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Implementation of the Obligations of the

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

First National Report of Switzerland
in Accordance with Article 32 of the Convention

April 2003

Executive Summary

Switzerland has currently two spent fuel management facilities and three radioactive waste management facilities. They comprise different interim storage facilities, waste treatment and conditioning installations, a collection centre for radioactive waste from medicine, industry and research, as well as two research reactors in the decommissioning stage.

The present report, after considering in detail the requirements laid down in the Convention, concludes that the safety of spent fuel management and radioactive waste management in Switzerland is in compliance with the obligations of the Convention.

Nevertheless, a further strengthening of the legislation system is intended. A new Nuclear Energy Act, which recently was passed by Parliament and awaits public referendum, will soon replace the current Atomic Energy Act of 1959. The new Nuclear Energy Act addresses more specifically spent fuel and radioactive waste management and introduces modifications in the licencing procedure. The Regulatory Guides will be revised and adapted to conform to the new Act.

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Section A Introduction

Country and State

With a total surface area of 41,285 km² and a population of roughly 7.5 million inhabitants, Switzerland is a small State in the European context. Structurally, Switzerland has evolved as a federal State with twenty-six member States, known as cantons. Constitutionally delimited competencies and central tasks are given to the federal authorities. An important number of popular rights are guaranteed on a federal level, too. All other legislative power remains with the cantons, which have thus retained a high degree of autonomy. The municipalities and communes also enjoy considerable rights of self-government.

The Federal Council, composed of seven ministers of equal rank, acts as Federal Government. The Swiss Parliament consists of two chambers. The National Council represents the population as a whole. Its 200 members are elected for a term of four years. The Council of States has 46 members who represent the Swiss Cantons. Each Canton elects two members, regardless of size.

The voting population has the constitutional right to sanction changes to the Federal Constitution and has a right of referendum on the level of federal laws. Changes or a new article to the Federal Constitution can be requested by means of a popular initiative signed by at least 100,000 voters. All constitutional changes must be submitted to a popular vote (obligatory referendum). If a minimum of 50,000 voters challenge a proposal for a new federal law, the proposal is put to the vote (facultative referendum). The cantonal constitutions contain similar rules on popular initiatives and referendums as on the federal level. Two public initiatives will be voted on 18 May 2003, one on opting out of the nuclear energy programme, the other on a ten-year moratorium. The result of these votes will have an influence on the contents of the new Nuclear Energy Act.

Background of Nuclear Power in Switzerland

Historically, electricity generated in Switzerland came exclusively from hydro power without any recourse to fossil fuels, the latter not being available as a natural resource in the country. In the mid 1950's, an interest in the relatively new nuclear energy technology was manifested to cover an increasing electricity demand. In accordance with the general policy concerning the production of electricity, the promotion and use of nuclear energy was left to the initiative of the private sector. It was recognized, however, that the implementation of any nuclear programme and project requires a legislative frame to ensure safety and radiation protection, and that such a legislation should be established exclusively at the federal level. Therefore, a corresponding article was introduced into the Swiss Constitution and approved by vote of the Swiss population in 1957. Based on this article, the Atomic Energy Act was put into force in 1959.

The Atomic Energy Act attributes to the Federal Council (federal government) the exclusive competence to grant licences for the construction of, operation of and modification to nuclear

installations. For geological waste repositories, cantonal laws have to be additionally obeyed. Licences are based on a detailed review and assessment of nuclear safety. The supervision of nuclear installations implies the legal competence to take, at any time, appropriate measures to enforce compliance with the licensing conditions.

During the 1960's, a series of projects for establishing NPPs were initiated, more or less, in parallel. Four of them reached the stage of realization, leading to five currently operating units commissioned between 1969 and 1984. These five units contribute roughly 40% of the total national electricity production, the rest being essentially covered by hydro power complemented by a small amount from other energy sources.

Nuclear Power Plants

There are today four different utilities producing electricity from nuclear energy in five units: Beznau I and II, Mühleberg, Gösgen and Leibstadt.

Switzerland is a small and densely populated country. The number of suitable sites for NPPs is therefore limited. Two sites are situated near the German border, at a distance of 0.5 km (Leibstadt) and of 5 km (Beznau). The two other sites are about 40 km away from the French and 20 km from the German border respectively. The geographical position of all Swiss nuclear facilities is indicated on the map in Figure 1.

Facilities for Nuclear Education, Research and Development

The major part of nuclear research in Switzerland is performed at the Paul Scherrer Institute (PSI). Work is carried out at PSI in the following areas in collaboration with other national and international research institutes and with industry: elementary particle physics, biological sciences (including radiation protection), solid state research and material science, nuclear energy research, non-nuclear energy research and environmental research related to the production of energy, medical research and medical treatment (oncology). These include research related to spent fuel and radioactive waste management.

At the PSI location there are several nuclear installations. The research reactors "DIORIT" and "SAPHIR" are in the state of decommissioning.

The former Lucens experimental NPP has been decommissioned and dismantled after it experienced a loss of coolant accident in 1969. With the exception of a small nuclear waste storage area, this site was declassified and released for non-nuclear activities in March 1995.

Nuclear Waste

Each NPP has installations for the conditioning and interim storage of radioactive waste resulting from its operation. PSI also has such an installation for treating radioactive waste from medicine, industry and research. The Federal Storage Facility for radioactive waste (BZL) is also located at PSI. Furthermore, on the premises of the Beznau NPP, there is an

interim storage called ZWIBEZ for operational waste, for waste arising from spent fuel reprocessing, and for spent fuel elements.

In Würenlingen, a Central Storage Facility (ZZL) for nuclear waste has been constructed by the utility-owned company ZWILAG. In addition to storage capacity for spent fuel, vitrified high level waste and other intermediate and low level radioactive waste, the facility also includes installations for the conditioning of specific waste streams and the incineration or melting of low level waste. The storage facility started active operation in June 2001. The facility relieves the time pressure for the realization of final disposal facilities.

The application for the General Licence for a repository for low and intermediate level waste at the Wellenberg site in the Canton of Nidwalden was submitted in 1994. The cantonal legislation requests a mining concession for the construction of such a repository. The granting of this mining concession was rejected by the citizens of the canton in 1995. A new application for a mining concession relating only to an exploratory drift was submitted in January 2001 and rejected once again at a cantonal referendum in September 2002. The NPP operators subsequently decided to abandon the Wellenberg site.

Figure 1: Geographical position of nuclear facilities in Switzerland. Triangles mark NPPs (the Lucens NPP has been decommissioned), squares mark spent fuel and radioactive waste management facilities outside NPPs, the open circle marks the abandoned disposal site of Wellenberg, and filled circles mark some major cities.

Section B Policies and Practices (Article 32 Paragraph 1)

In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

- ***(i) spent fuel management policy;***
- ***(ii) spent fuel management practices;***
- ***(iii) radioactive waste management policy;***
- ***(iv) radioactive waste management practices;***
- ***(v) criteria used to define and categorize radioactive waste.***

B.1 Spent Fuel Management (Clauses i and ii)

The back-end of the nuclear fuel cycle is not prescribed by the present legislation (Atomic Energy Act and Federal Decree on the Atomic Energy Act). The strategy chosen by the NPP operators includes both reprocessing and storage of spent fuel, the latter with a view to later reprocessing or direct disposal. The reprocessing takes place abroad (France and UK), but the radioactive waste arising from that will be returned to Switzerland. For the interim storage of spent fuel and of radioactive waste returned from reprocessing abroad, a dry storage building at Beznau NPP (ZWIBEZ) and a Central Storage Facility (ZZL) have been built.

The present legislation stems in part from the early years of civil use of nuclear energy and contains no detailed provisions on spent fuel and radioactive waste management. A totally new Nuclear Energy Act addressing more specifically spent fuel and radioactive waste management was recently passed by Parliament and awaits public referendum. The new Nuclear Energy Act could possibly enter into force in 2005. Concerning the back-end of the fuel cycle, additional prerequisites for authorization of export of spent fuel for reprocessing are required.

In Switzerland, five power reactors (3 PWR, 2 BWR) at four sites are in operation, totalling around 3’000 MWe. A total amount of about 3’000 t of spent fuel is expected assuming 40 years operation. Longer operating lifetimes are technically feasible. The contracts between the Swiss NPP operators and the foreign reprocessing companies (COGEMA in France and BNFL in the UK) cover roughly 1’200 t of spent fuel. By the end of 2002, about 1’060 t of spent fuel have been shipped from the Swiss NPPs to the reprocessing installations in France and the UK. ZZL started storage operation in the year 2001. By the end of 2002, seven transport and storage casks containing about 110 t of spent fuel elements have been emplaced at ZZL. This facility has a capacity of 200 transport and storage casks containing either spent fuel elements or vitrified high level waste from reprocessing.

B.2 Radioactive Waste Management (Clauses iii and iv)

The producers of radioactive waste are legally responsible for the safe management and disposal of the waste they generate. The responsibility for conditioning and interim storage of radioactive waste from NPPs remains with the NPP operators, whereas the Federal State has taken over the responsibility for the collection, conditioning, storage and disposal of radioactive waste generated by the use of radioisotopes in medicine, industry and research. All radioactive waste is to undergo final disposal in repositories situated in suitable geological formations; no near-surface disposal is planned. The producers of radioactive waste, *i.e*., the NPP operators and the Federal State (for the waste from medicine, industry and research) have formed the National Cooperative for the Disposal of Radioactive Waste (Nagra) which is responsible for the planning of the disposal of all kinds of radioactive waste. Dedicated companies domiciled at the sites are responsible for the construction and operation of waste management facilities. Thus the ZWILAG company is responsible for ZZL, and other companies will be in charge of the realization of the disposal facilities.

Two repositories are foreseen, one for mostly short-lived low and intermediate level waste and the other for high level waste (including spent fuel if not reprocessed) and long-lived intermediate level waste. The realization in Switzerland of the repository for low and intermediate level waste is intended as soon as possible. Due to the necessary cooling time prior to disposal, a repository for high level waste is needed only several decades from now. However, the demonstration of the feasibility in Switzerland of safe and permanent disposal of high level waste is required by the Federal Decree on the Atomic Energy Act when a General Licence for a further NPP is applied for. Disposal of high level waste in the framework of a bilateral or multilateral project is maintained as an option.

Since no final repositories are in operation yet, all radioactive waste is currently stored in interim storage facilities. Each NPP has, for its own operational waste, conditioning installations and interim storage capacity. Some operational NPP waste is stored at ZZL. The radioactive waste from medicine, industry and research is conditioned and stored at PSI. The radioactive waste returning from reprocessing abroad of Swiss spent fuel is stored at ZZL. By the end of 2002, three casks containing 28 canisters each with vitrified high level waste have been emplaced at ZZL. Combustible low level waste was incinerated at PSI until the end of 2002. In future, such waste will be incinerated in the new plasma oven at ZZL.

The repository for low and intermediate level waste is planned to accommodate about 80'000 m^3 of waste; a large part of this volume will arise from the decommissioning of the NPPs and nuclear research facilities. The site of Wellenberg in the Canton of Nidwalden in Central Switzerland was selected in 1993 for the realization of this repository. The company GNW was created by the NPP operators for the construction and operation of the repository. In 1994, GNW applied for the General Licence as required by the federal legislation. At the same time, GNW applied to the Canton of Nidwalden for the mining concession required by the Cantonal legislation. The granting of this mining concession was refused by the citizens of the Canton at a referendum in June 1995. It was then agreed that, as a first step, a mining concession only for an exploratory gallery should be applied for; the corresponding application was submitted in January 2001. The granting of this concession was again rejected at a Cantonal referendum in September 2002. As a consequence, the NPP operators decided

to abandon the site of Wellenberg. For the realization of a repository for low and intermediate level waste a new site selection process will be started.

Concerning the disposal of high level and long-lived intermediate level waste, the work is still concentrated on the demonstration of the feasibility of such a repository in Switzerland. The project "Gewähr" submitted in 1985 by Nagra, which was a feasibility study based on a repository in the crystalline basement of Northern Switzerland, did not fully succeed in providing the required demonstration. The Federal Government then ordered that research be continued and extended to sedimentary rocks. As a result of a broad selection process, Nagra chose the Opalinus clay in the Zurich Weinland for further geological investigations. The results from the deep exploratory drilling at Benken and from a 3-D seismic survey in that region have been evaluated and provide the geological background for the new feasibility demonstration. The corresponding project was submitted to the authorities in December 2002. It is expected that, after review by the competent authorities, the Federal Government will take a decision on the feasibility demonstration in the beginning of 2006. At the same time, the Federal Government will define the subsequent steps in view of the disposal of high level and long-lived intermediate level waste.

B.3 Categorization of Radioactive Waste (Clause v)

Material or waste are considered to be radioactive if they fall within the scope of application of the legislation on radiation protection as defined in the Radiological Protection Ordinance. Three criteria are taken into account for declaring material as radioactive:

- The specific (Bq/kg) or absolute (Bq) activity of the material exceeds the nuclide specific clearance level specified in the Ordinance.
- The surface contamination (Bq/cm^2) of the waste exceeds the nuclide specific value specified in the Ordinance.
- The dose rate at a distance of 10 cm from the surface of the waste exceeds 0.1 μSv per hour, after deduction of the background.

The clearance level for the activity is derived from the nuclide specific dose factors for ingestion; the intake by ingestion of an activity corresponding to the clearance level would lead to an effective dose of 10 μSv. The surface contamination has to be averaged on a surface of 100 cm^2. The limiting value is derived from consideration of skin exposure and of intake by ingestion and inhalation. The applicable dose factors are tabulated in the Radiological Protection Ordinance and conform with those of the IAEA Standards (IAEA Safety Series No. 115).

In Switzerland, the main sources of radioactive waste are the NPPs. The operation of NPPs gives rise to operational waste and to waste from the reprocessing of the spent fuel. Large volumes of waste will eventually arise from the decommissioning and dismantling of the NPPs. Further radioactive waste arises from the use of radionuclides in medicine, industry and research, and from the decommissioning of nuclear research facilities. Switzerland has neither uranium mines nor enrichment, fuel fabrication or reprocessing facilities.

For the purpose of disposal, the following classification of radioactive waste is currently used in Switzerland:

- High level waste (HAA): Vitrified waste from reprocessing, as well as spent fuel (BE) if declared to be waste, *i.e*., if it is not reprocessed or used any further.
- Long-lived intermediate level waste (LMA): Alpha-bearing waste originating mainly from reprocessing.
- Low and intermediate level waste (SMA): All other radioactive waste, mostly short-lived.

This radioactive waste classification was developed by Nagra and accepted by the regulatory body; it is not defined in the present legislation. No further criteria have had to be used for the segregation of radioactive waste between these categories, because vitrified waste from reprocessing is categorized as high level waste by the country of origin, and alpha-bearing intermediate level waste from reprocessing is declared as such by the country of origin (being not suitable for near-surface disposal). It has been shown that, with very few exceptions, all other types of radioactive waste arising in Switzerland fulfill the IAEA criteria for classification as short-lived low and intermediate level waste (IAEA Safety Series No. 111-G-1.1).

In connection with the ongoing total revision of the Atomic Energy Act, a binding classification system for radioactive waste will be defined in the new Nuclear Energy Ordinance. This classification will rely on the system and criteria elaborated by the IAEA in their Safety Guide No. 111-G-1.1.

Section C Scope of Application (Article 3)

C.1 Reprocessing (Paragraph 1)

This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities as part of a reprocessing activity is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.

There are no reprocessing facilities in Switzerland, hence Switzerland has not considered whether to declare reprocessing to be part of spent fuel management pursuant to Paragraph 1 of Article 3.

Spent fuel from NPPs is held in storage on site for some years. It it is then sent abroad for reprocessing or stored for several decades at the Central Storage Facility (ZZL). Radioactive waste arising from reprocessing of Swiss spent fuel is returned to Switzerland. The Convention applies to the management of radioactive waste from reprocessing returned to Switzerland.

C.2 Waste Containing only Naturally Occurring Radioactive Material (Paragraph 2)

This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.

The Radiological Protection Ordinance defines the conditions under which naturally occurring radioactive material falls under the provisions of the radiation protection legislation. If such material is radioactive waste (*i.e.*, if it is not further used), it is subject to the same requirements as other radioactive waste and is considered to be radioactive waste for the purposes of the Convention. In particular, the waste must be delivered to the National Collection Centre at PSI, where it is conditioned and stored for later disposal.

At present there is no such radioactive waste in storage at PSI and no such waste is expected to arise.

C.3 Radioactive Waste within the Defence Programme (Paragraph 3)

This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.

The Swiss legislation applicable to radioactive waste management contains no exceptions for waste material originating from military applications. In particular, such radioactive waste must be delivered to the National Collection Centre at PSI.

Only a small amount of radioactive waste has come from military applications. It has been conditioned and stored at PSI together with similar material from other sources and is considered to be radioactive waste for the purposes of the Convention.

Section D Inventories and Lists (Article 32 Paragraph 2)

This report shall also include:

(i) a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;

(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

(iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

(iv) an inventory of radioactive waste that is subject to this Convention that:

(a) is being held in storage at radioactive waste management and nuclear fuel cycle facilities;
(b) has been disposed of; or
(c) has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

(v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

The first part of the present section gives an overview of the waste classes defined in Switzerland and gives their composition in relation to the IAEA definitions as outlined in the IAEA Safety Series No. 111-G-1.1. The second part gives the lists and inventories requested in Article 32 Paragraph 2.

D.1 Waste Register and Waste Classes

Swiss Waste Register (ISRAM)

The conditioning of radioactive waste (including spent fuel if declared waste) requires a permit from HSK. The requirements on the conditioning process, the waste package and its documentation are defined in the Guideline HSK-R-14. The documentation includes a detailed description of the waste package and its inventory. The Swiss NPPs and waste management facilities have agreed on a common electronic data base, ISRAM, where this information is kept. Further to the description of the waste packages produced after its implementation, the data base has also been augmented to contain the corresponding data on the then pre-existing waste packages. It is also used by the NPPs to keep track of the raw waste in interim storage and by the NPPs and ZZL to keep the data on the spent fuel in storage. Thus ISRAM provides the waste owners and Nagra with a fairly complete and detailed account of the radioactive waste existing in Switzerland. HSK is informed on the waste inventories in periodical reports.

Waste Classes

The waste classification currently in use in Switzerland for the purpose of disposal (see Section B.3) corresponds to a large extent (with the exception of a small amount of SMA) to the classification defined by the IAEA in the Safety Series No. 111-G-1.1. Both the Swiss waste classes HAA (vitrified high level waste from reprocessing) and BE (spent fuel if declared waste) correspond to the IAEA class HLW. The Swiss waste class LMA (long-lived intermediate level waste), as well as currently about 3% by volume of the Swiss waste class SMA (low and intermediate level waste), correspond to the IAEA class LILW_LL, while the remaining 97% by volume of the Swiss waste class SMA correspond to the IAEA class LILW_SL.

For information, and in order to present an overview of all radioactive waste now existing in Switzerland, the types and inventories of waste in storage at the NPP are reported in Table D.2. All the waste currently in storage at the NPPs is classified as SMA. The radioactive waste originating from medicine, industry and research and stored at PSI is mainly classified SMA. Since 2001, some SMA waste is also stored at ZZL. Table D.1 shows how the SMA waste relates to the IAEA classification of waste.

Table D.1: SMA waste in interim storage at the NPPs, PSI and ZZL, and its relation to the IAEA waste classification scheme. Numbers are rounded and in % by volume.

NPP, Storage facility	LILW_SL (%)	LILW_LL (%)
Beznau NPP (Including ZWIBEZ)	100	0
Gösgen NPP	100	0
Leibstadt NPP	100	0
Mühleberg NPP	100	0
PSI	90	10
ZZL	97	3

D.2 Facilities and Inventories

D.2.1 Spent Fuel Management Facilities (Clause i)

The following spent fuel management facilities exist in Switzerland:

- **ZZL**: An interim storage facility in Würenlingen, owned by the ZWILAG company, itself a subsidiary of the NPP companies. Its storage hall for dry storage of spent fuel and HAA waste can accommodate 200 transport and storage casks. The storage facility started operation in 2001.
- **ZWIBEZ**: An interim storage facility at Beznau NPP. The storage hall for dry storage of spent fuel and HAA waste can accommodate 48 transport and storage casks. The storage facility has received an Operating Licence but has not yet been commissioned to begin storage of spent fuel or HAA waste.

A planned wet storage facility for spent fuel at Gösgen NPP is currently in the phase of obtaining a Construction Licence. This storage pond will have a capacity to accommodate 1000 spent fuel elements of Gösgen NPP.

D.2.2 Inventory of Spent Fuel in Storage (Clause ii)

The only spent fuel management facility to have an inventory of spent fuel at the present time is ZZL. As of the end of 2002, it contained three transport and storage casks with a total of 291 spent fuel elements of the BWR type and four transport and storage casks with a total of 148 spent fuel elements of the PWR type.

D.2.3 Radioactive Waste Management Facilities (Clause iii)

At present, the following radioactive waste management facilities exist in Switzerland:

- **ZZL**: An interim storage facility in Würenlingen, owned by the ZWILAG company. It features a storage hall for dry storage of spent fuel and vitrified high level waste that can accommodate 200 transport and storage casks, a storage building for LMA waste with a capacity of 4000 m^3 of waste, and a storage hall for SMA waste with a capacity of 16'500 m^3 of waste. Further, ZZL has installations for the sorting and decontamination of materials and for the conditioning of waste. It also has a plasma furnace for incineration of radioactive waste. The ZZL has received the Operation Licence, but has only partially been commissioned for operation yet. The hall for spent fuel and HAA storage and the building for LMA storage have been commissioned. The other parts of the ZZL are in various stages of commissioning.
- **ZWIBEZ**: An interim storage facility at Beznau NPP. It consists of a storage hall for the storage of operational waste (SMA) from Beznau NPP with a capacity of 12'000 m^3 of waste, and a hall for dry storage of spent fuel and HAA waste that can accommodate 48 transport and storage casks. The SMA storage facility has been in operation since 1990, whereas the dry storage hall, which received an Operation Licence at the same time, has not yet been commissioned to begin storage of spent fuel or HAA waste.
- **PSI**: The Paul Scherrer Institute (PSI) operates the National Collection Centre for all non-nuclear radioactive waste, where the waste is sorted and conditioned. In this connection, PSI also operates the Federal Storage Facility (BZL) for this waste, with a capacity of 2100 m^3 of waste.

D.2.4 Inventory of Radioactive Waste in Storage (Clause iv-a)

In addition to the inventory of the waste management facilities listed under Section D.2.3, the inventories of the interim stores at the NPPs are also reported in Table D.2. In this manner, a comprehensive overview of the radioactive waste stored in Switzerland is obtained.

D.2.5 Disposal of Radioactive Waste (Clause iv-b)

There are no radioactive waste disposal facilities in Switzerland. Preparations are under way, however, to build geologic repositories for the Swiss radioactive waste (see Section B.2).

From 1969 to 1982, approximately 2300 m^3 of low and intermediate level waste was disposed of by sea dumping in the North Atlantic in the frame of campaigns organized by the OECD Nuclear Energy Agency.

D.2.6 Radioactive Waste from Past Practices (Clause iv-c)

Radioactive waste from industrial facilities (primarily watch industry) that have been closed down in recent years are being transferred to the National Collection Centre at PSI and will be dealt with in the same manner as all the other radioactive wastes from medicine, industry and research that are collected by the Centre.

One experimental power reactor has been dismantled in Switzerland: This installation, at Lucens in the Canton of Vaud, was shut down in 1969 following an accident after a short period of operation, and was later decommissioned. The site was released from regulatory control in 1995 with the exception of a shed containing approximatley 240 t of unconditioned, solid radioactive waste in six containers, which will be transported to ZZL for storage and conditioning.

D.2.7 Nuclear Facilities Being Decommissioned (Clause v)

Two Swiss research reactors are in the state of being decommissioned:

- The DIORIT reactor at PSI. The decommissioning is in its final phase.
- The SAPHIR reactor at PSI. The decommissioning started in 2002 and is ongoing.

These facilities are considered as radioactive waste management facilities for the purpose of the Convention. The decommissioning waste is conditioned and stored on site.

Table D.2: Waste inventories at the radioactive waste management facilities and the NPPs in Switzerland. The data are rounded and refer to the end of 2002. BE = spent fuel, HAA = vitrified high level waste, LMA = long-lived intermediate level waste, SMA = low and intermediate level waste, cond. = conditioned, uncond. = unconditioned, n.a. = not available, HM = heavy metal. (1) The activity of unconditioned LMA is included in the activity value of conditioned LMA. (2) The activity of unconditioned SMA is included in the activity value of conditioned SMA.

Site name	Waste class	Waste volume (m^3)	Waste mass (t)	Total activity (Bq)
ZZL	BE		110 (HM)	$1.4 \cdot 10^{18}$
	HAA		35 (net)	$1.6 \cdot 10^{18}$
	LMA	8		$5.9 \cdot 10^{11}$
	SMA	30		$3.9 \cdot 10^{10}$
PSI	LMA, cond.	10		$9.1 \cdot 10^{13}$
	LMA, uncond.	5		(1)
	SMA, cond.	900		$4.5 \cdot 10^{14}$
	SMA, uncond.	150		(2)
ZWIBEZ	SMA, cond.	500		$3.9 \cdot 10^{12}$
	SMA, uncond.	n.a.		$1.9 \cdot 10^{11}$
Beznau NPP (excluding ZWIBEZ)	SMA, cond.	500		$8.2 \cdot 10^{14}$
	SMA, uncond.	n.a.		$1.9 \cdot 10^{13}$
Gösgen NPP	SMA, cond.	300		$7.5 \cdot 10^{13}$
	SMA, uncond.	40		$3.3 \cdot 10^{12}$
Leibstadt NPP	SMA, cond.	1400		$2.4 \cdot 10^{14}$
	SMA, uncond.	50		n.a.
Mühleberg NPP	SMA, cond.	900		$2.6 \cdot 10^{14}$
	SMA, uncond.	100		$1.6 \cdot 10^{12}$

Section E Legislative and Regulatory System

E.1 Implementing Measures (Article 18)

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

As described in Sections E.2 and E.3 below, Switzerland has taken the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under the Convention.

Conclusion

The Swiss Party complies with the obligations of Article 18.

E.2 Legislative and Regulatory Framework (Article 19)

E.2.1 Overview (Paragraph 1)

Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.

The safety of spent fuel and radioactive waste management is governed by the federal legislation on atomic energy and on radiation protection. This legislation consists mainly of the following laws, decree and ordinances:

- Atomic Energy Act (1959)
- Federal Decree on the Atomic Energy Act (1978)
- Radiological Protection Act (1991)
- Ordinance on the Decommissioning Fund (1983)
- Atomic Energy Ordinance (1984)
- Ordinance on Preparatory Measures (1989)
- Radiological Protection Ordinance (1994)
- Ordinance on the Collection of Radioactive Waste (1996)
- Ordinance on the Waste Management Fund (2000)

The requirements of the legislation are detailed in Regulatory Guides issued by HSK. A complete list of the HSK Guidelines is given in Annex L.2.2.

As demonstrated below, this legislation covers the requirements set forth in Paragraph 2. Thus the obligation under Paragraph 1 of Article 19 of the Convention is met. However, the

present legislation on nuclear energy is partly outdated. A new Nuclear Energy Act addressing more specifically spent fuel and radioactive waste management was recently passed by Parliament and awaits public referendum. The new legislation takes account of the requirements of the Convention concerning spent fuel and radioactive waste management.

E.2.2 Radiation Safety (Paragraph 2 Clause i)

This legislative and regulatory framework shall provide for the establishment of applicable national safety requirements and regulations for radiation safety.

National requirements for radiation safety are established in the legislation on radiological protection (Radiological Protection Act and Radiological Protection Ordinance). This legislation aims at protecting human health and the environment against ionising radiation. It implements the internationally agreed principles of justification of a practice, optimization of radiation exposure and dose limitation. Important requirements regarding spent fuel and radioactive waste management are as follows:

- The generation of radioactive waste must be minimized.
- Radioactive waste generated in Switzerland must in principle be disposed of domestically.
- Import of radioactive waste for disposal in Switzerland is allowed only under an international agreement.
- Material or waste are considered to be radioactive if at least one of the following criteria is fulfilled:
  - the activity exceeds the nuclide specific clearance level set in the Ordinance,
  - the surface contamination exceeds the nuclide specific value set in the Ordinance,
  - the dose rate at a distance of 10 cm from the surface exceeds 0.1 μSv per hour.
- The dose limit for occupational exposure is 20 mSv per year.
- The dose limit for individuals of the population is 1 mSv per year.
- A dose constraint lower than the above limit must be set for each facility.
- The limits for immissions of radioactivity in the environment include
  - nuclide specific airborne concentrations,
  - nuclide specific concentrations in accessible waters,
  - a maximal dose of 1 mSv per year from direct exposure in working and living places.
- The discharges from facilities must be limited so that the immission limits and the dose constraint are met.
- Radioactive waste arising from medical, industrial and research facilities must be delivered to the Federal Collection Centre at PSI which is a nuclear installation governed by the atomic legislation.

- Radioactive waste from nuclear installations shall be conditioned, stored and eventually permanently disposed of.

These requirements are in line with the internationally agreed standards on radiation protection. More detailed criteria concerning radiation protection are set in Guidelines of the regulatory body.

E.2.3 Licensing System (Paragraph 2 Clause ii)

This legislative and regulatory framework shall provide for a system of licensing of spent fuel and radioactive waste management activities.

The Atomic Energy Act states that a federal licence is required for

- the construction, operation, as well as any change of purpose, nature and size of a nuclear installation,
- transporting, delivering and any form of holding nuclear fuel and radioactive waste,
- trade in Switzerland, as well as import, transit, export and procurement of nuclear fuel and radioactive waste.

According to the definitions in the Atomic Energy Act, nuclear installations are facilities for production of atomic energy and for mining, treatment, storage and disposal of radioactive fuel and waste. Among the prerequisites for granting a licence for such a facility, the protection of human health and the environment, the non-proliferation of nuclear weapons, and the operator's aptitude for meeting all the requirements must be demonstrated. The licensing authority for construction and operation of nuclear installations, as well as changes to them, is the Federal Council (federal government). The licensing authority for other licences according to the Atomic Energy Act (*i.e.*, transport, delivering, holding, trade, import, transit, export and procurement of nuclear fuel and radioactive waste) is the Federal Office of Energy (BFE).

As a prerequisite to the specific licences required by the Atomic Energy Act, the Federal Decree on the Atomic Energy Act requires a General Licence for every new nuclear installation. General Licences granted by the Federal Council (federal government) must be approved by Parliament. A General Licence is refused unless the protection of human health and the environment can be guaranteed. For new nuclear power plants, a General Licence is only granted if the feasibility of radioactive waste disposal has been demonstrated. The General Licence defines the site and the essential features of the planned installation. For storage and disposal facilities, these features include the nature of fuel or waste, the capacity and the approximative layout of the surface and underground constructions.

The Federal Decree on the Atomic Energy Act also requires a licence for geological and hydrogeological field investigations in view of the disposal of radioactive waste (so-called preparatory measures). The licence is granted by the Federal Council (federal government). As outlined in the Ordinance on Preparatory Measures, prerequisites for granting this licence include the suitability of the investigations for safety assessment purposes of the envisaged repository under the requirement that the quality of the site is preserved.

The licensing process is conducted by BFE and consists of the following main steps:

1. Submission of the application with a description of the project and a safety analysis report.
2. Deposition of the licence application documentation for public consultation; individuals, communities and organisations can raise objections against the project.
3. Consultation of cantonal governments and federal offices.
4. Review of the project by the nuclear safety authorities (HSK and KSA) and possibly other concerned authorities.
5. Statement of the applicant on the objections resulting from the public consultations.
6. Second deposition for public consultation of possibly modified project documentation, review reports of the nuclear safety authorities and statements on the objections from the first round of consultations.
7. Compilation by BFE of all the material received, and proposal for a decision.
8. Decision by the Federal Council (federal government), generally along with a list of obligations.

Except for the General Licence, which must be approved by Parliament, the present legislation considers the decision taken by the Federal Council (federal government) as final, *i.e.*, it cannot be appealed against. This is not fully in line with many current licensing systems. The new Nuclear Energy Act introduces modifications in the licensing procedure in order to fulfill the right of appeal for all types of procedures.

Handling of radioactive material not subjected to the Atomic Energy Act requires a licence according to the radiation protection legislation. The Federal Office of Public Health (BAG) is the licencing authority for such licences. Radioactive waste from medicine, industry and research has to be delivered to the National Collection Centre at PSI which is a nuclear installation.

E.2.4 Prohibition of Operation without a Licence (Paragraph 2 Clause iii)

This legislative and regulatory framework shall provide for a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence.

The Atomic Energy Act requires a licence for the operation of a spent fuel or radioactive waste management facility. There are no exceptions to this requirement.

E.2.5 Institutional Control, Regulatory Inspection, Documentation and Reporting (Paragraph 2 Clause iv)

This legislative and regulatory framework shall provide for a system of appropriate institutional control, regulatory inspection and documentation and reporting.

Spent fuel and radioactive waste management may only take place in nuclear installations. The Federal Council (federal government) has appointed HSK as supervisory body of the nuclear installations. HSK is the principal regulatory body (see Section E.3 below). HSK is also in charge of supervising the preparations for the disposal of radioactive waste and the transport of radioactive material from and to nuclear installations. In addition to HSK, the Swiss Federal Nuclear Safety Commission (KSA) has been established which advises the Federal Council (federal government) and the Federal Department for Environment, Transport, Energy and Communication (UVEK) on nuclear safety and radiation protection matters.

In its capacity as a supervisor of the nuclear installations, HSK has established a comprehensive inspection system (see Section E.3 below).

The atomic legislation requires comprehensive documentation on the construction, modification and operation of nuclear installations. Detailed specifications on documentation and reporting are set forth in HSK Guidelines.

E.2.6 Enforcement (Paragraph 2 Clause v)

This legislative and regulatory framework shall provide for the enforcement of applicable regulations and of the terms of the licences.

HSK is in charge of enforcing the legislation and the regulations applicable to nuclear installations, as well as the obligations of the licences. It is empowered to take the necessary enforcement measures (see Section E.3 below). Different steps of contruction and operation of nuclear facilities require permits of HSK.

E.2.7 Allocation of Responsibilities (Paragraph 2 Clause vi)

This legislative and regulatory framework shall provide for a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.

According to the Federal Decree on the Atomic Energy Act, the producers of spent fuel and radioactive waste are responsibile for its management including disposal. They have to bring the radioactive waste into a form suitable for transport, storage and disposal (conditioning), to store it pending disposal, and eventually to dispose of it in a geological repository at their own costs. They also have to manage spent fuel. According to the present legislation, this can be done either by storage pending direct disposal or by reprocessing with subsequent storage and disposal of the radioactive waste arising from reprocessing.

The Federal State assumes responsibility for the collection, conditioning, storage and disposal of radioactive waste generated by the use of radioisotopes in medicine, industry and

research. The Federal State has the right to take over the management of radioactive waste from NPPs in case the operators do not meet their duties; this would be at the expense of the concerned NPP operators.

As mentioned under Section E.2.3 above, the licensing authority for nuclear installations is the Federal Council (federal government). The licencing authority for other licences according to the atomic energy legislation, such as transport, trade, import and export of radioactive fuel and waste is the Federal Office of Energy (BFE).

The nuclear safety authorities (in particular HSK) have the responsibility to supervise the nuclear installations and to enforce the applicable legislation and regulations, as well as the obligations of the licences.

E.2.8 Regulating Radioactive Materials as Radioactive Waste (Paragraph 3)

When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

The Radiological Protection Act gives the following definition of radioactive waste: Radioactive waste is radioactive material or radioactively contaminated material that is not further used. This is consistent with the internationally agreed definition. In the current legislation, spent fuel is not considered as waste but rather as recyclable material that is exploited by reprocessing, unless it is declared by its owner to be radioactive waste that has to be disposed of. This policy takes due account of the objectives of the Convention.

Conclusion

The Swiss Party complies with the obligations of Article 19.

E.3 Regulatory Body (Article 20)

E.3.1 Establishment and Designation (Paragraph 1)

Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.

The regulatory body, in general, entrusted with the implementation of the legislative and regulatory framework referred to in Article 19 above, is divided between several organisations:

- Federal Council (federal government): The Federal Council is the licensing authority for nuclear installations (the General Licence granted by the Federal Council has to be approved by Parliament).

- Federal Office of Energy (BFE): BFE is the licensing authority for other licences according to the Atomic Energy Act (*e.g.*, transport, trade, import and export of nuclear fuel and radioactive waste). BFE also conducts the licensing process for nuclear installations.
- Swiss Federal Nuclear Safety Inspectorate (HSK): HSK has three main functions: (a) it specifies the detailed safety requirements in Regulatory Guides, (b) reviews the licence applications, and (c) supervises the nuclear installations, the preparations for the disposal of radioactive waste and the transport of radioactive material from and to nuclear installations.
- Federal Office of Public Health (BAG): BAG is the licensing authority for the handling of radioactive material that does not fall under the Atomic Energy Act (see Section E.2.3). It supervises the handling of radioactive material in medical and research institutions and in other situations where the protection of the general public is the primary concern.
- Swiss Accident Insurance Institute (SUVA): SUVA supervises industrial practices and other situations where the protection of workers is the primary concern.

In addition to these organisations within the federal administration, the following advisory bodies on spent fuel and radioactive waste management have been established:

- Swiss Federal Nuclear Safety Commission (KSA): KSA comments on licence applications and on fundamental safety issues.
- Interdepartmental Working Group on Radioactive Waste Management (AGNEB): AGNEB prepares technical documents for governmental decisions on radioactive waste management.
- Geological Commission on Radioactive Waste Disposal (KNE): KNE advises BFE and HSK on geological aspects of waste disposal.

HSK is the Swiss regulatory body in the narrow sense, *i.e*., the supervisory authority. HSK is attached to BFE and is therefore part of UVEK. HSK's primary task is to supervise and assess the nuclear safety and radiation protection of the nuclear installations, including spent fuel and radioactive waste management. HSK has been given the necessary legal competences to assume its assigned responsibilities. HSK performs its supervisory functions by means of inspections, setting requirements, issuing enforcement orders, and granting execution permits within the terms of awarded licences.

HSK employs 92 persons today and is divided into three divisions plus a separate section reporting to the Director:

- Nuclear Safety Division (reactor systems, electrical, mechanical and civil engineering, probabilistic safety analysis)
- Radiation Protection Division (occupational radiation protection, radiation measurements, accident consequences, emergency preparedness, human factors)

- Support Division (co-ordination of NPP supervision, information, informatics, regulatory research, finances, etc.)
- Transport and Waste Management Section

In recent years, HSK's annual budget has been in the order of 25 million CHF, *i.e.*, about 17 million EUR or 18 million USD. The expenditures are met by funds from the Federal Government. Applicants for nuclear licences are subject to fees, and the operators of nuclear installations are invoiced for HSK's services.

The implementation of the legislative and regulatory framework concerning spent fuel and radioactive waste management lies mostly with the Transport and Waste Management Section. This Section comprises ten persons. They deal with matters concerning the transport of radioactive material, the conditioning, storage and disposal of spent fuel and radioactive waste, as well as the decommissioning of nuclear installations. They evaluate the proposed methods for conditioning radioactive waste, issue the necessary execution permits and supervise the operation of the corresponding facilities. They have a leading role in HSK's review of safety of facilities for storage and disposal of spent fuel and radioactive waste. They supervise the construction and operation of such facilities. They follow and appraise the geological investigations in preparation of spent fuel and radioactive waste disposal. In their role as the Swiss competent authority, they also issue the package and shipment approval certificates for the transport of radioactive material in Switzerland and supervise such transports to and from nuclear installations.

In summary, Switzerland has established a regulatory organisation entrusted with the implementation of the legislative and regulatory framework related to spent fuel and radioactive waste management. This regulatory organisation is provided with the necessary authority, competence and financial and human resources to fulfill its assigned responsibilities.

E.3.2 Independence (Paragraph 2)

Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.

The owners of spent fuel and radioactive waste in Switzerland are the NPP operators and the Federal State (the latter for the waste from medicine, industry and research). In order to meet their responsibility regarding the management of spent fuel and radioactive waste, they have established the National Cooperative for the Disposal of Radioactive Waste (Nagra). Nagra is responsible for the planning of the disposal of all kinds of radioactive waste, including spent fuel if declared as waste. Dedicated companies domiciled at the site are responsible for the construction and operation of spent fuel and radioactive waste management facilities. The responsibility for conditioning and storage of NPP waste remains with the NPP operators.

Both the responsibility for the management of radioactive waste from medicine, industry and research, and the regulatory task reside within the federal government. These two functions, however, belong to different departments (ministries), and the regulatory authorities are granted complete independence in their judgements.

HSK, as the principal part of Switzerland's regulatory body, has so far been attached to the Federal Office of Energy (BFE). However, BFE has a promoting role with regard to nuclear energy. This point has been addressed at both review meetings of the Nuclear Safety Convention held to date, as well as on the occasion of an IAEA international regulatory review (IRRT) mission to Switzerland. The Contracting Parties to the Nuclear Safety Convention must make sure that all activities in the field of civil nuclear energy or ionizing radiation are controlled by a regulatory body that makes judgements and takes enforcement actions without undue pressure from interests that may compete with safety. It has been recognized that HSK has the characteristics for acting in a competent and independent way. However, the fact that HSK is attached to BFE gives an image of dependency. Therefore, recommendations have been made that a formal independence should be given to HSK.

First steps in this direction have already been undertaken. As from January 2004, HSK will receive its mission in four-year periods from the Federal Government and have its own budget at disposal, while it will continue to be attached to BFE. At a later stage, a full separation of HSK from BFE is envisaged.

Conclusion

The Swiss Party complies with the obligations of Article 20.

Section F Other General Safety Provisions

F.1 Responsibility of the Licence Holder (Article 21)

F.1.1 Licence Holder (Paragraph 1)

Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

The Federal Decree on the Atomic Energy Act clearly puts the responsibility for the safe and permanent management of spent fuel and radioactive waste on the producers (see Section E.2.7). The producers of spent fuel and radioactive waste are primarily the NPP operators that have been granted a licence to construct and operate their plants according to the Atomic Energy Act. The licence contains conditions that must be met by the licence holder, in addition to the legal and regulatory safety requirements. These include safe pre-disposal management of spent fuel and radioactive waste resulting from the plant operation. In case of expiration or withdrawal of the Operating Licence, the Atomic Energy Act requires the operator to remove and safely manage all the radioactive material of the plant to be decommissioned.

The Federal State takes over the responsibility for the collection, conditioning, storage and disposal of radioactive waste generated in medicine, industry and research. According to the Radiological Protection Ordinance, PSI is the National Collection Centre and is in charge of the pre-disposal management of this kind of waste. PSI holds the licences, according to the Atomic Energy Act, to operate the nuclear installations necessary for these activities.

For the implementation of the back-end of spent fuel and radioactive waste management, dedicated companies are established in due time. Such companies are licensed for the construction and operation of spent fuel and radioactive waste management facilities according to the Atomic Energy Act. The company ZWILAG has been licensed to construct and operate the ZZL which includes an incinerator, conditioning installations and storage buildings for spent fuel and all kinds of radioactive waste. So far no licence has been issued for disposal facilities.

In order to ensure that the licence holders meet their responsibilities, Switzerland has established a regulatory body entrusted with the implementation of the legislative and regulatory framework (see Section E.3). HSK forms the main part of this regulatory body and has been given the necessary authority and competence to fulfill its enforcement functions.

F.1.2 Unlicenced Facilities, Activities and Materials (Paragaph 2)

If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.

In the Federal Decree on the Atomic Energy Act, the Federal State has reserved the right to take over the management of radioactive waste from NPPs in case the operators do not meet their duties. This would be at the expense of the concerned NPP operators, and the Federal State would establish a dedicated organisation independent of the licensing and supervisory authorities.

The Radiological Protection Ordinance defines the kinds of non-nuclear radioactive waste that must be delivered to the National Collection Centre at PSI. The Federal Office of Public Health (BAG) regulates the details concerning the treatment and collection of non-nuclear radioactive waste, see also Ordinance on the Collection of Radioactive Waste. This includes cases where no licence holder or other responsible party exists.

Conclusion

The Swiss Party complies with the obligations of Article 21.

F.2 Human and Financial Resources (Article 22)

F.2.1 Qualified Staff (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility.

The Atomic Energy Act requires qualified senior staff to manage and supervise any nuclear installation and to fulfill all legal, regulatory and licence requirements. This is a prerequisite for granting a licence for nuclear installations, including spent fuel and radioactive waste management facilities. The Operation Licence of the nuclear installation can be withdrawn in case these conditions are not or no longer met. Precise requirements on the organisation and operating staff of a nuclear installation are set out in the Operation Licence and in the technical specifications. HSK Guidelines define specific regulatory requirements on the organisation (HSK-R-17), the operating staff of NPPs (HSK-R-27), and on the radiation protection staff (HSK-R-37). These requirements also apply to other nuclear installations (*i.e.*, spent fuel and radioactive waste management facilities) by analogy where appropriate.

F.2.2 Adequate Financial Resources (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning.

Two funds have been legally established in order to ensure the availability of sufficient financial resources for the decommissioning of nuclear installations and the final management of spent fuel and radioactive waste. The Ordinance on the Decommissioning Fund for Nuclear Facilities defines the allocation of financial resources for the decommissioning and for the disposal of decommissioning waste. The Ordinance on the Waste Management Fund for Nuclear Power Plants defines the allocation of financial resources to cover the costs for the final management of spent fuel and radioactive waste from NPP operation. The Waste Management Fund has been established to cover the management costs arising after shut-down of the NPPs. The current expenditures related to spent fuel reprocessing and storage of spent fuel and radioactive waste, as well as to research and development, planning, geological investigations and, eventually, construction and operation of disposal facilities, are continuously paid for by the NPP operators. The two funds are independent legal entities administrated by a management Commission appointed by the Federal Council (federal government). The annual contributions to be paid to the funds by the NPP operators are based on cost estimates, derived from specific decommissioning and disposal projects submitted by the operators and reviewed by the nuclear safety authorities. The projects, cost estimates and annual contributions are periodically updated.

F.2.3 Financial Provision for Institutional Controls (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

The legislation on radiological protection puts the Federal Office of Public Health (BAG) in charge of monitoring the radioactivity in the environment. This duty includes the monitoring of the environment of past nuclear facilities cleared from regulatory control after decommissioning, and eventually will also include closed disposal facilities. As an example, the former experimental NPP at Lucens, which has been decommissioned and cleared from nuclear regulatory control, is subject to the environmental radiation monitoring programme of BAG.

The new Nuclear Energy Act, which recently was passed by Parliament and awaits public referendum, addresses more specifically spent fuel and radioactive waste management. The Waste Management Fund mentioned in Section F.2.2 covers the disposal costs up to and including the final closure of the repository and monitoring after closure. After proper final closure, the disposal facility will be cleared from nuclear regulatory control. However, the draft Nuclear Energy Act specifically allows the Federal Council (federal government) to decide on continued institutional control and monitoring after closure.

Conclusion

The Swiss Party complies with the obligations of Article 22.

F.3 Quality Assurance (Article 23)

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

Swiss regulatory Guidelines (HSK-R-30, HSK-R-17 and HSK-R-15) require the implementation of appropriate Quality Management (QM) systems for the construction and operation of nuclear installations, including storage and disposal facilities for spent fuel and radioactive waste. Following this requirement, the Swiss nuclear installations, including spent fuel and radioactive waste management facilities, are in the process of establishing, or have established and implemented, QM systems based on international standards such as the IAEA Safety Series No. 50-C/SG-Q or the standards of the ISO 9000 series.

HSK approves and supervises the completeness and the proper function of the QM systems of spent fuel and radioactive waste management facilities. HSK is responsible for the inspection work. Significant changes in the QM system of the responsible organisation must at all phases be notified to the HSK.

The new Nuclear Energy Act, which recently was passed by Parliament and awaits public referendum, contains specific QM requirements as a condition for granting construction and Operation Licences for nuclear installations.

Conclusion

The Swiss Party complies with the obligations of Article 23.

F.4 Operational Radiation Protection (Article 24)

The Radiological Protection Act and the Radiological Protection Ordinance form the legal basis for operational radiation protection in Switzerland. This legislation aims at protecting human health and the environment against ionising radiation. It implements the internationally agreed principles of justification of a practice, optimization of radiation exposure and dose limitation. More detailed requirements are defined in further Ordinances and in HSK Guidelines, and specific conditions are contained in the Operation Licences granted to each nuclear facility operator.

F.4.1 Radiation Exposure (Paragraph 1 Clause i)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account.

The Swiss radiation protection legislation contains optimization as a fundamental principle for limiting the radiation exposure of the workers and the public. Guideline HSK-R-11 in its new draft version requires that every licence holder of a nuclear installation (including storage and disposal facilities) must establish a QM system for operational radiation protection. The QM system must include the optimization process as an integrated part of the radiation protection planning.

F.4.2 Radiation Doses (Paragraph 1 Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

The Radiological Protection Ordinance sets the dose limit for individuals of the population to 1 mSv per year and that for occupational exposure to 20 mSv per year (see Section E.2.2 above). This is in accordance with international standards. In order to ensure that these dose limits are not exceeded, reference values, limits and constraints for dose and activity have been defined in the Radiological Protection Ordinance, in the Regulatory Guides HSK-R-07, HSK-R-11, as well as in the licence conditions. Models on atmospheric dispersion and exposure paths (as outlined in HSK-R-41 based on IAEA Safety Series No. 50-SG-S3), including transfer factors and dose conversion factors, are used to obtain the effective dose as a function of the discharge. The discharge limits are set by HSK based on such calculations. The Guidelines HSK-R-15 and HSK-R-25 require that the activity discharged to the environment be reported by each nuclear facility in periodical reports. The measuring instruments used in the facilities have to be calibrated periodically (HSK-R-47). HSK takes various samples and independent measurements from each nuclear facility for independent analysis several times a year.

F.4.3 Preventive Measures Taken (Paragraph 1 Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.

The Radiological Protection Ordinance requires the licence holder to take appropriate measures to prevent unplanned and uncontrolled releases of radioactive materials into the environment. The corresponding technical and administrative requirements to be considered

during planning, construction, operation and decommissioning are outlined in the Ordinance on the Use of Unsealed Radiation Sources and in Regulatory Guides (HSK-R-07, HSK-R-14). Any facility specific details are laid down in the licences and permits. For example, Guideline HSK-R-07 requires that the pressure in a controlled zone must be lower than in the surrounding, uncontrolled area. In order to continuously ensure such an underpressure, a graduation of the pressure is necessary using a series of air locks.

F.4.4 Radiation Exposure Due to Discharges (Paragraph 2 Clause i)

Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account.

In the licence application for the construction and operation of a nuclear facility (including storage and disposal facilities), the technical measures taken to limit exposure to radiation caused from radioactive discharges must be shown to comply with the ALARA principle. These measures are explicitly stated as conditions when granting the licence. Each nuclear facility has to report periodically the discharged radioactivity to HSK.

F.4.5 Radiation Doses Due to Discharges (Paragraph 2 Clause ii)

Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.

The annual dose limit for the public is ensured via a partition into source related dose constraints of 0.3 mSv per year for each nuclear site (HSK-R-11). The dose from direct exposure must not exceed 0.1 mSv per year. Based on these dose constraints, maximum values for the total activities and activity concentrations discharged into the environment are derived using models for dispersion and transfer (HSK-R-41).

F.4.6 Corrective Measures (Paragraph 3)

Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.

According to the Radiological Protection Ordinance, the licence holder is obliged to make the necessary operational preparations in order to be able to cope with failures. This includes regular training of the personnel, issuing instructions regarding the immediate measures to be taken in an emergency, and providing sufficient resources for dealing with failures at all times, *e.g.*, employing and training an appropriate number of health physicists and other radiation protection personnel. The limiting dose for outside emergency personnel involved in rescuing human lives and protecting the population is 250 mSv during the first year following

the event, while the personnel involved in aftermath work is limited to 50 mSv during the first year following the event.

In addition, the Radiological Protection Ordinance requires that the licence holder take every effort possible in the case of an unplanned or uncontrolled release of radioactive material into the environment, to control the release and to mitigate its effects. This includes appropriate protective measures for the personnel, as well as dose monitoring and instruction.

In case of a radiological incident, the licence holder has to notify HSK and the National Emergency Operations Centre (NAZ) immediately, see Section F.5

HSK approves the training courses for and the qualification of the radiation protection personnel. The nuclear facilities have to report the participation of their personnel in training courses.

Conclusion

The Swiss Party complies with the obligations of Article 24.

F.5 Emergency Preparedness (Article 25)

F.5.1 Facility Emergency Plans (Paragraph 1)

Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.

The federal Emergency Organisation in Case of Increased Radioactivity (EOR) is in charge of emergency planning and preparedness in Switzerland. The Concept on Emergency Planning and Preparedness for the Vicinity of Nuclear Power Plants (1998) defines the requirements for emergency preparedness and is based on the following Ordinances and Regulatory Guides:

- Emergency Protection Ordinance
- Ordinance on the Intervention Organisation in Case of Increased Radiation
- Iodine Tablet Ordinance
- Guideline HSK-R-42: Responsibilities for decisions to implement certain measures to mitigate the consequences of a severe accident at a nuclear power plant
- Guideline HSK-R-45: Planning and execution of emergency exercises in Swiss nuclear power plants

These requirements refer to NPPs and are used for other nuclear installations by analogy. Prior to the start-up of a new spent fuel or radioactive waste management facility, on-site emergency plans are required that must be approved by HSK.

To prepare emergency measures for spent fuel and radioactive waste management facilities, specific scenarios are evaluated that form the basis for the emergency planning in the environment of such facilities. Off-site emergency plans are required if possible accidents can cause off-site doses above 1 mSv (Ordinance on the Intervention Organisation in Case of Increased Radiation). Accidents at spent fuel and radioactive waste management facilities located at NPPs (*e.g.*, ZWIBEZ) are covered by the emergency organisation of the corresponding NPP. At PSI and ZZL such doses can only be attained in an airplane crash scenario. For this scenario the alerting and counter measures are implemented for the population of the neighbouring communities.

On-Site Emergency Organisation

Each new spent fuel or radioactive waste management facility is in possession of facility-specific emergency preparedness documentation which includes the following information:

- operating procedures for abnormal situations;
- emergency procedures;
- reporting procedure to HSK, and in case of radiological events also to the National Emergency Operations Centre (NAZ).
- reporting procedure to the police in case of rapidly evolving accidents (*e.g.*, airplane crash).

The emergency organisation of the facility is inspected by HSK every year.

Off-Site Emergency Organisation and Protective Measures

The off-site emergency organisation is based on the resources within the Swiss civil defence concept. These resources consist of a well developed shelter infrastructure and well trained troops for fire and disaster mitigation. In the case of a radiological emergency the Emergency Organisation in Case of Increased Radioactivity (EOR) coordinates the use of civil and military resources. EOR can issue warnings, siren signals for general alert, as well as instructions over the radio. NAZ, as a part of EOR, is responsible for the transmission of warning and alerting orders to the cantonal authorities, and also for initial countermeasures for the protection of the public.

The designated protective measures for the population are based on the concept of emergency reference levels of dose as quoted in the Ordinance on the Intervention Organisation in Case of Increased Radiation. The concept describes which protective measures are to be adopted for an expected radiation dose.

Emergency Exercises

HSK issues the permit for operation only if the on-site emergency organisation is operational and has been tested by an emergency exercise. Furthermore, on-site emergency preparedness exercises are performed every year in accordance with the specifications in the Guideline HSK-R-45. In addition, each of the different emergency teams, such as the fire brigade, have to carry out their own specific exercises.

F.5.2 Territory Emergency Plans (Paragraph 2)

Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

EOR also becomes active in case of any radiological emergency coming from abroad. Automatic dose rate monitoring systems have been installed in Switzerland. The systems continuously monitor the dose rate at a large number of locations.

Conclusion

The Swiss Party complies with the obligations of Article 25.

F.6 Decommissioning (Article 26)

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility.

The atomic legislation currently in force (Atomic Energy Act and Federal Decree on the Atomic Energy Act) requires the operator of a nuclear facility to apply for a licence for any significant planned change of the facility. Cessation of operation at the end of the operational life of the facility is such a significant planned change, and a licence must therefore be applied for. The licence lays down the requirements with respect to the decommissioning activities, covering Paragraphs (i) to (iv) of Article 26 (see below).

The current legislation is being revised. The new Nuclear Energy Act, which recently was passed by Parliament and awaits public referendum, contains more detailed requirements on decommissioning. Specifically, decommissioning must be addressed from the very early stages of licensing.

Up to now, licences have been granted for the decommissioning of the prototype reactor at Lucens and of the research reactors DIORIT and SAPHIR at PSI.

F.6.1 Staff and Financial Resources (Clause i)

Such steps shall ensure that qualified staff and adequate financial resources are available.

With respect to the financial aspects, the Swiss legislation (Federal Decree of the Atomic Energy Act and Ordinance on the Decommissioning Fund for Nuclear Facilities) provides for a fund (Decommissioning Fund) into which all nuclear facility operators must pay annual contributions. Contributions are paid at regular intervals by the operators of the four NPPs and the Central Storage Facility (ZZL). The contributions are based on the estimated costs of decommissioning of each facility. The cost estimates are based on specific decommissioning studies presented by the NPP operators and reviewed by HSK. They are reviewed periodically by the Management Commission of the Fund to ensure that sufficient funds will be available at the time of decommissioning. New decommissioning studies including a re-evaluation of the costs for all Swiss NPPs were submitted to the authorities in 2001. These studies were reviewed and approved by HSK in 2002.

With adequate financial resources the recruitement of qualified staff can be ensured. Guideline HSK-R-17 specifies requirements that apply also to decommissioning. The Decommissioning Licence can lay down specific requirements in this respect. The new Nuclear Energy Act requires the operator to submit a detailed project with his application for a Decommissioning Licence. This project must address specifically the staff and the organisation needed for decommissioning.

F.6.2 Radiation Protection (Clause ii)

Such steps shall ensure that the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied.

The Radiological Protection Act and the Radiological Protection Ordinance apply independently of whether a nuclear facility is in operation or is being decommissioned. This legislation covers all aspects of Article 26 Clause (ii) (see Section F.4). The Decommissioning Licence lays down complementary requirements as appropriate.

F.6.3 Emergency Preparedness (Clause iii)

Such steps shall ensure that the provisions of Article 25 with respect to emergency preparedness are applied.

The legal requirements concerning emergency preparedness apply independently of whether a facility is in operation or is being decommissioned. These requirements cover all aspects of Article 26 Clause (iii) (see Section F.5). The Decommissioning Licence lays down complementary requirements as appropriate.

F.6.4 Record Keeping (Clause iv)

Such steps shall ensure that records of information important to decommissioning are kept.

There are currently no specific legal requirements concerning technical record keeping in view of decommissioning. However, all nuclear facility operators keep technical records for the whole operational life of the facility. The necessary requirements are laid down in the construction and Operation Licences. The new Nuclear Energy Act requires the operator of a nuclear facility to keep comprehensive records on the technical installations of the facility and its operation up to the decommissioning.

Conclusion

The Swiss Party complies with the obligations of Article 26.

Section G Safety of Spent Fuel Management

G.1 General Safety Requirements (Article 4)

Each Contracting Party shall take the appropriate steps to ensure that at all stages of spent fuel management, individuals, society and the environment are adequately protected against radiological hazards.

The protection of individuals, society and the environment against radiological hazards related to spent fuel management is subject to the Swiss legislation on radiation protection and on atomic energy, as detailed in Section E.2. Compliance with the legal requirements regarding nuclear safety and radiation protection is verified and enforced by the Swiss Federal Nuclear Safety Inspectorate (HSK) for nuclear installations. This is done by reviewing safety analysis reports during the licensing steps and by supervising construction and operation particularly by inspections.

G.1.1 Criticality and Removal of Heat (Clause i)

In so doing, each Contracting Party shall take the appropriate steps to ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed.

Criticality and heat removal are attended to during the licensing process of a spent fuel management facility and during operation if changes in the operational procedures are planned. These points are analysed in the safety analysis report submitted with the licence application and reviewed by the regulatory body. Safety relevant changes to a spent fuel management facility, including equipment and procedures, require a licence or a permit from the regulatory body. All Swiss spent fuel management facilities are in compliance with the requirements of Clause (i).

G.1.2 Generation of Radioactive Waste (Clause ii)

In so doing, each Contracting Party shall take the appropriate steps to ensure that the generation of radioactive waste associated with spent fuel management is kept to the minimum practicable, consistent with the type of fuel cycle policy adopted.

The Radiological Protection Act requires that any handling and management of radioactive materials must take place in such a way that the generation of radioactive waste is kept to the minimum practicable. The spent fuel management facilities mentioned under Section D.2.1, as well as any future facilities, have been built and are operated to this principle.

G.1.3 Interdependencies (Clause iii)

In so doing, each Contracting Party shall take the appropriate steps to take into account interdependencies among the different steps in spent fuel management.

Spent fuel management is subject to the requirement of optimization formulated in Article 6 of the Radiological Protection Ordinance, thus interdependencies among the different steps must be and in practice are taken into account.

G.1.4 Protection of Individuals, Society and the Environment (Clause iv)

In so doing, each Contracting Party shall take the appropriate steps to provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards.

Protection of individuals, society and the environment from the effects of ionizing radiation is a subject of the radiation protection legislation (see Section E.2.2), in which the ICRP system of radiation protection, consisting of justification, optimization and dose limitation, is implemented. The applicable dose limits are compatible with the International Basic Safety Standards (IAEA Safety Series No. 115). In particular, a dose limit for members of the public of 1 mSv effective dose per year and a dose limit for workers of 20 mSv per year is implemented. Compliance of spent fuel management facilities with the legislation is ensured during the licensing and operational phase. At each licensing step a safety analysis report demonstrating compliance has to be submitted and is reviewed by the regulatory body. During the operational phase, compliance is verified and enforced by regulatory supervision, mainly by inspections. The regulatory supervision includes monitoring of the radioactivity in the environment of the facility.

G.1.5 Biological, Chemical and other Hazards (Clause v)

In so doing, each Contracting Party shall take the appropriate steps to take into account the biological, chemical and other hazards that may be associated with spent fuel management.

Biological, chemical and other hazards are subject to the environmental protection legislation, which also aims at human health protection. This latter part of the legislation concerns air and water quality. An Environmental Impact Assessment is required for the General Licence and Construction Licence. Hazards other than radiation encountered by workers during handling of spent fuel are covered by general legislation on safety in working places, enforced by supervision by the Swiss Accident Insurance Institute (SUVA).

G.1.6 Impacts on Future Generations (Clause vi)

In so doing, each Contracting Party shall take the appropriate steps to strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation.

Several legal requirements aim to avoid impacts on future generations. The Atomic Energy Act requires that all radioactivity hazards be removed from a nuclear installation in the case that the licence is terminated. The Federal Decree on the Atomic Energy Act requires safe and permanent management and disposal of all radioactive waste including spent fuel if declared as waste. The requirements on the long-term safety of disposal facilities are detailed in the Regulatory Guide HSK-R-21. Here, the principle is formulated that the risk to humans and the environment shall at no time in the future exceed the levels permissible in Switzerland today.

There are currently no disposal facilities for spent fuel in operation or under construction in Switzerland. However, the requirements on the long-term safety have been observed in the design and planning of disposal facilities, and compliance with them has been verified in the regulatory review of such projects.

G.1.7 Burdens on Future Generations (Clause vii)

In so doing, each Contracting Party shall take the appropriate steps to aim to avoid imposing undue burdens on future generations.

As explained in Section G.1.6 above, the legal requirements prevent imposing undue burdens on future generations. Regarding disposal, the Regulatory Guide HSK-R-21 explicitly formulates, as one of the overall objectives of disposal, that no undue burdens are to be imposed on future generations.

Conclusion

The Swiss Party complies with the obligations of Article 4.

G.2 Existing Facilities (Article 5)

Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

Two spent fuel management facilities exist in Switzerland (Section D.2.1).

- **ZZL**: The Central Storage Facility (ZZL) includes storage buildings for spent fuel and all kinds of radioactive waste, conditioning installations and a plasma incinerator. The different parts of the facility are successively entering the operational stage. The

storage hall for spent fuel and high level waste was commissioned in 2001. The safety analysis report for the already commissioned parts of ZZL has recently been updated to the "as built" stage. Thus the safety assessment of this facility is up to date.

- **ZWIBEZ**: This storage facility is located at Beznau NPP and obtained a construction and Operation Licence in 1990, based on a safety analysis report submitted in 1988. It consists of a storage hall for spent fuel and high level radioactive waste from reprocessing, and a storage hall for low level operational waste from Beznau NPP. The storage hall for spent fuel has not yet been commissioned for operation. The ZWIBEZ facility is included, as a part of Beznau NPP, in the 10-year safety re-assessment programme conducted for the Swiss NPPs. In 2002, Beznau NPP submitted to HSK a corresponding safety re-assessment report. This report is currently under review.

Gösgen NPP has requested a licence for a wet storage facility. This request is currently under review.

No other spent fuel management facilities exist or have existed in Switzerland. In the past, all spent fuel has been sent abroad for reprocessing.

Conclusion

The Swiss Party complies with the obligations of Article 5.

G.3 Siting of Proposed Facilities (Article 6)

G.3.1 Safety Impact Information (Paragraph 1)

Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility:

(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;

(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;

(iii) to make information on the safety of such a facility available to members of the public;

(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

A spent fuel management facility is a nuclear facility according to the Swiss atomic energy legislation. The site of a nuclear facility has to be fixed by the General Licence (which is a prerequisite for further licences and has to be approved by Parliament, see Section E.2.3). The safety analysis report to be submitted with the General Licence application has to include an evaluation of the site-related factors likely to affect the safety of the facility, as well

as the likely safety impacts of the facility on individuals, society and the environment (Clauses i and ii).

The licencing procedure includes two public consultations. The documentation on the project, including the safety analysis report, is made available, and any person (also from foreign countries) can give input or raise objections. Furthermore, bilateral agreements have been established with the neighbouring countries (France, Germany, Austria and Italy) with the aim of exchanging information on planned or operating nuclear installations that are situated close to the common national borders. This fulfills the requirements of Clauses (iii) and (iv).

G.3.2 Effects on other Contracting Parties (Paragraph 2)

In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.

For nuclear installations in general, adequate protection beyond the national borders is effected in practice by the fact that the evaluation of impact is carried out irrespective of national borders. Some nuclear installations in Switzerland are located close to the German border. In the frame of a bilateral agreement with Germany, German regulatory authorities review licence applications for such nuclear installations and assess the potential radiological effects according to the German regulations.

Conclusion

The Swiss Party complies with the obligations of Article 6.

G.4 Design and Construction of Facilities (Article 7)

G.4.1 Limitation of Radiological Impacts (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases.

The procedure for the Construction Licence for a nuclear installation, including spent fuel management facilities, requires the submission of a safety analysis report with the licence application. This safety analysis report, which is reviewed by the nuclear safety authorities, has to contain the necessary information to verify that the possible radiological impacts on individuals, society and the environment are limited. The evaluation of the radiological impacts must encompass normal operation as well as possible accidental situations.

G.4.2 Decommissioning (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account.

As a prerequisite for granting the General Licence for a NPP, the Federal Decree on the Atomic Energy Act requires demonstration of the feasibility of decommissioning and dismantling of the facility. This requirement was in fact also applied to the granting of the General Licence to ZWILAG for the Central Storage Facility (ZZL). Hence, detailed decommissioning studies have been conducted both for Beznau NPP (with ZWIBEZ) and ZZL. These studies have been reviewed by HSK. The new Nuclear Energy Act in preparation requires, for any nuclear installation, a decommissioning concept at the General Licence stage and a more detailed decommissioning plan at the Construction Licence stage. The decommissioning plan has to be updated periodically.

G.4.3 Technologies (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

The present legislation does not explicitly require that technologies incorporated in the design and construction of nuclear installations are supported by experience, testing or analysis. However, regulatory guidelines (in particular HSK-R-30) describe the regulatory supervision during the construction phase. The construction permit is issued upon verification that it proceeds in compliance with the licence and satisfies the quality requirements as specified. HSK bases its assessments of nuclear installations, including spent fuel management projects, on an evaluation taking note of the recent developments in science and technology.

Conclusion

The Swiss Party complies with the obligations of Article 7.

G.5 Assessment of Safety of Facilities (Article 8)

G.5.1 Safety Assessment (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out.

A safety assessment report is part of the documentation required by the Swiss atomic energy legislation for each licensing step of a nuclear installation, including spent fuel management facilities. An environmental assessment is required at the General and Construction Licence

stage based on the Environmental Protection Act. Comprehensive safety assessment reviews are carried out by HSK.

G.5.2 Update of Safety Assessment (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in clause (i).

The safety assessment has to be updated at each step of the licensing procedure (General Licence, Construction Licence and Operation Licence). The new Nuclear Energy Act requires periodical safety re-assessments. However, periodical safety assessments are already carried out today and are reviewed by HSK.

Conclusion

The Swiss Party complies with the obligations of Article 8.

G.6 Operation of Facilities (Article 9)

G.6.1 Operation Licence (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that the licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements.

The Operation Licence for a nuclear installation, including spent fuel management facilities, is granted based, among other things, on a safety analysis report. HSK supervises the construction of the facility and makes sure that the facility is built in accordance with the Construction Licence. The Operation Licence is granted on the condition that the start of operation has received a permit from HSK. This permit is issued as soon as the commissioning programme has demonstrated that the facility fulfills all safety and other requirements. The regulatory process for the commissioning of nuclear installations is specified in the Guideline HSK-R-30.

G.6.2 Defining and Revising Operational Limits and Conditions (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary.

HSK supervises and inspects the commissioning and operation of each nuclear facility including spent fuel management facilities. This includes the review and approval of

operational conditions for the particular nuclear installation. Any changes require a permit by HSK. HSK has the competence to revise operational limits and conditions as necessary for reasons of safety.

G.6.3 Accordance with Established Procedures (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures.

Operation, maintenance and monitoring of nuclear installations, including spent fuel management facilities, are specified in the Operation Licence. The corresponding procedures as described in the facility operation documents are reviewed by HSK. Their adequacy is a condition for issuing the permit to start operation. HSK is entrusted with the supervision of nuclear facilities and carries out inspections according to an annual inspection plan.

G.6.4 Engineering and Technical Support (Clause iv)

Each Contracting Party shall take the appropriate steps to ensure that engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility.

HSK inspects and supervises the qualification of the personnel of nuclear installations including spent fuel management facilities. HSK has the competence to intervene if it determines that a lack of technical or engineering support impacts on the safety of the facility.

G.6.5 Reporting of Incidents (Clause v)

Each Contracting Party shall take the appropriate steps to ensure that incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body.

The requirements regarding the regular reporting (monthly, quarterly and yearly) and the reporting of incidents are specified in the Regulatory Guide HSK-R-15. This Guideline refers to NPPs but is applied by analogy to spent fuel management facilities.

G.6.6 Collection and Analysis of Operating Experience (Clause vi)

Each Contracting Party shall take the appropriate steps to ensure that programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate.

The collection and analysis of operating experience is currently required by different regulatory guides issued by HSK. The new Nuclear Energy Act in preparation explicitly requires the operator of a nuclear installation, including spent fuel management facilities, to observe and analyse operating experience gained in comparable facilities.

G.6.7 Decommissioning Plans (Clause vii)

Each Contracting Party shall take the appropriate steps to ensure that decommissioning plans for a spent fuel management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

Updating of decommissioning plans for nuclear installations is not currently stated as an explicit legal requirement. However, the Ordinance on the Decommissioning Fund for Nuclear Facilities requires a periodic update of the decommissioning cost estimate. The decommissioning plans, which serve as a basis for the cost estimation, must thus be updated. The new Nuclear Energy Act now in preparation contains the explicit requirement to update the decommissioning plan during the operation of a nuclear installation.

Conclusion

The Swiss Party complies with the obligations of Article 9.

G.7 Disposal of Spent Fuel (Article 10)

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

According to current legislation, radioactive waste is defined as radioactive material which is no longer used. Thus spent nuclear fuel for which disposal without reprocessing is foreseen is radioactive waste by definition and must be disposed of accordingly.

Conclusion

The Swiss Party complies with the obligations of Article 10.

Section H Safety of Radioactive Waste Management

H.1 General Safety Requirements (Article 11)

Each Contracting Party shall take the appropriate steps to ensure that at all stages of radioactive waste management individuals, society and the environment are adequately protected against radiological and other hazards.

The protection of individuals, society and the environment against radiological and other hazards is subject to the Swiss legislation on radiation protection and on atomic energy, as detailed in Section E.2, and to the legislation on environmental protection (mainly the Environmental Protection Act and associated ordinances).

Compliance with the legal requirements regarding nuclear safety and radiation protection is verified and enforced by regulatory bodies. These are mainly the Swiss Federal Nuclear Safety Inspectorate (HSK) for nuclear installations, including radioactive waste management facilities, and the Federal Office of Public Health (BAG) for non-nuclear practices. The compliance is verified by reviewing safety analysis reports during the licensing steps and by supervising construction and operation particularly through inspections.

Protection of the environment from hazards other than radioactivity is verified in the licensing process of practices by the Federal Office of the Environment, Forests and Landscape (BUWAL). During operation, protection of workers is assured by requirements and compliance checks of the Swiss Accident Insurance Institute (SUVA). Compliance with the legislation on protection of the general population and the environment from non-radiological hazards is verified by Cantonal authorities.

H.1.1 Criticality and Removal of Heat (Clause i)

In so doing, each Contracting Party shall take the appropriate steps to ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed.

Criticality and heat removal are attended to during the licensing process of a radioactive waste management facility and during operation, if changes in the operational procedures are planned. These points are analysed in the safety analysis report submitted with the licence application and reviewed by the regulatory body. Safety relevant changes to a radioactive waste management facility, including equipment and procedures, require a licence or a permit from the regulatory body. All Swiss radioactive waste management facilities (see Section D.2.3) are in compliance with the requirements of Clause (i).

H.1.2 Generation of Radioactive Waste (Clause ii)

In so doing, each Contracting Party shall take the appropriate steps to ensure that the generation of radioactive waste is kept to the minimum practicable.

Minimization of radioactive waste is required by Article 25 of the Radiological Protection Act. The compliance is subject to verification by the regulatory body during licensing review, issuance of operation permits, and regular inspections. Until now there has never been any reason for a regulatory enforcement action regarding minimization of radioactive waste.

H.1.3 Interdependencies (Clause iii)

In so doing, each Contracting Party shall take the appropriate steps to take into account interdependencies among the different steps in radioactive waste management.

Radioactive waste management is subject to the requirement of optimization formulated in Article 6 of the Radiological Protection Ordinance, thus interdependencies among the different steps must be and in practice are taken into account. As an example of the enforcement in the larger perspective of this obligation, the Operation Licence for the waste treatment and conditioning installations of the Central Storage Facility (ZZL) contains the obligation to periodically perform an optimization study comparing the available options for the treatment, conditioning, storage and disposal of the waste. The first such study is due two years after the active commissioning of these installations, which is still in progress.

H.1.4 Protection of Individuals, Society and the Environment (Clause iv)

In so doing, each Contracting Party shall take the appropriate steps to provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards.

Protection of individuals, society and the environment from the effects of ionizing radiation is a subject of the radiation protection legislation (see Section E.2.2), in which the ICRP system of radiation protection, consisting of justification, optimization and dose limitation, is implemented. The applicable dose limits are compatible with the International Basic Safety Standards (IAEA Safety Series No. 115). In particular, a dose limit for members of the public of 1 mSv effective dose per year and a dose limit for workers of 20 mSv per year (see Section E.2.2) is implemented. Compliance of radioactive waste management facilities with the legislation is ensured during the licensing and operational phase. At each licensing step a safety analysis report demonstrating compliance has to be submitted and is reviewed by the regulatory body. During the operational phase compliance is verified and enforced by regulatory supervision, mainly by inspections. The regulatory supervision includes monitoring of the radioactivity in the environment of the facility. The protection of the environment against hazards other than radioactivity is the subject of a separate legislation. Compliance

with the environmental protection legislation is verified by inspections by the responsible Cantonal authorities.

H.1.5 Biological, Chemical and other Hazards (Clause v)

In so doing, each Contracting Party shall take the appropriate steps to take into account the biological, chemical and other hazards that may be associated with radioactive waste management.

Biological, chemical and other hazards are subject to the environmental protection legislation, which also aims at human health protection. This latter part of the legislation concerns air and water quality. An Environmental Impact Assessment is required for the General Licence and Contruction Licence. Hazards other than radiation encountered by workers during handling of radioactive waste are covered by general legislation on safety in working places, enforced by supervision by SUVA.

H.1.6 Impacts on Future Generations (Clause vi)

In so doing, each Contracting Party shall take the appropriate steps to strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation.

Several legal requirements aim to avoid impacts on future generations. The Atomic Energy Act and the Radiological Protection Act require that all radioactivity hazards be removed from a practice in the case that the licence is terminated. The Federal Decree on the Atomic Energy Act requires safe and permanent management and disposal of all radioactive waste. The requirements on the long-term safety of disposal facilities are detailed in the Regulatory Guide HSK-R-21. Here, the principle is formulated that the risk to humans and the environment shall at no time in the future exceed the levels permissible in Switzerland today.

There are currently no final disposal facilities for radioactive waste in operation or under construction in Switzerland. However, the requirements on the long-term safety have been observed in the design and planning of disposal facilities, and compliance with them has been verified in the regulatory review of such projects.

H.1.7 Burdens on Future Generations (Clause vii)

In so doing, each Contracting Party shall take the appropriate steps to aim to avoid imposing undue burdens on future generations.

As explained in Section H.1.6 above, the legal requirements prevent imposing undue burdens on future generations. Regarding disposal, the Regulatory Guide HSK-R-21 explicitly formulates, as one of the overall objectives of disposal, that no undue burdens are to be imposed on future generations. Sites of past practices in Switzerland needing clean-up measures for reasons of radioactivity are being restored to safe conditions under the supervision of the Federal Office of Public Health (BAG), see Section H.2.2.

Conclusion

The Swiss Party complies with the obligations of Article 11.

H.2 Existing Facilities and Past Practices (Article 12)

H.2.1 Existing Facilities (Clause i)

Each Contracting Party shall in due course take the appropriate steps to review the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

An overview of the existing radioactive waste management facilities is given in Section D.2.3.

- **ZZL**: The Central Storage Facility (ZZL) is owned by ZWILAG and includes storage buildings for spent fuel and all kinds of radioactive waste, conditioning installations and a plasma incinerator. The different parts of the facility are successively entering the operational stage. The storage hall for spent fuel and high level waste and the building for intermediate level waste were commissioned in 2001. The storage hall for low level waste has not yet been commissioned. The conditioning installations and the incinerator are expected to start active operation in 2003. The Operation Licence was granted in two parts, in 1995 (storage) and in 1999 (conditioning and incineration) after in-depth review of the projects by the regulatory body. The operation permits are delivered by the regulatory body when all licence conditions are met. The safety analysis report for the already commissioned storage parts has recently been updated to the "as built" stage. Thus the safety assessment of ZZL is up to date.
- **ZWIBEZ**: This storage facility is located at Beznau NPP and obtained a Construction Licence and an Operation Licence in 1990, based on a safety analysis report submitted in 1988. It consists of a storage hall for spent fuel and high level radioactive waste from reprocessing, and a storage hall for low level operational waste from Beznau NPP. The ZWIBEZ facility is included, as a part of Beznau NPP, in the 10-year safety re-assessment programme conducted for the Swiss NPPs. In 2002, Beznau NPP submitted to HSK a corresponding safety re-assessment report. This report is currently under review by the regulatory body.
- **PSI**: PSI is a federally funded research institute. It also acts as the National Collection Centre for radioactive waste from medicine, industry and research. At PSI this waste is sorted, conditioned and stored in the Federal Storage Facility (BZL). All radioactive waste management installations at PSI are nuclear installations with corresponding licences, and they are supervised by HSK. All safety relevant changes in installations or operations require a licence or a permit from HSK. Several parts of these installations have recently been upgraded. The pilot incinerator plant at PSI had a last operation phase at the end of 2002 and is to be decommissioned. The Operation Licence for the Federal Storage Facility (BZL) at PSI for radioactive waste from medicine, industry and research is due to be re-issued in 2003. The licence appli-

cation with a totally new safety analysis report was submitted in 2001 and has been reviewed by the nuclear safety authorities. The day to day waste management operations at PSI are subject to inspections by HSK, where issues of safety and optimization are addressed. Thus the current safety status of the radioactive waste management installations at PSI is verified to be in compliance with the legal requirements.

- **Research reactors in the decommissioning stage**: This concerns two reactors at PSI. The first to enter decommissioning was the DIORIT reactor. Its dismantling was licensed in 1994. The decommissioning proceeded under regulatory supervision by HSK and is now almost complete. All operations took place in compliance with the applicable legislation. The resulting conditioned radioactive waste is temporarily stored on site and will be brought to the Federal Storage Facility (BZL). The second reactor, SAPHIR, received the Decommissioning Licence in 2000. The dismantling work is ongoing. It takes place under the regulatory supervision of HSK and proceeds in compliance with the applicable legislation. The resulting radioactive waste is conditioned and stored in the same way as for the DIORIT reactor.

H.2.2 Past Facilities and Practices (Clause ii)

Each Contracting Party shall in due course take the appropriate steps to review the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.

One experimental power reactor has been dismantled in Switzerland. This installation, at Lucens in the Canton of Vaud, was shut down in 1969 following an accident after a short period of operation, and was later decommissioned. The site was released from regulatory control in 1995 with the exception of a shed containing approximately 240 t of unconditioned, solid radioactive waste in six containers, wihch will be transported to ZZL for storage and conditioning. The site of the former experimental power reactor at Lucens is subject to the environmental radiation monitoring programme of the Federal Office of Public Health (BAG).

In the Canton of Jura several former watch industry sites, where contamination with radium has been found, are in the process of being cleaned up under the supervision of BAG. There are no other past practices in Switzerland that would need intervention for reasons of radiation protection.

Conclusion

The Swiss Party complies with the obligations of Article 12.

H.3 Siting of Proposed Facilities (Article 13)

H.3.1 Safety, Impact and Information (Paragraph 1)

Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed radioactive waste management facility:

- ***(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;***
- ***(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;***
- ***(iii) to make information on the safety of such a facility available to members of the public;***
- ***(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.***

A radioactive waste management facility is a nuclear facility according to the Swiss atomic energy legislation. The site of a nuclear facility has to be fixed by the General Licence (which is a prerequisite for further licences and has to be approved by Parliament, see Section E.2.3). The safety analysis report to be submitted with the General Licence application has to include an evaluation of the site-related factors likely to affect the safety of the facility, as well as the likely safety impacts of the facility on individuals, society and the environment (Clauses i and ii).

The licencing procedure includes two public consultations. The documentation on the project, including the safety analysis report, is made available, and any person (also from foreign countries) can give input or raise objections. Furthermore, bilateral agreements have been established with the neighbouring countries (France, Germany, Austria and Italy) with the aim of exchanging information on planned or operating nuclear installations that are situated close to the common national borders. This fulfills the requirements of Clauses (iii) and (iv).

H.3.2 Effects on other Contracting Parties (Paragraph 2)

In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 11.

For nuclear installations in general, adequate protection beyond the national borders is effected in practice by the fact that the evaluation of impact is carried out irrespective of national borders. For disposal facilities, this requirement is explicitly stated by Principle 3 in the Guideline HSK-R-21. Some nuclear installations in Switzerland are located close to the German border. In the frame of a bilateral agreement with Germany, German regulatory authorities review licence applications for such nuclear installations and assess the potential radiological effects according to the German regulations.

Conclusion

The Swiss Party complies with the obligations of Article 13.

H.4 Design and Construction of Facilities (Article 14)

H.4.1 Limitation of Radiological Impacts (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that the design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases.

The procedure for the Construction Licence for a nuclear installation, including waste management facilities, requires the submission of a safety analysis report with the licence application. This safety analysis report, which is reviewed by the nuclear safety authorities, has to contain the necessary information to verify that the possible radiological impacts on individuals, society and the environment are limited. The evaluation of the radiological impacts must encompass normal operation as well as possible accidental situations.

H.4.2 Decommissioning (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a radioactive waste management facility other than a disposal facility are taken into account.

As a prerequisite for granting the General Licence for a NPP, the Federal Decree on the Atomic Energy Act requires demonstration of the feasibility of decommissioning and dismantling of the facility. This requirement was in fact also applied to the granting of the General Licence to ZWILAG for the Central Storage Facility (ZZL). The operators of the NPPs have elaborated detailed decommissioning studies for their installations. These studies have been reviewed by HSK. The new Nuclear Energy Act in preparation requires, for any nuclear installation, a decommissioning concept at the General Licence stage and a more detailed decommissioning plan at the Construction Licence stage.

H.4.3 Closure of Disposal Facility (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that at the design stage, technical provisions for the closure of a disposal facility are prepared.

The present atomic energy legislation does not explicitly address the closure of a disposal facility; it requires safe and permanent disposal of radioactive waste. The long-term safety of a disposal facility depends on the quality of the closure. Therefore, the safety documentation to be submitted with a licence application must contain enough technical detail in order for the regulatory body to verify that the closure can be effected in an adequate way. Thus implicitly, adequate closure is a requirement at every licensing stage. The new Nuclear

Energy Act in preparation explicitly requires, for the closure of a disposal facility, a concept at the stage of the General Licence and a more detailed plan at the stage of the Construction Licence.

H.4.4 Technologies (Clause iv)

Each Contracting Party shall take the appropriate steps to ensure that the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.

The present legislation does not explicitly require that technologies incorporated in the design and construction of nuclear installations are supported by experience, testing or analysis. This requirement is, however, covered by the regulatory review of licence applications. HSK bases its assessments of nuclear installations, including radioactive waste management projects, on an evaluation taking into account the recent developments in science and technology.

Conclusion

The Swiss Party complies with the obligations of Article 14.

H.5 Assessment of Safety of Facilities (Article 15)

H.5.1 Safety Assessment (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out.

A safety assessment report is part of the documentation required by the Swiss atomic energy legislation for each licensing step of a nuclear installation, including radioactive waste management facilities. An Environmental Impact Assessment is required at the General Licence and Construction Licence stage based on the Environmental Protection Act. Comprehensive safety assessment reviews are carried out by HSK.

H.5.2 Post-Closure Safety Assessment (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body.

For a disposal facility, a safety assessment addressing also the period after closure (long term safety) is required at each licensing step. An environmental assessment of non-radiological hazards is a requirement of the Environmental Protection Act.

H.5.3 Update of Safety Assessment (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that before the operation of a radioactive waste management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).

The safety assessment has to be updated at each step of the licensing procedure (General Licence, Construction Licence and Operation Licences). The new Nuclear Energy Act requires periodical safety re-assessments. However, periodical safety assessments are already carried out today and are reviewed by HSK.

Conclusion

The Swiss Party complies with the obligations of Article 15.

H.6 Operation of Facilities (Article 16)

H.6.1 Operation Licence (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that the licence to operate a radioactive waste management facility is based upon appropriate assessments as specified in Article 15 and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements.

The Operation Licence for a nuclear installation, including radioactive waste management facilities, is granted based, among other things, on a safety analysis report. HSK supervises the construction of the facility and makes sure that the facility is built in accordance with the Construction Licence. The Operation Licence is granted on the condition that the start of operation has received a permit from HSK. This permit is issued as soon as the commissioning programme has demonstrated that the facility fulfills all safety and other requirements. The regulatory process for the commissioning of nuclear installations is specified in the Guideline HSK-R-30.

H.6.2 Defining and Revising Operational Limits and Conditions (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary.

HSK supervises and inspects the commissioning and operation of each nuclear facility including radioactive waste management facilities. This includes the review and approval of operational conditions for the particular nuclear installation. Any changes require a permit by HSK. HSK has the competence to revise operational limits and conditions as necessary for reasons of safety.

H.6.3 Accordance with Established Procedures (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that operation, maintenance, monitoring, inspection and testing of a radioactive waste management facility are conducted in accordance with established procedures. For a disposal facility the results thus obtained shall be used to verify and to review the validity of assumptions made and to update the assessments as specified in Article 15 for the period after closure.

Operation, maintenance and monitoring of nuclear installations are specified in the Operation Licence. The corresponding procedures as described in the facility operation documents are reviewed by HSK. Their adequacy is a condition for issuing the permit to start operation. The new Nuclear Energy Act under preparation specifically requires, for the Operation Licence for a disposal facility to be granted, that the findings gained during construction confirm the suitability of the site. HSK is entrusted with the supervision of nuclear facilities and carries out inspections according to an annual inspection plan.

H.6.4 Engineering and Technical Support (Clause iv)

Each Contracting Party shall take the appropriate steps to ensure that engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility.

HSK inspects and supervises the qualification of the personnel for nuclear installations including radioactive waste management facilities. It has the competence to intervene if it determines that a lack of technical or engineering support impacts on the safety of the facility.

H.6.5 Characterization and Segregation of Radioactive Waste (Clause v)

Each Contracting Party shall take the appropriate steps to ensure that procedures for characterization and segregation of radioactive waste are applied.

Conditioning of radioactive waste requires a permit from HSK. The permit depends, among other things, on the measures taken to ensure that the properties of the waste and its characterization are optimal in view of the further waste management steps. The former point includes that attention is paid to segregation where this is beneficial.

H.6.6 Reporting of Incidents (Clause vi)

Each Contracting Party shall take the appropriate steps to ensure that incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body.

The requirements regarding the regular reporting (monthly, quarterly and yearly) and the reporting of incidents are specified in the Regulatory Guides HSK-R-15 and HSK-R-25. These Guidelines refer to NPPs and the PSI but are also applied by analogy to radioactive waste management facilities.

H.6.7 Collection and Analysis of Operating Experience (Clause vii)

Each Contracting Party shall take the appropriate steps to ensure that programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate.

The collection and analysis of operating experience is presently required by different regulatory guides issued by HSK. The new Nuclear Energy Act in preparation explicitly requires the operator of a nuclear installation to observe and analyse operating experiences made in comparable facilities.

H.6.8 Decommissioning Plans (Clause viii)

Each Contracting Party shall take the appropriate steps to ensure that decommissioning plans for a radioactive waste management facility other than a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.

Updating of decommissioning plans for nuclear installations is not currently stated as an explicit legal requirement. However, the Ordinance on the Decommissioning Fund requires a periodic update of the decommissioning cost estimate. The decommissioning plans, which serve as a basis for the cost estimation, must thus be updated. The new Nuclear Energy Act now in preparation contains the explicit requirement to update the decommissioning plan during the operation of a nuclear installation.

H.6.9 Closure of Disposal Facility (Clause ix)

Each Contracting Party shall take the appropriate steps to ensure that plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

The preparation and updating of plans for the closure of a disposal facility is not yet a formally stated legal requirement. However, implicitly, adequate closure is a requirement at every licensing stage for a disposal facility (see Section H.4.3). The new Nuclear Energy Act now in preparation contains explicitly the requirement to update the closure plan.

Conclusion

The Swiss Party complies with the obligations of Article 16.

H.7 Institutional Measures after Closure (Article 17)

H.7.1 Keeping Records (Clause i)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility records of the location, design and inventory of that facility required by the regulatory body are preserved.

Preservation of information on a closed disposal facility, including location, design and inventory, is presently required in the Regulatory Guide HSK-R-21. This requirement is included in the new Nuclear Energy Act. The Federal Council (federal government) must take the necessary measures to ensure that the information is preserved.

H.7.2 Institutional Controls (Clause ii)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility active or passive institutional controls such as monitoring or access restrictions are carried out, if required.

The safe and permanent disposal of radioactive waste required by the Swiss legislation is to be realized in such a way that the long-term safety does not rely on active surveillance and maintenance. This is stated in the Guideline HSK-R-21. However, continuing monitoring after closure of a disposal facility is allowed and foreseen. Since there will be no disposal facilities closed or even built in Switzerland in the near future, the details of the institutional controls after closure have not been decided yet. The new Nuclear Energy Act addresses passive institutional controls after closure, allocating the corresponding decision to the federal government. The new law also establishes a protection area around a disposal facility. This is the underground area where intrusions may impair the long-term safety of the disposal facility. The protection area is to be entered in the land register. Future activities such as drillings, underground constructions or explosions, which would affect the protection area of a disposal facility, are subject to authorization.

H.7.3 Intervention Measures (Clause iii)

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

Switzerland has implemented a national monitoring programme of the radioactivity in the environment. This monitoring is performed by the Federal Office of Public Health (BAG). The environment of a closed disposal facility will be subject to the environmental radiation monitoring programme. The intervention measures to be taken in the case of increased environmental radiation are established by the radiation protection legislation and by the Ordinance on the Intervention Organisation in Case of Increased Radiation.

Conclusion

The Swiss Party complies with the obligations of Article 17.

Section I Transboundary Movement (Article 27)

I.1 General Requirements (Paragraph 1)

Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments.

I.1.1 Authorization by State of Destination (Clause i)

In so doing, a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination.

The import and export of radioactive material are subject to an authorization issued under the Atomic Energy Act and the Atomic Energy Ordinance (for nuclear materials) or the Radiological Protection Act and the Radiological Protection Ordinance (for other radioactive materials). Export of radioactive waste for disposal abroad is prohibited unless such export is the object of an agreement between Switzerland and the country of disposal. Since sea dumping of radioactive waste ceased in the early 1980's, no radioactive waste has been exported from Switzerland for disposal purposes.

Export of spent fuel and radioactive waste for reprocessing, treatment or research is possible, but subject to authorization. Such authorizations are regularly issued in the context of the reprocessing contracts between the Swiss utlities and COGEMA (France) and BNFL (UK). In both cases there is an agreement at government level between Switzerland and the country of reprocessing. Under the terms of these agreements Switzerland agrees to have the radioactive waste from reprocessing returned to Switzerland in due course. The first canisters with vitrified waste were returned from France in 2001 and 2002.

Other wastes have been exported in the past for the purpose of treatment and conditioning, the conditioned waste being subsequently returned to Switzerland. Export for this purpose is possible under the current Swiss legislation. While *de facto* the state of destination would in such a case be notified, and the export licence would only be issued if that state had given its consent, there is no formal legal requirement in this respect. Finally, export of small quantities of spent fuel for research purposes is possible and does in fact regularly take place. The materials are returned to Switzerland after completion of the research projects.

I.1.2 Movements through States of Transit (Clause ii)

In so doing, transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized.

Switzerland is a party to the European Agreement on the International Carriage of Dangerous Goods by Road (ADR) and by Rail (RID). Air tranport is covered by the ICAO Dangerous Goods Regulations and transport on the Rhine river by the ADNR (Règlement

pour le transport des matières dangereuses sur le Rhin). Licences for export would not be issued unless the international obligations relevant to the modes of transport used were fulfilled.

I.1.3 Requirements for State of Destination (Clause iii)

In so doing, a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention.

The Radiological Protection Act prohibits the import of radioactive waste not originally arising from Switzerland for disposal purposes unless under an international agreement. No such agreement has been concluded so far by Switzerland. Import of waste for treatment and conditioning purposes is possible under current legislation, the import licence would, however, not be issued unless the return of the processed waste to the country of origin was garanteed. *De facto* no licence would be issued for import of spent fuel or radioactive waste to Switzerland, since the licences of the existing and planned Swiss facilities rule out treatment or storage of spent fuel and radioactive waste not arising from Swiss facilities. The only exception concerns small quantities of fresh or spent fuel imported for research purposes and re-exported after completion of the research work.

Switzerland has the administrative and technical capacity, as well as the appropriate regulatory structure, so that it would be in a position to manage imported spent fuel or radioactive waste in a manner consistent with the Convention.

I.1.4 Meeting the Requirements for State of Destination (Clause iv)

In so doing, a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement.

The Radiological Protection Ordinance expressly prohibits export of radioactive waste for disposal purposes unless (a) the safety requirements in the destination state are shown to be sufficient, (b) a repository exists in that state, and (c) disposal takes place under an international agreement between Switzerland and the state of destination for disposal. As already mentioned, no radioactive waste or spent fuel has been exported from Switzerland for the purpose of disposal since the sea dumping campaigns ceased in the early 1980's.

There are currently no specific legal requirements concerning the issuance of licences for export of waste or of spent fuel for the purpose of treatment and conditioning abroad and subsequent return of the treated and conditioned products to Switzerland. Under current policy such licences would not in practice be issued unless the requirements of Article 27 Paragraph 1 Clause (iv) of the Convention are fulfilled.

The new Nuclear Energy Act, which was recently passed by Parliament and awaits public referendum, defines the conditions to be met for an exceptional authorization to export radio-

active waste for conditioning or disposal. These conditions include the requirements of the Radiological Protection Ordinance as mentioned above (a, b, c) and fulfill the requirements of Article 27 Paragraph 1 Clause (iv).

I.1.5 Re-entry in Case of Non-Conformity (Clause v)

In so doing, a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.

In the case of reprocessing of spent fuel Switzerland expressly accepts that the waste products originating from the reprocessing of Swiss spent fuel are subsequently returned to Switzerland. In the past, this also applied to wastes other than those associated with reprocessing, in those rare cases where wastes had been exported for the purpose of waste treatment and conditioning. This would equally apply in the future. There are currently no explicit legal requirements in this respect. Alternative arrangements not ending with the return of the waste products to Switzerland would, however, be equivalent to disposal abroad: This is prohibited unless strict criteria are fulfilled, see Section I.1.1 and I.1.2 above).

The new Nuclear Energy Act, which was recently passed by Parliament and awaits public referendum, explicitly requires a binding agreement between the consignor and the consignee concerning the re-entry into Switzerland, if necessary, of radioactive waste to be exported for conditioning or disposal, as a condition for issuing the export licence.

I.2 Shipment South of Latitude 60 (Paragraph 2)

A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

Under current practice a licence for export and shipment of spent fuel or radioactive waste would not be issued, if the purpose of the export were storage or disposal at a latitude south of 60 in the Southern Hemisphere. There are, however, no specific legal requirements in this respect.

Conclusion

Switzerland fulfills in practice the requirements in Article 27 of the Convention and will continue to do so. However, not all of these requirements have been incorporated into national legislation. The new Nuclear Energy Act, which was recently passed by Parliament and awaits public referendum, will remedy to this situation.

Section J Disused Sealed Sources (Article 28)

J.1 Possession, Remanufacturing and Disposal (Paragraph 1)

Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.

The use of sealed radiation sources is regulated by the Radiological Protection Act and the corresponding Ordinances. The radiation protection legislation requires minimization of radioactive waste. According to this requirement, disused sealed sources shall, as far as possible, be recycled for further use. If this is not possible, disused sealed sources are to be managed as radioactive waste. Non recyclable disused sealed sources must thus be delivered to the National Collection Centre for radioactive waste at PSI. PSI is responsible for the conditioning and storage of such sources and, eventually, for delivering them to a radioactive waste disposal facility.

J.2 Re-entry into Territory (Paragraph 2)

A Contracting Party shall allow for reentry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.

There are no manufacturers of sealed radiation sources in Switzerland. Therefore, no authorization for re-entry into Swiss territory of disused sealed sources for the purpose of recycling have been applied for. However, Switzerland would allow the re-entry into its territory of disused sealed sources if facilities authorized to manufacture and recycle such devices existed in Switzerland. The prerequisites for such an import are set forth in the Radiological Protection Ordinance.

Conclusion

The Swiss Party complies with the obligations of Article 28.

Section K Planned Activities to Improve Safety

As is shown in the present report, the safety of spent fuel management and the safety of radioactive waste management in Switzerland is in compliance with the obligations of the Convention. There is thus no imminent need for measures to improve safety in Switzerland.

However, a new Nuclear Energy Act was recently passed by Parliament and awaits public referendum. It will replace the present legislation which is based on the Atomic Energy Act of 1959 and could possibly enter into force in 2005. The new Nuclear Energy Act addresses more specifically spent fuel and radioactive waste management and introduces modifications in the licensing procedure in order to make it compatible with European legislation. In particular, it contains specific QM requirements as a condition for granting Construction and Operation Licences for nuclear installations, requires periodical safety re-assessments and, for any nuclear installation, a decommissioning concept at the General Licence stage and a more detailed decommissioning plan at the Construction Licence stage. Concerning final disposal, the new Nuclear Energy Act addresses passive institutional controls after closure, allocating the corresponding decision to the federal government. All the Regulatory Guides will be revised and adapted to conform to the new Act.

The new legislation takes better account of the requirements of the Convention concerning spent fuel and radioactive waste management.

Section L Annexes

L.1 List of Abbreviations

AGNEB	Interdepartmental Working Group on Radioactive Waste Management
ALARA	“As low as reasonably achievable”
BAG	Federal Office of Public Health, Swiss regulatory body for non-nuclear practices
BE	Spent fuel if declared as waste
BFE	Federal Office of Energy
BWR	Boiling water reactor
BUWAL	Federal Office of the Environment, Forests and Landscape
BZL	Federal Storage Facility at PSI for all non-nuclear radioactive waste originating from medicine, industry and research
EOR	Emergency Organisation in Case of Increased Radioactivity
GNW	Genossenschaft für Nukleare Entsorgung Wellenberg, applicant for a final repository for radioactive waste in central Switzerland
HAA	Vitrified high level waste from reprocessing
HSK	Swiss Federal Nuclear Safety Inspectorate, Swiss regulatory body (attached to BFE)
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiation Protection
IRRT	International Regulatory Review Team
ISRAM	Information System for Radioactive Materials
KSA	Swiss Federal Nuclear Safety Commission
LMA	Long-lived intermediate level waste
NAZ	National Emergency Operations Centre
Nagra	National Cooperative for the Disposal of Radioactive Waste
NEWMDB	Net-Enabled Waste Management Database of IAEA
NPP	Nuclear Power Plant
OECD	Organisation of Economic Co-operation and Development
PSI	Paul Scherrer Institute at Villigen and Würenlingen, until 1987 Swiss Federal Institute for Reactor Research (EIR). PSI operates the National Collection Centre for non-nuclear radioactive waste, as well as BZL.
PWR	Pressurised water reactor
QM	Quality management
SMA	Low level and intermediate level waste, mostly short-lived
SUVA	Swiss Accident Insurance Institute
UVEK	Federal Department for Environment, Transport, Energy and Communication
ZWIBEZ	Interim storage facility at Beznau NPP
ZWILAG	Company that owns and operates ZZL
ZZL	Central Storage Facility at Würenlingen

L.2 References to National Laws and Regulations

L.2.1 Legislation[1] (Acts and Ordinances)

Acts

- Atomic Energy Act (Loi fédérale sur l'utilisation pacifique de l'énergie atomique), RS 732.0, 23 December 1959.
- Federal Decree on the Atomic Energy Act (Arrêté fédéral concernant la loi sur l'énergie atomique), RS 732.01, 6 October 1978.
- Environmental Protection Act (Loi fédérale sur la protection de l'environnement), RS 814.01, 7 October 1983.
- Water Protection Act (Loi fédérale sur la protection des eaux), RS 814.20, 24 January 1991.
- Radiological Protection Act (Loi sur la radioprotection), RS 814.50, 22 March 1991.

Ordinances

- Ordinance on Preparatory Measures (Ordonnance sur les mesures prises en prévision de l'aménagement d'un dépôt de déchets radioactifs), RS 732.012, 27 November 1989.
- Ordinance on the Decommissioning Fund (Ordonnance concernant le fonds pour la désaffectation d'installations nucléaires), RS 732.013, 5 December 1983.
- Ordinance on the Waste Management Fund (Ordonnance sur le fonds pour la gestion des déchets radioactifs provenant des centrales nucléaires), RS 732.014, 6 March 2000.
- Ordinance on the Intervention Organisation in Case of Increased Radiation (Ordonnance relative à l'organisation d'intervention en cas d'augmentation de la radioactivité), RS 732.32, 26 June 1991.
- Emergency Protection Ordinance (Ordinance sur la protection en cas d'urgence au voisinage des installations nucléaires), RS 732.33, 28 November 1983.
- Radiological Protection Ordinance (Ordonnance sur la radioprotection), RS 814.501, 22 June 1994.
- Iodine Tablet Ordinance (Ordinance sur la distribution de comprimés d'iode à la population), RS 814.52, 1 July 1992.
- Ordinance on the Use of Unsealed Radiation Sources (Ordonnance sur l'utilisation des sources radioactives non scellées), RS 814.554, 21 November 1997.
- Ordinance on the Collection of Radioactive Waste (Ordonnance sur les déchets radioactifs soumis à l'obligation de livraison), RS 814.557, 8 July 1996.

[1] RS (Recueil Systématique) refers to the classification system of the Swiss legislation.

L.2.2 Regulatory Guides

The following table presents the Regulatiory Guides currently in force in Switzerland. All Guidelines are originally written in German. Guidelines denoted /e are also available in English, whereas Guidelines provided with * are available in German only.

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Guideline	Title of Guideline	Date of current issue
HSK-R-04/d *	Supervisory procedures governing the construction of nuclear power plants: Design of buildings (Aufsichtsverfahren beim Bau von Kernkraftwerken: Projektierung von Bauwerken)	December 1990
HSK-R-05/d *	Supervisory procedures governing the construction of nuclear power plants: Mechanical equipment (Aufsichtsverfahren beim Bau von Kernkraftwerken: Mechanische Ausrüstungen)	October 1990
HSK-R-06/d *	Safety classification, interface between classes and construction regulations concerning equipment of light water reactor nuclear power plants (Sicherheitstechnische Klassierung, Klassengrenzen und Bauvorschriften für Ausrüstungen in Kernkraftwerken mit Leichtwasserreaktoren)	May 1985
HSK-R-07/d *	Guideline for radiation protection zones in nuclear installations and in the Paul Scherrer Institute (Richtlinie für den überwachten Bereich der Kernanlagen und des Paul Scherrer Institutes)	June 1995
HSK-R-08/d	Sicherheit der Bauwerke für Kernanlagen, Prüfverfahren des Bundes für die Bauausführung	May 1976
HSK-R-08/e	Safety of buildings for nuclear installations: Federal supervisory procedures for the construction	May 1976
HSK-R-11/d *	Radiation protection objectives in the normal operation of nuclear installations (Strahlenschutz-Ziele im Normalbetrieb von Kernanlagen)	May 2003[2]
HSK-R-12/d	Erfassung und Meldung der Dosen des strahlenexponierten Personals der Kernanlagen und des Paul Scherrer Institutes	October 1997
HSK-R-12/e	Determining and reporting the doses of occupationally radiation exposed personnel of nuclear installations and the Paul Scherrer Institute	October 1997
HSK-R-13/d *	Clearance of materials and areas from controlled zones (Inaktivfreigabe von Materialien und Bereichen aus kontrollierten Zonen) (Freimessrichtlinie)	February 2002
HSK-R-14/d	Konditionierung und Zwischenlagerung radioaktiver Abfälle	December 1988
HSK-R-14/e	Conditioning and Interim Storage of Radioactive Wastes	December 1988
HSK-R-15/d *	Reporting guideline concerning the operation of nuclear power plants (Berichterstattung über den Betrieb von Kernkraftwerken)	December 1999
HSK-R-16/d *	Seismic plant instrumentation (Seismische Anlageninstrumentierung)	February 1980
HSK-R-17/d	Organisation von Kernkraftwerken	June 2002
HSK-R-17/e	Organisation of nuclear power plants	June 2002

[2] The old version of HSK-R-11 of May 1980 is still in force while the present report is published (April 2003). The new version is planned for May 2003.

Guideline	Title of Guideline	Date of current issue
HSK-R-18/d *	Supervision of repairs, modifications and replacement of mechanical equipment in nuclear installations (Aufsichtsverfahren bei Reparaturen, Änderungen und Ersatz von mechanischen Ausrüstungen in Kernanlagen)	December 2000
HSK-R-21/d HSK-R-21/e	Schutzziele für die Endlagerung radioaktiver Abfälle Protection Objectives for the Disposal of Radioactive Waste	November 1993
HSK-R-23/d *	Revisions, testing, replacement, repair and modification of electrical equipment in nuclear installations (Revisionen, Prüfungen, Ersatz, Reparaturen und Änderungen an elektrischen Ausrüstungen in Kernkraftwerken)	January 2003
HSK-R-25/d *	Reporting guideline concerning the Paul Scherrer Institute and the nuclear installations of the Swiss Confederation and the cantons (Berichterstattung des Paul Scherrer Institutes sowie der Kernanlagen des Bundes und der Kantone)	June 1998
HSK-R-27/d *	Selection, training and examination of NPP staff requiring a licence (Auswahl, Ausbildung und Prüfung des lizenzpflichtigen Betriebspersonals von Kernkraftwerken)	May 1992
HSK-R-30/d *	Supervisory procedures for construction and operation of nuclear installations (Aufsichtsverfahren beim Bau und Betrieb von Kernanlagen)	July 1992
HSK-R-31/d *	Supervisory procedures governing the construction of nuclear power plants: 1E classified electrical equipment (Aufsichtsverfahren beim Bau von Kernkraftwerken, 1E klassierte elektrische Ausrüstungen)	January 1994
HSK-R-32/d *	Guideline for meteorological measurement on sites of nuclear installations (Richtlinie für die meteorologischen Messungen an Standorten von Kernanlagen)	September 1993
HSK-R-35/d *	Supervisory procedures governing the construction of nuclear power plants: System engineering (Aufsichtsverfahren beim Bau und Änderungen von Kernkraftwerken, Systemtechnik)	May 1996
HSK-R-37/d *	Appreciation of education and training in radiation protection within the supervisory domain of HSK (Anerkennung von Strahlenschutz-Ausbildungen und –Fortbildungen im Aufsichtsbereich der HSK)	July 2001
HSK-R-39/d *	Registration of radiation sources and material testers on a nuclear installation site (Erfassung der Strahlenquellen und Werkstoffprüfer im Kernanlagenareal)	January 1990
HSK-R-40/d *	Filtered containment venting for light water reactors: design requirements (Gefilterte Druckentlastung für den Sicherheitsbehälter von Leichtwasserreaktoren, Anforderungen für die Auslegung)	March 1993
HSK-R-41/d *	Calculation of the radiation exposures in the vicinity of nuclear installations due to emissions of radioactive materials (Berechnung der Strahlenexposition in der Umgebung aufgrund von Emissionen radioaktiver Stoffe aus Kernanlagen)	July 1997
HSK-R-42/d *	Responsibility for decisions to implement particular measures to mitigate the consequences of a severe accident at a nuclear installation (Zuständigkeiten für die Entscheide über besondere Massnahmen bei einem schweren Unfall in einer Kernanlage)	February 2000

Guideline	Title of Guideline	Date of current issue
HSK-R-45/d	Planung und Durchführung von Notfallübungen in den schweizerischen Kernanlagen	July 1997
HSK-R-45/e	Planning and Execution of Emergency Exercises in Swiss Nuclear Power Plants	February 1998
HSK-R-47/d *	Testing of radiation measuring instruments (Prüfung von Strahlenmessgeräten)	October 1999
HSK-R-49/d *	Technical safety requirements for the securing of nuclear installations (Sicherheitstechnische Anforderungen an die Sicherung von Kernanlagen)	March 2001
HSK-R-50/d *	Reporting of the Paul Scherrer Institute and of the nuclear installations of the Confederation and the cantons (Berichterstattung des Paul Scherrer Institutes sowie der Kernanlagen des Bundes und der Kantone)	March 2003
HSK-R-60/d *	Assessment of nuclear fuel production (Überprüfung der Brennelementherstellung)	March 2003
HSK-R-100/d *	Nuclear power plant conditions (Anlagezustände eines Kernkraftwerks)	June 1987
HSK-R-101/d	Auslegungskriterien für Sicherheitssysteme von Kernkraftwerken mit Leichtwasser-Reaktoren	May 1987
HSK-R-101/e	Design Criteria for Safety Systems of Nuclear Power Plants with Light Water Reactors	May 1987
HSK-R-102/d	Auslegungskriterien für den Schutz von sicherheitsrelevanten Ausrüstungen in Kernkraftwerken gegen die Folgen von Flugzeugabsturz	December 1986
HSK-R-102/e	Design criteria for the protection of safety equipment in NPPs against the consequences of airplane crash	December 1986
HSK-R-103/d *	Plant internal measures against the consequences of severe accidents (Anlageinterne Massnahmen gegen die Folgen schwerer Unfälle)	November 1989

L.3 IAEA Safety Guides

- IAEA Safety Series No. 50-C/SG-Q, Quality Assurance for Safety in Nuclear Power Plants and other Nuclear Installations: Code and Safety Guides Q1-Q14, IAEA, Vienna, 1996.
- IAEA Safety Series No. 50-SG-S3, Atmospheric Dispersion in Nuclear Power Plant Siting: A Safety Guide, IAEA, Vienna, 1980.
- IAEA Safety Series No. 111-G-1.1, Classification of Radioactive Waste: A Safety Guide, a Publication within the RADWASS Programme, IAEA, Vienna, 1994.
- IAEA Safety Series No. 115, International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources: A Safety Standard, IAEA, Vienna, 1996.

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