time.

With an assumed building time of approximately 2 years, the on-site storage facilities could be available around 2005.

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