

Czech Republic



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



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Revision 4.0

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General comment: Substantial changes in the current version of the National Report, except numerical values (such as inventories), are highlighted in grey.

List of abbreviations and selected terms

Atomic Act	Act No. 18/1997 Coll., on peaceful utilization of nuclear energy and ionizing radiation and on amendments to and alterations to some acts as amended
AZ	reactor core
BAPP	Auxiliary service building (NPP Dukovany)
BPP	Auxiliary service building (NPP Temelín)
BRS	National Safety Board (or, the Board)
BSVP	spent fuel pool (NPP Temelín)
BVP	spent fuel pool (or storage pool; NPP Dukovany)
ČHMÚ	Czech Institute for Hydrometeorology
ČR	Czech Republic
ČSKAE	Czechoslovak Atomic Energy Commission
CV Řež	Centrum výzkumu (Research center) Řež s. r. o.
EDU	ČEZ, a. s., Nuclear Power Plant Dukovany
ENATOM	Emergency Notification and Assistance Technical Operations Manual
EOAR	equivalent volume activity of radon
ETE	ČEZ, a. s., Nuclear Power Plant Temelín
EU	European Union
FDS	fragmentation and decontamination center
FJFI	Faculty of nuclear and physical engineering, Czech University of Technology in Prague
GTRI	Global Threat Reduction Initiative
HK	hot chamber
HÚ (DGR)	deep geological repository
HVB	main production building
I.O.	primary circuit
II.O.	secondary circuit
ICRP	International Committee for Radiation Protection
INES	International Nuclear Event Scale
IRRS	International Regulatory Review Service
IRRT	International Regulatory Review Team
IRS	Incident Reporting System
IRS	Incident Reporting System
JE (NPP)	Nuclear Power Plant
JZ	nuclear installation
k_{eff}	effective coefficient of neutron breeding
KKC	Emergency Response Center
Policy	Policy for radioactive waste management and spent fuel management in the Czech Republic approved by the Czech government Resolution No. 487 of 15 May 2002
KRAO	liquid radioactive waste
KŠ	Crisis Staff
KÚ	Regional Office
LaP	Limits and Conditions
LVR	light water reactor
MAAE (IAAE)	International Atomic Energy Agency
MěÚ	Town Office

MF	Ministry of Finance of the Czech Republic
MPO	Ministry of Industry and Trade of the Czech Republic
MSVP (ISFSF)	Interim Spent Fuel Storage Facility
MV	Ministry of the Interior of the Czech Republic
MŽP	Ministry of the Environment of the Czech Republic
National Report	National Report of the Czech Republic under the Joint Convention on Safety in Spent Fuel Management and e Safety in Radioactive Waste Management
NATO	North Atlantic Treaty Organization
NEA/OECD	Nuclear Energy Agency/Organization for Economic Co-operation and Development
OS	packaging assembly/cask (formerly also container)
PE	polyethylene
PpBZ (FSAR)	Final Safety Analysis Report
PRAO	solid radioactive waste
PS (FA)	fuel assembly
PZJ	quality assurance program
RAO (RAW)	radioactive waste
RO	radiation protection
RRRFR	Russian Research Reactor Fuel Return
s. p.	state enterprise
SKŘ (I&C)	Instrumentation and Control system
Joint Convention	the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
SÚJB	State Office for Nuclear Safety (or Office)
SÚJCHBO	State Institute for Nuclear, Chemical and Biological Protection
SÚRAO	Radioactive Waste Repositories Authority (or the Authority)
SÚRO	State Institute for Radiation Protection
SVO	special water purification system
SVP (SFSF)	spent fuel storage facility (Dukovany)
SVJP (SFSF)	spent nuclear fuel storage facility (Temelín)
ŠR	training reactor
ŠTK	transfer cask shaft (under ČEZ, a. s., terminology shaft No. 1)
TK (HM)	heavy metal
TLD	thermoluminescent detector
ÚJF Řež	Nuclear Physics Institute Řež
ÚJV Řež a. s.	Nuclear Research Institute Řež a. s.
ÚKŠ	Central Crisis Staff (or Staff)
ÚRAO	radioactive waste repository
URZ	sealed radionuclide source
ÚVVVR	Institute for Research, Production and Utilization of Radioisotopes, Prague
VAO (HLW)	high-level active waste
VCNP	Committee for Civil and Emergency Planning (or Committee)
VP (SF)	spent fuel
VVER	type identification of light water reactors designed in former Soviet Union
ZIZ	ionizing radiation source
ZRAO	solidification of radioactive waste
ŽP	environment

Summary

On 25 March 1999 the government of the Czech Republic approved the Joint Convention which came into effect in the Czech Republic on 18 June 2001. In agreement with the obligations resulting from its accession to the Joint Convention the Czech Republic has drawn already the fourth National Report for the purposes of review meetings of the contracting parties, which describes the system of spent fuel and radioactive waste management in the scope required by selected articles of the Joint Convention. The information contained in the report were gathered and updated as at 31 December 2010, unless stated otherwise. Meanwhile, at the national level the National Report serves as a source of up-to-date publicly available information (<http://www.sujb.cz>) on methods of spent fuel and radioactive waste management in all facilities subject to the Joint Convention.

Results from the first three review meetings of the Contracting Parties to the Joint Convention in 2003, 2006 and 2009 and the existing practices make it possible to conclude that spent fuel and radioactive waste in the Czech Republic is managed fully in compliance with the Joint Convention articles. The Atomic Act and its implementing decrees form a legislative base for all activities in spent fuel and radioactive waste management and clearly define responsibilities of license holders for the achieved level of nuclear safety, radiation protection, emergency preparedness and physical protection. Specific activities completed and started before the end of 2010 have ensured that:

- the long-term storage of spent fuel from all operated nuclear power plants at the territory of the Czech Republic complies with the adopted government Policy using type-approved casks placed in dry spent fuel storage facilities at NPP Dukovany and NPP Temelín sites,
- new immobilization technologies have been tested and used on both the plants for operational sludge and ion exchangers so that the resulting radioactive waste form can be safely disposed in the Dukovany disposal facility
- safe storage and disposal of all categories of operating and institutional low- and intermediate-level waste continued in near-surface repositories operated by the state organization SÚRAO, established by MPO to provide for activities associated with radioactive waste disposal.
- most of old environmental liabilities on the ÚJV Řež a. s. site have been remedied.

The following activities, which have been planned for 2010 – 2013 to improve safety of spent fuel and radioactive waste management should be mentioned:

- preparation of the new Atomic Act that will take into account experience from the period of application of the current Act No. 18/1997 Coll. and related legislative regulations and that will use new recommendations of international institutions (IAEA, EC, WENRA). A significant role in a proper setup of the regulation will be also played by changes in the organization and funding of SÚJB, which have been the subject matter of amending of the existing Act No. 18/1997 Coll.,
- updating of the national Policy, which will particularly take into account generation of spent fuel and radioactive waste from the planned new builds,
- continuing project of remedy of environmental liabilities on the ÚJV Řež a. s. site and refurbishment of technology units to process institutional radioactive waste,
- implementation of the IRRS international mission organized by IAEA on a request made by the Czech Republic.

In the long-term perspective, the key activity foreseen in the area of spent fuel and radioactive waste management will be the development of a national deep geologic repository which should be commissioned after 2065.

In conclusion, SÚJB as the state administration body responsible for elaboration of this report would like to express its thanks for the support provided in the process of National Report development by the following organizations engaged in spent fuel and radioactive waste management in the Czech Republic: ČEZ, a. s., CV Řež s. r. o., ÚJV Řež a. s. and SÚRAO.

1. Introduction

The present National Report is submitted by the Czech Republic for the purpose of the Fourth Review Meeting of the Contracting Parties to the Joint Convention. The objective is to describe the performance of obligations under the Joint Convention in the Czech Republic as of December 31, 2010. The National Report outline is based on the reviewed recommendations approved in the Second Review Meeting of the Contracting Parties to the Joint Convention held in May 2006 and provided in the „Guidelines regarding the form and structure of national reports (INFCIRC/604/Rev. 1)“ of July 19, 2006.

By the mentioned date several facilities were in operation in the Czech Republic that are subject to the Joint Convention. In addition to power generating units with four reactor units VVER 440/213 the site of NPP Dukovany, owned by ČEZ, a. s., also includes following nuclear installations:

- ISFSF Dukovany – in operation since 1997,
- SFSF Dukovany – in operation since April 2008 and
- RAW repository Dukovany – in operation since 1995, owned by the state since 2000,



Fig. 1.1 Locations of selected nuclear installations and facilities subject to the Joint Convention in the Czech Republic

In addition to the mentioned standalone nuclear installations, the NPP Dukovany site also includes SF pools and ŠTK used to handle SF in each production unit.

Similar facilities are also a part of NPP Temelín where two reactor units VVER 1000/320 are installed. The NPP Temelín site also includes SFSF Temelín which has been in trial operation since September 2010,

SF generated by the operation of the research reactor LVR–15 in CV Řež s. r. o. may be stored in the HLW Storage Facility in ÚJV Řež a. s., which is classified as an standalone nuclear installation in agreement with the Czech law. The other research reactors in Centrum výzkumu Řež s. r. o. (LR–0) and FJFI Prague (VR–1) do not produce any SF, due to their small thermal output and limited time of operation.

In addition to RAW Repository Dukovany used for disposal of RAW from operation of nuclear power plants and selected categories of institutional RAW, there are the following disposal systems on the territory of the Czech Republic:

- RAW repository Hostím in Beroun (active in the period of 1959-1964; closed in 1997),
- RAW repository Richard in Litoměřice (institutional waste; in operation since 1964),
- RAW repository Bratrství in Jáchymov (disposal of RAW contaminated by natural radionuclides; in operation since 1974).

In compliance with Article 12 of the revised document “Guidelines Regarding the Form and Structure of National Reports (INFCIRC/604/Rev. 1)” of July 19, 2006, Table 1.1 provides a summary of methods of SF management and management of individual RAW categories in the Czech Republic.

Table 1.1 Overview of SF management and management of selected categories of RAW

Type of liability	Long term management policy	Funding	Current practice/facilities	Planned facilities
Spent fuel	Preferred alternative – direct disposal in DGR but other options are not excluded (reprocessing, regional repository)	Nuclear account	Long-term storage / ISFSF and SFSF Dukovany, SFSF Temelín (SF from NPP) + reprocessing in Russian Federation and storage / HLW storage facility (SF from research reactors)	DGR
Nuclear fuel cycle waste	Disposal in operating repositories and in planned DGR	Nuclear account	Disposal in the operating repository (Dukovany) and storage in operational systems (NPPs)	DGR
Institutional waste	Disposal in operating repositories and in planned DGR	Nuclear account	Storage and disposal in operating repositories (Richard, Bratrství, Dukovany) and storage (ÚJV Řež a. s.)	DGR
Decommissioning liabilities	Deferred dismantling (NPP) and immediate dismantling (research reactors and other NIs), RAW will be disposed in Dukovany repository	Decommissioning fund	Periodical review of decommissioning plans; all nuclear installations are currently (NPPs, research reactors, SF storage facilities) in operation	DGR
Disused sealed sources	Disposal in operating repositories and in planned DGR; return to the country of origin	Licensee; if the licensee is not known then the state budget	Storage and disposal in operating repositories (Richard, Bratrství, Dukovany)	DGR
Mining and milling waste	Tailing pond rehabilitation	State budget (state enterprise operating uranium mines)	Recovery of chemical uranium production on the Stráž site and use of tailing ponds on the Rožná site (Dolní Rožínka)	None

2. RAW Categories and Radioactive Waste Management and Spent Fuel Management Policy – Art. 32 Paragraph 1 of the Joint Convention

In accordance with the provisions of Article 30, each Contracting Party shall submit a national report at 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.*

2.1. Radioactive Waste Categories

In agreement with the Atomic Act, radioactive waste is defined as „*substances, objects or equipment containing or contaminated by radionuclides for which no further use is foreseen*“.

In accordance with the Decree No. 307/2002 Coll., on radiation protection, RAW is categorized as gaseous, liquid and solid waste. Solid RAW are further divided into three basic classes: temporary, low- and intermediate- and high-level radioactive waste:

- temporary RAW are waste in which radioactivity after long-term storage (up to 5 years) is lower than release levels,
- low- and intermediate-level waste are divided into two sub-groups: short-term waste with the radionuclide half-life (including ^{137}Cs) less than 30 years and with limited mass activity of long-term alpha sources (per cask up to 4000 kBq/kg and the mean value 400 kBq/kg for the total volume of waste produced in one calendar year), and long-term waste that include those not classified in the “short-term“ RAW sub-group,
- high-level waste require storage and disposal considering the heat released from decay of radionuclides contained therein.

SF shall not be considered radioactive waste under the Atomic Act unless it has been declared as radioactive waste by its owner, or by SÚJB. SF storage shall be subject to the requirements equal to RAW before disposal and SF shall be stored so that its further treatment is not impeded.

Natural materials produced in the course of mining and treatment of uranium ores are also subject to the Act No. 44/1988 Coll., on protection and use of mineral riches (the Mining Act), and therefore they are not covered by e.g. the Policy. Their repositories containing solely natural radionuclides are not considered nuclear installations under the Atomic Act.

2.2. Radioactive Waste Management and Spent Fuel Management Policy

The Policy adopted by the Czech Government on May 15, 2002 (Government Resolution No. 487/2002) is a fundamental document which defines the RAW management policy and

strategy of the government and its agencies (waste generated from nuclear installations and workplaces with ionizing radiation sources in healthcare, research and industry) approximately by 2025, with an outlook to the end of the 21st century, with regard to generators of radioactive waste and spent fuel. The main principles of the Policy are:

- RAW and SF management in the Czech Republic is the responsibility of authorized private entities and SÚRAO and, if needed, the Authority will also provide extended services for the generators,
- long-term disposal of low and intermediate short-term RAW in the Czech Republic lies in their safe disposal in the existing near-surface repositories whose economical operation has been continuously evaluated and optimized,
- one of disposal alternatives for low and intermediate long-term RAW and high-level waste is the use of DGR; before its commissioning, these materials will be stored at their generators or in facilities of the Authority,
- technological procedures for RAW management and preparations to implement the deep repository in the Czech Republic comply with the legislative requirements and foreign research and technology development results. At the same time, possibilities of SF reprocessing and the use of new technologies leading to reduction of SF volume and toxicity are being monitored and evaluated,
- costs of activities associated with the development of DGR for RAW and SF disposal are paid from the nuclear account, a source funded by RAW and SF generators in agreement with the Atomic Act and the Government Order, while the nuclear account as a part of the governmental assets and liabilities is managed by the Ministry of Finance. This ensures that disposal costs for waste currently generated will not be transferred to future generations,
- the general public is kept informed about the Policy and its fulfillment.

RAW and SF management, as described below herein, fully complies with the Policy. The Policy was not substantially amended as at December 31, 2010 and for its detail description see the National Report of the Czech Republic under the Joint Convention, Revision 1.1 of February 2003.

In connection with the planned development of new nuclear build SÚJB, in cooperation with MPO and SÚRAO, initiated a process of the Policy updating. The objectives of the Policy updating include particularly:

- evaluation of the current status of RAW and SF management from the viewpoint of their existing and expected future generation,
- evaluation of the fulfillment of short-term and long-term objectives of the Policy by the individual RAW classes and areas, specification of new objectives,
- evaluation of the level of technical provision of RAW and SF management from the viewpoint of long-term sustainability and research and development needs and
- assessment of the economy of RAW and SF management from the viewpoint of long-term equal balance between sources and costs.

Based on an approved schedule of works the entity responsible for preparation of the Policy will be SÚRAO so that the final version of the updated Policy is ready in 2012 at the latest and subsequently submitted to the Government for approval. At the end of 2010 SÚRAO completed a draft of principles of the new Policy.

3. Scope of Application - Article 3 of the Joint Convention

- 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.*
- 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.*
- 3. This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defense programs, 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 defense programs if and when such materials are transferred permanently to and managed within exclusively civilian programs.*
- 4. This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.*

The Policy does not anticipate reprocessing of SF produced by operation of power generating reactors in the Czech Republic. The use of SF reprocessing technologies is justified as long as its economic or safety benefits have been proved. The existing prices in the the fuel cycle front, in particular prices of natural uranium, currently make SF reprocessing economically unattractive. From the viewpoint of safety, reprocessing does not significantly increase radiation hazards but, in terms of disposal, reprocessing or RAW treatment procedures enable separation of long-term and hazardous radionuclides and thus even their optimum treatment before final disposal. On the other hand, the DGR design requirements for disposal of HLW from SF reprocessing are more challenging than for direct disposal of SF.

The presented National Report provides a comprehensive evaluation of the management practices used for all RAW categories covered by the Joint Convention, i.e. both operating and institutional RAW management. Information about the residual material after extraction and treatment of uranium ores containing natural radionuclides was presented in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008.

In accordance with the Atomic Act, nuclear energy may be only used for peaceful purposes in the Czech Republic and therefore our country does not participate in any military oriented projects of nuclear energy utilization. For this reason SF and RAW in the Czech territory solely originate from peaceful utilization of nuclear energy.

The information on discharges is provided in the respective chapters referring to Articles 4, 7, 11, 14, 24 and 26 of the Joint Convention.

4. Inventory and List of Facilities for SF and RAW Management - Article 32 Paragraph 2 of the Joint Convention

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 is being held in storage at radioactive waste management and nuclear fuel cycle facilities; has been disposed of; or 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.

4.1. Inventory and Facilities for SF Management

This part of the National Report contains a list and brief description of plants used for SF management in nuclear power and research facilities. In addition to the information given in Chapter 7, this Chapter 4 provides details concerning the following SF management plants:

- NPP Dukovany site - SF pools, ISFSF and SFSF Dukovany,
- NPP Temelín site - SF pools and SFSF Temelín,
- CV Řež - SF pool and SF storage facility,
- ÚJV Řež a. s. site - HLW storage facility.

4.1.1. Nuclear Power Plant Dukovany

The basic description of NPP Dukovany units, including technical specifications, is provided in the National Report submitted of the Czech Republic under the Convention on Nuclear Safety of September 2001.

4.1.1.1. SF Pools

To ensure safe storage of SF removed from reactors, a SF pool is constructed next to each reactor unit, its volume being 335 m³, where SF is stored for a period of time necessary to reduce the residual heat output. After that, SF assembly thermal output and radiation drops to a level permitting their transport in CASTOR-440/84 or CASTOR-440/84M type-approved casks for transportation and storage to ISFSF or SFSF Dukovany. The storage pools for SF provide the following functions:

- subcriticality of stored SF,
- residual heat removal from FAs,
- radiation protection.

In the pools, SF is stored in a compact rack with the capacity of 682 positions. SF pool also contains 17 positions for hermetically sealed containers for damaged SF storage. Depending on the number of removed FAs in the annual reactor cycle, the pools enable to store SF for a period of at least 7 years. In case of emergency fuel removal from the core or during a reactor pressure vessel inspection, however, a reserve rack is inserted into the SF pool.



Fig. 4.1 Uncovered SF pool and ŠTK during reactor refueling

As at 31 December 2010 the four SF pools contained 2294 fuel assemblies with the total weight of heavy metals about 275 300 kg.

4.1.1.2. ISFSF Dukovany

ISFSF Dukovany, located on the NPP site, is designed for dry storage of SF using CASTOR-440/84 casks. The central building of ISFSF Dukovany is a ground-level hall with a combined structural system consisting of fixed reinforced concrete poles and steel roof structure with a 6-meter module. The poles bear a crane runway and roof steel open-web girders supporting the roof structure. The building shell is assembled from reinforced concrete panels of thickness 100 mm. The storage area of the building is surrounded with a shielding concrete wall 5 m high and 500 mm thick. The floor is made of a reinforced concrete slab with dust-free consolidating surface finish.

ISFSF Dukovany forms an independently operating facility linked to existing engineering utility networks in NPP Dukovany. It has a railway siding and road links through SFSF Dukovany to the reactor units of NPP Dukovany.

The total capacity of ISFSF Dukovany is 60 casks, while the last 60th CASTOR-440/84 cask was placed in ISFSF Dukovany on March 8, 2006. Consequently, ISFSF Dukovany contained 60 casks CASTOR-440/84 with a total of 5040 FAs as at December 31, 2010.



Fig. 4.2 Fully occupied storage hall in ISFSF Dukovany

4.1.1.2. SFSF Dukovany

SFSF Dukovany, located on the NPP site and connected with ISFSF Dukovany, is used for dry storage of SF using CASTOR-440/84M casks. The storage capacity of SFSF Dukovany is sufficient to cover all SF production of NPP Dukovany, after the existing storage capacity of ISFSF Dukovany is exhausted, with the anticipated operation of the units at least until 2035.

SFSF Dukovany is a facility independent of ISFSF Dukovany. The building comprises a rectangular hall of the length 107,9 m divided into two main parts, specifically the receiving area and storage hall. In the receiving area, casks are mainly received into the storage or loaded for transportation. The railway siding enters the SFSF receiving area which is linked to the existing ISFSF Dukovany through a connecting corridor.

The storage hall with position indications for the individual stored cask is provided with a gantry crane of the capacity 130 t. The outside reinforced concrete shielding wall surrounding the storage area of SFSF Dukovany is 4.8 m high and 0,5 m thick.

The storage capacity of SFSF Dukovany is 1340 t of heavy metal in 133 casks. As at December 31, 2010 SFSF Dukovany contained 15 CASTOR-440/84M casks with the total number of 1260 FAs.

4.1.2. Nuclear Power Plant Temelín

The basic description of NPP Temelín units, including technical specifications of the plant, is provided in the National Report of the Czech Republic under the Convention on Nuclear Safety of September 2001.

4.1.2.1. SF Pools

Similarly to NPP Dukovany, the main production building of NPP Temelín provides a storage pool with the volume of 1440 m³ for spent fuel removed from the reactor, immediately next to the reactor cavity. The removed SF is stored in the storage pool for a period of 12 years (during NPP operation), or for at least 5 years (after NPP decommissioning).

The SF pool consists of 3 parts: two larger parts contain two rack sections each and the third has only one storage rack section. The entire SF pool enables to store 678 FAs, 25 fuel assemblies in hermetically sealed containers (10 positions occupied) and 2 cluster cases (one position occupied). In the normal storage mode, however, at least 163 positions shall remain unoccupied for emergency fuel removal from the whole core.

As at December 31, 2010 the SF pool at unit 1 of NPP Temelín contained 478 FAs and 25 failed elements and the SF pool at unit 2 contained 307 FAs and 24 failed elements with the total weight app. 374 500 kg of heavy metal.

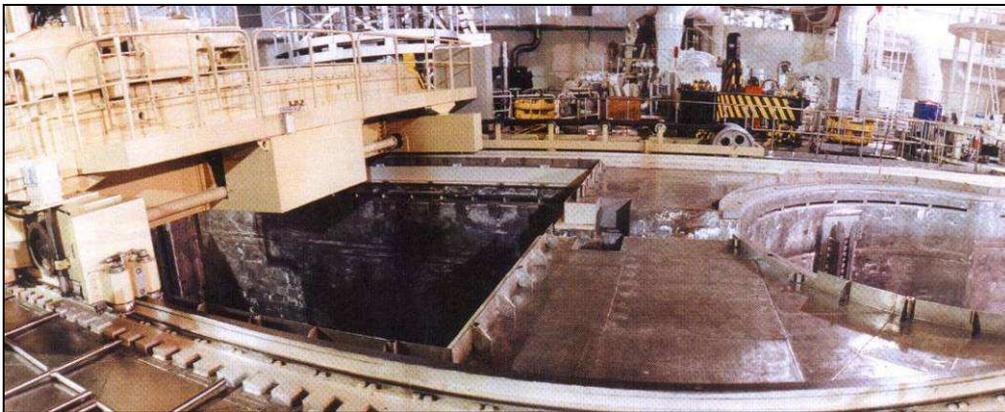


Fig. 4.3 Uncovered SF pool at NPP Temelín

4.1.2.2. Spent Fuel Storage Facility Temelín

The Spent Fuel Storage Facility Temelín, located directly on the NPP Temelín site is used for dry storage of spent fuel using CASTOR-1000/19 casks. The storage capacity of SFSF Temelín is sufficient to cover all SF production of two NPP Temelín units for 30 years of its operation and it may be expanded on as needed basis by building of additional storage halls.

SFSF Temelín is an independent object divided into two main parts, specifically the receiving area and storage hall. The casks are delivered to the receiving area of the storage facility by a railway siding and loaded to be transported. The receiving area also includes three service places, additional premises for maintenance and repairs, building technology premises and sanitary facilities for the operating personnel.

The storage part of the object has been designed as a one-story two-aisle hall object with lengthwise cranes that reach under the crane in the receiving part. The central partition wall dividing the hall into two aisles is interconnected with supporting columns for the crane track.

The storage capacity of SFSF Temelín is 1370 t of heavy metals in 152 casks. As at December 31, 2010 SFSF Temelín contained 1 CASTOR-1000/19 cask with 19 fuel assemblies in total.



Fig. 4.4 The storage hall in SFSF Temelín with the first cask

4.1.3. Centrum výzkumu Řež s. r. o.

In 2010 both the research reactors in the complex of ÚJV Řež a. s. were transferred into the company Centrum výzkumu Řež s. r. o. The limited liability company CV Řež was founded on October 9, 2002 as a subsidiary of ÚJV Řež a. s. for the purposes of research and development and natural and technical sciences. The core activity of CV Řež is the provision of experimental base for research and development on the reactors LR-0 and LVR-15.

The basic description of LVR-15 research reactor, including the technical specifications, is provided in the National Report of the Czech Republic under the Joint Convention, Revision 1.1 of February 2003.

4.1.3.1. SF Pool in the Reactor Hall

The wet accumulator tank is designed for storage of SF removed from LVR-15 reactor core. It is an aluminum vessel seated in the floor of the reactor hall and protected on all sides with concrete and a steel-plated case. The vessel is covered with three cast iron plates 500 mm thick. The plates have two handling openings sealed with blinds. A sloping pipe ending at the tank bottom provides connection between the upper edge of the reactor vessel and the tank. In 1996, the fuel was removed from the wet accumulator tank and its condition was inspected. The water level and physicochemical parameters inside the tank are continuously monitored.

As at December 31, 2010 the tank contained 31 fuel assemblies of IRT-2M type with the initial enrichment of 36% wt. ^{235}U .

4.1.3.2. Building 211/7 - SF Storage Facility

The building comprises two pools - A and B. For pool A, the inner dimensions are 230 x 120 cm, depth 6 m and for pool B, the dimensions are 440 x 120 cm, depth 6 m. The lengths are stated including a 50 cm long handling recess. The pools are constructed with heavy concrete cast between the inner and outer jacket of a stainless steel vessel. The pool bottom and walls consist of a stainless steel inner jacket, 50 cm of heavy concrete and an

outer stainless steel jacket. For a detailed description of Building 211/7 - SF storage facility, see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

The fuel from the pool A was taken out and inspected in 2000 and in 2008. The level and physicochemical parameters of the water in the pool are regularly monitored.

As at December 31, 2010 56 fuel assemblies of IRT-2M type with the initial enrichment of 36% wt. ^{235}U were stored in the SF storage facility.

4.1.4. ÚJV Řež a. s. (Building 211/8 - HLW Storage Facility)

The HLW storage facility is designed for storage of SF and solid RAW produced in ÚJV Řež a. s. and in CV Řež. The facility was built in 1981 – 1988. Its trial operation started in 1995 and the facility has been in commercial operation since 1997. The structural details of the original HLW storage facility are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

As part of rehabilitation efforts to remove the old environmental liabilities and in the scope of the preparation for transport of high-enriched SF to the Russian Federation for reprocessing (RRRFR project is a part of the GTRI initiative declared on May 26, 2004), the HLW storage facility underwent an extensive reconstruction, completed in two stages within 2003 - 2007. Stage 1 included construction of a hot chamber, control room and storage installation (safe) in Boxes VI, VII and VIII of the HLW storage facility. Stage 2 of the refurbishment of the HLW Storage Facility included construction of a storage extension to the HLW Storage Facility for storage of Škoda VPVR/M casks, with SF type EK-10 and IRT-2M and preparation of workplaces for loading of Škoda VPVR/M casks and for management of damaged SF.

More details on the reconstruction of the HLW storage facility and transport of SF to the Russian Federation are provided in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008.

No spent fuel was stored in the HLW Storage Facility as at December 31, 2010.

4.2. Inventory and Facilities for RAW Management

4.2.1. Nuclear Power Plant Dukovany

The operation of NPP Dukovany generates liquid, solid and gaseous RAW. Facilities for RAW management s are listed according to the individual types of RAW in the chapters below.

4.2.1.1. Solid RAW

4.2.1.1.1. Facilities for management of solid RAW

- Low-level waste

The management of low-level solid waste consists of the following steps:

- controlled collection and primary segregation of solid RAW by the type is

performed at stable assigned places (at least 60 stable collection points in HVB, and additional may be established on as needed basis, particularly during regular and general repairs of the units). The collection points are provided with PE bags and metal bins for minor metal waste. Solid RAW with dose equivalent rate $> 1\text{mSv/h}$ are collected in shielded boxes. The collected waste is transported from collection points to BAPP,

- measuring and segregation of solid RAW - primary measuring and segregation of solid RAW based on their radioactivity and waste type is performed in BAPP. The measurement uses hand-held devices, measuring carousel and sorting table,
 - discharge of solid RAW into the environment - the part of solid RAW suitable for discharge into the environment is officially measured to determine the content of radionuclides. The waste meeting criteria of the Decree No. 307/2002 Coll. is discharged into the environment or disposed of on the dump for solid municipal waste Petrůvky if not dismissed by SÚJB and subject to compliance with the criterion that *"the collective effective dose associated with the release into the environment shall not exceed 1 Sv in any calendar year and the effective dose in any individual associated with the release into the environment shall not exceed 10 μSv ,"*
 - storage of solid RAW - RAW which cannot be discharged into the environment is stored in an organized manner in box pallets with the volume $0,4\text{ m}^3$ or, after low-pressure compacting (15 t), in 200 liters galvanized casks in BAPP storage vaults,
 - the part of the waste intended for decay storage or for processing in an incinerating plant is kept loose in the storage premises in PE bags.
- Intermediate-level waste (waste failing to meet the waste acceptance criteria for disposal in RAW repository, non-generating heat)

If RAW cannot be disposed in a RAW repository due to their high specific activity of radionuclides then they are stored in a storage area for radioactive items while their final treatment and disposal will be addressed within the NPP decommissioning process.

4.2.1.1.2. Facilities for processing of solid RAW

- Low-level RAW

Although the solid RAW management concept formulated in 1980s envisaged a wider range of technologies for solid RAW treatment, the only one available now is low-pressure compacting. High-pressure compacting was used as a subsequent technology to minimize the final volume of solid RAW in 1996 (using a rented high-pressure compactor). In early 2005, additional equipment was introduced to reduce the volume of solid RAW (waste crusher, cable insulation ripper).

- Intermediate-level RAW

Intermediate-level waste is not treated but only fragmented (if practicable) and stored under control in the storage facility for radioactive items.

4.2.1.1.3. Facilities for storage of solid RAW

- Low-level solid RAW

The low-level solid RAW storage system is located in BAPP. It consists of 13 concrete rooms (storage wells) sized 6 x 9 x 11 m. The room floors are built at the elevation - 1.3 m. The rooms are covered with in-situ concrete blocks 600 x 96 x 30 cm (weight 4.4 t), or closed with hermetic closures (in three layers) sized 170 x 170 cm at the elevation +10,80 m. A steel hall 9 x 60 x 8 m is constructed above the storage area at the elevation +10,80 m to shelter the whole area above the rooms. In the hall, an overhead 5 t crane is used to handle monolithic panels, hermetic closures and to load box pallets with solid RAW in the rooms. For the time being, the following 8 rooms are used of a total number of 13 rooms:

- 4 rooms in BAPP 108/2, 3, 4, 5 are equipped with built-in structures for palletization. The rooms are used for solid RAW storage using box pallets, or 200 l drums. Each room is covered with 8 monolithic panels. The structure inside divides each room into 32 units (unit dimensions: 1206 x 860 mm). Each unit accommodates up to 20 stacked folding-up pallets,
- 1 room is intended for storage of spent air-conditioning filters. The room is divided into 48 units, each with a built-in steel structure 600 x 600 mm. Each unit is covered with a hermetic closure, and
- 3 rooms are used for storage reserve of solid non-standard RAW that are difficult to process into box pallet dimensions. Each room has 6 openings covered with hermetic closures.

- Intermediate-level solid RAW

Intermediate-level solid RAW are kept in the storage facility for active items in the reactor hall (in the so-called "mogilnik") A, B 314 and on the floor $\pm 0,0$ m A, B 101/1,2. The anticipated storage time is until NPP decommissioning.

4.2.1.2. Liquid RAW

4.2.1.2.1. Facility for management of liquid RAW

Liquid RAW generated in the process of radioactive liquid treatment and processing are collected and placed in BAPP storage tanks with the volume of 460 or 550 m³.

The bituminization technology is used for radioactive concentrate treatment into a form acceptable for RAW repository Dukovany. The bitumen-based product is then disposed in RAW repository Dukovany using 200-liter galvanized drums.

Removal of ion exchangers from the storage tank OTW30B02 started in 2010. The immobilization in aluminosilicates matrix SIAL[®] in a mobile equipment was used for treatment of 22,5 tons of ion exchangers in total in order to achieve a form acceptable for RAW repository Dukovany. The resulting volume of the product deposited in the RAW repository was 44 m³.

4.2.1.2.2. Facilities for storage of liquid RAW

The system for storage of liquid RAW consists of:

- storage tanks for radioactive concentrate with the total volume 2680 m³ (4x550 m³ + 460 m³) per double reactor unit,
- emergency tanks for radioactive concentrate with the volume of 460 m³,
- tanks for active sorbents with the volume of 460 m³ each,
- pumps and auxiliary technology equipment.

Liquid RAW of the organic origin (oils) are stored in 200 l metallic drums. There are safety sumps under them to accommodate the whole volume of the stored drums.

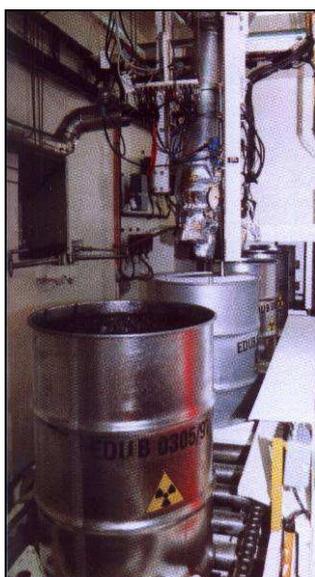


Fig 4.5 View of a bituminization line to process liquid RAW

Table 4.1 Comparison of the actually stored RAW with the operational limits and conditions for storage as at December 31, 2010

Waste type	Maximum Allowable Storage Amount	Actual Storage Amount
Liquid RAW - Active Water	4000 m ³	1762 m ³
Liquid RAW - Degraded Sorbents	460 m ³	307 m ³
Solid RAW Total	800 t	164 t

4.2.1.3. Gaseous RAW

4.2.1.3.1. Facilities for collection of gaseous RAW

Gaseous RAW are removed using the venting technology systems (piping, tanks) and ventilation systems (space).

4.2.1.3.2. Facilities for processing of gaseous RAW

Gaseous RAW are processed in the venting process systems - gaseous RAW are either treated or held-up. The treatment includes filtration of radioactive aerosols, including radioactive iodine in the aerosol form. Hold-up means that gas flow is decelerated which causes the activity of short-term radionuclides to drop. The gaseous RAW processing creates solid RAW and gas that complies with the requirements for radionuclide release into the environment.

Table 4.2. Activities of gaseous and liquid discharges

Radionuclide	Discharges into the atmosphere A [Bq]		
	Year		
	2008	2009	2010
Noble gases	6,01.10 ¹²	5,41.10 ¹²	5,11.10 ¹²
Aerosols	3,29.10 ⁷	3,47.10 ⁷	2,51.10 ⁷
Iodines	9,19.10 ⁶	2,80.10 ⁶	1,26.10 ⁶
¹⁴ C	6,86.10 ¹¹	7,51.10 ¹¹	6,69.10 ¹¹
³ H	5,70.10 ¹¹	5,61.10 ¹¹	7,09.10 ¹¹
Total E (Sv)	4,1.10 ⁻⁸	1,7.10 ⁻⁸	2,1.10 ⁻⁸
Percentage of discharge limit (%)	0,10	0,04	0,05
Radionuclide	Liquid discharges A [Bq]		
	Year		
	2008	2009	2010
³ H	1,29.10 ¹³	1,35.10 ¹³	1,59.10 ¹³
Fission products	1,85.10 ⁷	2,39.10 ⁷	2,25.10 ⁷
Total E (Sv)	1,27.10 ⁻⁶	1,53.10 ⁻⁶	1,15.10 ⁻⁶
Percentage of discharge limit (%)	21,2	25,5	19,1

4.2.2. Nuclear Power Plant Temelín

4.2.2.1. Solid RAW

4.2.2.1.1. Facilities for management of solid RAW

- Low level RAW

The low-level solid waste management includes the following steps:

- controlled collection and primary segregation of solid RAW by the type is performed at stable assigned places (at least 10 fixed collection points in HVB and additional may be established if needed, in particular for unit routine repairs and general overhauls). The collection points are provided with PE bags and metal bins for minor metal scrap. Solid RAW with dose equivalent rate > 1mSv/h are collected in shielded bins or containers. The collected waste are transported from collection points to BAPP,
- measuring and segregation of solid RAW - primary measuring and segregation of solid RAW based on their radioactivity is performed in BAPP. The measurement is performed with hand-held devices, a measuring carousel and segregation table,

- discharge of solid RAW into the environment - the part of solid RAW suitable for discharge into the environment is measured to determine the content of radionuclides. The waste that complies with the criteria of SÚJB authorization is released into the environment or disposed on the Temelínec waste dump,
 - solid RAW storage - RAW that cannot be released into the environment is stored in organized manner using PE bags, or using 200 liter galvanized drums in BAPP storage wells after low-pressure compacting (15t),
 - part of the waste intended for decay storage or processing in an incinerating plant is kept loose in storage using PE bags.
- Intermediate-level waste (waste failing to meet the waste acceptance criteria for disposal in RAW repository, non-generating heat)

If RAW cannot be disposed in RAW repository due to their high specific activity of radionuclides they are stored in the storage area while final treatment and disposal will be addressed in the NPP decommissioning process.

4.2.2.1.2. Facilities for processing of solid RAW

- Low-level waste

Although the solid RAW management concept formulated in 1980s envisaged a wider range of technologies for solid RAW treatment, the only one available now is low-pressure compacting.

Incineration in an external incinerating plant was used as subsequent technology to minimize the final volume of solid RAW in 2007.

The equipment for processing of solid RAW consists of:

- low-pressure press for solid RAW treatment,
 - low-pressure press for pre-treatment of combustible solid RAW,
 - low-pressure press for air-conditioning filter elements,
 - hydraulic cutter,
 - shielding containers, and
 - box pallets.
- Intermediate-level RAW
- Intermediate-level waste are not treated but only fragmented (if practicable) and kept in controlled RAW stores.

4.2.2.1.3. Facilities for storage of solid RAW

- Low-level solid RAW

The low-level solid RAW storage system is located in BAPP. It consists of 7 concrete rooms (storage wells) sized 7,5 x 2,5-5,4 x 3,8 m. They contain no inside structures and solid RAW are kept in drums. The room floors are built at the elevation 9 m. They are roofed with in-situ concrete blocks used for ceilings at the elevation +13.20 m.

An overhead 16 t crane is mounted in the hall and used to handle monolithic panels and to load drums with solid RAW into the rooms. It is also used to handle transport containers and load drums with solid RAW onto transport vehicles. All rooms are currently used for solid RAW storage prior to their transport to RAW repository. The rooms are also

used for sludge storage prior to its fixation in aluminosilicate matrix. Also the bituminization product may be stored here if necessary.

- Intermediate-level solid RAW

Intermediate-level solid RAW are kept in BAPP active storage in rooms C187/1 and C187/2. The rooms contain 32 steel pipes 11,7 m long to insert cases with active items. The storage time is expected until the NPP decommissioning.

4.2.2.2. Liquid RAW

4.2.2.2.1. Facility for processing of liquid RAW

Liquid RAW generated in the process of radioactive liquid cleaning and processing are collected and placed in BAPP storage tanks with the volumes of 200 or 60 m³.

The technology to process radioactive concentrate into a form acceptable for RAW repository Dukovany is bituminization. The bitumen-based product is then disposed in RAW repository Dukovany using 200 l galvanized drums.

In 2010 1,7 m³ of sludge was solidified into aluminosilicate matrix SIAL[®] using the mobile equipment. The total quantity of sludge with ion exchangers treated into the final form acceptable for disposal in RAW repository Dukovany was 7,4 t.

4.2.2.2.2. Facilities for storage of liquid RAW

The liquid RAW storage system consists of:

- radioactive concentrate storage tanks with a total volume of 520 m³ (2 x 200m³ + 2 x 60 m³) for two units,
- emergency tanks for radioactive concentrate and sorbets with a volume of 200 m³,
- active sorbent tanks with a volume of 200 m³ each,
- pumps and auxiliary process equipment.

Organic liquid RAW (oils) are stored in 200 l metal drums. There are safety sumps under them to accommodate the whole volume of the stored drums.

Table 4.3 Comparison of stored RAW with the limits and conditions for storage as at December 31, 2010

Waste type	Maximum Allowable Storage Amount	Actual Storage Amount
Liquid RAW - Active Water Concentrates	520 m ³	192 m ³
Liquid RAW - Degraded Sorbents	200 m ³	26 m ³
Solid RAW Total	500 t	109 t

4.2.2.3. Gaseous RAW

The philosophy of processing of gaseous RAW is rather simple and it consists in separation of radioactive materials from contaminated air in the ventilation system by filtration. The following tables provide discharged gas activity data, effective doses received by an individual in the critical group of the population and shares of individual groups of radionuclides on the used specified limit for gaseous discharges.

Table 4.4 Activity of gaseous and liquid discharges

Radionuclide	Discharges into the atmosphere A [Bq]		
	Year		
	2008	2009	2010
Noble gases	$7,30 \cdot 10^{12}$	$2,73 \cdot 10^{12}$	$2,97 \cdot 10^{12}$
Aerosols	$5,70 \cdot 10^6$	$3,96 \cdot 10^6$	$4,43 \cdot 10^6$
Iodines	$6,15 \cdot 10^7$	$7,23 \cdot 10^6$	$5,75 \cdot 10^6$
^{14}C	$4,41 \cdot 10^{11}$	$4,72 \cdot 10^{11}$	$4,95 \cdot 10^{11}$
^3H	$1,41 \cdot 10^{12}$	$1,07 \cdot 10^{12}$	$1,25 \cdot 10^{12}$
Total E (Sv)	$3,0 \cdot 10^{-8}$	$1,2 \cdot 10^{-8}$	$1,4 \cdot 10^{-8}$
Percentage of discharge limit (%)	0,08	0,04	0,03
Radionuclide	Liquid discharges A [Bq]		
	Year		
	2008	2009	2010
^3H	$5,43 \cdot 10^{13}$	$4,07 \cdot 10^{13}$	$4,24 \cdot 10^{13}$
Fission products	$3,13 \cdot 10^8$	$5,60 \cdot 10^7$	$1,09 \cdot 10^8$
Total E (Sv)	$5,84 \cdot 10^{-7}$	$6,84 \cdot 10^{-7}$	$5,56 \cdot 10^{-7}$
Percentage of discharge limit (%)	19,5	22,8	18,6

The specified limit is the authorized effective dose limit of external irradiation and the effective dose rate per individual in the critical group of the population set up for NPP Temelín at $40 \mu\text{Sv}/\text{year}$ by SÚJB license. This limit is based on the optimizing limit set forth in Section 56 of the Decree No. 307/2002 Coll. ($200 \mu\text{Sv}$ for discharged gas from nuclear power installations).

4.2.3. SÚRAO

4.2.3.1. RAW Repository Richard

This repository is used to mainly dispose institutional RAW containing artificial radionuclides. Separately from disposed RAW, there are also RAW that cannot be currently disposed and are waiting to be disposed in a respective repository. They mainly include sealed radionuclide sources, collected radionuclide sources from fire detectors and nuclear materials.

Table 4.5 Inventory of RAW disposed in the Richard repository as at December 31, 2010

Radionuclide	Total Activity [Bq]
^3H	$3,91\text{E}+13$
^{14}C	$8,20\text{E}+12$
^{36}Cl	$8,90\text{E}+09$
^{90}Sr	$2,42\text{E}+13$
^{99}Tc	$1,04\text{E}+08$
^{129}I	$5,05\text{E}+06$
^{137}Cs	$4,73\text{E}+14$
Total activity of long-term α radionuclides	$1,54\text{E}+13$

Table 4.6 Inventory of RAW stored in the Richard repository as at December 31, 2010

Radionuclide	Total Activity [Bq]
^{137}Cs	2,96E+14
^{60}Co	3,08E+14
^{241}Am	8,73E+12
^{239}Pu	6,61E+12
^{238}Pu	1,14E+11
^{238}U	3,25E+10
^{226}Ra	3,64E+08
^{235}U	6,17E+05
Total activity of long-term α radionuclides	1,55E+13

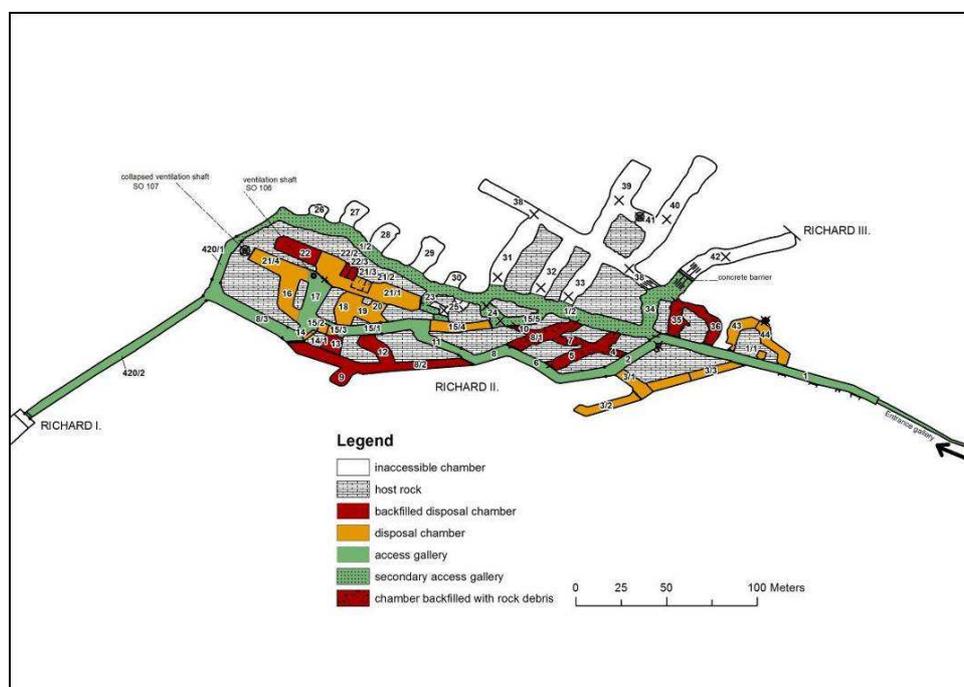


Fig. 4.6 RAW repository Richard - cross section

4.2.3.2. RAW Repository Bratrství

The repository is used to dispose RAW containing natural radionuclides.

Table 4.7 RAW repository Bratrství Inventory at December 31, 2010

Radionuclide	Total Activity [Bq]
^{226}Ra	1,35E+12
U	4,52E+11
^{232}Th	1,36E+08

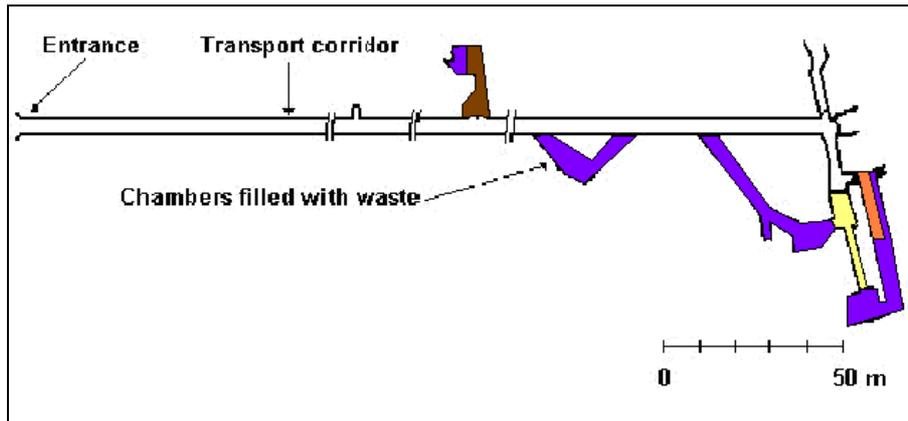


Fig. 4.7 RAW repository Bratrství – cross section

4.2.3.3. RAW Repository Dukovany

The repository is used to dispose short-lived low-level waste from both the nuclear power plants at the Czech Republic's territory, and limited amount of institutional RAW.

Table 4.8 Inventory of RAW repository Dukovany as at December 31, 2010

Radionuclide	Total Activity [Bq]	Radionuclide	Total Activity [Bq]
¹⁴ C	1,30E+11	⁹⁹ Tc	1,36E+09
⁴¹ Ca	3,85E+08	¹²⁹ I	4,84E+08
⁵⁹ Ni	4,34E+09	¹³⁷ Cs	6,45E+12
⁶³ Ni	3,84E+11	²³⁹ Pu	2,01E+07
⁹⁰ Sr	1,44E+10	²⁴¹ Am	1,99E+08
⁹⁴ Nb	9,56E+08		

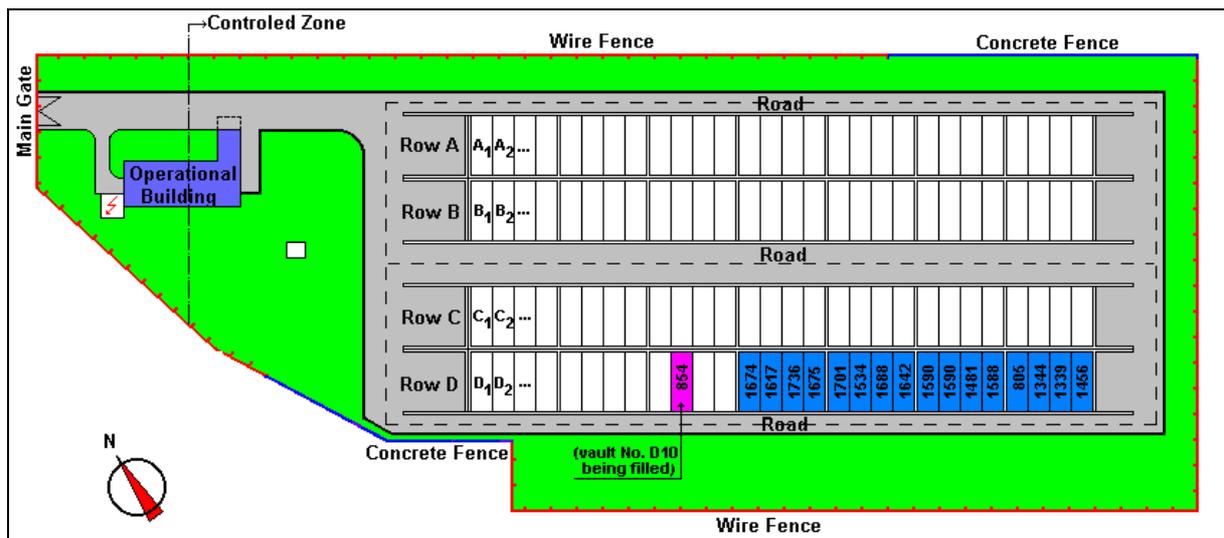


Fig. 4.8 Layout and current filling (occupation) of the disposal units in RAW repository Dukovany as at December 31, 2010

4.2.3.4. RAW Repository Hostím

The repository was used to dispose institutional RAW and has now been closed. Based on conservative evaluation of documents and radiation monitoring results, the inventory as shown in Table 4.10 below was calculated in 1991.

Table 4.9 10 Inventory of RAW repository Hostím - activity re-calculation in 1991

Radionuclide	Total activity [Bq]	
	Gallery A	Gallery B
^3H	Estimate: Gallery A. equivalent max. 10^{10} Bq (the range of radionuclides produced in the former ÚJF)	$1,0 \cdot 10^{11}$
^{14}C		$2,0 \cdot 10^{10}$
^{137}Cs		$1,3 \cdot 10^{10}$
^{90}Sr		$1,3 \cdot 10^{10}$
^{60}Co		$5,8 \cdot 10^8$
^{226}Ra		$3,3 \cdot 10^7$
^{63}Ni		$1,9 \cdot 10^6$
^{204}Tl		$1,5 \cdot 10^6$
^{147}Pm		$1,1 \cdot 10^5$
Total activity of α radionuclides *)	max. 10^{10}	about 10^{11}
Total activity of short-term radionuclides **)	$< 10^{11}$	

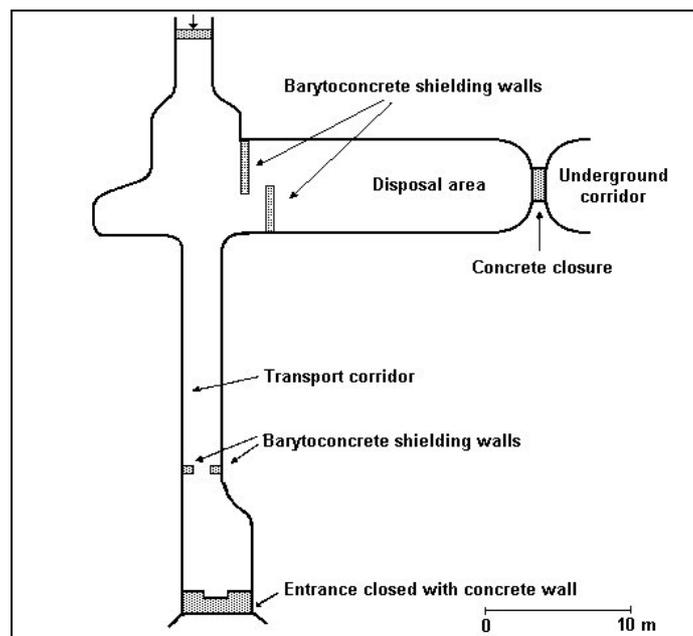


Fig. 4.9 RAW repository Hostím – cross section

4.2.4. ÚJV Řež a. s.

4.2.4.1. Building 241 - Velké zbytky - RAW Management Facility

The facility is used to store only RAW before treatment and RAW after the processing before the transport for disposal. The maximum volume of low and intermediate-level waste stored before processing is 123 m³ (liquid RAW) and 23 m³ (solid RAW). The maximum volume of processed RAW stored in the building is 26 m³.

4.2.4.2. Building 211/6 - RAW Re-loading Facility

Table 4.10 Quantities of low and intermediate-level solid RAW in building 211/6

Box No.	RAW Volume [m ³]
Box No. 1	50
Box No. 2	50
Box No. 3	40
Box No. 4	140
Box No. 5	15,5
Box No. 6	1
Box No. 7	28
Box No. 8	70
Total	394,5

The estimated total activity of the stored RAW is 100 GBq (RAW) and 3 TBq (spent sealed sources), with the prevailing radionuclides ⁶⁰Co, ⁹⁰Sr and ¹³⁷Cs.

4.2.4.3. Building 211/8 - HLW Storage Facility

Table 4.11 Low and intermediate-level waste volume

Box No.	RAW volume [m ³]
Box No. I	0
Box No. II	0
Box No. IV	3,8
Total	3,8

The estimated total activity of RAW stored is 200 MBq (isotopes ¹³⁷Cs, ²⁴¹Am) and 50 MBq (²³⁸U).

Table 4.12 SF inventory

SF	Qty	Location	Estimated activity	Prevailing radionuclides
No SF was stored in the HLW storage facility at December 31, 2010				

4.2.4.4. Storage Area for RAW

Table 4.13 Low and intermediate-level waste amounts

Location	Quantity [pcs]	RAW Volume [m ³]
ISO containers	5	100
Collecting tanks in Building 261	2	20
Sand filter tanks in Building 241	5	20
Collecting tanks 9A, 9B, 9C in Bldg. 241	3	30
Exchangers in Building 241	1	2
Tanks B and C in Building 241	0	0
Total	16	172

The estimated total activity of RAW storage is 10 GBq, the prevailing radionuclides are ⁶⁰Co, ⁹⁰Sr and ¹³⁷Cs.

4.2.4.5. Decay Tanks for RAW, Building 211/5

In the course of 2010 the project of remedy of environmental liabilities on the ÚJV Řež a. s. site included withdrawing and solidification of all liquid RAW stored in the decay tank “B” in the building 211/5. The liquid RAW was solidified by direct cementation on a simple line situated above the decay tank “A”, i.e. in the premises of the building 211/5. The processing of liquid RAW was performed from 18 May to 15 July 2010 and it resulted in filling of 80 pieces of 200-liter pre-concreted double-drums; the volume of the processed liquid RAW was 5,1 m³ and the total activity was about 0,1 TBq. The cementation line has been decontaminated and preserved.

Table 4.14 Quantities of RAW stored in decay tanks

Location	RAW Volume [m ³]	
	Liquid RAW	Solid RAW
Tank A	0	0
Tank B	0	3
Total	0	3

The estimated total activity of RAW storage in decay tank B, building 211/5 is 50,1 TBq. The prevailing radionuclides are ⁶⁰Co and fission products (primarily ⁹⁰Sr and ¹³⁷Cs).

5. Legislative and Regulatory System - Articles 18 - 20 of the Joint Convention

5.1. Implementing Measures

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.

All steps leading to fulfillment of the JC in terms of legislative, regulatory and administrative activities are summed up particularly in Articles 19, 20 and detailed in the individual relevant articles of the National Report.

5.2. Legislation and Regulatory Framework

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.*
2. *This legislative and regulatory framework shall provide for:*
 - (i) *the establishment of applicable national safety requirements and regulations for radiation safety;*
 - (ii) *a system of licensing of spent fuel and radioactive waste management activities;*
 - (iii) *a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a license;*
 - (iv) *a system of appropriate institutional control, regulatory inspection and documentation and reporting;*
 - (v) *the enforcement of applicable regulations and of the terms of the licenses;*
 - (vi) *a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management*
3. *When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.*

5.2.1. Currently Valid Legislation in Utilization of Nuclear Energy and Ionizing Radiation

The history of the Czech nuclear safety and radiation protection legislation was described in the National Report of the Czech Republic under the Joint Convention, Revision 1.1 of February 2003.

The Act No. 18/1997 Coll., as amended (the Atomic Act), set forth the conditions for peaceful utilization of nuclear energy and ionizing radiation, including activities subject to license from SÚJB. The list of decrees associated with the Atomic Act is provided in the National Report under the Joint Convention, Revision 2.3 of September 2005 and Revision 3.3 of September 2008, while the following additional decrees shall apply:

- Decree No. 132/2008 Coll., on quality assurance system in carrying out activities connected with utilization of nuclear energy and radiation protection and on quality assurance of selected equipment within regard to their assignment to classes of nuclear safety.

- Decree No. 208/2008 Coll., implementing the act on some measures associated with the ban of chemical weapons.
- Decree No. 77/2009 Coll., which changes the Decree issued by the State office for Nuclear Safety No. 317/2002 Coll., on type-approval of packages for transport, storage and disposal of nuclear materials and radioactive substances, on type-approval of ionizing radiation sources and transport of nuclear materials and specified radioactive substances (on type-approval and transport).
- Decree No. 165/2009 Coll., establishing a list of selected items in the nuclear area (that revokes the Decree No. 179/2002 Coll.).
- Decree No. 166/2009 Coll., establishing a list of items of dual use in the nuclear area.
- Decree No. 213/2010 Coll., on accounting for and control of nuclear materials and reporting of data required by regulations of the European Communities (that revokes the Decrees No. 145/1997 Coll. and 316/2002 Coll.).

The requirements RAW management (RAW from NIs and institutional RAW) are defined in the Atomic Act (Sections 24-31) and in the Decree No. 307/2002 Coll. (Sections 46-55).

A major step in the legislative efforts was the adoption of so-called "crisis legislation" (see Chapter 12.6.1.3). Those legal regulations regulate one of the areas directly associated with nuclear safety in a manner compatible with the EU law.

In connection with the country's preparation to join the EU and with the objective to enable the implementation of the obligations resulting from new international treaties, the Parliament of the Czech Republic amended the Atomic Act with Act No. 13/2002 Coll. The amendments mainly concern provisions dealing with radiation protection in order to ensure compatibility with the relevant European directives, and the provisions dealing with safeguards that accept a Supplementary Protocol to the Nuclear Weapons Non-Proliferation Treaty.

A complete list of legal regulations concerning nuclear energy, ionizing radiation and the associated regulations is provided in Chapter 12.6. The full texts of the Atomic Act and its implementing regulations are available on the SÚJB website (<http://www.SÚJB.cz>).

The Czech legislation in the given area includes, by means of reference in the Atomic Act and in other regulations, international treaties acceded by the Czech Republic (or by the former ČSSR and later ČSFR) (see the National Report under the Joint Convention, Revision 2.3 of September 2005).

In addition to the international documents mentioned above, the Czech Republic has signed the Comprehensive Nuclear Test Ban Treaty, however, it has not come into effect yet. The Czech Republic is also a pro-active member of IRS, INES and ENATOM within the IAEA systems.

The duty to inform about significant events affecting nuclear safety is also established in bilateral agreements entered by the Czech Republic, or by its predecessors, in the past (see the National Report under the Joint Convention, Revision 2.3 of September 2005).

5.2.2. Approval Process, Inspections and Enforcement of Compliance

The fundamental law governing the licensing and approval process for nuclear installations lies in the Building Act (No. 183/2006 Coll.) and the Atomic Act. Other important regulations in this legal area include the Act No. 500/2004 Coll., the Code of Administrative Procedure, the Act No. 552/1991 Coll., on state supervision, the Act No. 244/1992 Coll., on assessment of impacts of development concepts and programs on the environment, the Act No. 100/2001 Coll., on assessment of impacts on the environment, and the Act No. 106/1999 Coll., on free access to information, and the associated legal regulations with a lower legal force.

From the viewpoint of the Building Act, the issuance of three fundamental approvals for any construction with a nuclear installation, apart from the land use permit: i.e. building permit, final inspection approval (permanent operation) and permit for removal of a structure, is within the competence of the Ministry of the Industry and Trade which is the competent building office for such resolutions. In respect to the land use permit, the competent building office is the Regional Office. Provided the proceedings involve interests protected by special regulations, such as nuclear safety or radiation protection, the building office shall decide in agreement with or based on permits from relevant state administration bodies which defend such interests. The relevant state administration body may make its permit conditional upon meeting of conditions specified in its decision issued in agreement with a special act that authorizes the body to do so.

The Atomic Act specifies activities requiring a license from SÚJB. Apart from the zoning and planning decision, building permit and approval to operate, many other activities require the approval e.g. individual stages of nuclear installation commissioning, refurbishment or other changes affecting nuclear safety, radiation protection, physical protection and emergency preparedness, discharge of radionuclides into the environment etc. More detailed information is provided in the respective chapters hereof.

The Act No. 17/1992 Coll., on the environment, as amended and supplemented later, the Act No. 244/1992 Coll., on assessment of impacts of development concepts and programs on the environment and, particularly, the Act No. 100/2001 Coll., on assessment of impacts on the environment and alterations in some related acts (the Act on Assessment of Impacts on the Environment), require assessment of construction projects from the viewpoint of their impact on the environment (the so-called "Environmental Impact Assessment") in a special procedure with a potential involvement of the public. The document also includes assessment of radiation risks.

The act establishes a right for the public - citizens- to attend related public hearings and to express their comments on the concerned construction project. The public may be also represented by a concerned municipality, which is a party to the proceedings under the law, or by registered civil initiatives. The state administration body in charge of a decision about the impact of a nuclear power plant construction on the environment is the Ministry of the Environment.

The SÚJB supervising activities are regulated in more detail by Section 39 of the Atomic Act and by the Act No. 552/1991 Coll., on state supervision, as amended.

Remedial measures to meet legislative requirements are specified in Sections 40 and 41 of the Atomic Act and include the SÚJB power to require redress, to order performance of technical reviews, inspections and tests of operational condition of the installation, power to withdraw an authorization of special professional competence from the nuclear installation personnel in case

they violate their obligations and power to impose fines for failure to met the obligations specified in the Atomic Act.

In case of danger in delay SÚJB shall be entitled to order to reduce the output of or to stop the operation of a nuclear installation. Section 16 of the Atomic Act, and particularly its Paragraph 4, deals with alteration, cancellation and cessation of a license, which entitles SÚJB to reduce or to suspend the licensed activity, provided the licensee violates his obligations.

5.3. Regulatory Bodies

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, financial and human resources to fulfill its assigned responsibilities.*
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.*

5.3.1. Mandate and Competence of the Regulatory Body

The SÚJB competence is currently defined in the Atomic Act, Section 3 which states the following:

- " (1) *State administration and supervision of the utilization of nuclear energy and ionizing radiation and in the field of radiation protection shall be performed by the State Office for Nuclear Safety (hereafter referred to as "the Office").*
- (2) *The Office*
- a) *shall carry out state supervision of nuclear safety, nuclear items, physical protection, radiation protection and emergency preparedness and shall inspect the adherence to the fulfillment of the obligations arising out of this Act;*
 - b) *shall monitor non-proliferation of nuclear weapons and carry out state supervision of nuclear items and physical protection of nuclear materials and nuclear installations;*
 - c) *shall issue licenses to perform practices governed by this Act and shall issue type-approvals for packaging assemblies for transport and storage of nuclear materials and radioactive substances given in an implementing legal regulation, ionizing radiation sources and other products;*
 - d) *shall issue authorizations for activities performed by selected personnel;*
 - e) *shall approve documentation, programs, lists, limits, conditions, methods of physical protection assurance, emergency rules and, subject to discussion with the relevant District Authority of compatibility with off-site emergency plans, on-site emergency plans and their modifications;*
 - f) *shall establish conditions, requirements, limits, maximum permitted levels, maximum permitted levels of radioactive contamination of foodstuffs, guidance levels, dose constraint, reference levels, diagnostic reference levels, exemption levels and clearance levels;*
 - g) *shall establish the emergency planning zone and, if applicable, its further*

- structuring, and shall approve delineation of the controlled area;*
- h) in accordance with an implementing legal regulation, shall establish requirements on emergency preparedness of licensees, and shall inspect their fulfillment;*
 - i) shall monitor and assess the exposure status and regulate exposure of individuals;*
 - j) shall issue, register and verify personal radiation passport; related details shall be set out in an implementing legal regulation;*
 - k) shall provide information to municipalities and District Authorities concerning radioactive waste management within their territory of administration;*
 - l) shall control the activity of the National Radiation Monitoring Network, the functions and organization of which shall be set out in an implementing legal regulation, shall provide for the functioning of its head-office, and shall provide for the activities of an Emergency Response Center and for an international exchange of information on the radiation situation;*
 - m) shall establish State and Professional examination commissions for verification of special professional competence of selected personnel, and shall issue statutes for these commissions and specify activities directly affecting nuclear safety and activities especially important from the radiation protection viewpoint;*
 - n) shall maintain a State system of accounting for and control of nuclear materials and data and information in accordance with international agreements binding on the Czech Republic, and shall set out requirements for accounting methods and inspection thereof in an implementing legal regulation;*
 - o) shall maintain a national system for registration of licensees, registrants, imported and exported selected items, ionizing radiation sources, and a record of exposure of individuals;*
 - p) shall ensure, by means of the National Radiation Monitoring Network and based on assessment of a radiation situation, the availability of background information necessary to take decisions aimed at reducing or averting exposure in the case of a radiation accident;*
 - q) shall approve a classification of nuclear installation or its components and nuclear materials into appropriate categories, from the physical protection viewpoint;*
 - r) shall perform the function of the national authority for an international verification of a comprehensive ban of nuclear tests;*
 - s) shall ensure international co-operation within its sphere of competence and, in particular, shall be an intermediary of technical co-operation with the International Atomic Energy Agency, and within its sphere of competence shall communicate information to the European Commission or, if applicable, to other bodies of the European Union;*
 - t) shall decide on assurance of handling nuclear items, ionizing radiation sources or radioactive waste having been treated inconsistently with rules of law, or where the detrimental condition is not being removed;*
 - u) shall be obliged to give out information according to special legal provisions and once a year to publish a report on its activities and submit it to the Government and to the public;*
 - v) shall establish technical requirements to ensure technical safety of the specified equipment;*
 - w) in agreement with the administrative authority, it shall supervise the activity of persons authorized by a special legal regulation;*
 - x) shall give opinion on the area development and zoning and planning documentation in view of safety and radiation protection for activities associated*

with the utilization of nuclear energy and radiation activities. "

The SÚJB competence was further extended by the Act No. 249/2000 Coll., on execution of state administration and inspection of chemical weapons ban, and by the Act No. 281/2002 Coll., on some measures associated with the ban on bacteriological (biological) and toxin weapons.

5.3.2. Specification of Powers and Responsibilities of the Regulatory Body

Section 9, Paragraph 1 of the Atomic Act set forth the following conditions for utilization of nuclear energy and ionizing radiation:

"A license issued by the Office is required for:

- a) siting of a nuclear installation or radioactive waste repository,*
- b) construction of a nuclear installation or category IV workplace,*
- c) particular stages, laid down in an implementing legal regulation, of nuclear installation commissioning,*
- d) operation of a nuclear installation or category III or IV workplace,*
- e) restart of a nuclear reactor to criticality following a fuel reload,*
- f) reconstruction or other changes affecting nuclear safety, radiation protection, physical protection and emergency preparedness of a nuclear installation or category III or IV workplace,*
- g) particular stages of decommissioning of a nuclear installation or category III or IV workplace to the extent and in the manner established in an implementing legal regulation;*
- h) discharge of radionuclides into the environment to the extent and in the manner established in an implementing legal regulation;*
- i) ionizing radiation sources management to the extent and in the manner established in an implementing regulation;*
- j) radioactive waste management to the extent and in the manner established in an implementing legal regulation;*
- k) import or export of nuclear items or transit of nuclear materials and selected items;*
- l) nuclear materials management;*
- m) transport of nuclear materials and radioactive substances laid down in an implementing legal regulation; this license does not relate to the person performing the transport, or to the carrier, unless he is simultaneously the shipper, or consignor or consignee;*
- n) professional training of selected personnel (Section 18, Paragraph 5);*
- o) re-import of radioactive waste originated in the processing of materials exported from the Czech Republic;*
- p) international transport of radioactive waste to the extent and in the manner established in an implementing regulation;*
- q) performance of personal dosimetry and other services significant from the viewpoint of radiation protection to the extent and in the manner established in an implementing regulation;*
- r) adding of radioactive substances into consumer products during their manufacturing or preparation or import or export of such products. "*

Other provisions of the Atomic Act define:

- conditions for a license issue (Section 10),

- probity and professional competence of the applicant for a license (Sections 11 and 12),
- content and particulars of a license application (Section 13),
- SÚJB conduct in the administrative proceedings (Section 14),
- license requisites (Section 15),
- alteration, cancellation and cessation of a license (Section 16).

The execution of state supervision of peaceful utilization of nuclear energy and ionizing radiation, including sanctions, is regulated in the Atomic Act, Chapter VI, including:

- SÚJB supervising activities (Section 39),
- remedial measures (Section 40),
- penalties (Sections 41 and 42).

The Atomic Act, together with the Act No. 552/1991 Coll., on state supervision, provide SÚJB with sufficient powers to execute the state supervision, as well as coercion means to enforce the compliance with legal requirements for nuclear safety and radiation protection.

SÚJB performs supervision of compliance with the Atomic Act and other regulations issued based on the Act by the licensees under the quoted Section 9, Paragraph 1. SÚJB supervisory activities are detailed in Section 39, Paragraph 1 of the Atomic Act.

The SÚJB personnel performing the supervision are nuclear safety and radiation protection inspectors appointed by the SÚJB chairperson. They are seated at the SÚJB headquarters, as well as at Dukovany and Temelín NPPs and in regional centers. In the scope of supervisory activities, the inspectors and SÚJB Chairperson are mainly authorized to:

- enter the supervised buildings, facilities, operations, land and other premises associated with the utilization of nuclear energy or radiation practices at any time,
- perform measurements and collect samples from the inspected persons as necessary for enforcement of the Act and other regulations based on the Act,
- verify professional competence and special professional competence under the said Act,
- participate in the investigation and remedies of events important to nuclear safety, radiation protection, physical protection and emergency preparedness, including unauthorized handling of nuclear items or ionizing radiation sources.
- enforce the requirements and conditions of nuclear safety, radiation protection, physical protection and emergency preparedness, and technical specifications and operating procedures, and inspect the nuclear installation condition, and
- require evidence for observance of all the obligations set forth in nuclear safety assurance, radiation protection, physical protection and emergency preparedness of the nuclear installation.

If any deficiencies are identified by the inspector with respect to activities performed by the inspected person, they shall be authorized, depending on the nature of the identified fault, to:

- require the inspected person to remedy the situation within the specified term,
- order the inspected person to perform technical inspections, overhauls or tests on the operational capability of the installation, or any of its parts, systems or its assemblies, if necessary to verify the nuclear safety,
- disqualify an employee of the inspected person from special professional competence in the case of serious violation of duties, or failure of professional, physical or mental competence, and
- propose a penalty.

If there is risk of delay or in case of undesirable occurrence important to nuclear safety, radiation protection, physical protection and emergency preparedness, SÚJB shall be authorized to issue a provisional order imposing on the inspected person to reduce the power output or suspend the operation of the nuclear installation, stop the assembly of components or systems of a nuclear installation, prohibit handling of nuclear items, ionizing radiation sources or RAW, or to impose on the inspected person the obligation to sustain that handling is performed by another person at the expense of the inspected person.

For violation of a legal obligation established in the Atomic Act, SÚJB may impose a penalty up to the amount specified in Section 41, and in compliance with the rules specified in Section 42.

The binding procedures for supervising activities are set forth in the SÚJB internal documents.

5.3.3. Position of the Regulatory Body within the State Administration Structure

SÚJB, as the successor of ČSKAE, is an independent central state administration body in the field of nuclear safety and radiation protection. It has its own budget item approved by the Parliament of the Czech Republic as part of the national budget. SÚJB is headed by a Chairperson appointed by the Czech Government. The SÚJB position in the state administration structure is shown in Fig. 5.1.

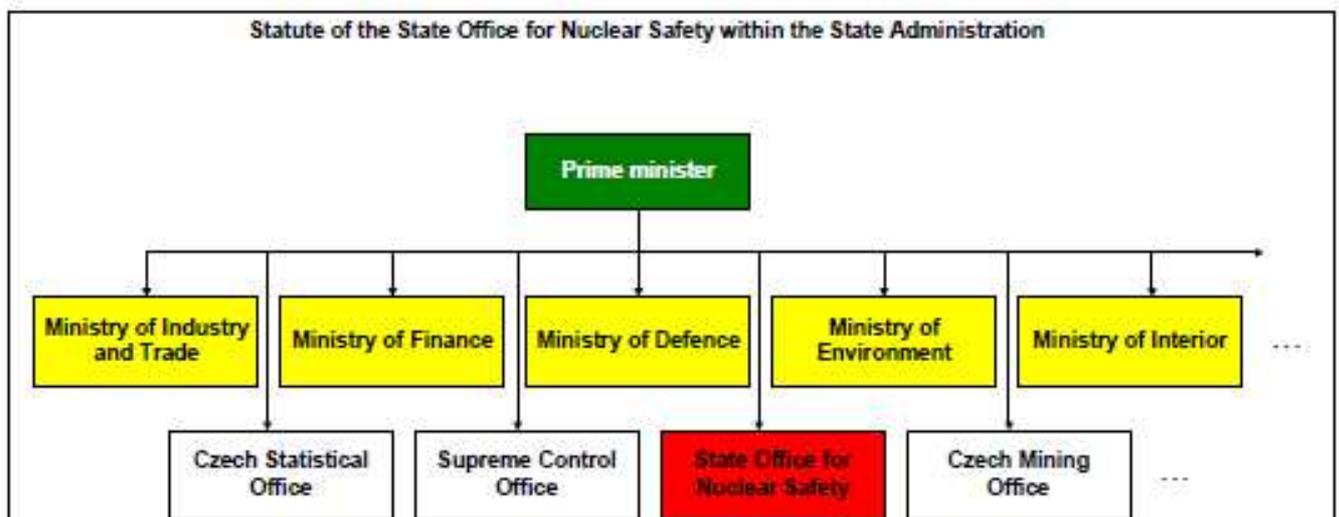


Fig. 5.1 Position of SÚJB within the structure of government bodies

5.3.4. Regulatory Body Structure, Technical Support and Material and Human Resources

The number of positions approved in the SÚJB budget for 2011 is 194 of which approximately 2/3 are held by nuclear safety and radiation protection inspectors. The SÚJB budget for 2011 is approximately 336 mil. CZK. In the current situation of the Czech Republic, the material and human resources are sufficient to provide the basic functions imposed by law.

The SÚJB organizational structure is shown in Fig. 5.2.

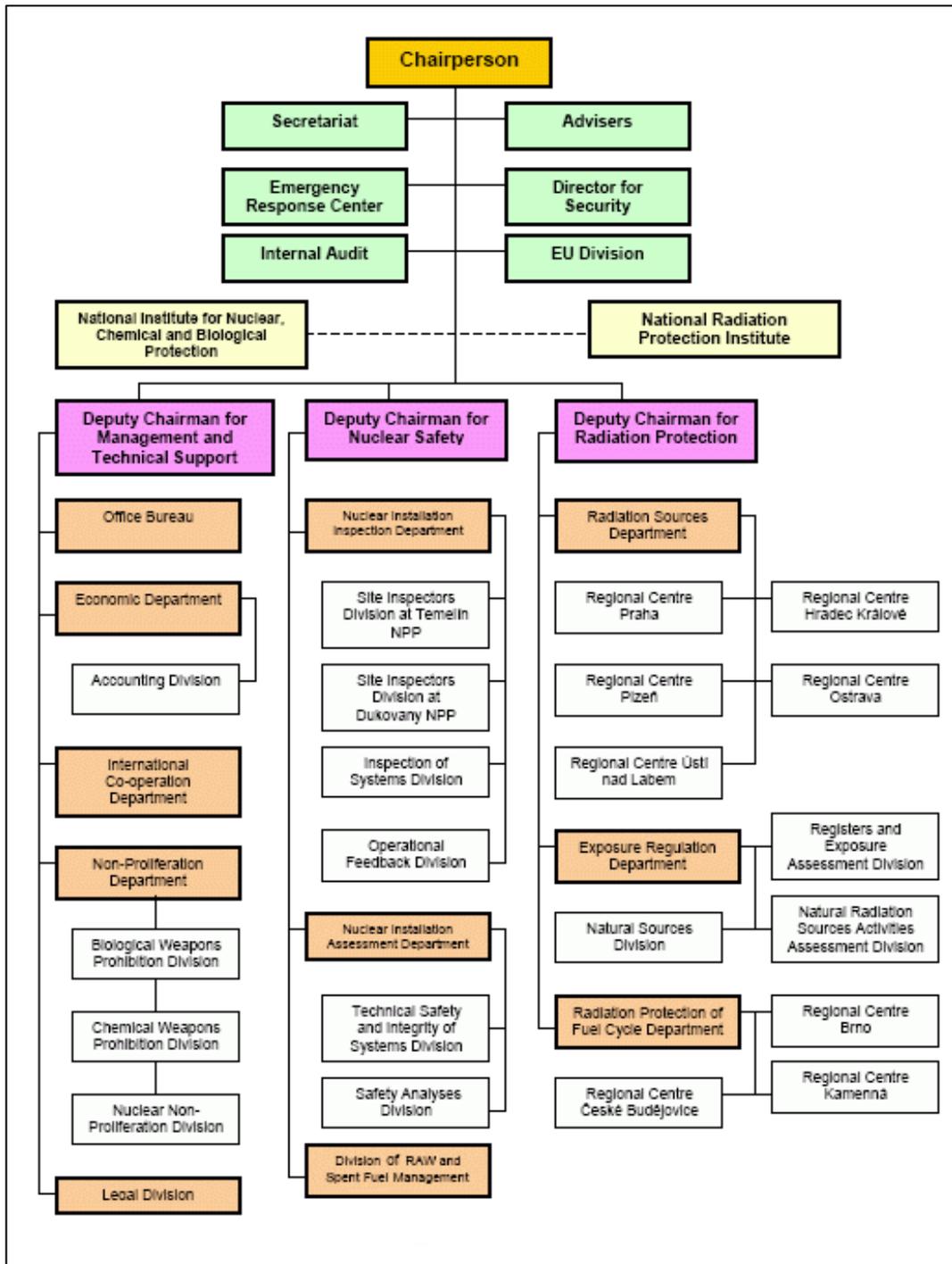


Fig. 5.2 Organizational structure of SÚJB

5.3.5. Regulatory Body within the Structure of Governmental Bodies

As shown from the above-mentioned Czech legislation and state administration structure, SÚJB has all powers and competence necessary to carry out its mission - to execute the state supervision of nuclear safety, radiation protection, physical protection and emergency preparedness. At the same time, the SÚJB competence does not overlap or contradict any other state administration bodies.

5.3.6. Independent Evaluations of the State Supervision

After the amendments to the supervisory and legal framework in the second half of the 1990s and after their full implementation, the Czech Republic approached the IAEA to request independent evaluation of the efforts. This was achieved through two international IRRT missions carried out at SÚJB in March 2000 and in June 2001.

In view of the results presented by the experts in their final reports, they found both the legislative framework and the execution of state supervision of peaceful utilization of nuclear energy and ionizing radiation at a very good level corresponding to the world's good practices. In respect to the position of the regulatory authority within the state administration structure, the experts underlined that SÚJB had not only reached "de iure" but also "de facto" independence. The experts also formulated specific recommendations which, if implemented, might further improve the level of supervision in the Czech Republic. The recommendations focused e.g. on special fields of supervision, such as emergency preparedness training or further development of probabilistic methods used in nuclear safety evaluation. However, they concluded that those recommendations mostly concerned long-term development of the organization. The final reports of both the IRRT missions are available on the SÚJB website.

SÚJB, in cooperation with IAEA, is planning to conduct another independent evaluation of the Office by means of an IRRS mission in 2013.

6. Other General Safety Provisions – Articles 21 - 26 of the Joint Convention

6.1. Responsibility of the Licensee

1. *Each Contracting Party shall ensure that primary responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant license and shall take the appropriate steps to ensure that the licensee performs its responsibility.*
2. *If there is no such licensee or other responsible party, the responsibility shall rest with the Contracting Party which has jurisdiction over spent fuel or radioactive waste management.*

The licensee's responsibility for safe management of SF and RAW is formulated in the Atomic Act which specifies a number of partial responsibilities of the licensee forming the aggregate liability for nuclear safety. Those specific responsibilities are mainly discussed under Sections 17 and 18 of the Atomic Act where the licensee is required, amongst other things, to ensure nuclear safety, radiation protection, physical protection and emergency preparedness of its respective nuclear installation, and this is followed by additional specific requirements for the nuclear safety system as imposed on the part of the licensee (see National Report under the Joint Convention, Revision 2.3 of September 2005).

The regulator of nuclear safety is mainly responsible to supervise the performance and fulfillment of the above-mentioned requirements. The rights of nuclear safety or radiation protection inspectors are specified under Section 39, Paragraph 4, letters b) and c) of the Atomic Act. In compliance with this law, the inspectors shall check for compliance with the terms and requirements for nuclear safety, radiation protection, physical protection, and emergency preparedness as well as the condition of nuclear installation, or adherence to technical specifications and operating procedures and require evidence that the specified obligations are being fulfilled.

The joint-stock company ČEZ, a.s., the holder of the license to operate NPP Dukovany and NPP Temelín, SÚRAO, CV Řež and ÚJV Řež a. s. are charged with the primary responsibility for nuclear safety and radiation protection of their NIs and repositories. This responsibility is delegated to the respective managers at the executive level while the key role in terms of safety is played by directors of those organizations. It shall be the highest priority of the licensee to ensure nuclear safety, radiation protection and emergency preparedness. The entire management system shall be used to maintain the desired level of safety, including the necessary safety controls and feedback to verify the level of safety.

The licensee has implemented its own supervision system in order to follow the requirements under the Atomic Act. In compliance with the Quality Assurance Program and the elaborated obligations or delegated responsibility within other documents, the authorized work procedures and the specified dates for periodical testing are subject to supervision. In compliance with the implemented system code, if any event occurs that is related to nuclear safety or radiation protection, this event shall be recorded and examined, and followed by corrective actions provided to prevent recurrence of such event. This entire process shall be evaluated and monitored regularly and systematically by the state inspectors.

The major responsibilities of the licensee also include the sole and absolute liability for nuclear damage due to operation of the nuclear installation (see Section 33, Paragraph 1 of the Atomic Act).

6.2. Human and Financial Resources

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;*
- (ii) 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;*
- (iii) 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 Atomic Act, Section 18 stipulates the following personnel qualification requirements:

"Activities directly affecting nuclear safety may only be performed by natural persons who are physically and mentally competent, with professional competence and to whom the Office has granted an authorization for the activities in question, subject to an application by the licensee.

Only natural persons with knowledge of the principles and procedures of radiation protection, as verified by the Expert Examination Commission of the Office, and holding an authorization to perform the working activity in question granted by the Office may perform activities especially important from the radiation protection viewpoint specified by an implementing legal regulation. "

Activities directly affecting nuclear safety and activities especially important for radiation protection and technical training and qualification requirements, including their testing and granting authorizations for persons authorized to perform the above activities, are set forth in the implementing regulation, the Decree No. 146/1997 Coll. as amended by the Decree No. 315/2002 Coll.

The obligation of each licensee authorized to operate a nuclear installation or a category III and IV workplace to make steady provision for decommissioning of nuclear installation or category III and IV workplace is declared in Section 18, Paragraph 1, letter h) of the Atomic Act (see National Report under the Joint Convention, Revision 2.3 of September 2005).

Institutional supervision of repositories containing RAW generated during decommissioning of nuclear installations and workplaces in categories III or IV after their closing will be funded from the nuclear account, to which payments are made in agreement with the Atomic Act by RAW generators in the amounts specific in the Government Order No. 416/2002 Coll., establishing the amounts and methods of payments by RAW generators to the nuclear account, as amended. The nuclear account is a part of state financial assets and liabilities, it is administered by the Ministry of Finance and its purpose is particularly the long-term accumulation of financial means for the development of a deep geological repository for radioactive waste and spent fuel.

6.2.1. ČEZ, a. s.

The responsibility for nuclear safety and radiation protection of NIs owned by ČEZ, a. s. rests with the statutory body of this joint-stock company (the Board of Directors) headed by Director General. Director General delegates responsibilities within his/her authority to the Executive Director of the Production Division who reports to Director General on the assurance of nuclear safety and radiation protection of the NIs within his/her responsibility.

The process of training and qualifications prescribed for the ČEZ personnel are detailed in Chapter 6 of the National Report of the Czech Republic under the Nuclear Safety Convention as provided in September 2001.

Under the law, the joint-stock company ČEZ is obligated to pay specific amounts to the nuclear account in order to make provision for decommissioning of nuclear installations. The payment on the nuclear account is set at CZK 50,00 per each MWh of electricity generated by nuclear plants under the Government Order No. 416/2002 Coll. The method used to make provision for decommissioning of nuclear installation is defined in the Decree No. 360/2002 Coll. issued by the Ministry of the Industry and Trade, which determines how to make provisions for decommissioning of nuclear installations or category III and IV workplaces.

The statutory provision for decommissioning of NPP Dukovany made by ČEZ, a. s. amounts to 165,420 mil. CZK/year. The provision for decommissioning of NPP Temelín amounts to 160,494 mil. CZK/year. The annual provision for decommissioning of ISFSF Dukovany is 0,180 094 mil. CZK/year. Since 2006, the provision of 0,184 328 mil. CZK/year has been created for decommissioning of SFSF Dukovany.

The creation of provisions for decommissioning of nuclear installations is inspected and verified annually by the state organization of SÚRAO in agreement with the Atomic Act.

Based on its internal decision, ČEZ, a.s. has been also creating a provision for storage of spent nuclear fuel. The provision is funded from the company profit and intended to cover the incurred ČEZ cost associated with the storage of spent nuclear fuel, also after decommissioning of nuclear units.

The power utility ČEZ, a.s.:

- in the accounting period 2010, in agreement with the Government Order No. 416/2002 Coll. deposited on the nuclear account the payment of 1 399,912 mil. CZK and the total amount paid to the nuclear account since 1997 amounts to about 13 219 mil. CZK;
- has created a provision for decommissioning of nuclear installations amounting to 6 252,588 mil. CZK (from which the provision for decommissioning of EDU it is 4 680,779 mil. CZK and for ETE it is 1 569,649 mil. CZK, for ISFSF Dukovany it is 1,422 mil. CZK and for SFSF Dukovany it is 0,737 mil. CZK); the blocked funds as at December 31, 2009 amounted to 6 953,802 mil. CZK;
- has created an internal provision for storage of spent fuel amounting to 7 986,140 907 mil. CZK (from which for storage of spent fuel from EDU 6 533,882 121 mil. CZK and for storage of spent fuel from ETE 1 452,258 786 mil. CZK).

6.2.2. ÚJV Řež a. s.

The joint-stock company of ÚJV Řež makes provision for decommissioning of the HLW storage facility. It has been in operation since 1995. The projected lifetime of the storage is fifty years.

It means that the HLW storage facility would be decommissioned in 2045 where its radioactive contents are to be removed to a repository - if permitted by the waste acceptance criteria – which will be either of the existing type or a planned DGR. If DGR is not available, the requirement for subsequent storage shall be addressed by construction of a new or reconstruction of the existing storage facility.

The waste management facilities are part of the decommissioning proposal approved by SÚJB. The cost of decommissioning was verified by SÚRAO. By December 31, 2010, ÚJV Řež a.s. had created the provision for decommissioning amounting to 109,0 mil. CZK, from which the provisions for decommissioning of the HLW storage facility was 75 945 CZK/year.

The SF and RAW management is supported with a sufficient number of qualified personnel. The staff number is derived from analyses of licensed activities, as necessary to meet the nuclear safety and radiation protection requirements during such activities.

6.2.3. Centrum výzkumu Řež s. r. o.

CV Řež, as the new owner of research reactors LVR-15 and LR-0, also creates a financial provision for their decommissioning. The provision for LVR – 15 amounts to 2 148,8 thous. CZK/year and the total amount as at 31 December 2009 was 26 546,2 thous. CZK. The provision for LR-0 amounts to 507,3 thous. CZK and the total amount as at 31 December 2009 was 10 192,5 thous. CZK. The amount of financial provision created by both the workplaces is reduced by the anticipated share of the state on the financial provision for decommissioning.

6.2.4. SÚRAO

SÚRAO has proposals approved by SÚJB for closure of repositories, and it does not create any provision for decommissioning because it is a state owned organizational unit in agreement with Section 18, Paragraph 1, letter h) of the Atomic Act. The SÚRAO budget is approved by the Czech Government. Activities associated with SÚRAO competencies are supported with a sufficient number of qualified personnel. The staff number is derived from the analyses of licensed activities, as necessary to meet the nuclear safety and radiation protection requirements in the course of such activities.

6.3. Quality Assurance

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

6.3.1. Present State

6.3.1.1. Legal Framework for Quality Assurance

The Act No. 18/1997 Coll., on peaceful utilization of nuclear energy and ionizing radiation and on amendments and alterations to some acts, as amended (hereinafter the Atomic Act) defines the general conditions for execution of practices related to nuclear energy utilization, radiation practices, or exposure reduction interventions. The quoted Act, Section 4, Paragraph 8 reads:

"Any person performing or providing for practices related to nuclear energy utilization or radiation activities, with the exception to practices as in Section 2 a) items 5 and 6, must have implemented a quality assurance system to the extent and in the manner set out in an implementing regulation, aimed at achieving the required quality of a relevant item, including tangible or intangible products, processes or organizational arrangements, with respect to the importance of this item from the aspect of nuclear safety and radiation protection. The implementing regulation shall establish the basic requirements for quality assurance of the classified equipment with respect to their safety classification. "

In this case the implementing regulation is the SÚJB Decree No. 132/2008 Coll., establishing basic requirements for the quality assurance system in carrying out activities connected with utilization of nuclear energy and radiation protection and on quality assurance of selected equipment within regard to their assignment to classes of nuclear safety. The quoted decree has replaced the original Decree No. 214/1997 Coll.

According to Section 13, Paragraph 5 of the Atomic Act, a license granted by SÚJB for specific activities related to nuclear energy and ionizing radiation utilization is subject to approval of the quality assurance system for the licensed activity.

6.3.1.2. Quality Assurance Strategy of the Licensee ČEZ, a.s

The quality assurance of SF and RAW management is provided by ČEZ, a. s. within the following nuclear activities:

- designing, implementation and operation of SF storage facilities,
- fuel cycle management,
- RAW management,
- nuclear fuel and nuclear material transportation,
- personnel training for these activities,
- handling of ionizing radiation sources (throughout the entire company).

The joint-stock company ČEZ has implemented and documented a quality management system to support the processes and activities in the scope of the above nuclear activities, with regard to the obligations promulgated in the corporate Quality Policy.

This quality management system has been designed to support processes and practices in the area of SF and RAW management in a controlled and organized manner and in full compliance with the Atomic Act and its implementing regulations, including the SÚJB Decree No. 132 /2008 Coll.

The quality management system uses a process-based model with integrated requirements for safety, quality and environmental protection (requirements of the standards EN ISO 9001, 14001, 18001, IAEA Safety Standards (The Management System for Facilities and Activities

No. GS-R-3 and Application of the Management System for Facilities and Activities No. GS-G-3.1.), recommended by the International Atomic Energy Agency (IAEA) to organizations operating nuclear power plants.

The requirements of the quality management system are applied using a graded approach based on the importance of individual processes and items for nuclear safety, radiation protection, emergency preparedness and physical protection.

An organizational change was implemented in the company ČEZ, a. s. on 1 January 2011 consisting in the establishment of the Quality and Management System section. The section reports to the Executive Manager in the organizational structure.

The mission of the section is to:

- provide for the development, evaluation and continual improvement of the ČEZ management system, the basic element of which is the performance with full observation of safety;
- establish requirements for the quality and management system within activities / processes in ČEZ;
- propose principles for the quality and management system;
- provide for co-ordination of the improvement and development of principles for the quality and management system in ČEZ and to reflect those principles within the ČEZ Group;
- define control mechanisms in ČEZ and to check fulfillment and functionality of principles for the quality and management system;
- provide for verification of effectiveness of the integrated management system in respect to the specified requirements, particularly under Section 3 of the SÚJB Decree No. 132/2008 Coll.

6.3.1.3. Quality Assurance Strategy of SÚRAO

For the purpose of management of activities associated with RAW disposal, the Ministry of Industry and Trade set up the organization of SÚRAO whose responsibilities are detailed in Chapter 4 of the Atomic Act. SÚRAO has implemented and described a quality assurance system based on the Czech standard series of ČSN ISO 9000 and related regulations and it observes requirements of national legal regulations (in the nuclear area particularly the Act No. 18/1997 Coll. and the SÚJB Decree No. 132/2008 Coll.) and IAEA recommendations. The long-term strategy of SÚRAO in quality assurance is formulated in its quality policy issued by the Resolution by the SÚRAO Director and specific quality objectives are established and evaluated for individual calendar years.

6.3.1.4. Quality Assurance Strategy of ÚJV Řež a. s.

The quality management system, as a part of the Integrated Management System implemented in ÚJV Řež a. s., is based on application of EN ČSN ISO 9000 series of standards with the objective to assure quality of products and services for clients while following regulatory standards applicable to the performed activities.

The quality assurance procedures enforcing the nuclear safety and radiation protection requirements under the Act No. 18/1997 Coll., as amended, and under other related regulations, are based on the company's Integrated Policy approved by the general meeting. The Integrated Policy is broken down into specific and measurable corporate Integrated

Goals, mainly focusing on professional and efficient management and improvement of processes.

6.3.1.5. Quality Assurance Strategy of Centrum výzkumu Řež s. r. o.

CV Řež s. r. o. has implemented and certified a quality management system based on the application of the EN ISO 9001: 2008 standard. The objective of the company is to assure quality of products and services for clients while following regulatory standards applicable to the performed activities. In order to ensure quality of respective activities CV Řež has developed quality assurance programs (PZJ) describing a quality system of the licensee, affected processes and activities, including definition of responsibilities for the licensee and its contractors. Related developed procedures provide for the requirements for nuclear safety and radiation protection pursuant the Act No. 18/1997 Coll. , as amended, and the Decree No. 132/2008 Coll. They are based on the company's Quality Policy approved by the Board of Executives. The policy is broken down into specific and measurable Quality Goals. The objective of the company management is to professionally and effectively manage and improve the company processes.

6.3.2. Quality Assurance Programs for Each Stage of Lifetime of Nuclear Installation

6.3.2.1. Quality Assurance Programs in ČEZ, a.s.

The quality management system of ČEZ is described in a system of management documents. The roof document is the Integrated Management System Manual [Quality assurance program for activities licensed under the Atomic Act, Section 9, Paragraph 1, letters d), e), f), j) and n)].

The system of management documents includes:

- strategic documents (e.g. Quality Policy, Safety Policy, etc.) - Level I
- management documents (rules, guidelines and procedures and Director General or Executive Director's orders) - Level II
- working documents (e.g. methodologies, operating instructions, technological procedures) - Level III

The ČEZ quality management system documents also include outputs from processes and activities (records).

For the quality assurance of nuclear activities, ČEZ has implemented Quality Assurance Programs describing the licensee's quality management system and the affected processes and activities, including the definition of the licensee's and its contractors' responsibilities. In most cases, the above mentioned system of management documents is applied by PZJ to describe the quality management system.

The Quality Assurance Programs are submitted by ČEZ to SÚJB for approval since their approval is required to issue a license for particular activities as stated in Section 13, Paragraph 5 of the Atomic Act.

Also reconstructions and other changes affecting nuclear safety, radiation protection, physical protection and emergency preparedness, or some major organizational changes in the joint-

stock company ČEZ are approved through Quality Assurance Programs for the respective licensed activities.

The Quality Assurance Programs for licensed activities are followed with the supplier's quality plans for components, systems and services affecting nuclear safety or radiation protection of nuclear installations.

6.3.2.2. Quality Assurance Programs of SÚRAO

The quality management system of SÚRAO is described in a system of management documents, structured in 4 layers. The top layer comprises documents setting forth the quality, safety and environmental policies are the Quality Manual of SÚRAO and Quality Manual of the Testing laboratory of packaging assemblies (a part of SÚRAO).

The second layer contains guidelines and rules that describe and establish basic procedures and responsibilities in the provision of SÚRAO processes – this layer includes quality assurance programs for operation of individual RAW repositories and quality of research and development works (developed in agreement with requirements of the SÚJB Decree No. 132/2008 Coll.). The third layer of quality management documents includes methodical instructions for partial activities and the fourth layer consists of operative documents (Resolutions, ordered measures).

Additionally, for particularly extensive job orders contractors develop and SÚRAO approves quality plans as a basis to follow-up the performance and fulfillment of quality indicators of the orders.

6.3.2.3. Quality Assurance Programs of ÚJV Řež a.s.

ÚJV Řež a. s. provides for on-site storage of SF (Building 211/8 – HLW Storage Facility) from research reactors and RAW generated from some other activities. Similarly, it provides for RAW collection, transport, processing and storage. To assure quality of the above-mentioned activities, the company has implemented a quality management system described in the Integrated Management Manual, associated process manuals, working instructions and, in the last layer, in working and management procedures for the individual activities.

Activities of the HLW Storage facility are provided for by the division of Fuel Cycle Chemistry and Waste Management. A Quality Assurance Program for the workplace in category IV - HLW Storage facility (Building 211/8), describing comprehensive measures to ensure safe operation of the storage, has been developed in agreement with the Decree No. 132/2008 Coll. A similar function is fulfilled by the Quality Assurance Program at workplaces of the Center for Radioactive Waste Management.

In respect to observation of individual elements of the quality management system both documents emphasize application of systematic measures for review, inspection and improvement of process efficiency.

6.3.2.4. Quality Assurance Programs of Centrum výzkumu Řež s. r. o.

In its objects and in the object of ÚJV Řež a.s. (Building 211/8 – HLW Storage Facility) CV Řež s. r. o. stores spent fuel from research reactors. CV Řež s.r.o. provides for collection and storage of RAW at the place of their generation and hands over the waste to ÚJV Řež a.s., which provides for its transport, storage, processing, treatment and transport into a repository. For quality assurance of the mentioned activities the company has implemented the quality

management system described in the Integrated Management System manual, related process manuals, working instructions and, in the last layer of management documents, also working and management procedures for the individual activities. The fuel cycle, including RAW, is described by quality assurance programs for the LVR-15 and LR-0 reactors.

In respect to observation of individual elements of the quality management the processes and activities are monitored, including their inputs and outputs, to check fulfillment of requirements for their quality and to demonstrate conformity of their properties with the specified requirements.

6.3.3. Methods of Application and Evaluation of Quality Assurance Program Efficiency

6.3.3.1. Evaluation of Quality Assurance Program Efficiency in ČEZ, a.s.

ČEZ, a.s. has established responsibilities for process quality control and verification at each level (the so-called process owners). The responsibilities for equipment quality and process verification are described in the management documents which form a part of the documented quality management system. The responsibility for implementation of the quality management system rests with all company managers. Each employee is responsible for quality of his/her own work. The persons who perform inspection and surveillance activities are granted a sufficient authority to identify nonconformities and, if necessary, to impose appropriate corrective actions. All company employees are entitled to initiate improvements or revisions of the quality management system.

Regular training and education of ČEZ employees are perceived as an investment into the maintenance and improvement of the quality management system. At all management levels ČEZ uses a consolidated training process for its employees in the field of quality assurance and improvement.

The efficiency of the quality management system is evaluated by ČEZ, a. s. and the system is updated on a yearly basis at the end of each calendar year. Managers at all management levels perform periodical assessments of all processes and procedures for their respective scope of responsibility, with the objective to evaluate their level and efficiency.

6.3.3.2. Evaluation of Quality Assurance Program Efficiency in SÚRAO

The control system provides feedback at each level of management, making it possible to demonstrate compliance with quality requirements for processes and activities. All managers regularly review key processes and procedures in their scope of responsibility. SÚRAO has implemented a multi-level review process of job orders and internal rules. SÚRAO management uses inputs from the quality manager to regularly review the quality management system of the organization.

The quality manager of the Testing Laboratory for Packaging Assemblies performs partial evaluation of this SÚRAO organizational unit. Applicable management documents are available to conduct internal audits in agreement with the Act 320/2001 Coll. and quality audits (of its own organizational units, RAW generators and contractors of works and services important from the viewpoint of nuclear safety and radiation protection). These audits are performed in compliance with the annual schedule approved by the SÚRAO director. If needed, a so-called external quality audit may be performed by an auditor company with the

appropriate certification. The audits are used to inspect partial activities and processes and to verify efficiency of the quality assurance programs.

6.3.3.3. Evaluation of Quality Assurance Program Efficiency in ÚJV Řež a. s

To evaluate efficiency of quality assurance programs ÚJV Řež applies control mechanisms, process efficiency assessments and feedback evaluation. For this purpose, the following activities are carried out:

- internal audits to verify the compliance of the implemented quality system with the current quality assurance programs,
- input documentation validation;
- regular vendor rating;
- determination of control activities in the project design stage (operating activities);
- definition of potential extraordinary events and critical points;
- proposal of control procedures and determination of the process reference parameters;
- corrective actions and their follow-up;
- verification of effectiveness of the adopted measures by the Division Supervisory Committee for Nuclear Safety and Radiation Protection;
- review of feedback application by the Nuclear Safety and Radiation Protection Supervisory Committee of ÚJV Řež, or discussion of serious events by the company management.

Moreover, the company management performs an annual review of the implemented quality system as a whole.

6.3.3.4. Evaluation of Quality Assurance Program Efficiency in Centrum výzkumu Řež s. r. o.

To evaluate efficiency of quality assurance programs CV Řež applies control mechanisms, process efficiency assessments and feedback evaluation. The evaluation enables to improve information flows, to verify working activities, responsibilities and powers of persons and to inspect procedures of mutual cooperation. All company managers shall be responsible for proper implementation of the quality system. Each employee is than responsible for quality of his/her own work. The evaluation focuses on continual monitoring of the achieved quality results, identification of deviations from specified or anticipated requirements, analysis of causes of nonconformities and implementation of corrective actions. Results of the evaluation are primarily used for the improvement of the exiting quality system. The evaluation of efficiency of quality assurance programs by the management of the organization includes a review of suitability, adequacy and efficiency in respect to the requirements for quality and radiation protection. The quality system of CV Řež is reviewed once a year. The output from the review of the quality system is a document containing conclusions of the review.

6.3.4. Current Practices of State Supervision in Quality Assurance

According to Section 39 of the Atomic Act, SÚJB is responsible for supervision of the licensee with respect to compliance with provisions of this Act, including the above quality assurance requirements. If deemed necessary, SÚJB may extend this task to cover its contractors. The supervision focuses on quality assurance of the entire system and of specific classified equipment. The SÚJB departments responsible for this activity primarily

include the Nuclear Installation Evaluation Department, Radioactive Waste and Spent Fuel Management Division and Fuel Cycle Radiation Protection Department (see Fig. 5.2).

In compliance with the Atomic Act, SÚJB shall approve quality assurance programs for nuclear installations dealing with SF and RAW disposal and storage that are essential to issue the following licenses as per Section 9, Paragraph 1 of the Atomic Act:

- NI / RAW repository siting,
- NI / RAW repository construction,
- NI commissioning stages,
- NI / RAW repository operation,
- reconstruction or other changes affecting nuclear safety, radiation protection, physical protection, or emergency preparedness of NI or RAW repository,
- NI / RAW repository decommissioning stages,
- management of ionizing radiation sources,
- RAW management,
- management of nuclear materials,
- professional training of selected staff,
- personal dosimetry and other services important to radiation protection.

The review of quality assurance programs verifies particularly the compliance with requirements set forth in the SÚJB Decree No.132 /2008 Coll.

SÚJB also approves selected documents relating to quality assurance issues where the approval is required by the Atomic Act.

6.4. Operational Radiation Protection

1. *Each Contracting Party shall take the appropriate steps to ensure that during the operating life of a spent fuel or radioactive waste management facility:*
 - (i) *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*
 - (ii) *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; and*
2. *Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:*
 - i) *To keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and,*
 - ii) *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.*
3. *Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility:*
 - (i) *Measures are taken to prevent unplanned or uncontrolled release of radioactive materials into the environment; and*
 - (ii) *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.*

6.4.1. Summary of National Legislation for Radiation Protection

The radiation protection for nuclear installations in the territory of the Czech Republic is regulated by the Atomic Act and its implementing Decree No. 307/2002 Coll., on radiation protection, amended by the Decree No. 499/2005 Coll.

The legislation in the field of radiation protection systematically complies with the internationally respected principles of radiation protection based on the recommendations from prestigious international non-governmental expert organizations (ICRP), in particular the ICRP recommendation No. 60 issued in 1990, and the associated international fundamentals for radiation protection adopted by inter-governmental organizations, including IAEA. The above legal provisions were also initiated by the efforts to harmonize the radiation protection law of the Czech Republic with the relevant EU directives, in particular the European Commission Directive 96/29/Euratom of May 13, 1996. The radiation protection was fully harmonized with the EU law in 2002 by amendment to the Atomic Act and its implementing regulation – the Decree No. 307/2002 Coll., on radiation protection.

More details on the national legislation in the field of radiation protection are provided in the National Report under the Joint Convention, Revision 2.3 of September 2005.

6.4.2. Implementation of Radiation Protection Requirements

6.4.2.1. Dose Limits

The most common limits for whole body exposure are presented by the international recommended parameters describing the whole-body radiation effect (i.e. effective dose). They refer to the sum of external effective doses plus committed effective internal doses for a certain period of time. There are no limits specified for a period less than one calendar year, or more than five consecutive calendar years.

The limits are set lower for the public, i.e. for individuals whose exposure is typically inadvertent and involuntary, unlike those for the individuals who are aware of the risk taken and whose exposure is voluntary and deliberate either as a part of their or their on-job training.

The effective dose limits for category A and B radiation workers, i.e. persons older 18 years, whose exposure to the ionizing radiation sources at work is deliberate and voluntary, following proven advice and information on the possible exposure level at work, as well as on the associated risks, shall be 100 mSv within five consecutive calendar years while the value of 50 mSv shall not be exceeded per calendar year. For employees in category A, including amongst others all persons working in the radiation controlled areas of nuclear installations, routine and regular monitoring of personal exposure shall be introduced as well as keeping records of personal exposure for at least 50 years. For monitoring of category A and B personnel, the Decree No. 307/2002 Coll. specifies so-called derived limits, easier to track and to control, which are expressed in more directly measurable parameters.

The effective dose limits for persons aged 16 to 18 (students and apprentices) who are exposed to ionizing radiation sources deliberately and voluntarily, following proven advice and information on the possible exposure level at work, as well as on the associated risk during specialized occupational training for work with ionizing radiation sources, shall be 6 mSv per calendar year.

The general effective dose limits, that is the limits applicable to any other members of the public, shall be 1 mSv per calendar year, or as specified in the license to operate category III or IV workplaces, and the emergency limit of 5 mSv for five consecutive calendar years.

Details concerning the optimizing limits for radiation protection optimizing in relation with the public are provided in the National Report under the Joint Convention, Revision 2.3 of September 2005.

6.4.2.2. Conditions for Discharge of Radioactive Material

Radioactive releases from NIs, both liquid and gaseous, are subject to a license issued by SÚJB as per the provisions of the Atomic Act (Section 9, Paragraph 1, Point h), and details, including the criteria for issue of such a license, are given in Sections 56 and 57 of the Decree No. 307/2002 Coll. The controlled releases, containing radionuclides, into the atmosphere or waters may only be approved if such provisions are made that the effective doses received by the particular critical group of the population due to releases shall not exceed 250 μ Sv per year. In addition, the general limit of 1mSv for the annual effective dose from all the sources also applies to radioactive releases from nuclear installations. The release shall be justified and optimized.

The authorized limits for releases from nuclear installations are not provided in any regulatory document. They are determined by SÚJB for each particular nuclear installation and set below 50 μ Sv/year for both the Czech NPPs. The actual values of radioactive releases are controlled and evaluated by the plant operator based on a monitoring program approved by SÚJB.

An extensive monitoring system was implemented for actual release tracking supported by the operators of nuclear installations and by independent measurements directly performed by SÚJB or through SÚRO. The measurement results have documented with a sufficient reliability that the authorized limits were not exceeded.

6.4.2.3. Radiation Protection Optimizing

The technical and organizational requirements, guidance levels and procedures to demonstrate the reasonably achievable level of radiation protection are specified under Section 17 of the Decree No. 307/2002 Coll. They are reviewed in the licensing process and periodical inspections. For a nuclear installation, it means that:

- prior to start of operation, alternative solutions must be considered for radiation protection and the cost of associated protection measures, collective doses and doses of the relevant critical group of the population must be reviewed and compared,
- in the course of operation the received doses are analyzed on a periodical (yearly) basis in respect to the tasks performed while additional possible actions to ensure radiation protection are considered and compared to similar operations.

More details concerning the radiation protection optimizing are provided in the National Report under the Joint Convention, Revision 2.3 of September 2005.

6.4.2.4. Radiation Monitoring in the Vicinity of Nuclear Installations

The nuclear operator (licensee) shall be responsible for radiological environmental monitoring. The monitoring is conducted based on a monitoring program authorized by

SÚJB. The monitoring program shall define the scope, frequency and methods of measurement and evaluation of results, as well as the associated reference levels. At present, the radiological environmental monitoring is performed by the nuclear operator through its environmental radiation monitoring labs. SÚJB is responsible for supervision of the compliance with the monitoring program and for its own independent measurements.

The off-site dose rates are continuously monitored at NPP Dukovany and NPP Temelín using a teledosimetric system operated by the NPPs. In addition, there is at least one off-site monitoring point of the national independent early detection network (see Chapter 6.5). The off-site dose equivalent from external radiation is monitored using local networks of thermoluminescent detectors controlled by the radiation monitoring laboratory of the particular NPP. Independent of those networks, the relevant regional centers of SÚJB perform measurements using thermoluminescent detectors. Up to now none of the authorized limits have been exceeded in any of the above mentioned networks due to NPP operation.

Regular sample collection and activity measurements of radionuclides in the environment in the proximity of NPP Dukovany are performed by the Radiation Monitoring Lab and by the independent SÚJB Regional Center in Brno. The radiological environmental monitoring of NPP Temelín is provided by the Environmental Radiation Monitoring Lab and by the SÚJB Regional Center in České Budějovice.

Since nuclear installations are included in the National Radiation Monitoring Network, measurement overviews are periodically submitted to the supervisory bodies. In addition, the utility takes its own initiative to issue various reference materials for the public. This area is regulated by the Government Order No. 11/1999 Coll., on the emergency planning zone (see Chapter 5.2).

There are additional off-site measurements performed, in particular aimed to detect and assess any possible radioactive leaks, and to provide reliable basis for decision-making about public protection measures. These measurements are performed within the National Radiation Monitoring Network whose function and structure are stipulated in the Decree No. 319/2002 Coll. SÚJB is responsible to control the activities of the National Radiation Monitoring Network, both its permanent and emergency services. The permanent service is used for monitoring of normal operating conditions while the emergency services are mobilized in case of emergency. The normal mode is primarily used for the actual radiation situation monitoring and early incident detection while the emergency mode is used to evaluate consequences of an incident. Monitoring results are submitted as part of annual reports on the radiation situation in the Czech territory to the Civil and Emergency Planning Committee and to the public through regional authorities, hygienic stations, or libraries.

Monitoring of the radiation situation on the Czech Republic's territory is performed by the following permanent services of the Radiation Monitoring Network:

- The early detection network comprising of 54 continuously operated measurement points with automatic measurement of the dose rate and transmission to the central database. The network contains a teledosimetric system on the site and in a close proximity of NPP Temelín and NPP Dukovany and 17 measuring points of the Czech Republic's Army.
- A network of thermoluminescent dosimeters (TLD) for measurements of gamma dose rates consisting of 205 measuring points of the territorial TLD network, from which 21 measuring points are in local TLD network in the proximity of the nuclear power plants.

- 12 measurement points of air pollution, including means to measure dose rates, collection of samples of aerosols and fall-out, and determination of activity of radionuclides in those samples.
- Measuring points of food contamination, including means for collection of samples and determination of activity of radionuclides in food chain links and measuring points of water contamination, including means for collection of samples and determination of activity of radionuclides in water, river sediments and in selected samples of water fauna.
- Mobile groups that perform monitoring of doses, dose rate and activities of radionuclides in the field, collection of samples from individual components of the environment and placement and replacement of dosimeters in the network of thermoluminescent dosimeters.
- An aviation group performing, on as needed basis, monitoring of large area territories (measurement of dose rates and areal or mass activities of man-made and natural radionuclides).
- Laboratory groups that provide for collection of samples from the environment and their spectrometric or radiochemical analyses.
- A central laboratory of the monitoring network performing measurements and evaluation of samples and coordinates and performs measurements of internal contamination of persons.
- A meteorological service that acquires meteorological data necessary for models of spreading of released radionuclides in the atmosphere in order to evaluate and to forecast radiation situation.

The purpose of the measurement monitoring program within the Radiation Monitoring Network is to track space and time distribution of radionuclides activity and ionizing radiation doses on the Czech territory, and in particular to identify long-term trends and ensure early detection of any deviations. The attention is given to artificial radionuclides of which those measurable and traceable are listed below:

- ^{137}Cs , ^{90}Sr , $^{239+240}\text{Pu}$ and ^{85}Kr in the atmosphere,
- ^{137}Cs , ^{90}Sr and ^3H in foodstuffs,
- ^{137}Cs in human body.

It was proven by participation of international exercises that the Czech Radiation Monitoring Network as a whole is comparable with the European standards in terms of its equipment, as well as the density of measurement points.

6.4.3. Supervision

As stated in the Atomic Act, SÚJB is responsible for state supervision of radiation protection in the Czech Republic. Consequently, SÚJB is authorized to issue regulations to implement the Act and to issue the relevant licenses for ionizing radiation source management and other radiation practices set forth in the above Act - see Chapter 5.2.2.

The radiation protection is supervised by SÚJB radiation protection inspectors. There are currently 55 inspectors in total, both at the headquarters in Prague and at seven detached workplaces all over the country referred to as regional centers. The inspector shall prove the necessary expertise and qualifications in the supervised area and have the relevant university degree plus three years of experience. The inspectors are appointed by the SÚJB chairperson - see Chapter 5.3 for more details.

There are three types of inspections performed:

- standard (routine) inspections performed by the regional centers,
- specialized inspections performed by a team of experienced inspectors for nuclear power plants, mining and processing of uranium, RAW, nuclear medicine, radiotherapeutic sources, radiodiagnostic sources, or major industrial and natural sources, and
- specific ad-hoc inspections by teams consisting of the most experienced inspectors.

A large number of internal guides have been prepared for supervision, as well as control documents for evaluation of different types of inspections that are used for all types of supervision.

6.5. Emergency Preparedness

- 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.*
- 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.*

6.5.1. Applicable Law

The obligations of licensees, that is operators of nuclear installations or workplaces where radiation practices are performed, including the SF and RAW management, in the area of emergency preparedness are primarily established in the Atomic Act, and its implementing regulations, or the associated government orders. The additional obligations are set forth in other regulatory guides, such as the Act No. 239/2000 Coll., the Act No. 240/2000 Coll., the Government Order No. 462/2000 Coll., or the Decree No. 328/2001 Coll. by the Ministry of the Interior, all as amended later.

More details concerning the national legislation in emergency preparedness are provided in the National Report under the Convention on Nuclear Safety of May 2010,

6.5.2. Implementation of Emergency Preparedness Measures, including the Role of State Supervision and Other Bodies

6.5.2.1. Classification of Extraordinary Events

For the purpose of severity assessment of extraordinary events that might occur during operation of a nuclear installation, or a workplace where radiation activities are performed, three basic levels of events are classified (Section 5 of the SÚJB Decree No. 318/2002 Coll., as amended, see the National Report under the Convention on Nuclear Safety of May 2010).

6.5.2.2. National Emergency Preparedness and Response Systems

In compliance with the legislation, particularly in the area of crisis management, an emergency preparedness system structure was implemented in the Czech Republic to

address various emergency conditions. Figure 6.1 provides the basic structure of the crisis (emergency) preparedness system.

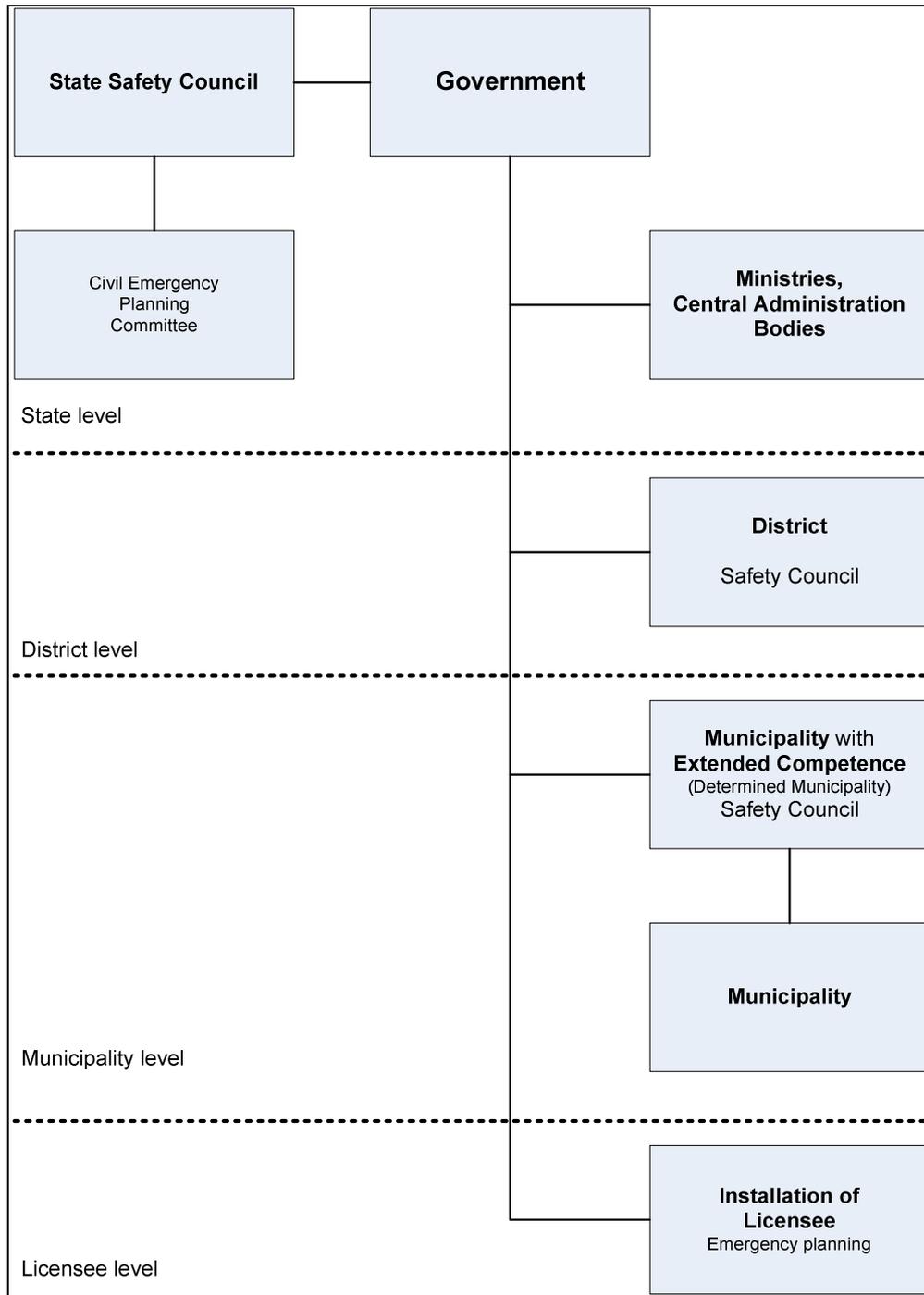


Fig. 6.1 Basic structure of emergency preparedness for extraordinary events in the Czech Republic

An extraordinary event - an accident in the Czech Republic or abroad, with a potential impact on the territory of the Czech Republic, shall be addressed using the crisis (emergency) response system of the basic structure as shown in Fig. 6.2.

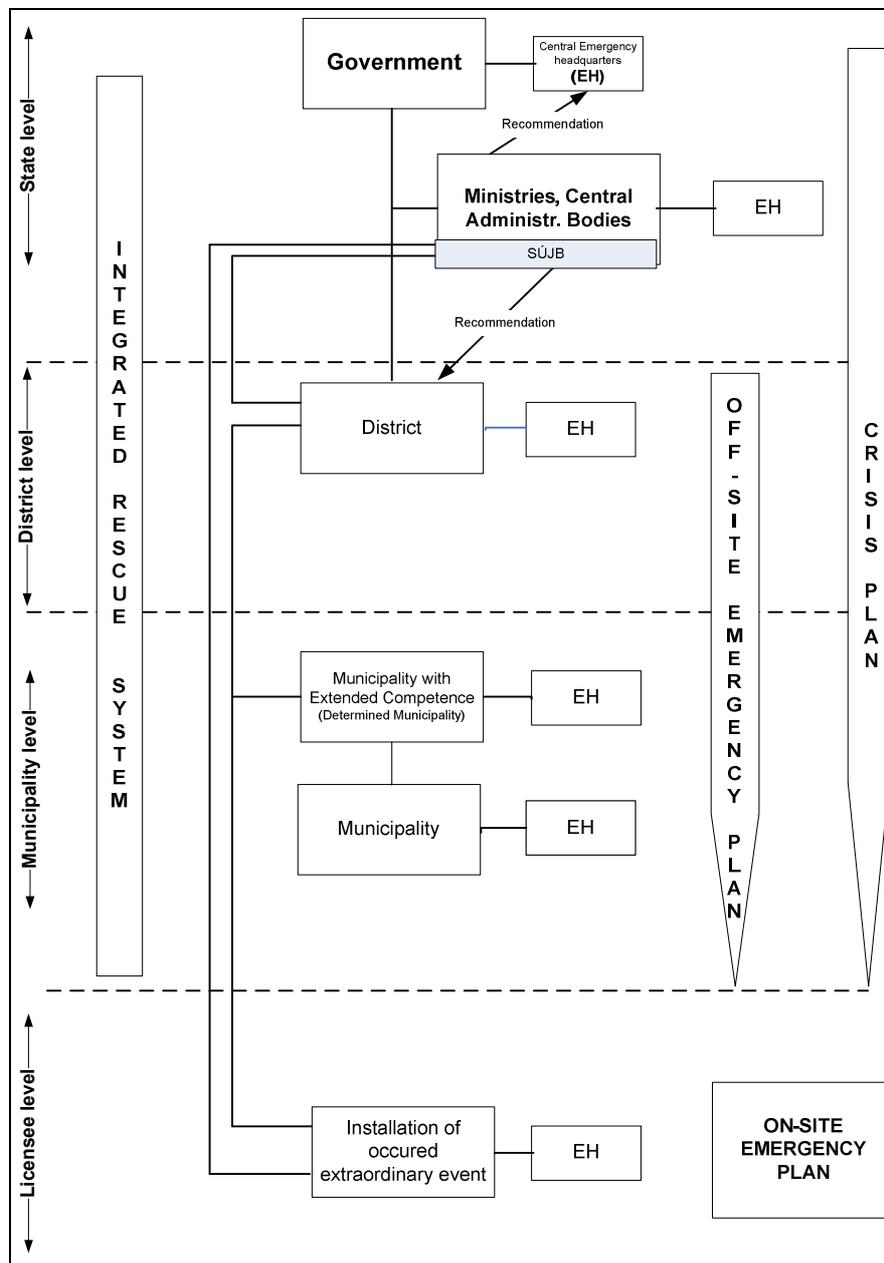


Fig. 6.2 Basic Structure of Emergency Response to Radiation Accident in the Czech Republic

The Czech Government is the superior body responsible for preparedness for crisis situations and, if such situations arise, for their management on the country's territory. The Constitutional Act No. 110/1998 Coll., on security of the Czech Republic, established the National Security Council. Further to the act, the government in its resolution No. 391 of 1998, as amended later, established membership on the National Security Council and approved its main tasks in preparedness for crisis and management of crisis situations.

In parallel, the Committee for Civil and Emergency Planning was established through the governmental resolution No. 391 of 1998, as a standing working body of the National Security Council responsible for co-ordination and planning of internal national security provisions, public and economic protection, and for co-ordination of requirements for civil resources necessary for assurance of security of the Czech Republic. The tasks in planning and preparedness for a radiation accident fall in the competence of the Committee for Civil and Emergency Planning and the tasks in management of radiation accidents fall in the competence of the Central Crisis Staff, a working body of the government to deal with crisis situations.

The main tasks in emergency planning and preparedness, including radiation accidents, are specified in the rules of procedure of the Committee for Civil and Emergency Planning and listed in the National Report under the Convention on Nuclear Safety of May 2010,

The Committee for Civil and Emergency Planning is presided by the Minister of the Interior and its members are deputy ministers and SÚJB chairperson. The Committee may establish ad hoc expert working groups.

These working groups consist of experts (specialists) in the respective fields of public and environmental protection in case of emergency occurrence (industrial accidents, or natural disasters etc.).

The Central Crisis Staff was formed as a working body of the National Security Council to deal with emergencies, including radiation accidents at the national level. The Central Crisis Staff is presided by the Minister of the Interior and its members are deputy ministers and senior executives of other central state administration bodies, including SÚJB chairperson.

The Central Crisis Staff is also mobilized in case of radiation accidents outside the Czech Republic with a potential impact on the Czech territory or in case of radiation accidents during transportation of nuclear and radioactive materials.

6.5.2.3. On-site Emergency Plans for Nuclear Installations or Workplaces with Radiation Activities - SF or RAW Management

Nuclear installations or workplaces where radiation practices are performed, that is also SF or RAW management activities, shall prepare on-site emergency plans as well as intervention instructions in compliance with the SÚJB Decree No. 318/2002 Coll. This obligation applies to:

- RAW repository and RAW storage facilities classified in the SÚJB Decree No. 307/2002 Coll. as category IV workplaces, and
- workplaces where radiation activities are performed, including RAW and SF management, classified according to the SÚJB Decree No. 307/2002 Coll. as Category IV and III workplaces

Emergency preparedness documents in the scope specified above shall be prepared by each of the following licensees:

- ČEZ, a. s. - NPP Dukovany (NI),
 - NPP Temelín (NI),
- SÚRAO - RAW repository Dukovany (NI),
 - RAW repository Richard (NI),
 - RAW repository Bratrství,

- ÚJV Řež a. s. (NI),
- ÚJP Praha, a. s.,
- VF, a. s.,
- ISOTREND s. r. o. Praha,
- ZAM-SERVIS s. r. o. Ostrava,
- AMEC Nuclear Czech Republic, a.s.

The mandatory contents of on-site emergency plan are specified in the SÚJB Decree No. 318/2002 Coll. (see the National Report under the Convention on Nuclear Safety of May 2010).

Therefore, each holder of the license to operate a nuclear facility has prepared its on-site emergency plan to include extraordinary events in RAW management. For NPP Dukovany, SF management in ISFSF and SFSF Dukovany are included in the on-site emergency plan. The on-site emergency plan of ÚJV Řež a. s. covers the entire site while specific emergency plans are developed for each building where radiation activities are performed. The provision of emergency preparedness, including the SF management, is also required for the LVR-15 research reactor buildings (Centrum výzkumu Řež s. r. o.) and HLW storage facility.

The on-site emergency plan documentation, or any amendments thereof, is subject to SÚJB approval. SÚJB supervises the emergency preparedness provisions of each licensee, in particular their compliance with approved on-site emergency plans.

6.5.2.4. Off-site Emergency Plans

In compliance with the Act No. 18/1997 Coll. and Government Order No. 11/1999 Coll., the above mentioned NIs were analyzed to determine their potential for occurrence of radiation events and impact on the public and the environment. Those analyses were submitted to SÚJB for review.

SÚJB issued resolutions to establish emergency planning zones for NPP Dukovany and NPP Temelín, as they were proposed, based on the assessment of anticipated extraordinary events and their consequences from the viewpoint of nuclear installation technologies intended for electric power generation.

Based on the review of analyses submitted for the affected workplaces with RAW or SF management and based on the assessment of stipulated extraordinary events and their consequences from RAW and SF management SÚJB established no additional emergency planning zones, while in case of the RAW repository Dukovany SÚJB considered the existing emergency planning zone.

For NPP Dukovany and NPP Temelín emergency planning zones the off-site emergency plans were (in compliance with the Act No. 18/1997 Coll., the Act No. 239/2000 Coll., the Act No. 240/2000 Coll. and the Decree No. 328/2001 Coll. by the Ministry of the Interior) prepared by the relevant district offices in cooperation with municipal offices with extended powers whose territories are included in emergency planning zones.

For more details on the off-site emergency plans, as specified in the Ministry of the Interior's Decree No. 328/2001 Coll., see the National Report under the Convention on Nuclear Safety of May 2010,

6.5.2.5. SÚJB Response to Extraordinary Events

In compliance with the provisions of the Atomic Act dealing with the occurrence of radiation incidents or accidents, SÚJB shall be responsible to support Emergency Response Center and manage the actions of the National Radiation Monitoring Network and function as its headquarters. In compliance with the provisions of the Crisis Act, the Emergency Response Center shall represent the crisis management center, i.e. also support the activity of the Crisis Staff, including the contact point service intended to continuously receive and deliver information on the occurrence of a radiation incident or accident.

In case of an extraordinary event the Crisis Staff at Emergency Response Center workplace shall focus on the following:

- evaluation and forecast of the development of technology condition in conjunction with the measures implemented by operators of the nuclear installation, including detection of the source term for radioactive leaks into the environment, based on the data and information provided from the nuclear installation and using the technical equipment and methodology or program tools,
- evaluation of the performance of on-site emergency plans,
- evaluation of the radiation situation of the nuclear installation based on the provided data and information and using the technical equipment and methodology or program tools,
- co-operation with Czech Hydrometeorological Institute to forecast spreading of radioactive materials from the source of radiation accident and to provide information on the potential exposure in the vicinity of the nuclear installation based on the weather situation and its predicted progress, including specification and clarification of possible levels of the radiation situation based on the information on radioactive leaks from the nuclear installation,
- specification of the source term of radioactive leaks and the range of affected area based on the data and information achieved by monitoring of the radiation situation using the teledosimetric systems of the nuclear installation, mobile groups in the vicinity of the nuclear installation, aircraft groups or any other activated components of the Radiation Monitoring Network while using the technical equipment and methodology or program tools,
- processing of inputs for determination of protective measures for the population and environment in the emergency planning zone of the nuclear installation and processing of information and messages on the occurrence and development of the radiation accident, including any information on the radiation situation and measures being implemented to protect the population and environment, or revocation of those measures for the relevant crisis staff, safety board and, if applicable, the Government, other state administration bodies and the public,
- provision of information to IAEA, as required under the “Convention on early notification of a nuclear accidents” and under the “Convention on assistance in the case of a nuclear accident or radiological emergency”, and to the contact points in other countries based on valid international bilateral agreements.

6.5.2.6. Training and Drills

Each NI or workplace with radiation activities shall develop its theoretical and practical training plans for its personnel and other individuals or components to handle extraordinary events of all levels.

Emergency exercises are performed according to the emergency exercise plan setting the exercise focus, scope and dates or their frequency, if applicable. The emergency exercise plan is prepared for each calendar year and submitted to SÚJB by the end of the prior calendar year.

The emergency exercise plan used to verify activities of the emergency plan and intervention instructions is based on exercises of the following:

- intervention procedures or intervention instructions for extraordinary event level one or two performed once a year,
- intervention procedures and related intervention instructions for extraordinary event level three performed at least once in two years.

Emergency exercises consist of the preparatory, implementation and evaluation stages (see the National Report under the Convention on Nuclear Safety of May 2010).

Emergency preparedness in the emergency planning zone is verified by exercises under the off-site emergency plan for extraordinary event level three - radiation accident. The exercise is prepared by the regional authority with the assistance of the licensee. The parties involved in the exercise are the licensee, regional office, the Integrated Rescue System components (fire brigade, police, health service) or other bodies and organizations covered by the off-site emergency plan and SÚJB.

The Czech Republic takes part in the international exercises organized by EC (ECURIE), IAEA (CONVEX), NEA OECD (INEX), NATO (CMX) and others.

6.5.2.7. Supervision by SÚJB

SÚJB is responsible for supervision of the licensees to determine the state of emergency preparedness in compliance with the Act No. 18/1997 Coll., as amended, and the Act No. 552/1991 Coll., as amended. The supervision in this area is focused on:

- up-to-date status of on-site emergency plans approved by SÚJB,
- intervention instructions in place, their mutual links and relationship to the intervention procedures stipulated in the on-site emergency plans,
- theoretical and practical training level of the personnel and other individuals to handle extraordinary events,
- theoretical and practical training level of the individuals designated in the on-site emergency plans to manage and to perform interventions to handle extraordinary events,
- observance of the emergency training plans,
- performance and documentation of the functionality testing on the technical equipment, systems and devices necessary to control and perform interventions at a nuclear installation or a workplace where radiation activities are performed,
- contracting of other individuals required to perform the intervention or activity to handle an extraordinary event as listed in the on-site emergency plan.

In addition to this part of supervision, SÚJB is also responsible for supervision of emergency exercises with scenarios simulating extraordinary event occurrence and development and for management and intervention activities under the on-site emergency plan and the associated intervention instructions.

6.6. Decommissioning

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

- (i) qualified staff and adequate financial resources are available ;*
- (ii) the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;*
- (iii) the provisions of Article 25 with respect to emergency preparedness are applied; and*
- (iv) records of information important to decommissioning are kept.*

6.6.1. Summary of National Law for Decommission

Decommissioning of NIs in the Czech Republic is regulated by the Atomic Act and its implementing Decree issued by SÚJB under No. 185/2003 Coll., on the decommissioning of nuclear installations or workplaces in category III or IV and the SÚJB Decree No. 307/2002 Coll., on radiation protection.

With reference to the Atomic Act, decommissioning of a NI is one of the activities associated with utilization of nuclear power while decommissioning is defined as the activities aimed at removal NIs or workplaces where radiation activities were performed for other purposes.

The Atomic Act, Chapter three, sets forth the prerequisites for utilization of nuclear power and ionizing radiation with respect to the activities associated with utilization of nuclear power. In Section 9, this prerequisite means a license issued to an applicant by SÚJB within its competence defined under Section 3 thereof. As stated in Section 3, SÚJB shall approve the documentation required under this Act for the given license applications. The license shall be issued for each decommissioning stage within the meaning of the provisions under Section 9, Paragraph 1, letter g) of the Atomic Act, in the scope and manner set forth in the implementing regulation (the SÚJB Decree No. 185/2003 Coll.).

The preparation for decommissioning shall be included in each stage of NI lifecycle. The siting license documentation for a nuclear installation shall include a draft concept for safe decommissioning within the Initial Safety Report. The building license documentation for a NI shall in the Initial Safety Report include a concept for safe decommissioning of the installation or workplace being licensed, including RAW disposal.

The licensing documentation for each commissioning stage of a NI for initial fuel load shall also include the proposed method of decommissioning approved by the Office, as well as the estimated cost of decommissioning verified by SÚRAO. The licensing documentation for operation of NI shall include the proposed method of decommissioning approved by the Office, as well as the estimated cost of decommissioning verified by SÚRAO.

The realized scope and method of decommissioning, as approved by SÚJB, are specified in the SÚJB Decree No. 185/2003 Coll.

The environmental impact assessment of decommissioning shall be required for issuance of the decommissioning license if this is stipulated by a special regulation (the Act No. 100/2001 Coll., on assessment of environmental impacts and changes in some related acts). The applicant is obligated to submit the required documentation as part of the decommissioning license application. The binding contents of the license documentation for each decommissioning stage of a nuclear installation are set out in an Annex to the quoted Act.

For decommissioning purposes the holder of the license to operate a nuclear facility is obligated, under the provisions of Section 18 of the Atomic Act and based on the estimated total cost of decommissioning as verified by SÚRAO, to continually create a provision so that monetary funds deposited on a blocked account are available for the preparation and process of decommissioning at the required time and in the amounts in agreement with the decommissioning proposal approved by SÚJB. More details on the process of making the provision for decommissioning of NI or category III or IV workplace are provided in the National Report under the Joint Convention, Revision 2.3 of September 2005.

6.6.2. Supervision

The license for each commissioning stage of NI and approval of the required documentation using the appropriate administration procedures as per Section 9, Paragraph 1, letter g) of the Atomic Act shall be preceded by on-site supervision. Prior to approval of decommissioning proposal for a nuclear installation, the supervision shall be related to the approval process for each commissioning stage as per Section 9, Paragraph 1, letter c) and the operation as per Section 9, Paragraph 1, letter d) of the Atomic Act.

The decommissioning of NIs is supervised by SÚJB inspectors. There are 2 inspectors assigned to this task at the headquarters in Prague. Based on the supervision needs and required specialization other radiation protection or nuclear safety inspectors from the SÚJB headquarters and inspectors of the SÚJB regional centers may be involved.

7. Safe Management of SF - Articles 4 - 10 of the Joint Convention

7.1. General Safety Requirements

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.

In doing so, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during spent fuel management are adequately addressed;*
- (ii) 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;*
- (iii) take into account interdependencies among the different steps in spent fuel management;*
- (iv) 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;*
- (v) take into account the biological, chemical and other hazards that may be associated with spent fuel management;*
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;*
- (vii) aim to avoid imposing undue burdens on future generations.*

The general safety requirements are incorporated in the supreme law, i.e. in the Atomic Act of the Czech Republic. Chapter two of this Act regulates the general conditions for the execution of activities associated with utilization of nuclear power. The Atomic Act, Section 4, Paragraph 3 clearly stipulates that:

"Whoever performs activities related to nuclear energy utilization or radiation practices shall proceed in such a manner that nuclear safety and radiation protection are ensured as a matter of priority."

This principle is then reflected in all implementing regulations associated with the Atomic Act in the Czech legislation to detail the fundamental requirements contained therein. Decrees are generally binding regulations and therefore their observation is mandatory for any person who performs or provides support for activities related to utilization of nuclear power, i.e. designers, manufacturers or operators, as well as the regulatory bodies.

The safety requirements essential for commissioning and operation of any nuclear installation are stipulated in the Decree No. 106/1998 Coll., on nuclear safety and radiation protection assurance during commissioning and operation of nuclear facilities.

Regulatory requirements for subcriticality and heat sink in SF management are detailed in Section 47 of the Decree No. 195/1999 Coll., on the requirements for nuclear installations relating to assurance of nuclear safety, radiation protection and emergency preparedness (see the National Report under the Joint Convention, Revision 2.3 of September 2005).

RAW generated from SF management shall be minimized by the actual storage technology. In both NPPs the residual contamination from cask surface decontamination prior to transportation from HVB to SF storage facilities is the only potential source of liquid and solid RAW. Residual contamination may only be released from cask surface during periodical cask treatment in SF storage facilities where radionuclides may be carried over into cleaning solutions, detergents or personal protective equipment.

In case that SF is declared as RAW by the generator or by SÚJB and subsequently disposed in DGR, this activity shall be also regulated by the legislation relating to RAW in underground (currently the Act No. 44/1988 Coll. and the Act No. 61/1988 Coll., as amended).

The links between individual stages of SF management were already considered in the Policy (see Chapter 2.2) whereas all key stages of SF management are defined in the Atomic Act and its implementing regulations. The current activities cover all stages of SF management up to its storage. SÚRAO was established in 1998 as the state organization responsible for activities associated with RAW storage, including activities related to SF treatment into a form suitable for disposal and activities associated with the preparation, construction, commissioning, operation and decommissioning of storage systems.

In the Czech Republic, the protection of the general public and the environment against radiological hazards due to SF management is mainly established in the Atomic Act and the Decree No. 307/2002 Coll., on the radiation protection. In compliance with the international recommendations and according to the European Community law, this Decree stipulates the exposure limits (general limits, radiation personnel limits and limits for apprentices and students), derived limits and authorized limits of exposure.

Any potential environmental impacts, including biological or chemical hazards, possibly related to SF management, shall also be reviewed and evaluated as stipulated by the Act No. 100/2001 Coll., on assessment of impacts on the environment. Annex 1 to the Act No. 100/2001 Coll. classifies „*The facilities intended for processing of spent or irradiated nuclear fuel or highly active radioactive waste*” in the Category I, Number 3.4 (plans subject to mandatory review).

Any activities performed to manage SF shall be aimed to minimize the burden incurred to the future generations due to such activities. These efforts are also conveyed as one of the fundamental principles of the Policy. As some activities will have to be continued even in the distant future, such as development, construction and operation of DGR, the prerequisites for such activities have been already ensured for their successful continuation. That means primarily the financial and institutional provision of such activities regulated under the Czech law.

7.2. Existing Facilities

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.

The concept of periodic safety review is implemented with help of time limited licenses (max 10 y), which have to be renewed following the same approach as by the issue of initial operational licence and additionally considering the operational experience feedback.

7.2.1. Nuclear Power Plant Dukovany

Spent fuel is generated at the NPP Dukovany site from four VVER 440/213 reactor units. The light-water reactors are operated in refueling cycles. Once a year, each reactor unit is shut down for planned refueling and equipment review. During each refueling, a part of VVER 440 spent FAs, that have worked the required number of cycles, is removed from the core to the adjacent SF pool located in the reactor hall (each reactor has its own SF pool). The annual generation of SF per reactor unit is approximately 9 t. SF is then stored in SF pools at least for six years and subsequently it is loaded into the CASTOR-440/84M casks with the type approval for transport and storage.

Each VVER 440/213 reactor core contains a total of 349 fuel assemblies, from which 312 are working and 37 are control rod assemblies.

The design of fuel assemblies used in VVER 440/213 reactors is described in the National Report under the Joint Convention, Revision 1.1, of February 2003.

7.2.1.1. SF Pools

Fuel assemblies are stored in SF pools using a compact rack with the capacity of 682 positions. This compact rack consisting of three sections is formed by hexagonal tubes made of a special material containing boron (ATABOR). The lower part of each tube is welded onto a support plate while the upper part is welded up. The entire tube bundle is tightened with a binding frame. The sections are connected with the support plate using trunnions.

The SF pool also contains a total of 17 hermetically sealed containers (enclosures) for storage of damaged fuel.

More design and operating details of SF pools are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.2.1.2. ISFSF Dukovany

The building of ISFSF Dukovany provides for the following basic storage functions:

- storage of 60 pcs of CASTOR-440/84 casks containing SF,
- handling of casks with a crane,
- reduction of radiation exposure outside of the building to the minimum, which is well below the permitted values,
- cooling of the stored casks and decay heat sink to the environment using natural aeration,
- assurance of working conditions for the personnel of ISFSF Dukovany,
- possibility to perform inspections and minor repairs of casks,
- protection against weather effects,
- prevention of unauthorized access - in conjunction with the physical protection system, and
- shielding from solar radiation.

The basic element of ISFSF Dukovany is the CASTOR-440/84 cask. It is used for transport and storage of 84 hexagonal SF assemblies from VVER 440 type reactor. In the cask the spent assemblies are stored dry in the environment filled with inert gas - He. In ISFSF Dukovany the casks are primarily used for storage while the transport function only

serves to carry casks from/to ISFSF Dukovany. In the Czech Republic this cask has a type approval for SF transport and storage.

The design of the CASTOR-440/84 cask provides the following functions:

- reduction of the gamma dose rate from SF on the packaging surface,
- reduction of the dose rate equivalent from neutrons on the packaging surface,
- prevention of radioactive leak from the inside space of the packaging,
- assurance of fuel subcriticality,
- assurance of fuel decay heat sink.

More design and operating details of ISFSF Dukovany and CASTOR-440/84 casks are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.2.1.3. SFSF Dukovany

SFSF Dukovany was put into trial operation in December 2006, it has been in operation since April 2008 and its functions are identical to the conceptually similar ISFSF Dukovany which is connected to it via a passage corridor.

The storage capacity has been designed for the expected operation period of NPP Dukovany, i.e. for 40 years. The operation period of SFSF Dukovany depends on the development and commissioning of DGR and the currently estimated period of operation is about 60 years.



Fig. 7.1 View of SFSF Dukovany (left) and ISFSF Dukovany (right)

SFSF Dukovany identification:

Cask supplier for the initial period of operation	GNS mbH Essen
Building contractor	HOCHTIEF VSB, a. s.
Designer	ÚJV Řež a. s., Divize Energoprojekt Praha
Construction start date	12/2002
Completion date	03/2006
Start of trial operation	12/2006
Facility length	107,9 m
Facility width	34,6 m
Facility height	about 20 m
Facility capacity	1340 t TK

The safety assurance of SF storage in SFSF Dukovany is based on the properties of dual-purpose casks whose design meets all the safety criteria similar to CASTOR-440/84 cask used in ISFSF Dukovany. SFSF Dukovany will only hold cask types B(U) and S approved in compliance with the Atomic Act and the related SÚJB Decree 317/2002 Coll. CASTOR-440/84M casks supplied by the company GNS mbH Essen are used for the initial period of operation at SFSF Dukovany.

More details about the design and operation of SFSF Dukovany and OS CASTOR-440/84M are provided in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008.

7.2.2. Nuclear Power Plant Temelín

At the NPP Temelín site spent fuel is generated from two VVER 1000/320 reactors. Similarly to NPP Dukovany, the reactors are operated in refueling cycles where fuel resides in the reactor for a period of 4 years.

The core contains 163 FAs and 61 control elements laid out in a hexagonal array. The total weight of fuel load is 92 t. The characteristics of fuel assemblies VVANTAGE 6 that were used in the past are provided in the National Report under the Joint Convention, Revision 1.1 of February 2003.

In 2010 NPP Temelín changed its fuel contractor and started using the TVSA-T fuel type from the Russian Federation. The newly designed fuel system TVSA-T consists of fuel assemblies and core components. The fuel assemblies consist of a skeleton which is made up of a sliding end section, a base with a bottom node, one instrumentation and 18 guide tubes and an external structure of six angle brackets with attached 8 spacer grids. The fuel assemblies contain a bundle of 312 fuel elements.

The core components include primarily 61 control rod clusters (clusters) divided into 10 groups (6 shutdown and 4 control). The purpose of the clusters is to control axial distribution of power in the core, power output control and assurance of a sufficient supply of negative reactivity to shutdown the reactor. Clusters consist of an end section and 18 absorption elements from stainless steel, with absorber tablets in the bottom part made of Dy_2TiO_5 and in the upper part of the column made of non-enriched B_4C .

Other core components include 3 sets of the secondary neutron source to ensure a sufficient signal in the ionizing chambers of the source zone, during fuel handling and achieving of

criticality. The secondary sources consist of an end section, 6 elements with sources and 12 spacer elements. The source is a mixture of Sb-Be in the ratio 50-50,

The last disposable components in the core are discrete burnable absorbers, made up of an end section and up to 18 elements coated with E110 alloy and filled with CrB₂+Al alloy with a natural content of ¹⁰B. They are used to temporarily absorb excessive reactivity and to improve power distribution in the core. The absorbers may be used if required by the design of the specific core.

Main parameters of the TVSA-T fuel assembly:

total FA length	4570 mm
total weight	750 kg
weight of UO ₂	527 kg
fuel element length	3925 mm
outer diameter of the fuel element	9,1 mm
weight of fuel in the fuel element	1689 g
fuel cladding thickness	0,63 mm
material of fuel cladding	alloy E110M
outer diameter of the fuel pellet	7,6 mm
inner diameter of the fuel pellet	1,2 mm
height of the of the fuel pellet	10-12 mm
material of the fuel pellet	UO ₂ enriched with the isotope ²³⁵ U 0,71-5 % or a mixture of UO ₂ and integrated burnable absorber Gd ₂ O ₃ with the weight share up to 8%

7.2.2.1. SF pool

Fuel is unloaded from the reactor and consequently stored in the SF pool under water to ensure fuel shielding and cooling as needed. Boric acid is dissolved in water with the minimum concentration of 11,44 g/l. The water charge is cooled using three identical interconnected cooling circuits, while each circuit alone is able to cover with a big margin the normal operating heat load of the entire pool (i.e. without the emergency unloaded core) up to 2,83 MW_t.

If a cladding leak is identified on FAs, or fuel rods, during testing, the damaged elements may be placed into hermetically sealed containers. One section of the storage rack is reserved for these containers. If compact storage rack is used and the reactor runs in four-year fuel cycle, the size of SF pool allows to keep fuel in the main unit buildings for up to 12 years from reactor unload. The rack per unit provides a total of 705 storage positions of which 678 positions are intended for undamaged fuel assemblies and 25 positions for hermetic containers with damaged fuel assemblies, or damaged fuel rods, and 2 positions accommodate for cluster cases. A part of the storage rack, 163 positions, are always reserved for a one-off and complete core unload.

More details about the SF pool design and its operation are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.2.2.2. SFSF Temelín

SFSF Temelín was put into trial operation in September 2010. It performs identical functions as the conceptually similar storage facilities on the NPP Dukovany site.

Basic parameters of the SFSF Temelín:

Cask supplier for the first operational period	GNS mbH Essen
Construction contractor	CEEI, a. s.
Designer	ÚJV Řež a. s., Division Energoprojekt Praha
Beginning of the works	03/2009
Completion date of the construction	04/2010
Beginning of trial operation	09/2010
Length	about 98 m
Width	about 46,5 m
Height	about 20,4 m
Storage capacity	1370 t TK

The safety assurance of SF storage in SFSF Temelín is based on the properties of dual-purpose casks whose design meets all the safety criteria. SFSF Temelín uses only cask types B(U) and S type-approved in compliance with the Atomic Act and the related SÚJB Decree 317/2002 Coll. CASTOR-1000/19 casks supplied by the company GNS mbH Essen are used for the initial operational period of SFSF Temelín.



Fig. 7.2 View of SFSF Temelín (receiving section)

The CASTOR-1000/19 casks consist mainly of a thick-wall cylindrical cast iron body with nodular graphite and a closing system with two lids and a load-carrying basket. The primary and secondary lids of the closing system are made of stainless steel and they are attached to the body of the packaging assembly with binding head screws. A cover plate is installed on the two lids to protect the cask from mechanical and climatic effects. In the wall of the cylindrical body along the cask perimeter there are two mutually overlapping lines of neutron-shielding polyethylene rods. Under the secondary lid and in the cask bottom there are polyethylene plates that serve the same purpose. For manipulation purposes the cask is provided with two pairs of trunnions on the lid sides. On the cask bottom there is one pair of

trunnions, designed particularly for tipping over of the cask on a means of transport. The load carrying basket is a plate structure with 19 positions for spent fuel. It is made of steel (steel plates, upper and bottom plate, structural parts), boron steel (fuel assembly shafts) and aluminum (heat removal plates).

Basic parameters of CASTOR-1000/19 casks:

Cask diameter	2370 mm
Cask height, including cover plate (storage configuration)	5577 mm
Wall thickness	415 mm
Cask material	cast iron (+nodular graphite)
Weight of the loaded cask	
– without shock absorbers	112 900 kg
– including shock absorbers (transport configuration)	136 000 kg
– including the cover plate (storage configuration)	115 500 kg
– including a lid for repair and cover plate	
VR (storage configuration VR)	117 400 kg
Maximum thermal output of the FA in the cask	17,5 kW
Maximum permitted total activity in the cask	$3,4 \cdot 10^{17}$ Bq
Maximum dose rate on the cask surface (the most exposed place)	< 2 mSv/h
Maximum dose rate at a distance of 2 m	< 0,1 mSv/h
Number of fuel assemblies in one cask	19 pcs
Maximum thermal output of one FA	1179 W

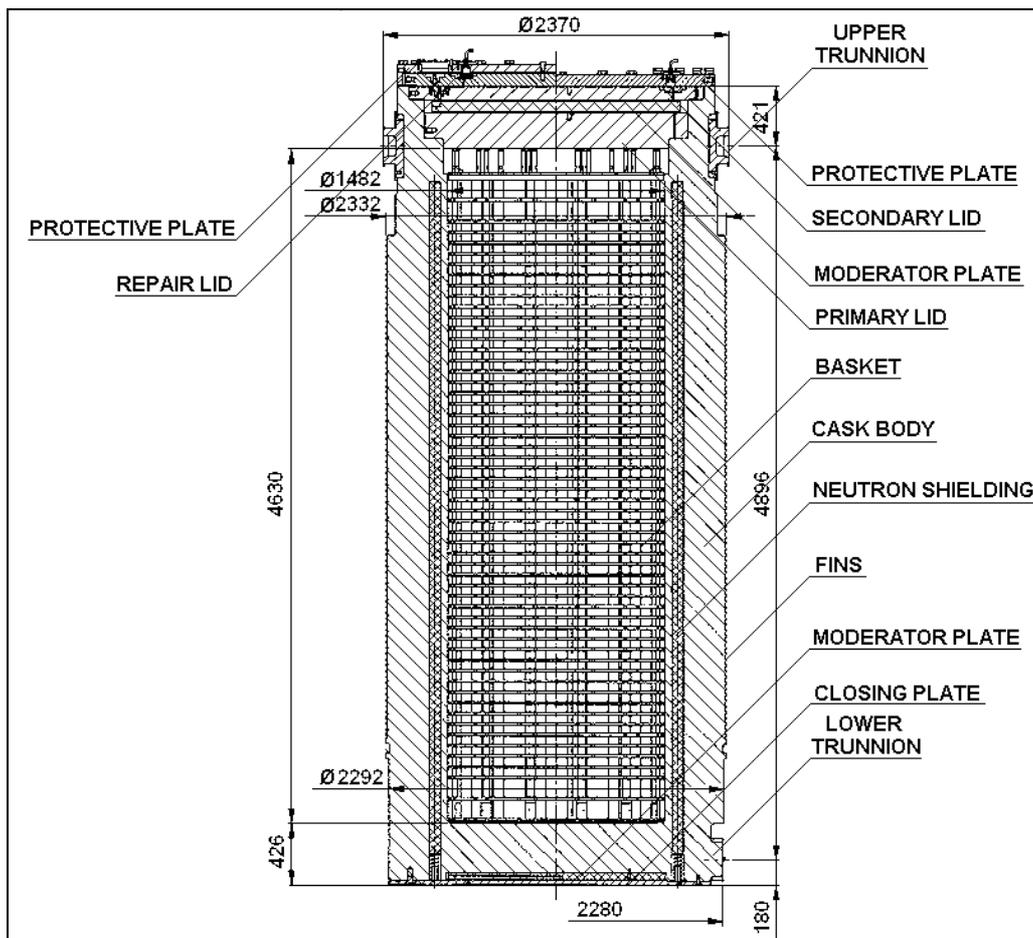


Fig. 7.2 OS CASTOR-1000/19 (storage configuration)

In case of extension of the service lives of both the units of NPP Temelín to 60 years the design of the storage facility and the layout of the receiving section will make it possible to double its current capacity. The period of SFSF Temelín operation depends on the development and commissioning of DGR. At present, based on the available data, one can expect that the operation of SFSF Temelín will be finished in 2080 - 2084. The time is based on the expected date of DGR commissioning in 2065, filling of the DGR with spent fuel from EDU by 2073 and the time of removal of spent fuel from SFSF Temelín for about 10 years.

7.2.3. Centrum výzkumu Řež s. r. o. (Bldg. 211/7 – SF Storage Facility)

The storage facility is used for storage of activated probes, loops and other active experimental materials (pool B) and for storage of spent fuel from the LVR-15 reactor (pool A). The storage area itself consists of two pools made of stainless steel sheet and filled with demineralized water. The pool accessories include a technology circuit for water treatment and a water pump with the capacity 60 l/min. Apart from the pools, there are additional dry stainless steel storage channels flush with the floor. The shielding of activated equipment in the pools is provided with a layer of water and in the dry channels with steel plugs. The activated equipment is transported from the reactor hall on a special motor car and the equipment is loaded on it in a container. The premises are equipped with a travelling crane and a crab.

As at 31 December 2010 the pools A and B contained no SF or old experimental equipment.

For more information about the operation of the SF Storage facility see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.2.4. ÚJV Řež a. s. (Bldg. 211/8 - HLW Storage Facility)

Bldg. 211/8 - HLW Storage Facility is used for storage of SF from nuclear reactors and the following RAW categories:

- HLW,
- solid non-standard waste.

Higher-activity RAW is kept fixed in concrete 200 liter barrels using storage boxes (II, IV). The non-standard solid RAW is stored in Box III. During the reconstruction of the high-level waste storage facility SF handling technologies were installed in Boxes VI - VIII.

Box I	-	Empty
Box II	-	Barrels with solidified HLW
Box III	-	Non-standard waste
Box IV	-	Barrels with solidified HLW
Box V	-	Empty
Box VI	-	Storage equipment (storage safe)
Box VII	-	Hot cell
Box VIII	-	Hot cell control room

The basic parameters of IRT-2M FAs are provided in the National Report under the Joint Convention, Revision 1.1 of February 2003.

7.3. Siting of Proposed Installations

1. *Each Contracting Party shall take the appropriate steps to ensure that the following 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.*
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.*

Procedures for siting of proposed installations are demonstrated on the example of SFSF Temelín in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008. During the preparation of this report (March 2011) no activities associated with siting of a new installation for spent fuel management on the territory of the Czech Republic were under way.

7.4. Installation Designing and Construction

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) *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;*
- (ii) *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;*
- (iii) *the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.*

Procedures for designing and construction of installations are demonstrated on the example of SFSF Temelín in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008. During the preparation of this report (March 2011) no installation of a new facility for spent fuel management for was being designed or prepared to be constructed in the Czech Republic.

7.5. Safety Assessment of Facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) 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;*
- (ii) 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 Paragraph (i).*

7.5.1. Nuclear Power Plant Dukovany

7.5.1.1. SF Pools

SF pools in the main production building are partial process units within these operating units and therefore their safety is not analyzed separately but as a part of safety reports mainly for reactor units. Safety reports for NPP Dukovany are developed separately for the reactors units (incl. SF pools), ISFSF Dukovany and SFSF Dukovany.

Based on ČSKAE decision No. 154/1991, other SÚJB requirements and general international recommendations, a safety report was prepared for NPP Dukovany in 1994, documenting in a comprehensive manner the satisfactory state of nuclear safety assurance of EDU production units. The report referred to as Operational Safety Report for EDU Unit 1 was based on the original EDU Final Safety Analysis Report and many of its amendments. With SÚJB advice, the safety report structure was based on the document "Typical content of technical grounds for safety - safety report - nuclear power plants", published in "Safety of Nuclear Installations No. 5/1988". Based on those documents SÚJB issued its decision No. 197/95 (license to operate Unit 1 after ten years) on August 21, 1995.

Consequently, Operational Safety Report sections specific for EDU Units 2, 3 and 4 were developed and reviewed by SÚJB to issue licenses for their operation. In view of the terminology used by the new Czech legislation, the Operational Safety Report was renamed in 1998 on SÚJB request and it has been now referred to as the EDU Final Safety Analysis Report, Revision 1 within regular updates submitted to SÚJB.

The SÚJB decision to renew the license to operate the nuclear units of NPP Dukovany for another ten years after 2005 was conditional upon a review of the Pre-operational Safety Case based on US NRC standard RG 1.70 requirement. In 2005 and 2006, the process of periodical safety assessment after 20 years of operation was completed at NPP Dukovany in compliance with new requirements of IAEA NS-G-2.10 guidance. In 2007, final reports were prepared for all fourteen areas of evaluation, including fresh fuel and spent fuel management and storage.

A brief summary of SF pools extraordinary situations, reviewed and analyzed within EDU safety documents, is provided in the National Report under the Joint Convention, Revision 1.1 of February 2003. In the process of periodical safety assessment, the assessment of such events was updated while the analyses results were similar to the conclusions of previous safety analyses.

7.5.1.2. ISFSF Dukovany

The Final Safety Analysis Report, Revision No. 1 of July 1995 was one of the main input documents for SÚJB approval to commission ISFSF Dukovany. The approval was given in the SÚJB decision No. 245/95 of November 24, 1995.

Revision No. 2 of the above mentioned report followed in September 1996 and after it was reviewed, including other necessary documents, SÚJB issued decision No. 29/97 of January 23, 1997 to grant the license for permanent operation of ISFSF Dukovany.

Validity of the SÚJB licenses is usually limited in time and in case of a nuclear installation it is up to 10 years. This method provides for periodic safety assessments of all nuclear installations, including spent fuel storage facilities.

ISFSF Dukovany is currently operated according to Revision No. 3 of the Final Safety Analysis Report from January 2000, which supported the SÚJB decision which in 2010 extended the operation of ISFSF Dukovany for additional 10 more years, until December 31, 2020.

7.5.1.3. SFSF Dukovany

The SÚJB approval for trial operation was based, among other documents, on the Final Safety Analysis Report, Revision 1 of September 2006. The approval for trial operation was issued for a period until December 31, 2008, while the minimum duration of commissioning shall be twelve months from the initial placement of loaded CASTOR - 440/84M cask in SFSF Dukovany storage hall and the number of loaded casks must not exceed 6 pieces.

After the successful completion and evaluation of the trial operation a license for operation was issued in October 2010 for SFSF Dukovany with the validity until 2014. The inputs for the license issuance included not only the above-mentioned FSAR, but also the “Summary Report on the course of SFSF operation in the period from 1 January 2008 – 31 July 2010“, Licensing document, certificate of preparedness of the equipment and personnel for the operation of SFSF“, “Licensing document, Schedule of SFSF Dukovany operation at NPP Dukovany“, Limits and Conditions approved by a separate resolution, etc.

7.5.2. Nuclear Power Plant Temelín

7.5.2.1. SF Pool

Identically as the SF pools at NPP Dukovany, the SF pools are part of the main production buildings and therefore their safety is evaluated within the safety documents for NPP Temelín.

A brief summary of analyses completed as part of the Final Safety Analysis Report for NPP Temelín in connection with the operation of SF pools is provided in the National Report under the Joint Convention, Revision 1.1 of February 2003. Periodic safety assessment of NPP Temelín was performed in 2008 – 2010.

7.5.2.2. SFSF Temelín

SFSF Temelín has been in trial operation since September 2010, The SÚJB decision to start commissioning of SFSF Temelín was based on the following safety documents:

- Spent fuel storage facility on the NPP Temelín site – Final Safety Analysis report, File number EGP 5090-F-090531, Revision 2, ÚJV Řež a. s., division Energoprojekt Praha, May 2010,
- Spent nuclear fuel storage facility on the NPP Temelín site – Program of non-active and active testing of SFSF NPP Temelín under the Decree No. 106/1998 Coll., File number EGP 5010 – F 100076, Revision 1, ÚJV Řež, a. s. – division Energoprojekt Praha, May 2010,
- Certificate of preparedness of the equipment and personnel for operation (under Section 13, Paragraph 3, letter d) of the Atomic Act), ČEZ, a. s., NPP Temelín, 22 June 2010,
- OTS181 System operating procedure Manipulations with CASTOR[®]1000/19 casks for loading of spent nuclear fuel ČEZ, a. s., NPP Temelín, 15 May 2010,
- OTS1821 System operating procedure, Operating procedure for SFSF (Spent Fuel Storage Facility) ČEZ, a. s., NPP Temelín, 1 July 2010.

When considering the application, SÚJB took into account that it had previously issued, in connection with the commissioning of SFSF Temelín, other authorizations on:

- the type-approval of CASTOR-1000/19 casks,
- the management of RAW in ČEZ, a. s., NPP Temelín,
- the method to ensure physical protection and
- the transport of nuclear materials – spent nuclear fuel on the NPP Temelín site

and further, that SÚJB had approved documents related to the proposed method of decommissioning of SFSF Temelín, internal emergency plan, Limits and Conditions and basic operating regulations for SFSF Temelín.

The authorisation has been issued for a period until the end of 2012. The minimum duration of commissioning shall be twelve months after placement of the first CASTOR-1000/19 cask in the SFSF Temelín and the maximum number of stored casks shall not exceed 8 pieces.

7.5.3. Centrum výzkumu Řež s. r. o. (Building 211/7 – SF Storage Facility)

The safety evaluation is provided in the updated Final Safety Analysis Report for LVR - 15 reactor, No. CVR 02, R, T of March 2010, A new revision of FSAR has been issued as a supporting document to the CV Řež application to SÚJB for a license to operate the reactor LVR-15. As a part of restructuring of the Řež group the LVR-15 reactor was as of 1 January 2010 conveyed to the property of CV Řež, a subsidiary of ÚJV Řež a.s. After that date the reactor was operated by the licensee based on a contractual relation between CV Řež and ÚJV Řež a.s. until CV Řež fulfilled all statutory obligations necessary for operation of a research nuclear reactor. The obligations were met by the end of 2010 and CV Řež has become the holder of a license issued by SÚJB to operate the LVR-15 reactor.

A wet accumulator tank and pool A are used to store exposed fuel during the hold-up period, before it is moved into the HLW Storage Facility. The fuel assemblies in the wet accumulator tank and in the pool are placed in the storage racks that ensures subcriticality of the system.

The fuel assemblies are stored in demineralized water with the same parameters as those prescribed for the primary circuit.

The technical parameters of both the pools in the storage facility and safety assurance during handling and storage of spent fuel are provided in the in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.5.4. ÚJV Řež a. s. (Building 211/8 - HLW Storage Facility)

7.5.4.1. HLW Storage Pool

Subcriticality of the HLW storage tank was verified by calculations using MCNP 4C program and a set of libraries with effective cross-sections DLC-200 dedicated to this program. Each calculation envisages that free space of the pool is evenly filled with water of different density. HLW storage pool meets the requirement for system subcriticality. For the pool flooded with water $k_{eff} = 0,459 \pm 0,016$. For the optimum moderation pool $k_{eff} = 0,737 \pm 0,017$.

The heat output of the stored spent fuel was determined for Pool B in the HLW storage facility under a shielding water layer. The total heat output of the stored spent fuel was determined based on the following initial conditions and assumptions:

- heat output was identified for full use of the storage pool capacity,
- generated residual heat for each fuel assembly in storage was calculated using the ORIGEN program, version 2.1, for IRT fuel - 2M (4-tube FA), with the enrichment 36 % wt. ^{235}U , burn-up rate 60 % (180 MWd/kg) and with the enrichment 80 % wt. ^{235}U , burn-up rate 55 % (350 MWd/kg),

The calculation was also made for the original fuel type EK - 10 fuel, with the enrichment 10 % wt. ^{235}U and burn-up rate 45 %.

7.5.4.2. Storage Equipment in the Facility

A calculation of subcriticality for the storage installation (storage safe), with the maximum capacity of 7 baskets with EK-10 fuel, was made as a part of documents for the first of two refurbishments of the RAW storage facility. In connection with the second refurbishment, which included the development of a storage annex for 16 Škoda VPVR/M casks, the safety documentation referred to assurance of subcriticality of the spent fuel in casks, which had been demonstrated during the type-approval of the cask. All computations were made on a conservative basis for fuel with the maximum multiplication capacity, i.e. for fresh fuel without burnup (see the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008).

7.6. Operation of Facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- the license 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 program demonstrating that the facility, as constructed, is consistent with design and safety requirements;*

- (ii) *operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article 8, are defined and revised as necessary*
- (iii) *operation, maintenance, monitoring, inspection and testing of a spent fuel management facility are conducted in accordance with established procedures;*
- (iv) *engineering and technical support in all safety-related fields are available throughout the operating lifetime of a spent fuel management facility;*
- (v) *incidents significant to safety are reported in a timely manner by the holder of the license to the regulatory body;*
- (vi) *programs to collect and analyze relevant operating experience are established and that the results are acted upon, where appropriate;*
- (vii) *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.*

7.6.1 Nuclear Power Plant Dukovany

7.6.1.1. SF Pools

The SF pools are partial process facilities of the EDU reactor units and as such they do not require separate licenses for operation, no safety reports need to be elaborated for them or limits and conditions for safe operation; all these issues have been addressed within the operation of reactor units. Safety evaluation for EDU reactor units has been in detail described in the National Report of the Czech Republic under the Convention on Nuclear Safety of June 2007.

To complete the information, it should be mentioned that the operation of the pools is governed by a number of operating procedures, e.g.:

- P026 Cooling system for storage pool water,
- P186j Fuel handling in the core, storage pool and cavity No. 1

Also the limits and conditions for safe operation of reactor units shall apply for the operation of SF pool and in respect to the SF pools they establish requirements for:

- level, temperature and concentration of H_3BO_3 in the storage pool,
- the cooling system of the storage pools.

7.6.1.2. ISFSF Dukovany

The construction of the ISFSF Dukovany building started after a demanding approval procedure in summer 1994. In less than a year the project was completed in summer 1995 and the first CASTOR-440/84 cask was delivered. Starting from September 1995 all tests and final adjustments of the facility were performed and the first filled cask was introduced into ISFSF Dukovany on December 5, 1995. At that moment also started the trial operation of the facility, which was scheduled to last 12 months. All design assumptions were verified during the trial operation and no serious non-nominal situations occurred. Therefore the trial operation was completed in January 1997 and ISFSF Dukovany moved into a permanent operation. The mentioned stages were supported with respective documents and the transition from one stage into another was conditional upon SÚJB approvals.

As at December 31, 2010, the storage capacity of ISFSF Dukovany was fully used, i.e. 5040 SF assemblies were stored in 60 CASTOR-440/84 casks.

The operation of ISFSF Dukovany is performed in agreement with the operating procedure P181j, while all conditions shall be observed as specified in the resolutions issued by SÚJB and in operational limits and conditions for ISFSF Dukovany, also approved by SÚJB (for more details see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005).

For more detailed information on:

- monitoring, inspections, tests and maintenance of the equipment,
- waste management,
- engineering and technical support to the operations,
- monitoring and evaluation of events during operation,
- regular inspections and evaluation of operation,
- decommissioning concept

see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

7.6.1.3. SFSF Dukovany

The construction of SFSF Dukovany started in April 2004 after the ending of approval procedure. In February 2006 the construction was completed and approved by the local competent building authority. From November 2006 the storage facility was in trial operation when all the design assumptions were verified, similarly as in the case of ISFSF Dukovany. In 2008 SÚJB started an administrative procedure to issue a license for its operation, which was concluded with the license issuance in October 2010,

For more detailed information on:

- monitoring, inspections, tests and maintenance of the equipment,
- waste management,
- engineering and technical support to the operations,
- monitoring and evaluation of events during operation,
- regular inspections and evaluation of operation,
- decommissioning concept

see the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008.

7.6.2. Nuclear Power Plant Temelín

7.6.2.1. SF Pools

Identically as in NPP Dukovany, SF pools in NPP Temelín are partial process facilities of reactor units and as such they do not require individual licenses for operation, individual safety reports or technical specifications for safe operation and all these issues are addressed within the operation of reactor units.

The operation of SF pools is regulated by the operating procedure 1(2)T045 "Spent fuel pool cooling system". The SF pools are also subject to the technical specifications for safe operation as provided in TL001 (chapter A.3.9), with the following requirements set with respect to SF pools:

- level, temperature and H_3BO_3 concentration in storage pools,

- cooling circuit operability in the storage pool cooling system,
- measures to prevent penetration of the pure condensate.

7.6.2.2. SFSF Temelín

The construction of SFSF Temelín was performed in agreement with the Czech Republic's government resolution No. 121/1997 of 5 March 1997, in which the government recommended construction of SF storage facilities on the sites of the operated NPPs. The advantage of the concept is an elimination of spent fuel transport outside the NPP complex and the use of the existing NPP sites without the necessity to intervene in intact landscape. At the same time, the development of SFSF Temelín respects the Czech Republic's government resolution No. 487/2002, which approved the Policy for radioactive waste management and spent fuel management.

The development of SFSF Temelín included, among other activities, also an analysis of environmental impacts of SFSF Temelín, issuance of affirmative positions by MŽP and the European Commission, issuance of the planning permit by the Regional Office of the South Bohemian region, issuance of resolutions by SÚJB that permitted construction of SFSF Temelín and issuance of the building permit by MPO for the SFSF Temelín project. The construction started in March 2009 and as early as in August 2010 SÚJB issued a license to commission SFSF Temelín. The trial operation of SFSF Temelín started on 9 September 2010 by placement of the first loaded cask into the SF storage facility.

7.6.2.2.1. Monitoring, Inspections, Tests and Maintenance in SFSF Temelín

7.6.2.2.1.1. Radiation Monitoring

SFSF Temelín is a nuclear installation used for management of ionizing radiation sources. Therefore, with regard to the method of SF storage, a program has been introduced for monitoring of the workplace, its surroundings and workers. SFSF Temelín is equipped with a radiation monitoring computer system which performs automatic collection, processing, presentation and filing of data from the control and monitoring system in SFSF Temelín and transmission of selected information into the central radiation monitoring control room .

The central radiation monitoring control room receives particularly the following information:

- change of the actual value, exceeding of the limit values (signalization levels) and failures from each monitor of the gamma radiation dose rate, neutron and noble gases dose rate equivalent,
- identification of the last person, results of measurements (contaminated/not contaminated), exceeding of the limit value and failures of the personal contamination monitor,
- exceeding of limit values (signalization levels) and failures of the item contamination monitor,
- signals for control and open/close status of remotely controlled valves on sampling routes of noble gas monitors,
- power supply failures of the UPS for the radiation monitoring computer system in SFSF Temelín,
- summary signaling of a positive trend of the surface temperature of the cask, loss of pressure between the primary and secondary lids of the cask (under 0,3 MPa) and defects of technical means of the cask monitoring systems,

- defects of the technological equipment of the storage facility (electric, I&C, ...).

7.6.2.2.1.2. System to measure pressure between the cask lids.

The purpose of the system is to provide information, both locally and remotely to the radiation monitoring central control room, about the helium pressure between lids of each individual cask. The data indicate the tightness status of the casks necessary to adopt appropriate measures. The value of the pressure between the lids is not displayed as the cask is not provided with a sensor but with a switch. If the pressure between the lids drops under a specified limit the switch sends a warning signal to start corrective actions. A drop of the pressure between the lids actually means that one of the lids is not completely tight. Then it is also necessary to check the switch or to identify the leaking lid and based on the result to implement corrective actions.

7.6.2.2.1.3. System to measure temperature of the cask surface

Each cask placed in the storage hall is provided with a temperature sensor and the cask is connected to the monitoring system. A temperature increase on a cask surface means a danger of overheating of the stored fuel. Therefore, unless the temperature increase is caused by a poorer heat removal from SFSF Temelín, then it is necessary to transport the cask to HVB, to open it and to identify the cause of the growing temperature and redress it. The action level set up in the temperature measuring system is 100°C.

7.6.2.2.1.4. Periodic tests

Periodic tests of cask components are performed after 15 transports or after 3 years at the latest, after 60 transports or after 6 years at the latest, before any transport on public communications, after 15 transports or after 3 years at the latest, at the earliest before the next transport and before placement into SFSF Temelín. The periodic tests are further structured based on the individual cask components – body, screw joints of the primary and secondary lids, trunnions and trunnion screws, lids, closures of opening in the primary and secondary lids, load-carrying basket, shock absorbers and preservation status monitoring check.

7.6.2.2.1.5. Other inspections and maintenance

Other inspections and maintenance of the equipment of packaging assemblies and SFSF are performed in agreement with the operating procedures OTS181 and OTS182. As the packaging assemblies are loaded in HVB, FSAR for NPP Temelín has been updated in connection with the commissioning SFSF Temelín and a technological procedure has been developed for handling and dispatching of packaging assemblies in HVB.

7.6.2.2.2. Waste management in SFSF Temelín

No significant quantities of RAW are generated in SFSF Temelín, neither under normal operating conditions nor under design accident conditions. The only potential source for generation of RAW is the residual contamination which may release from the cask surface into solutions used for periodic cleaning of the packaging assemblies or on the used personal protective equipment. The main sources of RAW during the facility operation is water used for cleaning in the controlled area in SFSF Temelín, from periodic cleaning of packaging assemblies and personal protective equipment and waste from periodic maintenance of the engineering equipment.

The overall annual production of solid waste amounts to about 3 m³. Solid waste is collected on a fixed collection point with closed containers with inlet openings and removable collection containers for non-compressible waste, compressible waste and metal waste. If specific maintenance works are to be performed, where a major quantity of solid waste is anticipated, a temporary collection point will be established with additional bags or metal containers. Solid RAW is transported for processing into BPP ETE. Waste in collection containers is placed into a transport container for solid RAW and transported into BPP. Any waste (RAW, non-standard waste, such as fluorescent tubes, accumulators) is disposed in agreement with working instructions for RAW management in ETE. Before leaving the controlled area of SFSF Temelín the collection containers and transport means are measured by a radiation monitoring worker in order to observe the conditions of its safe transport. The transport of solid waste is performed in conformity with the valid ETE operational documents.

The cleaning of floors and all deposited casks in SFSF Temelín produces approximately about 25 m³ of liquid waste per year and it is kept in wastewater tanks with the volume of 4 m³. The technical solution of the liquid waste management system makes it possible to discharge the water into the sanitary sewer or to re-pump it into transport tanks (2 tanks with the working volume 1 m³ each) and transport it for treatment in BPP ETE. A sample of the waste is taken before every discharge of the tank and analyzed in the ETE laboratory. The methods of further treatment of the wastewater is based on results of the radiochemical analysis.

7.6.2.2.3. Engineering and technical support to SFSF Temelín

The operation of SFSF Temelín uses technical and personnel resources of NPP Temelín. This is one of the major advantages of the selected location for SFSF Temelín. The support contracted from research organizations for the plant is also used for certain tasks associated with the operation of SFSF Temelín.

7.6.2.2.4. Monitoring and evaluation of events during the operation of SFSF Temelín

In agreement with legislative requirements NPP Temelín has a system of investigation of operating events, as well as a system of external sharing of operating experience. The systems cover both the operation of reactor units and SFSF Temelín. The system of investigation of operating events is included in the internal ETE procedures.

7.6.2.2.5. Regular inspections and evaluations of the operation of SFSF Temelín

In 2010 SÚJB performed, within its supervisory activities, inspections relating to the commissioning of SFSF Temelín. Three inspections were performed – inspection of non-active testing of SFSF Temelín, inspection of non-active testing of manipulations with casks in HVB1 ETE and inspection of active testing of manipulations with casks in HVB1 ETE, transport of cask in the secured ETE area and active testing of SFSF Temelín.

In agreement with the limits and conditions of safe operation for SFSF Temelín the operator continually monitors basic physical parameters, such as pressure between the primary and secondary lids of the packaging assembly, dose rate equivalent in connection with mapping of the radiation situation in the storage facility and its proximity and the surface temperature of all stores packaging assemblies.

In response to a requirement made by SÚJB the storage facility operator will regularly once a year produce a report on the operation SFSF Temelín to be submitted to SÚJB. The report

will provide an overall evaluation of the operation of SFSF Temelín in the past calendar year, including a summary of SÚJB supervisory activities and their results.

The structure of the report on the operation of SFSF Temelín shall be identical with that for ISFSF Dukovany and SFSF Dukovany, as provided in the National Report under the Joint Convention, Revision 1.1 of February 2003.

7.6.2.2.6. Concept for SFSF Temelín decommissioning

The documents required for a license to commission SFSF Temelín under the Atomic Act include a proposal of a decommissioning method for SFSF Temelín, including liquidation of RAW. The scope and method of development of the documents is specified in the implementing Decree No. 185/2003 Coll., on decommissioning of nuclear installations and workplaces in categories III or IV.

SF will be safely stored in SFSF Temelín until it is declared as RAW in agreement with the Atomic Act. Subsequently, it will be handed over to SÚRAO to provide for its safe disposal in agreement with the valid Policy. For more details of the Policy see chapter 7.4.5 of the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

The proposed decommissioning schedule implies that the decommissioning should start in 2084 and take about 1 year. Subsequently, the building of SFSF Temelín will be used for other purposes to be specified later. It is not expected that the decommissioning will produce any RAW. Empty packaging assemblies will be decontaminated on as-needed basis on the location of the planned DGR with the objective to be used as a secondary raw material. Therefore it is expected that after decontamination of all inner and outer surfaces the packaging assemblies will comply with the limits for release of radionuclides into the environment.

7.6.3. Centrum výzkumu Řež s. r. o. (Building 211/7 – SF Storage Facility)

The SF Storage Facility is a part of LVR-15 reactor and therefore it does not have a separate license for operation. Written programs and working procedures are provided for activities significantly affecting nuclear safety and activities important for radiation protection. The documents are developed in the form of organizational procedures of ÚJV Řež a. s. and working procedures for LVR-15 reactor working place.

7.6.4. ÚJV Řež a. s. (Obj. 211/8 – HLW Storage Facility)

The working and technological procedures effective until 2006 for the operation of HLW storage facility are explained in detail in the National Report under the Joint Convention, Revision 1.1 of February 2003 and in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005. In connection with an extensive reconstruction of the high-level waste storage facility, the below listed documents are effective on December 31, 2010:

- Limits and conditions for operation of high-level waste storage facility (Building 211/8) during operation of the hot chamber, HK EK-10, Ref. No. DPP 300,24, System No. 28.00,00, Edition 7, Revision 0, Level II, ÚJV Řež a. s. of December 1, 2006,
- Definition of the radiation controlled area of High-level waste storage facility, Ref.

No. DPP 300,25, System No. 28.00,00, Edition 6, Revision 0, Level II, ÚJV Řež a. s. of December 1, 2006,

- High-level waste storage facility monitoring program, Ref. No. DPP 300,26, System No. 28.00,00, Edition 6, Revision 0, Level II, ÚJV Řež a. s. of November 30, 2006,
- Internal emergency plan of high-level waste storage facility, Ref. DPP 300,27, System No. 28.00,00, Edition 4, Revision 0, Level II, ÚJV Řež a. s. of December 1, 2006,
- Decommissioning proposal for high-level waste storage facility (Building 211/8), Ref. DPP 300,11, System No. 28.00,00, Edition 2, Revision 0, Level II, ÚJV Řež a. s. of September 15, 2006,
- Quality assurance program, Operation of the high-level waste storage facility, Ref. PZJ 2400,04, System No. 40,03.00, Edition 1, Revision 0, Level II, ÚJV Řež a. s., of February 15, 2010,
- List of classified equipment, High-level waste storage facility reconstruction – Building 211/8, No. 4.4.2/315, Edition 1, Revision 2, ÚJV Řež a. s. of December 19, 2006.
- In-service inspection program for high-level waste storage facility (Building 211/8), Ref. DPP 300,31, System No. 28.00,00, Edition 1, Revision 0, Level III, ÚJV Řež a. s. of December 1, 2006.

For more detailed information on:

- monitoring, inspections, tests and maintenance of the equipment,
- waste management,
- regular inspections and evaluation of operation,
- decommissioning concept

see the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008.

7.7. Disposal of SF

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.

In agreement with the Policy for radioactive waste and spent fuel management of 2002 the Czech Republic anticipates to develop a national DGR in magmatic crystalline rocks (granites or homogenous gneiss massifs) after 2050 and it should start operation in 2065.

The program of DGR development started back in 1992 (in the first year jointly with the Slovak Republic). Based on previously collected geological data, 30 potential locations were gradually identified in the Czech Republic. Based on a subsequent screening and utilization of basic geological criteria 12 potential locations were selected with varied geological conditions and diverse host rocks. The first geological survey was performed on six locations with granitic massifs in 2003 – 2005, without utilization of surface survey methods, and areas were selected for future prospecting stage of the geological survey. The works were suspended in 2005 due to public resistance. The next period was used for intensive negotiations with the affected municipalities and with the general public. A working group for dialogue about the deep geological repository was established in late 2010 with the objective to improve transparency of the process to select the future DGR location while taking into account interests of the public. Based on results of the completed stage of negotiations with the general public the Administration anticipates the start of surveying works gradually at several

locations in 2011 – 2012 and only if the affected municipalities get involved on a voluntary basis in the selection process of the future DGR location.

The repository is expected to accommodate all RAW that cannot be disposed in near-surface repositories, SF declared as RAW and, if needed, also HLW from potential reprocessing of SF from NPP Dukovany and NPP Temelín and SF and HLW from other nuclear sources. Four units of NPP Dukovany will generate a total quantity of 1940 t HM and two units of NPP Temelín will generate 1370 t HM for the planned operation of all the units.

If the operation period of NPP Dukovany is extended to 60 years and the total quantity of SF from that source increases by about 485 t HM and if the operation period of NPP Temelín is also extended to 60 years then the quantity of SF will amount to about 1088 t HM. Further, the development of two new units in the NPP Temelín site and one new unit in the NPP Dukovany site, would increase the total quantity of SF by about 4130 t of HM. Based on the current estimates the demand for the storage capacity of DGR may exceed 9000 t HM.

In 1998 - 1999, alternative disposal was considered for SF as non-dismantled in non-shielded casks within the program “Reference Project of Surface and Underground Deep Repository Systems in Host Environment of Granitic Rock Formations for Agreed Composition of Initial Design and to Depth of Design Study”. As explained in the project, disposal casks should be wrapped into a bentonite layer and placed vertical in granite massif tunnels, about 500 m under the surface part of DGR.

Works to update the reference project started in 2009 which takes into account the current technical and technological developments in storage of spent nuclear fuel. Outputs from the project will be available at the end of 2011 and they will be reflected both in the requirements for the location selection and in the evaluation of adequacy of the accumulated financial means intended for the development of DGR and its operation.

8. Safe Radioactive Waste Management - Articles 11 - 17 of the Joint Convention

8.1. General Safety Requirements

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.

In so doing, each Contracting Party shall take the appropriate steps to:

- (i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;*
- (ii) ensure that the generation of radioactive waste is kept to the minimum practicable;*
- (iii) take into account interdependencies among the different steps in radioactive waste management;*
- (iv) 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;*
- (v) take into account the biological, chemical and other hazards that may be associated with radioactive waste management;*
- (vi) strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;*
- (vii) aim to avoid imposing undue burdens on future generations.*

The Atomic Act in Section 24, Paragraph 1 requires any person managing RAW to take into account all their physical, chemical and biological properties that might affect safety of the waste management. The requirement is elaborated in a more detailed manner in Section 46, Paragraph 3 of the Decree No. 307/2002 Coll. as follows: “*in radioactive waste management in addition to radioactivity, all the other hazardous properties shall be taken into account which might influence the safe waste management, particularly toxicity, flammability, explosiveness, spontaneous fissionability, formation of critical mass or residual heat.*” These hazardous properties are in RAW management addressed in agreement with general legal regulations on waste management.

Also the Decree No. 195/1999 Coll. in Section 47 defines requirements to assure subcriticality and heat removal. “*The installation for the handling with the irradiated and spent nuclear fuel and its storage, and for the handling and storing the other substances containing the fissile products and radioactive substances shall be designed in a such way, in order that it may be possible to prevent with margin the achievement of criticality even under conditions of the most effective deceleration of neutrons (optimum moderation) by area arrangement or by other physical means and procedures, and by this to prevent the exceeding the 0,95 value of effective neutron multiplication coefficient under the assumed accident situations (including the flooding by water), the exceeding the 0,98 value of effective neutron multiplication coefficient under the conditions of optimum moderation and to assure the adequate residual heat removal under normal and abnormal operations and under accident conditions.*”

In connection with the effort to minimize generation of RAW the Atomic Act in Section 18, Paragraph 1 letter d) requires to keep the generation of RAW and SF to the minimum necessary level.

A holder of a license to manage RAW submits once a year to SÚJB a document containing evaluation of RAW management, which includes proposed improvements (to minimize the generation of RAW) and their implementation. The key method for minimization of RAW products consists in their collection, segregation and use of effective separation methods.

Mutual links between the individual steps of waste management are described in Sections 46 - 55 of the Decree No. 307/2002 Coll. The document defines the basic principle saying that no activity in any individual step of RAW management shall adversely influence activities that follow thereafter.

The Czech legislation in radiation protection has been developed based on internationally recognized standards and criteria. The legislation is based on the IAEA safety standards Safety Series 115 and EU legislation - Directive No. 96/29/Euratom. Three fundamental pillars of radiation protection have been employed - optimization, justification and limitation and these have been integrated into the Atomic Act and the Decree No. 307/2002 Coll., on radiation protection. This is documented by the requirements in Section 46, Paragraph 2 of the Decree No. 307/2002 Coll., saying that: *“For radioactive waste management, radiation protection shall be ensured in the same way and scope as for other radionuclide sources unless expressly specified otherwise in a license.”* In the Czech Republic no RAW management shall be permitted without a license (Section 9 of the Atomic Act) issued by SÚJB.

Before the license is issued the applicant shall, among other things, to demonstrate through the documents required under the Atomic Act that he is able to ensure radiation protection in the scope and at the level required by the Atomic Act and its implementing regulations. The provision of the radiation protection is verified by inspections before the license is issued.

Concerning the requirement to avoid actions that impose *practical* impacts on future generations or impose undue burdens on future generations, provision of Section 4, Paragraph 2 of the Atomic Act says that: *“Whoever utilizes nuclear energy or performs radiation practices or interventions to reduce natural exposure or exposure due to radiation incidents must ensure that his or her action is justified by the benefits outweighing the risks arising or liable to arise from these activities.”*

One example of application of this provision is the provision of Section 52, Paragraph 6 of the Decree No. 307/2002 Coll., saying that *“The dose constraint for safe disposal of radioactive waste shall be an effective dose of 0,25 mSv per calendar year and individual from the critical group of the population.”* Also all requirements for safe management of ionizing radiation sources shall apply to RAW management.

8.2. Existing Facilities and Past Practices

Each Contracting Party shall in due course take the appropriate steps to review:

- (i) 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;*
- (ii) 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.

8.2.1. Nuclear Power Plant Dukovany

Assessment of safety of all facilities for RAW management was initially performed in agreement with safety requirements specified in the Act No. 28/1984 Coll., on state nuclear safety supervision of nuclear installations, and its implementing regulations. Based on a favorable assessment of the submitted documents (see 8.4) and results of the inspections a license was issued for their permanent operation. Requirements for safe RAW management corresponded to the then recognized international standards.

Subsequently, the safety of all facilities for RAW management was re-assessed in agreement with the safety requirements for these facilities specified in the Atomic Act and its implementing regulations. Based on this assessment SÚJB issued for EDU a license for RAW management under Section 9, Paragraph 1, letter j) of the Atomic Act. The license was issued for a limited period of time and before its expiry the facility's safety shall be re-assessed again. The safety of these facilities, i.e. RAW management facilities, is on regular basis evaluated by the operator in agreement with its internal quality assurance documents.

EDU now includes the following technology systems for RAW management:

- systems for treatment of liquid radioactive media,
 - treatment plant for SF pool water SVO 4,
 - treatment plant for boric acid SVO 6,
 - treatment plant for wastewater SVO 3.
 - a subsystem of sedimentation, emergency and overflow tanks designed for accumulation and storage of waste water in order to separate mechanical impurities (by sedimentation) before treating them on an evaporator,

The systems are common for reactor units 1 and 2 (HVB I) and for units 3 and 4 (HVB II). The aim of liquid RAW treatment is to concentrate radioactive substances contained therein to the minimum volume possible. A fraction of the original content of radioactive substances passes to the treated media that are recycled in the controlled area of NPP Dukovany.

More details on SVO are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

- systems for RAW management:
 - systems for storage of liquid RAW,
 - ⇒ a subsystem of tanks with active RAW concentrate, designed to store concentrated liquid waste resulting from wastewater treatment on the evaporator,
 - ⇒ a subsystem of storage tanks for radioactive sorbents to store spent ion exchangers.

The subsystems may operate independently or in mutual cooperation. Each subsystem is common for reactor units 1 and 2 and by reactor units 3 and 4.

- systems for conditioning of liquid RAW:

Systems for conditioning of liquid RAW consist of the process equipment of the operating unit "Bituminization". The system is common for all four reactor units.

In the “Bituminization” operating unit the liquid RAW (radioactive concentrate) is immobilized in bitumen, i.e. into a form suitable for disposal. The main process equipment is a film rotor evaporator where the concentrate is mixed with bitumen and water is evaporated. The resulting product is filled into 200-liter drums. The drums are transported on a conveyor. Once a drum is filled and cooled it is covered with a lid by a manipulator, removed from the conveyor and placed into the handling area.

In the mobile operating unit the liquid RAW (sludge and spent ion exchangers) are immobilized into aluminosilicate matrix, i.e. into a form suitable for permanent disposal. The main process equipment is a vessel with a stirrer, where the sludge (ion exchanger) is mixed with individual components of the solidification medium. The resulting product is filled into 200 liter drums. The drums are transported on a conveyor. Once a drum is filled and once the mixture is solidified, it is covered with a lid and transported into the handling area.

- Systems for collection, storage and conditioning of solid RAW:

Collection, storage and treatment of solid RAW are situated in the BAPP building and consists of a segregation workplace and storage of solid RAW. Each subsystem is common for the reactor units 1 and 2 and for units 3 and 4. Solid RAW are stored in box pallets, i.e. low-pressure compacted in 200 l drums.

A part of solid RAW suitable to be released into the environment is after previous segregation and measurements officially measured to check the content of radionuclides. This is performed in the newly refurbished building “Auxiliary Boiler House” subject to the monitored zone regime”. The waste which meet criteria specified in the Decree No. 307/2002 Coll. are released into the environment without any SÚJB permit, to the dump for solid municipal waste Petřůvky.

8.2.2. Nuclear Power Plant Temelín

Safety assessment of all facilities for RAW management was performed at ETE in agreement with the safety requirements specified for these facilities in the Atomic Act and its implementing regulations. Based on a favorable assessment of the submitted documents (see 8.6) and results of the inspections a license was issued for their trial operation. NPP Temelín is a holder of the license for RAW management under Section 9, Paragraph 1, letter j) of the Atomic Act. Operability and safety of the facilities for RAW management are regularly monitored and evaluated by the operator.

The following technology systems for RAW management are now situated at ETE in BPP:

- systems for treatment of liquid radioactive media,
- systems for storage and conditioning of liquid RAW,
- systems for collection, storage and conditioning of solid RAW.

8.2.2.1. System for Treatment of Liquid Radioactive Media

The system includes:

- treatment plant for SF pool water SVO 4,
- treatment plant for impure condensate SVO 6,
- treatment plant for wastewater SVO 3.

The aim of liquid radioactive media treatment is to concentrate radioactive substances contained therein to the minimum volume possible. A fraction of the original content of radioactive substances passes to the treated media that are recycled in the controlled area of NPP Temelín.

More details on SVO are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

8.2.2.2. System of Storage and Conditioning of Liquid RAW

The system for storage and conditioning of liquid RAW includes an interim storage for liquid RAW consisting of:

- technological node of tanks with sorbents,
- technological node of tanks with concentrate,
- technological node of concentrate solidification.

The interim storage for liquid RAW serves to accumulate and store concentrated RAW before further conditioning (bituminization). One technological node includes tanks with sorbents to store sorbents from all filtration stations in HVB and BPP, another technological node includes tanks with concentrate containing radioactive concentrate from SVO 3 evaporators, as well as radioactive sludge from SVO 3 centrifuge. The technological node for solidification of liquid RAW carries out immobilization of concentrated forms of liquid RAW in bitumen, i.e. the form suitable for disposal. The main process equipment is a filter rotor evaporator where the two components (concentrated liquid RAW and bitumen) are spread on an internal jacket surface and excess water is evaporated. The resulting product flows down into the evaporator bottom part and is filled via a stop valve into 200-liter drums. The drums are moved under the evaporator on a round 16-positions carousel. Once a drum is filled it remains on the carousel on several more positions and the product cools down. Then it is covered with a lid, taken down from the carousel by a swiveling manipulator and on a track platform moved into the handling space.

Sludge and ion exchangers are treated by immobilization in aluminosilicate matrix using a portable device and SIAL[®] technology.

8.2.2.3. System of Collection, Storage and Conditioning of Solid RAW

The system includes:

- segregation and fragmentation workplace,
- storage of solid RAW.

A part of the solid RAW from ETE, which meets requirements under the Decree No. 307/2002 Coll., is released into the environment based on a SÚJB permit and the remaining solid RAW from the main production unit is processed, treated and stored in BPP.

8.2.3. SÚRAO

Safety of repositories is demonstrated by compliance with the basic limits for radiation protection. The limits to be observed are the annual effective dose equivalent for the workers at 20 mSv and annual effective dose equivalent for individuals from a critical group of population at 250 µSv/y. All this is demonstrated in documents supporting the application

8.2.3.2. RAW Repository Bratrství

The repository is designed exclusively for RAW containing natural radionuclides.

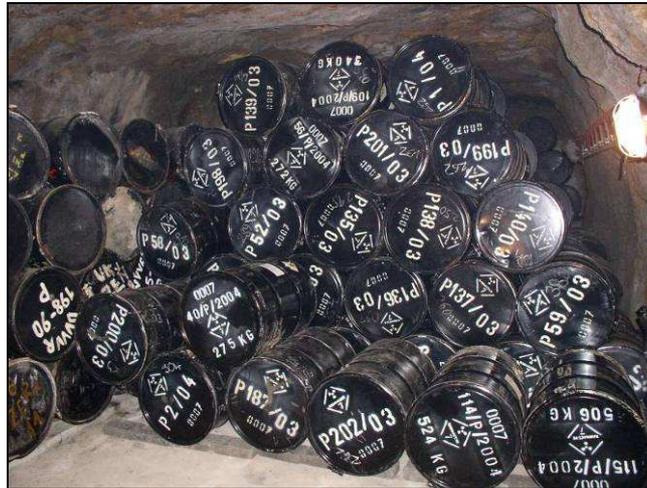


Fig. 8.2 View of a vault in the RAW repository Bratrství

The repository was developed by adaptation of a gallery in a former uranium mine, while five chambers were adapted for waste disposal with the total volume of nearly 1200 m³. The repository started operating in 1974. The mine is situated in a water-bearing crystalline complex and therefore a drainage system has been built in the surroundings of the repository area with a central retaining tank and flow-through retaining tanks. The removed water is monitored. It has been concluded that the site on a long-term basis meets all requirements for radiation protection and nuclear safety. The repository has been operated based on a license issued by SÚJB.

8.2.3.3. RAW Repository Dukovany



Fig. 8.3 Closing a full vault with concrete

RAW repository Dukovany has been developed in the site of NPP Dukovany to dispose of conditioned RAW from the NPPs. A potential release of radionuclides into the biosphere is prevented by a system of barriers with a long service lifetime. The repository has been in operation since 1995. The total volume for waste disposal is 55 000 m³ (about 180 000 200-liter

drums) is sufficient to accommodate all RAW from NPP Dukovany and NPP Temelín, provided the waste meets acceptance conditions for disposal, even in case the operation time of the plants is extended to 40 years. Safety of the operating repository is checked by a monitoring system in agreement with a monitoring program approved by SÚJB. The method of the repository closing has been assessed by safety analyses. The repository is operated based on a license for operation issued SÚJB.



Fig. 8.4 View of a partly filled vault in RAW repository Dukovany

8.2.3.4. RAW Repository Hostím

RAW Repository Hostím was in operation in 1959 - 1964. It was built in 1959 in the limestone mine Alkazar nearby the village of Hostím by adaptation of two galleries driven in 1942 -1944. The total volume of the two galleries was about 1690 m³. The repository contains low-and intermediate-level waste from ÚJV Řež a. s. and former ÚVVVR. The operation of the repository was terminated in 1965.

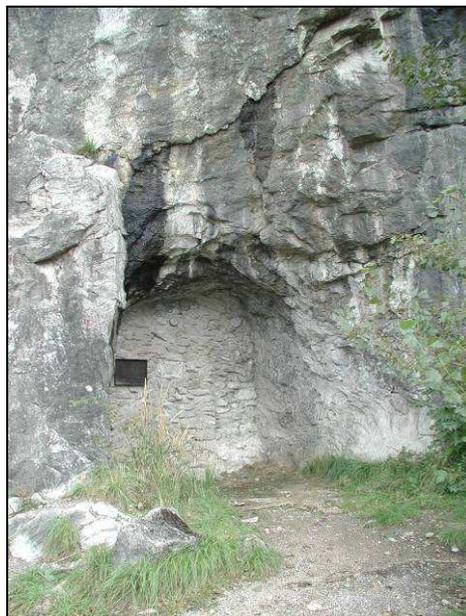


Fig. 8.5 Secured entrance into the Hostím repository

To assure safety of the disposed waste (an additional barrier preventing unauthorized persons from entering) both the galleries were filled with a special concrete mixture. Before the filling, inventory taking was performed and all long-term radionuclide sources and chemical waste were removed from the repository.

In 1990-1991 a hydrogeological monitoring system of institutional inspection was developed and it has been operated by SÚRAO. Also a network was established of geodynamic points to measure movements of the rock massif. The monitoring results have proved tightness and safety of the closed repository. The repository has been closed since 1997.

8.2.4. ÚJV Řež a. s.

ÚJV Řež a. s. has two operating facilities for RAW management:

- building 241 - Velké zbytky (RAW Management Facility) with technology for RAW processing,
- building 211/8 - HLW Storage Facility.

Apart from the mentioned facilities, there are additional facilities that had been in the past used for RAW management purposes. The latter are no more in operation, they form a part of old environmental liabilities and have been gradually removed. They include:

- building 211/6 - Reloading site for RAW,
- storage area for RAW,
- building 211/5 - Decay tanks for RAW.

8.2.4.1. Bldg. 241 - Velké zbytky

Building 241 contains the following process equipment for RAW management:

- FDS - installation for fragmentation and decontamination of RAW. FDS also serves as a development base to improve the existing and to develop new decontamination procedures and technologies,
- equipment for compacting of solid compressible RAW - low-pressure hydraulic press for compressible RAW (paper, PE, rubber, cellulose wadding, etc.),
- evaporation system for concentration of liquid RAW - to process liquid RAW produced mostly by research facilities within ÚJV Řež a. s.,
- solidification of liquid and solid RAW by cementation - for both solid and liquid (concentrate) RAW.

Planned repairs and modifications of the building 241 are currently being performed (2010-2012). The objective of the repairs and modifications is to ensure a long-term, safe, reliable and economical operation of the equipment for RAW management. Another objective is to increase the capacity for RAW management to meet the contractual requirements (management of RAW from external generators, remedy of environmental liabilities in ÚJV Řež a.s., etc.)

The repairs and modifications include repairs of selected construction and technological parts in order to provide for a long-term operation of the building 241 without the necessity to perform more repairs in the foreseeable future. The repairs include the following:

- repair of electric installations,
- repair of ventilation system,

- repair of the special sewerage system (replacement of sewer inlets and piping) and pumping of liquid RAW,
- separation of FDS from the evaporator area,
- repairs of floors and building structure surfaces,
- expanding of the hall entrance,
- adjustments based on fire safety requirements,
- repair of windows and doors.

The building will be equipped with additional technology (solidification of liquid and solid RAW by cementation, decontamination and fragmentation technologies) to ensure optimized and up-to-date RAW management and to increase the capacity of the RAW management center.

In addition to the above-mentioned technologies, Building 241 also includes old process equipment, already out of operation. There are e.g. storage tanks. The technology forms a part of old environmental liabilities that are currently being liquidated. No additional measures relating to radiation protection will be necessary during the liquidation.

8.2.4.2. HLW Storage Facility

The HLW storage facility has been designed to store SF from research nuclear reactors and solid RAW. The facility is a prefab hall with the ground plan 12 x 72 m, 15 meters high. Inside the space is divided into eight concrete square-shaped boxes to store solid RAW. Two cylindrical tanks are used for SF IRT-M. Each box contains an inner corrosion resistant tank placed in a tank made of carbon steel set in a concrete bed. The tank diameter is 4.6 m, water level 5 m. The storage area is divided horizontally into three levels with concrete panels. The upper covering layer consists of two shielding panels.

The following safety improvements have been made in the Building 211/8 - HLW Storage Facility:

- installation of an automatic monitoring system for conductivity of the shielding water in SF pool, with automatic start-up of the demineralization station,
- construction of new cable routes for the physical protection system in the HLW storage facility; unlike in the past, the cables are now under the ground,
- improvement of the physical protection system - replacement of the tanks covers - the original covers were made of steel profiles and Plexiglas and they have been replaced with all-metal covers with the minim weight of each part 150 kg. The covers cannot be taken off without a crane,
- in 2004 a new stationary dosimetric system and system for monitoring of radioactive aerosols in the air were introduced and they have been in trial operation so far,
- in 2006, HK EK-10 hot chamber workplace was commissioned and it is used for VP EK-10 repacking,
- in 2007, an annex of HLW storage facility was commissioned and used for storage of ŠKODA VPVR/M casks loaded with SF of EK-10 and IRT-2M type.

8.3. Siting of Proposed Facilities

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.*
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.*

The legislative framework for siting of RAW repositories and workplaces for RAW management in nuclear installations from the viewpoint of nuclear safety and radiation protection consists of the Atomic Act and its implementing regulations (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.)

As mentioned in 5.2.2, siting of a NI is one of the activities for which SÚJB shall issue a license in agreement with Section 9, Paragraph 1, letter a) of the Atomic Act from the viewpoint of nuclear safety and radiation protection. The preconditions for the license issue under Section 13 of the Atomic Act are:

- *“evaluation of the environmental impact of the nuclear installation”* under the Act No. 100/2001 Coll., on assessment of impacts on the environment,
- *“approval of a quality assurance program for the licensed activity.”*

An application for the license to site a nuclear installation shall be in agreement with the Appendix A to the Atomic Act supported with:

- the Initial Safety Report which shall include:
 - description and evidence of suitability of the selected site from the aspect of siting criteria for NIs or RAW repositories, as established in a legal implementing regulation;
 - description and preliminary assessment of the design concept from the viewpoint of requirements laid down in implementing regulations for nuclear safety, radiation protection and emergency preparedness;
 - preliminary assessment of impact of operation of the proposed installation on personnel, the public and the environment;
 - proposal of a concept for safe decommissioning;
 - assessment of quality assurance in the process of site selection, method of quality assurance for the preparatory stage of the construction and quality assurance principles for the following stages.
- analysis of needs and possibilities of physical protection.

More detailed requirements for the content of the Initial Safety Report are provided in a SÚJB guideline. The Decree No. 215/1997 Coll. establishes criteria to assess suitability of the selected site from the viewpoint of nuclear safety and radiation protection. The protection of interests from other aspects, as required by the valid legislation, remains unchanged. The Decree defines excluding and conditional criteria (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005).

The implementing regulation to the Atomic Act, the Decree No. 195/1999 Coll., on requirements for nuclear installations to assure nuclear safety, radiation protection and emergency preparedness and, particularly in the Decree No. 215/1997 Coll., on criteria for siting of nuclear installations and very significant sources of ionizing radiation, take into account IAEA recommendations and methodical guidelines concerning siting of nuclear installations.

In agreement with the IAEA recommendations the above-mentioned implementing regulations of the Atomic Act require that the design shall take into account the historically most serious phenomena reported for the given location and its surroundings and effects of a combination of natural phenomena and phenomena initiated by human activity and emergency conditions caused by such phenomena. The regulations further require for siting and designing that NI is evaluated from the viewpoint of resistance against the following natural phenomena and phenomena initiated by human activity:

- earthquake,
- climatic effects (wind, snow, rain, outdoor temperatures etc.),
- floods and fires,
- fall of an aircraft and falling objects,
- explosion of industrial, military and transport facilities, including explosions in nuclear installation objects,
- leakage of hazardous explosive liquids and gases.

Based on a probabilistic evaluation some events may be excluded, provided their probabilities are very low. Specification of the limit level for the individual cases is within the SÚJB competence.

The Act No. 18/1997 Coll. in Section 4, Paragraph 4 requires for operating NIs, as a part of re-assessment of the operation after a certain period of time or as a part of periodic inspections of safety documents, to reassess effects of the above-mentioned external events, using the current technical standards and knowledge and taking into account potential changes in the location.

SÚJB shall, in agreement with Section 3, Paragraph 2, letter k) and letter v) of the Atomic Act, provide to municipalities and District Offices data about RAW management on the territory they administrate and provide information under special regulations (the Act No. 123/1999 Coll., as enacted by the Act No. 132/2000 Coll., on the right for information about the environment and the Act No. 106/1999 Coll., on free access to information) and elaborate once a year a report on its activities and submit it to the government and to the public.

Based on bilateral intergovernmental agreements with the Federal Republic of Germany and Austria the Czech Republic submits to the governmental bodies of these countries the information on its near-boarder NIs. The transmission of the information is performed both on regular basis (meetings held once a year), and on irregular basis at agreed meetings or in a written form.

The Czech Republic has entered a general intergovernmental agreement about exchange of information concerning utilization of nuclear energy with another neighboring country - Slovakia. The obligation to inform about serious events in nuclear safety is contractually established also in an agreement on cooperation in state supervision of nuclear safety of nuclear installations and state supervision of nuclear materials between the Czech Republic and the Republic of Hungary.

An intergovernmental agreement about early notification of nuclear accidents and exchange of information concerning utilization of nuclear energy, nuclear safety and radiation protection has been concluded between the governments of the Czech Republic and Poland.

8.3.1. Nuclear Power Plant Dukovany

At the moment, EDU is not planning to site any additional facility for RAW management. Siting of the existing buildings and facilities for RAW management took place within the siting process of the entire NPP as described in the Initial Safety Report. A detailed description of the geographic location and protection against earthquake, floods, adverse climatic conditions, effects of aircraft crash, pressure waves from explosions and interventions by third persons is provided in the National Report of the Czech Republic under the Joint Convention, Revision 1.1, of February 2003.

8.3.2. Nuclear Power Plant Temelín

At the moment ETE is not planning to site any additional facility for RAW management.

Siting of the existing buildings and facilities for RAW management took place within the siting process of the entire NPP as described in the Initial Safety Report.

Similarly as in case of EDU, more detailed information about the site and its protection against various natural and man-induced events is provided in the National Report of the Czech Republic under the Joint Convention, Revision 1.1, of February 2003.

8.3.3. SÚRAO

The Czech Republic currently anticipates developing a DGR in granitic formations after 2065. More details about the issue are provided in 7.7.

8.3.4. ÚJV Řež a. s.

At the moment ÚJV Řež a. s. is not planning to site any additional facility for RAW management.

Siting of the existing buildings and facilities for RAW management (Building 241 and HLW Storage Facility) took place within the proceedings to site the entire nuclear installation under the valid legislation. Safety of the facilities has been reassessed in agreement with the Atomic Act and its implementing regulations, as required for the siting, design, construction and operation of nuclear installations.

8.4. Design and Construction of Facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) 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;*
- (ii) 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;*
- (iii) at the design stage, technical provisions for the closure of a disposal facility are prepared;*
- (iv) the technologies incorporated in the design and construction of a radioactive waste management facility are supported by experience, testing or analysis.*

The legislative framework to permit construction of a nuclear installation from the viewpoint of nuclear safety and a radiation protection consists of the Atomic Act and its implementing regulations (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.)

As stated in chapter 5.2.2, construction of a nuclear installation is an activity subject to a license by SÚJB in agreement with Section 9, Paragraph 1, letter b) of the Atomic Act from the viewpoint of nuclear safety and radiation protection. All the following preconditions shall be met to issue a license for construction of a nuclear installation under Section 13, Paragraphs 5 and 6 of the Atomic Act:

- approved quality assurance program for the licensed activity,
- approved quality assurance program for the designing,
- approved proposal of a method to assure physical protection of the nuclear installation and nuclear materials.

An application for a license to construct RAW repository and facilities for RAW management, which are a part of a nuclear installation, shall be supported with safety documents in agreement with the Appendix B of the Atomic Act (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.)

After a favorable assessment of the above-mentioned documents SÚJB will issue a license for construction of a nuclear installation while the list of selected equipment and proposed method of physical protection assurance shall be subject to SÚJB approval.

8.4.1. Nuclear Power Plant Dukovany

A trial operation of the technology for removal, processing and treatment of ion exchangers by means of fixation into SIAL[®] matrix started in 2010. During the trial operation 20 m³ of spent ion exchange resins were taken out from the storage tank and treated.

Decommissioning of facilities for RAW management is performed in agreement with the concept of EDU decommissioning. Conceptual plans for decommissioning of facilities for RAW management, and on as-needed basis also technical measures, are taken into account already in the designing stage.

8.4.2. Nuclear Power Plant Temelín

The basic design for ETE, and therefore also facilities for RAW management, was elaborated by the Czech designing organization Energoprojekt. The design was assessed in the early 1990s by independent experts in RAW management.

Their conclusions resulted in a fundamental revision of the entire system of RAW management. An overview of the implemented changes is provided in the National Report of the Czech Republic under the Joint Convention, Revision 1.1, of February 2003.

In 2007 SIAL[®] technology was tested successfully at ETE for solidification of sludge resulting from the operation of centrifugation for wastewater in the NPP control area. Properties of products of solidification with the SIAL[®] matrix were independently verified by SÚJB and they met waste acceptance criteria for the RAW repository Dukovany. The total quantity of treated sludge was over 10 tons.

Decommissioning of facilities for RAW management is addressed in agreement with the ETE decommissioning concept. Conceptual plans for decommissioning of facilities for RAW management are taken into account already in the designing stage, including adoption of technical measures on an as-needed basis.

8.4.3. SÚRAO

8.4.3.1. RAW Repository Richard

RAW repository Richard is designed to dispose RAW containing artificial radionuclides.

The repository is situated on the north-western edge of the Litoměřice cadastre area under the Bídnice hill.

In the past there were three limestone quarries in the location (now called Richard I - III) and there was an underground factory construction during the World War II. Limestone had been quarried here until 1960s by Čížkovické cementárny a vápenky.

In the early 1960s the mine work Richard II was identified as a potential repository for low-level waste. The repository is situated in a carbonate bank, with overlying and underlying clayey rocks.

The mine premises and disposal rooms are dry. The only leakage of underground water in the repository premises occurs in the entrance portal and from ventilation chutes. Additional water gets into the repository by condensation of water from forced ventilation. The seeping and condensing water in the repository are drained into the mine drainage system. The mine water from the Richard repository (in orders of tenths of liters per second) is drained through a system of retaining tanks into a public sewerage system. The mine water is monitored before it is discharged into the sewerage system.

Moreover, 13 drills have been made in the Richard repository to monitor hydrogeological conditions in the concerned area, 9 of which for monitoring purposes and the remaining ones for prospecting purposes.

The mine work is stable from the geotechnical viewpoint.

Based on the earlier performed prospecting works, regular geotechnical monitoring was introduced in 1992 in the location that focuses on the repository safety from the viewpoint of its stability.

Radiation protection is performed by monitoring in agreement with a monitoring program approved by SÚJB. A concept has been approved for the repository's decommissioning.

8.4.3.2. RAW Repository Bratrství

The Bratrství repository in Jáchymov is designed to dispose RAW consisting of or contaminated with natural radionuclides of the radium and thorium series. The repository was developed particularly to dispose leaking and disused radioactive sources from healthcare facilities.

The Bratrství repository has been developed from a part of abandoned underground premises in the former uranium mine Bratrství.

Two factors are specific for the repository operation:

- high humidity in the underground premises and a substantial flow rate of mine water nearby the disposal chambers,
- high concentration of radon decay products (not generated by the disposed RAW but by natural activity of the host environment) which makes it necessary to maintain a special regime.

The mine work is stable from the geotechnical viewpoint.

Based on earlier performed extensive prospecting works, regular hydrological and geotechnical monitoring was introduced in 1992 in the location and it focuses on the repository safety from the viewpoint of its stability.

Radiation protection is ensured by monitoring in agreement with a monitoring program approved by SÚJB. A concept has been approved for the repository's decommissioning.

8.4.3.3. RAW Repository Dukovany

RAW Repository Dukovany has been in permanent operation since 1995. It consists of 112 vaults arranged in four rows, each with 28 vaults sized 5,3 x 5,4 x 17,3 m. Four vaults make up 1 dilatation unit, with a free space between the dilatation units filled with wood-cement board. Each vault is covered with 14 sloping panels of three types. The engineering barriers in RAW repository are represented by the waste form itself (bitumen, compacted RAW), walls from reinforced concrete and asphalt-propylene layer. RAW repository Dukovany is situated above the underground water level and has a double drainage system. The filled vaults are covered with concrete (and topped with a thick-wall PE). Once the repository is filled the construction will be insulated from the top (to prevent rainwater from permeating).

The radiation protection is performed by monitoring in agreement with a monitoring program approved by SÚJB. A concept has been approved for the repository's decommissioning.

8.4.3.4. RAW Repository Hostím

RAW Repository Hostím developed in the former limestone mine Alkazar near Beroun was in operation in 1959 - 1964. It was established based on the Governmental resolution No. 231/1979 and related resolutions by the Ministry of Chemical Industry.

RAW is disposed in the repository in two galleries:

- Gallery A was adapted and used by the former ÚJF Řež (predecessor of ÚJV Řež a. s. and ÚJF AV ČR). The RAW was stored free (in tins, glass jars, air-conditioning filters),
- Gallery B was used by ÚVVVR Praha within the framework of the then established and state-subsidized system for collection and disposal of RAW.

The RAW was mostly stored in 60 l zinc-plated drums (containers) and some contaminated voluminous equipment was free disposed.

The operation of the Hostím repository was terminated by a decision issued by the Regional Hygienic Officer in 1965, which anticipated that the waste would be disposed here "forever". The resolution was in agreement with the then effectual regulations and the state took charge of the future safety of the Hostím repository. The repository has been closed since 1997.

The land over RAW Repository Hostím is administered by the Town Office in Beroun. The repository is now in the protected landscape area Český kras and the national preserve Karlštejn. The repository is not classified as an old mine work and therefore it is not supervised by the Ministry of the Environment. In 1990 the Hostím repository was included into the system of repositories provided for and funded by ČSKAE (due the state-guaranteed care for old loads).

8.4.4. ÚJV Řež a. s.

8.4.4.1. Bldg. 241 -Velké zbytky

The design of the building 241 was elaborated in 1957, its construction was completed in 1962 and in 1963 it was put into operation. It was designed and provided with technology for processing of liquid and solid RAW. Since at that time the documents supporting building inspectors' approval were secret the procedure was performed again in 1996 in agreement with the Act No. 50/1976 Coll.

The design of refurbishment of the evaporation system was elaborated in 1987. The main technological units were delivered to ÚJV Řež a. s. in 1988. Preparatory installation works started in 1988, the installation of the new evaporator in agreement with the design adapted in 1988 started in 1989 and was completed in August 1990. Comprehensive non-active tests were performed in August - December 1990. After the comprehensive tests ČSKAE, based on a request made by ÚJV Řež a. s., approved in 1992 the evaporation system into trial operation. In 1994 SÚJB issued a decision to approve the limits and conditions of the evaporation system for concentration of liquid RAW and approved its permanent operation.

The fragmentation and decontamination center was put into operation in 1995. The following safety-related documents were elaborated:

- Fragmentation and Decontamination Center, Building 241, Preliminary Safety Report, 1994,

- Final Safety Analysis Report for the Fragmentation and Decontamination Center, Building 241, 1996.

A concept has been approved for the facility's decommissioning.

8.4.4.2. Bldg. 211/8 - HLW Storage Facility

The facility construction took place in 1981 - 1988 and later it was modified based on the requirements made by ČSKAE and SÚJB. The facility construction was completed in 1995. The HLW storage facility was put into trial operation based on a resolution issued by SÚJB in 1995 for a period of one year and into permanent operation in 1997.

The Final Safety Analysis Report for the HLW storage facility (Building 211/8) from 1995 was elaborated as a part of documents submitted in 1995 by ÚJV Řež a. s. to support the application for trial operation of the HLW store facility. The report included:

- initial data specification and introductory information,
- an overview of data describing the project siting,
- monitoring of the surroundings and impact on the environment,
- description of the building and materials assumed to be stored,
- description of handling and transport of the materials and safety analyses.

The documents also included a preliminary proposal of a decommissioning method for the high-level waste storage facility.

After the submitted documents were favorably assessed SÚJB approved permanent operation of the high-level waste storage facility. At the same time, SÚJB approved the limits and conditions for the regular operation of the HLW storage facility.

A concept has been approved for the facility's decommissioning.

8.5. Assessment of Safety of Facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) 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;*
- (ii) 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;*
- (iii) 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).*

As described in the previous chapter 8.4., an applicant for a license for construction of a repository or RAW management facility, which is a part of a nuclear installation, shall meet the requirement specified in the chapter, i.e. to submit an initial safety report. The report shall include safety analyses and analyses of unauthorized handling of nuclear materials and ionizing radiation sources and evaluation of their consequences for the workers, population and the environment.

Any changes performed in the course of the operation, significant from the viewpoint of nuclear safety or radiation protection (e.g. refurbishment or innovation), are subject to a license under Section 9, Paragraph 1, letter f) of the Atomic Act.

More details relating to the assessment of safety of facilities are provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

8.5.1. Nuclear Power Plant Dukovany

Systematic safety assessments and evaluation of impacts on the environment have been performed of the RAW management facilities that are currently in operation, as appropriate for the risks represented by such facilities and covering their service lifetime in the scope and for the manner required by the valid legislation. The assessment and evaluation are documented in the Final Safety Analysis Report

For management of liquid RAW the causes of integrity defects in the considered system have been defined and evaluation has been performed of the final consequences and probability of the given initiation event and adverse impacts on the environment. The most serious incident, defined as leakage of radioactive materials, is a damage of tanks with the liquid media. The event may occur only as a result of a seismic event accompanied by destruction of the building structure and permeation by radioactive materials through all process and construction barriers. Calculation models have shown that even if conservative assumptions are used and for the scenario of leakage of all liquid RAW from the storage tanks into watercourses, an individual from a critical group of population will receive the effective dose 0,2 mSv/year. In the scenario of the waste leakage into the underground water the effective dose will be 0,04 mSv/year. The general limit for an individual from population is 1 mSv/year.

Another potential incident with a substantial impact on the environment is a fire of the bituminization line. Results of calculations of radiological impacts of the bituminization line fire have implied that even under the most conservative assumptions (the model e.g. anticipates that the person in the afflicted area will only eat food from the local sources) the individual effective dose for an individual from population will not exceed 0,2 mSv/year. The Decree SÚJB No. 307/2002 Coll. defines a general limit for the population, as a sum of effective doses from external exposure and effective dose commitments from internal exposure, at 1 mSv per calendar year.

The most significant incident in the management system for gaseous RAW (due to the maximum potential impact on the surroundings of the nuclear power plant) is a damaged integrity of the system of cleaning of technological venting in the main production building. Using a standard calculation model the annual effective dose for an individual from population is max. 20 µSv, which represents 2 % of the basic general limit 1 mSv/year.

8.5.2. Nuclear Power Plant Temelín

A systematic safety assessment and evaluation of impacts on the environment were performed before the beginning of construction of the RAW management facilities that are currently in operation, as appropriate for the risks represented by such facilities and covering its service lifetime in the scope and for the manner required by valid legislation. The assessment and evaluation are documented in the Final Safety Analysis Report.

For management of liquid RAW the causes of integrity defects in the considered system have been defined and evaluation has been performed of the final consequences and probability of the given initiation event and adverse impacts on the environment. The most serious incident, defined as leakage of radioactive materials, is damage of tanks with the liquid media. The event may occur only as a result of a seismic event accompanied by destruction of the building structure and permeation by radioactive materials through all process and construction barriers. Calculation models have shown that even if conservative assumptions are used and for the scenario of leakage of all liquid RAW from the storage tanks into watercourses, an individual from a critical group of population will receive an effective dose 0,1 mSv/year. In the scenario of the waste leakage into the underground water the effective dose will be 0,03 mSv/year. The general limit for an individual from population is 1 mSv/year.

Another potential incident with a substantial impact on the environment is a fire of the bituminization line. Results of calculations of radiological impacts of the bituminization line fire have implied that even under the most conservative assumptions (the model e.g. anticipates that the person in the afflicted area will only eat food from the local sources) the individual effective dose for an individual from population will not exceed 0,02 mSv/year. The SÚJB Decree No. 307/2002 Coll. defines a general limit for the population, as a sum of effective doses from external exposure and effective dose commitment from internal exposure, at 1 mSv per calendar year.

The most significant incident in the management system for gaseous RAW (due to the maximum potential impact on the surroundings of the nuclear power plant) is a damaged integrity of the system of cleaning of technological venting in the main production building. Using a standard calculation model the annual effective dose for an individual from population is max. 2 μ Sv which represents 0,2 % of the basic general limit 1 mSv/year.

8.5.3. SÚRAO

8.5.3.1. RAW Repository Richard

A revision of safety analyses for RAW repository Richard was prepared in 2008 which is a continuation of safety analyses and their revisions performed in 1995, 1998 and 1999 and used as supporting documents for the application for a license to operate the repository.

The safety analyses performed in 2003-2008 were supposed to verify the repository capacity and to reassess the already proposed decommissioning method. The efforts included safety evaluations for options with and without a backfilling material in the repository premises, taking into account the updated information on the source term, including RAW inventory and employment of different types of filling materials, particularly bentonites and materials on cement basis.

The transport model has been updated using data from the newly made drill holes to further specify hydrogeological data in the location.

Safety analyses evaluate the individual doses received by persons in the following scenarios:

- transport of radionuclides in the repository and underground water in case of barriers damage,
- scenario in which persons enter the repository and scenario with the persons stay in the location.

The transport of radionuclides was considered in two variants - with and without a backfilling material. The scenarios were anticipated to take place after termination of institutional control, i.e. 300 year after the operation of the facility is finished. Individual doses calculated for the real repository system (inventory, construction design, host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the repository Richard Litoměřice have been proposed based on the comparison.

8.5.3.2. RAW Repository Bratrství

The safety analyses performed in 2000-2008 were supposed to verify the repository capacity and to propose limits and conditions for its operation. The efforts included safety evaluations for options with and without a backfilling material in the repository premises, taking into account the updated information on the source term, including RAW inventory and employment of different types of filling materials, particularly bentonites and materials on cement basis.

The safety analyses evaluate individual personal doses in the following scenarios: transport of radionuclides in the repository and underground water in case of barrier damage, scenario in which persons enter the repository and scenario with the persons stay in the location. The transport of radionuclides was considered in two variants - with and without a backfilling material. The scenarios were anticipated to take place after termination of institutional control, i.e. 300 year after the operation of the facility is finished. Individual doses calculated for the real repository system (inventory, construction design, and host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the Bratrství repository have been proposed based on the comparison.

8.5.3.3. RAW Repository Dukovany

A license to operate the repository was issued based on safety analyses (Operational Safety Report) and the trial operation in 1995.

In 2007 safety analyses were completed that were based on operational experience in the repository. The analyses were used to update the acceptance criteria for RAW Repository Dukovany in connection with other potential forms of RAW to be disposed here. The earlier variants of safety analyses anticipated that the concentrate from NPP operation will be immobilized in bitumen and cement. Due to the need to dispose ion exchangers, sludge and waste from decommissioning of both the NPPs the safety analyses were extended to include an analysis of potential disposal of other waste types. Subsequently, waste acceptance criteria have been formulated for solidified and non-solidified RAW and the inventory of monitored radionuclides has been updated to take into account potential hazards of the whole range of the produced radionuclides.

The safety analyses evaluate individual personal doses in the following three scenarios: bath-tubbing, transport of radionuclides in the repository and underground water in case of barrier damage, scenario in which persons enter the repository and scenario with persons stay in the location. The scenarios were anticipated to take place after a termination of institutional control, i.e. 300 year after the operation of the facility is finished. Individual doses calculated for the real repository system (inventory, construction design, host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the RAW Dukovany repository have been proposed based on the comparison. The acceptance criteria are formulated separately for solidified and non-solidified waste

In 2007 the Operational Safety Report was updated within the licensing process for the RAW repository Dukovany. Inputs for the report included, among other, safety analyses completed in 2005 and 2006 which evaluated the potential for a limited disposal of institutional RAW and selected types of RAW, specifically sorbents and sludge, in an aluminosilicate matrix. The safety report also updated safety analyses concerning operational safety and evaluation of extraordinary events in respect to safety of personnel and of the surrounding environment. The new version of the operational and post-operational safety measures anticipates that the repository will be used for low-level waste from both the nuclear power plants and for institutional RAW; the disposal of solidified RAW has been evaluated for three basic types of immobilization materials - bitumen, cement and aluminosilicate. A new calculation of the source member has been performed, using the option to evaluate advection and diffusion transports in the near field. The safety evaluation was performed with a computer tool standardized in 2007 by an SÚJB commission in charge of software assessment. The results have been used to improve accuracy of determination of limits for critical radionuclides monitored for the purposes of acceptance criteria.

8.5.3.4. RAW Repository Hostím

In 1991 - 1994 an inventory was taken of the disposed RAW and radiation and mining surveys were performed inside both the galleries (the information was physically checked that sources and containers with high activity had been in 1964 moved from the gallery B into the repository Richard Litoměřice). Hydrogeological evaluation of the location was performed, evaluation of potential accident scenarios and a monitoring system was developed (surface and underground water, geotechnical stability).

The performed analyses have implied that the risks associated with reprocessing and transport of the RAW into another location would be significantly higher than those associated with the existing repository. The repository has been filled with a concrete mixture and closed.

8.5.4. ÚJV Řež a. s.

8.5.4.1. Bldg. 241 -Velké zbytky

A safety evaluation of the facility was performed before the construction start, in agreement with legal regulations valid at the time of the construction.

Safety evaluation of the evaporation system and fragmentation and decontamination center was performed based on the information provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

8.5.4.2. Bldg. 211/8 - HLW Storage Facility

Safety evaluation of the facility was performed before the construction start, in agreement with legal regulations valid at the time of the construction.

The following reports deal with the safety evaluation:

- Initial Safety Report - HLW storage facility in ÚJV Řež a. s., ÚJV 1987,
- Final Safety Analysis Report for the HLW storage facility, Building 211/8, ÚJV, revisions from 1995, 2002.

8.6. Operation of Facilities

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) 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;*
- (ii) operational limits and conditions, derived from tests, operational experience and the assessments as specified in Article 15 are defined and revised as necessary;*
- (iii) 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;*
- (iv) engineering and technical support in all safety-related fields are available throughout the operating lifetime of a radioactive waste management facility;*
- (v) procedures for characterization and segregation of radioactive waste are applied;*
- (vi) incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;*
- (vii) programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;*
- (viii) 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;*
- (ix) 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 legislative framework for the license to operate RAW repositories and facilities for RAW management in nuclear installations from the viewpoint of nuclear safety and radiation protection consists of the Atomic Act and its implementing regulations (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005).

As stated in chapter 5.2.2, the commissioning and operation of RAW repositories and RAW management facilities in NIs are activities subject to the SÚJB license under Section 9, Paragraph 1, letters c) and d) of the Atomic Act. A precondition of such licenses for commissioning and operation of a nuclear installation under Section 13, Paragraph 5 of the Atomic Act is an approved quality assurance program, approved method of physical protection assurance for the nuclear installation and nuclear materials and approved on-site emergency plan.

RAW repository and RAW management facilities in nuclear installations are commissioned gradually, starting with a trial operation for which the applicant shall submit documents specified in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005.

An application for a license to operate shall be supported under Appendix D of the Atomic Act with safety documents (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005).

After the above-mentioned documents are favorably assessed SÚJB will issue a license for operation of a NI, while changes in the documents approved in the earlier stages shall be approved by SÚJB separately. The limits and conditions for safe management of RAW, which is a document to be approved under J.9 Appendix to the Atomic Act, shall be established based on safety analyses and, under Section 53 of the Decree No. 307/2002 Coll., they shall include particularly the following:

- data on the permissible parameters which assure nuclear safety and radiation protection of the management,
- methods and times of their measurement and evaluation,
- requirements for operating capability of the facility for RAW management,
- requirements for setup of protection systems of the facility,
- limits of the conditional quantities,
- requirements for activities performed by workers and organizational measures to meet all defined conditions for the design operating situations.

RAW may be managed only by a licensee under Section 9, Paragraph 1, letter j) of the Atomic Act. The license may be issued only based on a favorable assessment of documents required by the same Act and based on favorable results of inspections and may be issued only if the applicant is the licensee under Section 9, Paragraph 1, letter i) for management of sources of ionizing radiation.

8.6.1. Nuclear Power Plant Dukovany

EDU is a holder of the license for RAW management under Section 9, Paragraph 1, letter j) of the Atomic Act. This means that all requirements have been met for safe management of RAW as specified in the Atomic Act and its implementing regulations, particularly the Decree No. 307/2002 Coll.

The limits and conditions for management of RAW are defined based on safety analyses and approved by SÚJB as a part of documents to obtain a license for RAW management. The prescribed period for their revising is 4 years.

The internal procedures for operation, maintenance, monitoring, inspections and tests of facilities for RAW management are developed in agreement with the procedures specified in the Atomic Act and its implementing regulations and they are a part of documents supporting an application for the license to manage RAW. The monitoring program shall be approved by SÚJB.

The requirement for technical and engineering support is established in ČEZ, a. s. internal documents and is a part of the corporate strategy.

In EDU the procedures for characterization and sorting of RAW are described in the internal regulations inspected by SÚJB. The regulations comply with the requirements of the Decree No. 307/2002 Coll. for sorting and characterization of RAW.

The obligation of the licensee holding a license for RAW management to promptly report accidents important from the viewpoint of nuclear safety and radiation protection is established in the Atomic Act. In EDU the reporting procedures are described in the internal regulations dealing with emergency preparedness.

Programs for accumulation and analyses of significant operating experience are used in EDU in all operating areas, i.e. also in RAW management. Outputs from the analyses are routinely used to modify the related procedures.

In each of the years two inspections of RAW management were conducted at EDU, which concentrated on compliance with limits and conditions for safe RAW management and on compliance with Sections 48 - 51 and 53 - 55 of the Decree No. 307/2002 Coll. on radiation protection. Results of the inspections did not indicate any violation of the above mentioned regulations.

A proposed method of NPP decommissioning is approved by SÚJB as a part of the license to operate the plant. The document content complies with the requirements of the Decree No. 185/2003 Coll. The costs of decommissioning are verified at the same time. ČEZ, a. s., creates a financial reserve for decommissioning of NPP Dukovany. A proposal for decommissioning is under the Decree No. 185/2003 Coll. approved for five years. Also the verification of decommissioning costs is valid for the same period of time. The proposal for decommissioning also includes facilities for RAW management.

8.6.2. Nuclear Power Plant Temelín

ETE is a holder of the license for RAW management under Section 9, Paragraph 1, letter j) of the Atomic Act. This means that all requirements have been met for safe management of RAW as specified in the Atomic Act and its implementing regulations, particularly the Decree No. 307/2002 Coll.

The limits and conditions for safe management of RAW are defined based on safety analyses and approved by SÚJB as a part of documents to obtain license for RAW management. The prescribed period for their revising is 4 years.

The internal procedures for operation, maintenance, monitoring, inspections and tests of facilities for RAW management are developed in agreement with the procedures specified in the Atomic Act and its implementing regulations and they are a part of documents supporting an application for the license to manage RAW. The monitoring program shall be approved by SÚJB.

The requirement for technical and engineering support is established in ČEZ, a. s. internal documents and is a part of the corporate strategy.

In ETE the procedures for characterization and sorting of RAW are described in the internal regulations inspected by SÚJB. The regulations comply with the requirements of the Decree No. 307/2002 Coll. for sorting and characterization of RAW.

The obligation of the licensee holding a license for RAW management to promptly report accidents important from the viewpoint of nuclear safety and radiation protection is established in the Atomic Act. In ETE the reporting procedures are described in the internal regulations dealing with emergency preparedness.

Programs for accumulation and analyses of significant operating experience are used in ETE in all operating areas, i.e. also in RAW management. Outputs from the analyses are routinely used to modify the related procedures.

In each of the years two inspections of RAW management were conducted at ETE which concentrated on compliance with the limits and conditions for safe management of RAW and compliance with Sections 48 - 51 and 53 - 55 of the Decree No. 307/2002 Coll., on

radiation protection, and on compliance with requirements of the Decree No. 214/1997 Coll., on quality assurance. Results of the inspections did not indicate any violation of the above mentioned regulations.

A proposed method of NPP decommissioning is approved by SÚJB as a part of the license to operate the plant. The document content complies with the requirements of the Decree No. 185/2003 Coll. Meanwhile, the costs of decommissioning are verified by SÚRAO. ČEZ, a. s., creates a financial reserve for the decommissioning of NPP Temelín. The proposal for decommissioning is under the Decree No. 185/2003 Coll. approved for five years. Also the verification of decommissioning costs is valid for the same period of time. The proposal for decommissioning also includes facilities for RAW management.

8.6.3. SÚRAO

8.6.3.1. RAW Repository Richard

The repository's safety has been assessed using requirements of the Act No. 28/1984 Coll. and its implementing regulations and subsequently in agreement with the Atomic Act No. 18/1997 Coll. and its implementing regulations.

As disposal of RAW in underground premises represents a special interference in the earth's crust the safety evaluation of the repository took into account also Section 34 Paragraph 1 of the Act No. 44/1988 Coll.

The repository is operated in a standard manner in agreement with the operating regulations, with the limits and conditions for safe operation with the acceptance conditions. Current maintenance is performed in the underground part of the mine and in the surface facilities.

The volume activity of mine water is monitored in agreement with the monitoring program in samples collected at the repository entrance and in the retention tank. The results of monitoring demonstrate that the volume activity limits in mine water have not been exceeded in the course of the monitored period.

8.6.3.1.1. Volume activity of ^3H radionuclide in the atmosphere

The volume activity of ^3H has been monitored in three points in the repository and it ranges from 1-3 kBq/m³. The limit volume activity for the repository atmosphere is $3 \cdot 10^4$ Bq/m³.

8.6.3.1.2. Limit of Rn equivalent volume activity intake in the atmosphere

Average EOAR levels are considered separately for premises with increased radon concentration and for other premises. Limit EOAR values are specified at 3000 Bq/m³ in locations with increased radon concentration and at 1500 Bq/m³ in other premises. In the course of 2010 the measured EOAR values ranged from 100 Bq/m³ to 9 900 Bq/m³ (the maximum values were measured in the regime without the presence of operators and with the ventilation off).

8.6.3.1.3. Maximum intake

The maximum intake for a worker in the course of 2010 was 0,126 MBq, which corresponds to the effective dose 0,84 mSv/year. The annual intake of equivalent volume activity from radon received by the repository workers shall not exceed 3 MBq.

In connection with the limits and conditions for safe operation a verification is performed of electric equipment operability, forklift truck operability, passability of the drainage system and operability of the instrumentation.

Since the beginning of the operation RAW has been always disposed in agreement with the waste acceptance criteria valid in the given period. When disposing the waste the operator checks it for the following:

- damage of the container,
- surface contamination of the container,
- dose rate equivalent on the container surface,
- content of radionuclides.

The individual containers are placed in disposal rooms. Individual containers are disposed to maximize utilization of the space in the rooms, up to 5 layers (from the viewpoint of strength capacity up to 8 layers may be stacked without damage of the bottom layer of the casks).

In addition to the monitoring of parameters important from the viewpoint of radiation protection, also basic climatic and hydrological data and geotechnical parameters are measured in the location.

The RAW in which the content of radionuclides exceeds the waste acceptance criteria for disposal are, in agreement with the limits and conditions for storage of RAW, stored separately from the disposed RAW (they include particularly radionuclides ^{60}Co , ^{137}Cs , ^{241}Am , ^{238}Pu and ^{239}Pu).

Table 8.1 Summary data on RAW repository Richard

Beginning of operation	1964
Scheduled end of operation	2070
Repository depth under the surface	70 - 90 m
Total volume adapted for the	17 000 m ³
Filled volume of disposal chambers	7 250 m ³
Free volume	(the volume of deposited RAW represents about
Access tunnel and other corridors (including that to Richard I)	1 150 m ³ (additional 1 000 m ³ may be used by adjustment of the existing communications)
Activity converted as in 2007	see chapter 4.2.3.1.

In 2010 two inspections of RAW management were conducted at the Richard repository which concentrated on compliance with the limits and conditions for safe management of RAW, acceptance conditions for disposal and acceptance conditions for storage and on compliance with Sections 52 - 55 of the Decree No. 307/2002 Coll., on radiation protection. Results of the inspections did not indicate any violation of the above mentioned regulations.

8.6.3.2. RAW Repository Bratrstvi

The repository's safety has been assessed using requirements of the Act No. 28/1984 Coll. and its implementing regulations and subsequently in agreement with the Atomic Act No. 18/1997 Coll. and its implementing regulations.

The utilization of underground premises for RAW disposal is classified as a special interference in the earth's crust and a decree issued by ČBU establishes basic obligations for its operation. These requirements extend requirements resulting from the Atomic Act particularly with the following:

- monitoring of geotechnical parameters of the underground premises,
- monitoring of airstreams.

A standard container used for RAW disposal has been a sandwich disposal unit with the volume of 200 l with anticorrosion finish. The drums are laid down flat in layers up to about 2 m.

Table 8.2 Summary data about the Bratrství repository

Beginning of operation	1972
Scheduled end of operation	2030
Repository depth under the surface	over 50 m
Total volume adapted for the repository	3 500 m ³ (the anticipated storage layer is 2 m, however it may be more in rooms No. 1, 4 and 5)
Filled volume of disposal chambers	1057 m ³ (the volume of deposited RAW is 142 m ³)
Free volume	142 m ³ (the filling rate is about 30 %)
Activity converted as in 2010	see chapter 4.2.3.2

The monitoring of the repository, persons, surroundings and discharges is performed in agreement with the monitoring program for the Bratrství repository approved by SÚJB. Inspections in the repository are performed on a regular basis in agreement with the monitoring program, as well as in connection with working activities on as-needed basis. The inspections focus particularly on activity of mine water from ²²⁶Ra, ²³²Th and radon transformation products and on air activity from radon transformation products.

The air in the repository is monitored based on a contract with SÚJCHBO Příbram – Kamenná and ÚJV Řež a.s. (²³²Th). Analyses of discharged water and water samples from the workplace and its surroundings are performed on a contractual basis in the laboratories of SÚJCHBO and ÚJV Řež a. s.

The RAW disposed in the Bratrství repository is mostly RaSO₄ in platinum cases (medical sources), Ra-Be neutron sources, laboratory waste containing natural radionuclides, depleted uranium and natural thorium (mostly as Th(NO₃)₄ · 5H₂O and ThO₂).

The overall inventory of selected radionuclides disposed in the repository shall not exceed 1.10¹³ Bq of natural radionuclides.

In 2010 one inspection of radiation protection was performed in the Bratrství repository.

8.6.3.3. RAW Repository Dukovany

The repository's safety has been assessed using requirements of the Act No. 28/1984 Coll. and its implementing regulations and subsequently in agreement with the Atomic Act No. 18/1997 Coll. and its implementing regulations.

The limits and conditions for safe operation define conditions in which the repository may be operated:

- the tanks are monitored for presence of water,
- drainage water from inspection tanks is monitored,
- passability of the drainage system is checked (once a year),
- the instrumentation is checked for operating ability.

The acceptance criteria establish requirements for the form of the disposed RAW, including the activity. The prevailing type of container used in the repository are 200 l drums of zinc-plated sheet which are regularly visually inspected at the receiving inspection of the RAW; open-box pallets are used for radioactive waste in form of pieces.

Every receipt of RAW includes evaluation of compliance with activity limits for selected radionuclides.

Table 8.3 Summary data on RAW repository Dukovany

Beginning of operation	1995
Scheduled end of operation	2100
Repository depth under the surface	0 m
Total volume adapted for the repository	55 000 m ³
Filled volume	8 120 m ³
Free volume	46 880 m ³
Activity converted as in 2010	see chapter 4.2.3.3

In 2010 two inspections of RAW management were conducted at the Dukovany repository which concentrated on compliance with the limits and conditions for safe management of RAW, acceptance conditions for disposal and on compliance with Sections 52 - 55 of the Decree No. 307/2002 Coll., on radiation protection. Results of the inspections did not indicate any violation of the above mentioned regulations.

8.6.3.4. RAW Repository Hostím

The repository was closed based on the performed safety analyses in 1997. The following activities were performed in 1991 - 1994:

- inventory-taking of the disposed RAW (based on the available records),
- radiation and mining survey inside both the galleries (the information was physically checked that sources and packagings with high activity had been in 1964 moved from the gallery B into the repository Richard),
- hydrogeological evaluation of the location,
- evaluation of potential accident scenarios,
- a monitoring system has been created (surface and underground water, geotechnical stability).

Table 8.4 Summary data on RAW Repository Hostím

Beginning of operation	1959	
End of operation	1964	
Final sealing	1997	
Repository depth under the surface	about 30 m	
	Gallery A	Gallery B
Repository volume	about 360 m ³	1220 m ³
Total volume of disposed RAW	about 1/3 of the gallery	200 m ³
Activity converted as in 1991-1997	see chapter 4.2.3.4	see chapter 4.2.3.4

The performed analyses positively demonstrated that the risks associated with reprocessing and transport of the RAW into another location would be significantly higher than those associated with immobilization of the disposed waste. Therefore the repository has been filled with a concrete mixture and closed.

At the moment the repository is in the regime of institutional control. The control has not identified any release of radioactive materials from the repository premises into the environment.

8.6.4. ÚJV Řež a. s.

8.6.4.1. Bldg. 241 -Velké zbytky

SÚJB has issued the following licenses concerning operation of the facility in the Building 241 Velké zbytky:

- license for management of simple and significant sources of ionizing radiation and for use of unsealed radionuclide sources in management of radioactive waste at workplaces of the RAW Management Center from 2006,
- license for operation of workplaces in categories II and III with unsealed sources in the building 241 - Velké zbytky from 2006,
- license for management of sources of ionizing radiation and use of an significant sources of ionizing radiation - radiographic equipment from 2006,
- license for operation of a workplace in category III in the building 241 - Velké zbytky - radiographic workplace with a significant source of ionizing radiation from 2006,
- license for RAW management, which covers collection, sorting, treatment, conditioning and storage of RAW; the license also approves the limits and conditions for RAW management in ÚJV Řež a. s. from 2009,
- license for refurbishment of the workplace in category III, specifically the workplace in the department 2404 – Center for radioactive waste management in the building 241 – Velké zbytky from 2010,

Additionally, RAW management in ÚJV Řež a. s. is regulated by the following internal procedures:

- Rules of Organization, Reg. No. Rad 03 (2010),
- Metrological Manual, Reg. No. Rad 01 (2009),
- On-site emergency plan, Reg. No. OSM 16 (2010),

- Monitoring program, Reg. No. OSM 17 (2010),
- System to assure safety and protection occupational risks, Reg. No. OSM 21 (2009),
- Radioactive waste management, Reg. No. OSM 23 (2010),
- Assurance of radiation protection, Reg. No. OSM 25 (2008),
- System of employees training in radiation protection and nuclear safety, Reg. No. OSM 26 (2008).
- Accounting for ionization radiation sources, Reg. No. OSM 27 (2008),
- Assurance of emergency preparedness, Reg. No. OSM 28 (2008),
- Assurance of nuclear safety, Reg. No. OSM 29 (2010),

The operational limits and conditions for RAW management have been approved by SÚJB.

8.6.4.2. Bldg. 211/8 - HLW Storage Facility

SÚJB has issued the following licenses concerning operation of the HLW storage facility:

- license for operation of a workplace in category IV with very significant sources of ionizing radiation, i.e. a workplace of the HLW storage facility - Building 211/8 from 2007,
- license for operation of a nuclear installation - a workplace with HLW storage facility at the site of ÚJV Řež a. s. from 2008,
- license to perform reconstruction of the HLW storage facility, building 211/8, including construction modifications and construction of a hot cell, repackaging of EK-10 fuel and increase of the pool storage capacity from 2003,
- license to perform reconstruction of the HLW storage facility, building 211/8, including construction of a storage annex, loading of ŠKODA VPVR/M casks with SF and storage of the casks, management of damaged SF from 2007,
- license for management of nuclear material in the HLW Storage facility from 2008.

A resolution issued by SÚJB has approved the limits and conditions for operation of HLW storage facility (Building 211/8).

Management of RAW and ionizing radiation sources

ÚJV Řež a. s. is a research organization capable of providing engineering and technical support for activities it performs, including RAW management. Some activities have been contracted by ÚJV Řež a. s. to entities with necessary qualification.

The system for RAW management includes a sorting process, which has a decisive effect on the efficiency of RAW processing. The sorting process features the following key parameters:

- type of material and outer dimensions,
- nature of contamination:
 - level of contamination,
 - nature (type) of contaminants,
 - nature of contaminants fixation on the surface.

The parameters for sorting of RAW into groups (classes) then determine further processing and selection of methods to process the waste.

Based on the activity level RAW are sorted into temporary, low- and intermediate-level waste and HLW (the last mentioned type is not generated in ÚJV). Subsequently, the RAW is sorted based on its nature as follows:

- solid low- and intermediate-level waste, further divided into:
 - compressible,
 - non-compressible,
 - with higher activity, which must be collected in shielding casks due to the high activity
- liquid, low- and intermediate active RAW,
 - water based,
 - non-water based (e.g. organic solvents, oils, crude oil products) and their mixtures with water
 - containing tritium,
- special RAW (sealed radionuclide sources, nuclear materials, others).

The criteria for RAW sorting into groups are derived from a method for processing of the waste and from the acceptance criteria for storage and disposal.

RAW is sorted based on the composition of contaminating radionuclides into the following classes:

- waste contaminated with natural radionuclides.
- waste contaminated with man-made radionuclides.

The system for handling of ionizing radiation sources includes emergency preparedness, which means the ability to recognize occurrence of an extraordinary radiation situation and at its occurrence to perform measures specified by emergency plans. An emergency plan is a set of planned measures to liquidate a radiation accident or radiation emergency and to limit their consequences. The following documents have been elaborated and approved by SÚJB for the mentioned purposes:

- On-site emergency plan ÚJV Řež a. s., Reg. No. OSM 16, Edition No. 6, Revision No. 0, valid from 1 October 2010,
- On-site emergency plan for workplaces of the RAW Management Center, Reg. No. DPP 300,19, Edition No. 3, Revision No. 1, valid from 14 August 2006,
- On-site emergency plan for operation of HLW Storage facility, Reg. No. DPP 300,27, Edition No. 4, Revision No. 0, valid from 22 January 2007.

Records are kept about the RAW managed in ÚJV Řež a. s., i.e. quantities and specific activities of radionuclides in the waste. Also operating records are kept and maintained on RAW management. The data are regularly once a year sent to SÚJB, in agreement with the valid legislation and the concerned SÚJB licenses.

Regulations about keeping and maintenance of the data are specified in the following Quality Assurance Programs:

- Quality assurance program for RAW management, Reg. No. PZJ 2400,03, Edition No. 2, Revision No. 0, valid from 19 October 2010,
- Quality assurance program, Operation of the HLW Storage Facility, Reg. No. PZJ 2400,04, Syst. No. 40,03.00, Edition No. 1, Revision No. 0, level II, ÚJV Řež a. s., of 31 August 2010,

In 2010 two inspections of RAW management, including waste from remedy of old environmental liabilities, were conducted in ÚJV Řež a. s., which concentrated on

compliance with the operational limits and conditions for safe RAW management and on compliance with Sections 48 - 51 and 53 - 55 of the Decree No. 307/2002 Coll., on radiation protection. Results of the inspections did not indicate any violations of the above mentioned regulations.

Decommissioning Programs

The following proposals for decommissioning have been developed and approved by SÚJB:

- Proposed decommissioning method for the High-level Waste Storage Facility (Building 211/8), Reg. No. DPP 300,11, Edition No. 2, Revision No. 0, valid from 22 January 2007,
- Proposed decommissioning method for workplaces in Building 241 "Velké zbytky" (RAW management facility), Reg. No. DPP 300,40, Edition No. 2, Revision No. 0, valid from 1 October 2008,
- Proposed decommissioning method for the radiographic workplace, Reg. No. DPP 300,17, Edition No. 1, Revision No. 0, valid from 14 August 2006.

8.7. Institutional Measures after Closure

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;*
- active or passive institutional controls such as monitoring or access restrictions are carried out, if required;*

The Atomic Act defines in Section 18, Paragraph 1) the following obligations, among others:

... a licensee shall also

- keep and archive records of ionizing radiation sources, facilities, materials, activities, quantities and parameters and other facts impacting on nuclear safety, radiation protection, physical protection and emergency preparedness, and submit the recorded information to the Office in the manner set out in an implementing regulation;*
- keep records of radioactive waste by type of waste in such a manner that all characteristics affecting its safe management are apparent;"*

The state guarantees under the conditions in Section 25 of the Atomic Act a safe disposal of all RAW, including monitoring and inspections of repositories even after their closure. Responsibility for the monitoring of repositories is defined in Section 26, Paragraph 3 of the Atomic Act, which, among other things, says: *"The Authority shall engage in preparation, construction, commissioning, operation and closure of radioactive waste repositories and monitoring of their impact on the environment"*.

8.7.1. RAW Repository Richard

A method to close the repository is provided in the Proposal of a closure method approved by SÚJB. It is anticipated that disposal chambers and access tunnels will be filled with a mixture based on cements or clayey sealing material. Institutional control is anticipated for a period of 300 years after the operation is terminated. A monitoring program for a period after the closure has not yet been proposed.

8.7.2. RAW Repository Bratrství

A method to close the repository is provided in the Proposal of a closure method approved by SÚJB. It is anticipated that disposal rooms and access tunnels will be filled with a mixture based on bentonites or cement. Institutional control is anticipated for a period of 300 years after the operation is terminated. A monitoring program for a period after the closure has not yet been proposed.

8.7.3. RAW Repository Dukovany

A method to close the repository is provided in the Proposal of a closure method approved by SÚJB. Application of layers of sealing materials is anticipated to cover the repository. Institutional control is anticipated for a period of 300 years after the operation is terminated. A monitoring program for a period after the closure has not yet been proposed.

8.7.4. RAW Repository Hostím

Free space in the repository was sealed in 1997 (filled with concrete) to assure:

- access is prevented to the disposed RAW and the repository premises,
- long-term stabilization of the respective part of the mine work,
- increased efficiency of the existing barriers against penetration by water and potential spreading of contamination into the environment.

The monitoring program includes ten sampling points (underground and surface water) in the repository surroundings.

9. Transboundary Movement - Article 27 of the Joint Convention

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.*

In so doing:

- (i) 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;*
 - (ii) transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;*
 - (iii) 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;*
 - (iv) 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;*
 - (v) 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.*
2. *A Contracting Party shall not license the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.*
3. *Nothing in this Convention prejudices or affects:*
- (i) the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;*
 - (ii) rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;*
 - (iii) the right of a Contracting Party to export its spent fuel for reprocessing;*
 - (iv) rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.*

The import of RAW is prohibited by Section 5, Paragraph 3 of the Atomic Act:

“An import of radioactive waste into the territory of the Czech Republic, with the exception of the re-import of ionizing radiation sources produced in the Czech Republic or radioactive waste originated from materials exported from the Czech Republic for the purpose of their processing or reprocessing having been approved by the Office, is prohibited.”

International transport of RAW (i.e. only its reimport, transit or export) is subject to a license by SÚJB under Section 9, Paragraph 1 letters m), o) and p) of the Atomic Act and the method of transport is governed by provisions of Section 7 through 10 of the Decree No. 317/2002 Coll., on type-approval of packaging assemblies for transport, storage and disposal of nuclear materials and radioactive substances, on type-approval of ionizing radiation sources and transport of nuclear materials and specified radioactive substances (on type-approval and transport).

The provisions of Sections 8 and 9 of the Decree No. 317/2002 Coll. establish requirements for transport of radioactive materials in general and are fully compatible with requirements of the Directive of the European Parliament and Council 2008/68/EC of 24 September 2008 on the inland transport of dangerous goods.

The provisions of Section 10 concern only international movements and they are fully compatible with:

- Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel
- Commission decision 2008/312/Euratom of 5 March 2008 establishing the standard document for the supervision and control of shipments of radioactive waste and spent fuel referred to in Council Directive 2006/117/Euratom.

In 2007-2009 transports of solid burnable RAW from NPP Dukovany and NPP Temelín to the company Studsvik Nuclear AB, Nyköping, Sweden were performed, in order to reduce the RAW volume by incineration. The total weight of the waste sent for incineration in one campaign (3 transports) is about 30 t/year. The overall activity of the transported waste was about 3-5 GBq. The transport is performed in 20-foot ISO containers Type IP-2¹ by a combined road and naval transport through the territories of the Czech Republic and Federal Republic of Germany to Sweden. The transport was performed in agreement with legislative requirements of all the countries affected by the transport and in agreement with the Council Directive 92/3/Euratom of February 3, 1992, on the supervision and control of shipments of RAW between Member States and in and out of the Community. In the Czech Republic SÚJB issued an applicable resolution based on the Atomic Act and on the implementing Decree No. 317/2002 Coll.; the resolution was conditional upon the approvals granted by competent bodies in the Federal Republic of Germany and Sweden.

The first import of the incineration product (ash, powder) back to the Czech Republic was performed in 2009 (ash, powder). 35 pieces of 200 liter drums with the total weight of 4,5 t were returned. The waste was disposed in 2010 into the RAW repository Dukovany. Also in this case the transport was organized in agreement with legislative requirements of all the countries affected by the transport and in agreement with the new Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel. Applicable licenses were issued by SÚJB in the Czech Republic, based on the Atomic Act and related implementing regulations; the transport license was conditional upon the approvals granted by competent bodies in the Federal Republic of Germany, Denmark (alternative route) and Sweden.

Moreover, since 2009 more transports of solid combustible RAW from NPP Dukovany and Temelín to the company Studsvik Nuclear AB, Nyköping in Sweden, have been organized in

¹ According to Regulations for the Safe Transport of Radioactive Material 2005 Edition, Safety Requirements No TS-R-1 IAEA, Vienna 2005

order to reduce the RAW volume by incineration. The transports have been performed in agreement with legislative requirements of all the countries affected by the transport and in agreement with the new Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel. An applicable license was issued by SÚJB in the Czech Republic, based on the Atomic Act and the implementing Decree No. 317/2002 Coll.; the transport license was conditional upon the approvals granted by competent bodies in the Federal Republic of Germany, Denmark (alternative route) and Sweden.

Details about experience with transboundary transports of SF from research reactors ÚJV Řež a. s. to Russian Federation for the purposes of reprocessing in the reprocessing plant “Mayak“, completed in late 2007, are provided in the National Report of the Czech Republic under the Joint Convention, Revision 3.3 of September 2008. The treated waste consisted of about 2 tons of SF containing 362 kg of uranium and plutonium, which were transported by combined road and railway transport through the territories of the Czech Republic, Slovak Republic and Ukraine to Russian Federation in agreement with legislative requirements of all the countries affected by the transport. Applicable licences were issued by SÚJB in the Czech Republic, based on the Atomic Act and relevant implementing regulations.

10. Disused Sealed Sources – Article 28 of the Joint Convention

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.
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.

Section 18, Paragraph 1, letter c) of the Atomic Act establishes the obligation to keep and archive records on ionizing radiation sources, facilities, materials, activities, quantities and parameters and other facts important from the viewpoint of nuclear safety, radiation protection, physical protection and emergency preparedness and to hand over the recorded data to SÚJB, as laid down in an implementing regulation.

The same Act in Section 22, letter e) requires to maintain and to keep records about ionizing radiation sources and to communicate the recorded information to the Office, as laid down in an implementing regulation.

The implementing regulation, the Decree No. 307/2002 Coll., in Section 80, Paragraphs 1 and 2 requires also the following documents and data about the ionizing radiation sources (see the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005).

The data under Section 80, Paragraphs 1 and 2 of the Decree No. 307/2002 Coll. shall be retained for at least 10 years after the termination of the ionizing radiation source management.

Table 10.1 Number and radioactivity of disused sealed sources stored in RAW repository Richard

Radionuclide	Number of sources [pcs]	Total activity [GBq]
¹³⁷ Cs	51	4,407E+05
⁶⁰ Co	992	1,692E+05
¹⁵² Eu	1	4,516E+04
²³⁹ Pu	73	6,802E+03
²⁴¹ Am	369	6,300E+03
⁹⁰ Sr	3828	2,852E+02
²³⁸ Pu	11	1,127E+02
²²⁶ Ra	1	3,695E-01
²⁵² Cf	7	4,200E-03
²² Na	1	1,027E-04
¹⁴⁷ Pm	1	2,772E-06
²³⁸ U	1	1,000E-06
Total	5336	6,69E+05

Licenses holding a license to use or to store ionizing radiation sources shall send to the Office, in written or in another agreed form, to the state system of accounting for ionizing radiation sources the data on ionizing radiation sources that they possess, except insignificant and type-approved minor sources, unless the license condition establish otherwise. The movement of a sealed source is monitored from its manufacture or introduction into distribution until its disposal or storage. The storage option is used only if the sealed source fails to meet acceptance conditions for disposal in a given repository. All costs associated with sealed source management are born by the licensee holding a license for their management, i.e. starting from their takeover to their disposal in a RAW repository. Recommendations have been developed by SÚJB to handle found disused sealed sources, which define the role of the Czech Police, Czech Customs Service and SÚRAO in the process and the duty of persons who find such a source to report the finding to SÚJB. According to Section 26, Paragraph 3, letter k) of the Atomic Act, the found sources shall be administered by SÚRAO. Provided the owner of a found source is not identified the costs associated with its disposal or storage shall be paid from the state budget.

Table 10.2 Number and radioactivity of disused sealed sources disposed in RAW repository
Richard

Radionuclide	Number of sources [pcs]	Total activity [GBq]
¹³⁷ Cs	741	3,156E+05
⁶⁰ Co	1587	2,232E+05
²⁴¹ Am	2965	7,444E+03
³ H	10	3,127E+03
⁹⁰ Sr	336	2,443E+03
²³⁹ Pu	42	1,206E+03
⁸⁵ Kr	113	1,063E+03
¹⁵² Eu	42	1,694E+02
⁵⁵ Fe	49	7,164E+01
¹⁴⁷ Pm	35	3,538E+01
¹⁴ C	15	1,430E+01
²⁵² Cf	21	3,064E+00
⁶³ Ni	2	7,837E-01
¹⁰⁹ Cd	18	4,709E-01
²⁰⁴ Tl	4	3,258E-02
⁵⁷ Co	22	2,177E-02
¹⁰⁶ Ru	4	1,012E-03
¹³³ Ba	7	1,359E-04
²¹⁰ Pb	1	9,303E-05
¹³⁴ Cs	1	3,601E-05
¹⁴⁴ Ce	2	8,990E-06
⁶⁵ Zn	1	3,994E-06
⁷⁵ Sn	16	2,855E-06
²² Na	2	2,760E-06
⁴⁰ K	2	6,920E-07
⁵⁴ Mn	1	3,758E-09
Total	6193	5,544E+05

The described activities are supervised by SÚJB. Stable or portable detectors of ionizing radiation are used to monitor such found sources e.g. in metallurgical plants, scrap collecting centers and at border crossings.

To store disused sealed sources, which fail to meet acceptance criteria for disposal in the Richard repository, separate premises in the repository have been dedicated for this type of sources, in the form defined in the acceptance conditions for their storage. Among other conditions, the cask of such sources shall be leak-tight and easy to handle throughout the storage time.

The Czech legislation enables reimportation of a sealed source by its manufacturer as specified in Section 5, Paragraph 3 of the Atomic Act: *“An import of radioactive waste into the territory of the Czech Republic, with the exception of the re-import of ionizing radiation sources produced in the Czech Republic or radioactive waste originated from materials exported from the Czech Republic for the purpose of their processing or reprocessing having been approved by the Office, is prohibited.”*

Table 10.3 Number and radioactivity of disused sealed sources disposed in RAW repository Bratrství

Radionuclide	Number of sources [pcs]	Total activity [GBq]
²¹⁰ Pb	7	7,24E-01
²²⁶ Ra	195	7,45E+01
Total	202	7,52E+01

11. Planned Activities to Improve Safety

11.1. Nuclear Power Plant Dukovany

Replacement of ion exchangers and their treatment was tested in a trial operation in 2010. The total quantity of RAW that was withdrawn, characterized and conditioned in the SIAL[®] matrix was about 20 m³. Currently, the sludge and ion exchangers are treated at the workplace in NPP Dukovany in the operating regime.

A waste crusher and equipment for removal of cable insulation are being commissioned to minimize the volume of solid RAW.

A test remelt of 3.2 t aluminum was performed at an external workplace.

11.2. Nuclear Power Plant Temelín

A new treatment of radioactive sludge and ion exchangers has been implemented in a pilot plant using immobilization in the so-called SIAL[®] matrix. Acceptability of the resulting product for RAW repository Dukovany has been verified by an independent analysis. The waste acceptance criteria have been met.

11.3. ÚJV Řež a. s.

ÚJV Řež a. s. has facilities that were in the past used for RAW management and some of them are no more in operation. The facilities are a part of old environmental liabilities and have been gradually dismantled (see chapter 8.2.4). These facilities contain RAW from operation and from refurbishment of the nuclear installation or workplaces with ionizing radiation sources accumulated earlier. They are the following facilities:

- building 211/6 - Reloading site for RAW,
- building 241 - Velké zbytky (RAW management facility), containing technology for processing of RAW,
- storage area for RAW,
- building 211/5 - Decay tanks for RAW.

Further, adjustments and repairs are being performed in the building 241 (see chapter 8.2.4.1.).

11.4. SÚRAO

11.4.1. RAW Repository Richard

Based on results of the pilot project for chamber closing using the principle of the so-called hydraulic cage, the proposed concept has been optimized and it is now being gradually applied for the released premises.

11.4.2. RAW Repository Bratrství

Based on the license issued by SÚJB for operation of the RAW Repository Bratrství a project has been under way to fill our free space in a selected chamber.

11.4.3. RAW Repository Dukovany

Research activities have been under way concerning further specification of radionuclides behavior in a near-field (migration parameters), properties of sealing and backfilling materials in respect to the chemistry in the repository premises and host environment.

11.4.4. RAW Repository Hostím

No further activities are foreseen.

12. Appendices

12.1. List of SF Management Facilities

Table 12.1 List of SF Management Facilities

Location	Facility name	Storage capacity [pieces FA]	Storage capacity [tons of HM]
Dukovany	SF pool reactor unit 1	699	83
	SF pool reactor unit 2	699	83
	SF pool reactor unit 3	699	83
	SF pool reactor unit 4	699	83
	Interim Spent Fuel Storage Facility	5 040	600
	Spent Fuel Storage Facility	11 172	1340
Temelín	SF pool reactor unit 1	703	396
	SF pool reactor unit 2	703	396
	Spent Fuel Storage Facility	2888	1370
Řež	Annex to HLW Storage Facility (ÚJV)	576	
	SF pool in HLW Storage Facility (ÚJV)	465	
	Wet tank (CV Řež)	60	
	RAW Storage Facility (CV Řež)	80	

12.2. List of RAW Management Facilities

Table 12.2 List of RAW Management Facilities

Licensee for RAW Management	Facility	Storage/Disposal capacity
EDU	Storage of liquid RAW	
	- RAW concentrate tanks	4000 m ³
	- storage tanks for active sorbents	460 m ³
	Collection, storage and processing of solid RAW	
	- sorting workplace and storage of solid RAW	800 t
ETE	Storage and processing of liquid RAW (BPP)	
	- storage tanks for active sorbents	200 m ³
	- storage tanks for radioactive concentrate	520 m ³
	Collection, storage and processing of solid RAW (BPP)	
	- sorting workplace and storage of solid RAW	500 t
SÚRAO	Repository Richard²	8 400 m ³
	Repository Bratrství³	1 200 m ³
	Repository Dukovany	55 000 m ³
	Repository Hostím	1 690 m ³
ÚJV Řež a. s.	Velké zbytky	
	- storage facility for liquid RAW	123 m ³
	- storage facility for solid RAW	49 m ³
	High-level waste storage facility	300 m ³
	Storage area Červená skála	198 m ³
	Reloading site for RAW	1 400 m ³

² total space mined out is about 17 050 m³

³ total space mined out is about 3 500 m³

12.3. List of Nuclear Installations in the Decommissioning Stage

During the development of this National Report (March 2011) there were no NIs or other facilities associated with SF management on the Czech Republic's territory in the stage of decommissioning.

The school reactor ŠR-0 with a zero output, situated in Pilsen -Vochov, was decommissioned by decontamination and dismantling in 1995-1997. The workplace ceased to exist in 1997.

12.4. SF Inventory

Table 12.3 SF Inventory as on 31 December 2010

Location	Facility Name	Number of stored fuel assemblies [pieces]	Weight of stored fuel assemblies [tons of HM]
Dukovany	SF pool reactor unit 1	584	70
	SF pool reactor unit 2	613	74
	SF pool reactor unit 3	538	65
	SF pool reactor unit 4	559	67
	Interim Spent Fuel Storage Facility	5 040	600
	Spent Fuel Storage Facility	1 260	144
Temelín	SF pool reactor unit 1	478 ⁴	228
	SF pool reactor unit 2	307 ⁵	146,5
	SFSF	19	9,1
Řež	Annex to HLW Storage Facility (ÚJV)	0	0
	SF pool in HLW Storage Facility (ÚJV)	0	0
	Wet tank (CV Řež)	31 ⁶	
	RAW Storage Facility (CV Řež)	56 ⁷	

⁴ + 25 leaking fuel rods

⁵ + 24 leaking fuel rods

⁶ fuel type IRT-2M, 36 % wt. ²³⁵U

⁷ the dry channel of the RAW Storage Facility is used to store 12 pieces of experimental irradiated rods from natural U (1 pc) and U enriched to 6,5 % wt. ²³⁵U (11 pcs.)

12.5. RAW Inventory

Table 12.4 Inventory of solid low- and intermediate-level waste as on 31 December 2010

Licensee for RAW management	Facility	Used storage/disposal capacity
EDU	Storage of liquid RAW	1 762 m ³
	Storage of degraded sorbents	307 m ³
	Collection, storage and processing of solid RAW	164 t
ETE	Processing of liquid RAW (BPP)	192 m ³
	Storage of degraded sorbents	26 m ³
	Collection, storage and processing of solid RAW (BPP)	109 t
SÚRAO	Repository Richard	7 250 m ^{3 8}
	Repository Bratrství	1 057 m ³
	Repository Dukovany	8 120 m ³
	Repository Hostím	330 m ³
ÚJV Řež a. s.	Velké zbytky	5,7 m ³
	Storage area Červená skála	172 m ³
	HLW storage facility	3,8 m ³
	Reloading site for RAW	394,5 m ³

⁸ the reduction of the volume of disposed RAW in comparison with the past occurred due to rearrangement of a part of the inventory in the RAW repository. More details are provided in chapter 4.2.

12.6. Overview of the Czech Legislation on Utilization of Nuclear Energy and Ionizing Radiation and Related Regulations

The following paragraphs contain an overview of valid legal regulations concerning the use of nuclear energy and ionizing radiation.

12.6.1. Atomic Act and Related Acts

- Act No. **18/1997** Coll., on peaceful utilization of nuclear energy and ionizing radiation (Atomic Act) and on amendments to and alterations of some acts,
- Act No. **83/1998** Coll., amending and altering Act No. 50/1976 Coll., on land planning and building regulations (Building Act), as amended later, and on amendments to and alterations of some other acts (Art. VI - change of Section 6 of Atomic Act),
- Act No. **71/2000** Coll., amending Act No. 22/1997 Coll., on technical requirements for products and on amendments to and alterations of some other acts (Art. X - change and modification of Section 23 of Atomic Act),
- Act No. **132/2000** Coll., on modification and revocation of some acts related to the Act on Regions, Act on Municipalities, Act on District Offices and Act on the capital of Prague (Art. XX.- cancellation of Part II of Atomic Act - effective since 1 January 2001),
- Act No. **249/2000** Coll., to amend Act No. 19/1997 Coll., on some provisions associated with the ban on chemical weapons and on amendments to and alterations of the Act No. 180/2006 Coll. on land planning and building regulations (Building Act), as amended later, of Act No. 455/1991 Coll., on trade licensing (Trade Licensing Act), as amended later and of Act No. 140/1961 Coll., Criminal Act, as amended later - extension of SÚJB competence,
- Act No. **13/2002** Coll., amending the Act on peaceful utilization of nuclear energy and ionizing radiation (Atomic Act) and on amendments to and alterations of some acts, as amended later, Act No. 505/1990 Coll., on metrology, as enacted by Act No. 119/2000 Coll., Act No. 258/2000 Coll., on protection of public health and on alterations in some related acts, as amended later, and Act No. 2/1969 Coll., on establishing of ministries and other central state administration bodies of the Czech Republic, as amended later,
- Act No. **281/2002** Coll., on some provisions associated with the ban on bacteriological (biological) and toxin weapons and on alterations in the Trade Licensing Act - extension of SÚJB competence,
- Act No. **320/2002** Coll., altering and revoking some acts in connection with the terminated activities of district offices (Part 11, Article CXI, altering and amending Act No. 18/1997 Coll., as amended later).

12.6.2. SÚJB Decrees

- Decree No. **317/2002** Coll., on type-approval of packagings for transport, storage and disposal of nuclear materials and radioactive substances, on type-approval of ionizing radiation sources and transport of nuclear materials and specified radioactive substances (on type approval and transport),

- Decree No. **77/2009** Coll., amending the Decree by SÚJB No. 317/2002 Coll., on type-approval of packagings for transport, storage and disposal of nuclear materials and radioactive substances, on type-approval of ionizing radiation sources and transport of nuclear materials and specified radioactive substances (on type approval and transport),
- Decree No. **144/1997** Coll., on physical protection of nuclear materials and nuclear installations and their classification,
- Decree No. **145/1997** Coll., on accounting for and control of nuclear materials and their detailed specification, as enacted by the Decree No. 316/2002 Coll.,
- Decree No. **146/1997** Coll., specifying activities directly affecting nuclear safety and activities especially important from radiation protection viewpoint, on requirements for qualification and professional training, on methods for verification of special professional competence and issue of authorizations to selected personnel, and the form of documentation to be approved for licensing of training of selected personnel, as enacted by the Decree No. 315/2002 Coll.,
- Decree No. **165/2009** Coll., establishing a list of selected items and items of dual use in the nuclear area,
- Decree No. **307/2002** Coll., on radiation protection,
- Decree No. **132/2008** Coll., on quality assurance system in carrying out activities connected with utilization of nuclear energy and radiation protection and on quality assurance of selected equipment within regard to their assignment to classes of nuclear safety. Decree No. 215/1997 Coll., on criteria for siting of nuclear installations and very significant sources of ionizing radiation,
- Decree No. **318/2002** Coll., on details for assurance of emergency preparedness at nuclear installations and workplaces with sources of ionizing radiation and on requirements for the content of on-site emergency plans and of emergency rules, as amended by the Decree No. 2/2004,
- Decree No. **106/1998** Coll., on nuclear safety assurance and radiation protection of nuclear installations during their commissioning and operation,
- Decree No. **195/1999** Coll., on requirements for nuclear installations to assure nuclear safety, radiation protection and emergency preparedness,
- Decree No. **185/2003** Coll., on decommissioning of nuclear installations and workplaces in categories III or IV,
- Decree No. **324/1999** Coll., establishing concentration and quantity limits of nuclear materials not subject to provisions about nuclear damages,
- Decree No. **319/2002** Coll., on function and organization of the radiation monitoring network,
- Decree No. **419/2002** Coll., on personal radiation passes,
- Decree No. **474/2002** Coll., on some measures related to prohibition of bacteriological (biological) and toxin weapons and on amendments to Trades Licensing Act,
- Decree No. **193/2005** Coll., on establishment of the list of theoretical and practical areas

contained in education and training required in the Czech Republic for the performance of regulated activities in the scope of competency of the State Office for Nuclear Safety,

- Decree No. **309/2005** Coll., on technical safety assurance for some nuclear installations,
- Decree No. **462/2005** Coll., on distribution and collection of dosimeters serving for survey of buildings with higher level of exposure from natural radionuclides and on conditions for acquirement of state budget subsidy.
- Decree No. **165/2009** Coll., establishing a list of selected items and items of dual use in the nuclear area (repealing the Decree No. 179/2002 Coll.).
- Decree No. **166/2009** Coll., establishing a list of selected items and items of dual use in the nuclear area,
- Decree No. **213/2010** Coll., on accounting for and control of nuclear materials and on reporting of data required by EC regulations (repealing Decrees No. 145/1997 Coll. and 316/2002 Coll.).

12.6.3. Other Regulations

- Government Order No. **46/2005** Coll., amending Government Order No. 416/2002 Coll., establishing amounts of allocations and method of their payment by generators of radioactive waste to the nuclear account and amounts of annual contributions to municipalities and rules for their provision,
- Decree No. **360/2002** Coll., issued by the Ministry of the Industry and Trade, establishing a method to create a financial reserve for decommissioning of nuclear installations or workplaces in categories III or IV,
- Statute of the Radioactive Waste Repository Authority approved by the Government Resolution No. **846/2007**,
- Government Order No. **11/1999** Coll., on emergency planning zone.

12.6.4. Related Regulations

- Communication No. **67/1998** Coll., on agreement to the Nuclear Safety Convention,
- Act No. **500/2004** Coll., on administrative procedure (Code of Administrative Procedure), as amended,
- Act No. **44/1988** Coll., on protection and utilization of mineral riches (Mining Act),
- Act No. **552/1991** Coll., on state supervision, as amended later,
- Act No. **634/2004** Coll., on administrative fees, as amended later,
- Decree No. **305/2005** Coll., on safety assurance of technical equipment in nuclear energy industry, as amended later,
- Act No. **2/1969** Coll., on establishing of ministries and other central state administration bodies of the Czech Republic (as enacted and amended later),
- Act No. **40/2009** Coll., the Criminal Code (as enacted and amended later),
- Act No. **17/1992** Coll., on the environment,

- Act No. **93/2004** Coll., on assessment of impacts of development concepts and programs on the environment,
- Act No. **111/1994** Coll., on road transport, as amended later,
- Decree No. **478/2000** Coll., implementing the Act on road transport, as amended later,
- Act. No. **183/2006** Coll., on town and country planning and building code (Building Act)
- Decree No. **268/2009** Coll., on general technical requirements for construction projects,
- Act No. **123/1998** Coll., on the right for information about the environment, as amended later,
- Decree No. **339/2001** Coll., on method and scope of assessment of compliance of food, method of preparation and collection of samples from food and tobacco products by the producer, on food types requiring a written declaration of compliance to be issued by the producer or importer and on the scope and content of the declaration (assessment of compliance), as amended later,
- Act No. **106/1999** Coll., on free access to information, as amended later,
- Act No. **594/2004** Coll., implementing the regime of the European Communities to control export of goods and technologies of dual use,
- Act No. **22/1997** Coll., on technical requirements for products and on amendments to and alterations of some other acts, as amended later,
- Decree No. **186/2001** Coll., by the Ministry of the Industry and Trade, on the conditions to issue official permits to import and export goods and services, as amended later,
- Government Order No. **1/2000** Coll., on railway shipping rules for public railway freight transport, as amended later (particularly Section 14 thereof),
- Act No. **123/2000** Coll., on medical means and alterations in some related acts (Sections 7, 23, 24, 28 and 38),
- Act No. **124/2000** Coll., to amend Act No. 174/1968 Coll., on state professional supervision of labor safety, as amended later, Act No. 61/1988 Coll., on mining activities, explosives and state mining administration, as amended later, and Act No. 455/1991 Coll., on trade licensing (Trade Licensing Act), as amended later (Section 6, letter b)),
- Act No. **219/2000** Coll., on property of the Czech Republic and its treatment in legal relations, as amended later,
- Decree No. **62/2001** Coll., on national property management by state organizational units and state organizations,
- Decree No. **28/2001** Coll., issued by the Ministry of Transport and Communications, specifying conditions of basic postal services and basic quality requirements of their assurance by the postal service licensee (Decree on basic services provided by postal services licensees) - Section 3,
- Act No. **244/2000** Coll., amending Act No. 91/1996 Coll., on animal food (Section 3, Paragraph 13),
- Decree No. **282/2005** Coll., regulating sale of medical means (Section 1, Paragraph 2, letter e), Section 2, Paragraph 1, letter m), Paragraph 2, letter i), Appendix to the Decree,

letter h),

- Decree No. **409/2005** Coll., on hygienic requirements for products which come to direct contact with water and for products used for water treatment (Section 3),
- Decree No. **432/2003** Coll., defining conditions to classify works into categories, limit levels for biological exposure tests and particulars of reports on works with asbestos and biological agents (Section 4, Paragraph 3 and Appendix No. 1, item 6),
- Act No. **100/2001** Coll., on evaluation of impacts in the environment and alterations in some related acts (Act on Evaluation of Impacts on the Environment),
- Act No. **164/2001** Coll., on natural healing sources, sources of natural mineral water, natural healing spas and spa locations and on alterations in some related acts (Spa Act), as amended later - Section 3,
- Government Order No. **361/2007** Coll., establishing conditions for health protection of employees at work,
- Government Order No. **25/2004** Coll., establishing technical requirements for medical means,
- Act No. **185/2001** Coll., on waste and alterations in some other acts, as amended later,
- Act No. **258/2000** Coll., on protection of public health and on alterations in some related acts, as amended later.

12.6.5. Emergency Legislation

- Constitutional Act No. **110/1998** Coll., on Czech Republic's security, as amended by Act No. 300/2000 Coll.,
- Act No. **148/1998** Coll., on protection of confidential facts and alterations in some acts, as amended later,
- Government Order No. **412/2005** Coll., defining lists of confidential facts, as amended later
- Act No. **59/2006** Coll., on prevention of serious accidents caused by selected dangerous chemical materials and chemical preparations
- Government Order No. **246/1998** Coll., defining lists of confidential facts, as amended later,
- Act No. **353/1999** Coll., on prevention of serious accidents caused by selected dangerous chemical materials and chemical preparations and on alteration of Act No. 425/1990 Coll., on district offices, regulation of their competence and other related provisions, as amended later (Act on Prevention of Serious Accidents),
- Act No. **239/2000** Coll., on integrated rescue system and alterations of some acts, as amended later,
- Act No. **240/2000** Coll., on crisis management and alterations of some acts (Crisis Act), as amended later,
- Act No. **241/2000** Coll., on economic measures in crisis situations and on amendments to some other acts,

- Decree No. **328/2001** Coll., issued by the Ministry of Interior, on some details of integrated rescue system assurance, as amended, in the wording of the Decree 429/2003 Coll.
- Decree No. **380/2002** Coll., issued by the Ministry of Interior, on preparation and implementation of tasks in population protection.

12.7. Overview of National and International Safety Documents

An overview of safety documents relating to NPP Dukovany, NPP Temelín, reactor LVR-15 and all individual installations falling under the regime of the Joint Convention is provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005 and Revision 3.3 of September 2008. Other documents, not mentioned in the above referred Revisions of the National Report and mostly developed after the third review meeting of the Contracting Parties to the Joint Convention (May 2009) concern the RAW Repository Bratrství – Stabilization of chamber K2 in the premises of RAW Repository Bratrství – Jáchymov, detailed design of technical works, ENERGOPRŮŽKUM PRAHA spol. s r.o., Praha 2010.

12.8. Overview of Final Reports by International Assessment Missions

An overview of reports from international assessment missions which took place before the mid 2004 at NPP Dukovany, NPP Temelín and in ÚJV Řež a. s., SÚJB and SÚRAO is provided in the National Report of the Czech Republic under the Joint Convention, Revision 2.3 of September 2005 and in the National Report of the Czech Republic under the Convention on Nuclear Safety of May 2010.

The following international missions took place in the period from the second half of 2004 until the end of 2010:

- Follow-up WANO Peer Review 2009 (NPP Dukovany),
- SALTO mission 2008 (NPP Dukovany),
- WANO Peer Review 2007 (NPP Dukovany),
- Follow-up WANO Peer Review 2006 (NPP Temelín),
- WANO mission 2004 (NPP Temelín).