Czech Republic

National Report

under

the Article 14.1 of Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste

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Revision 1.1

June 2015

Contents

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.
Directive	Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste
EC	European Commission
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
HAW	higher active waste
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
JE (NPP)	Nuclear Power Plant
JZ (NI)	nuclear installation
k_{eff}	effective coefficient of neutron breeding
KKC	Emergency Response Center
KRAO	liquid radioactive waste
KŠ	Crisis Staff
KÚ	Regional Office
LaP	Limits and Conditions
LVR	light water reactor
MAAE (IAAE)	International Atomic Energy Agency
MF	Ministry of Finance of the Czech Republic
MMR	Ministry of Regional Development 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
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 and its update, draft of which has been approved on 15 December 2014 by the Czech government Resolution No. 1061
PpBZ (FSAR)	Final Safety Analysis Report
PRAO	solid radioactive waste
PS (FA)	fuel assembly
PZJ	quality assurance program
RAO (RAW)	radioactive waste
RF	Russian federation
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	thermoluminiscent detector
ÚJF Řež	Nuclear Physics Institute Řež
ÚKŠ	Central Crisis Staff (or Staff)
ÚRAO	radioactive waste disposal facility
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 fifth 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.

At the same time the National Report contains information on the implementation of Directive which entered into the force on 22 August 2011. The content of the National Report takes into the consideration the requirements of articles of the Directive and contains new chapter 6.7 (Transparency) on the implementation of Article 10 of the Directive. By the preparation of the National Report the non-binding recommendations of ENSREG published in a guide regarding Member States reports as required under Article 14.1 of the Directive were taken into the consideration as well.

The information contained in the report were gathered and updated as at 31 December 2013, 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, 2009 and 2012 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 2014 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 disposal facilities operated by the state organization SÚRAO, established by MPO to provide for activities associated with radioactive waste disposal.
- substantial part of old environmental liabilities on the ÚJV Řež, a. s. site has been remedied.

The following activities, which have been planned for 2014 – 2016 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.,

- approval of draft of the updated national Policy, which will particularly take into account increased demands on the disposal of RAW of institutional origin and 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 recommendations and suggestions coming from the IRRS mission organized by IAEA on a request made by the Czech Republic at the end of 2013.

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 Fifth Review Meeting of the Contracting Parties to the Joint Convention and first reporting to European Commission on Directive's implementation. The objective is to describe the performance of obligations under the Joint Convention in the Czech Republic as of December 31, 2013. 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 and on non-binding „ENSREG Guidelines regarding Member States Reports as required under Article 14.1 of Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste" of February 27, 2013.

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 disposal facility Dukovany – in operation since 1995, owned by the state since 2000,

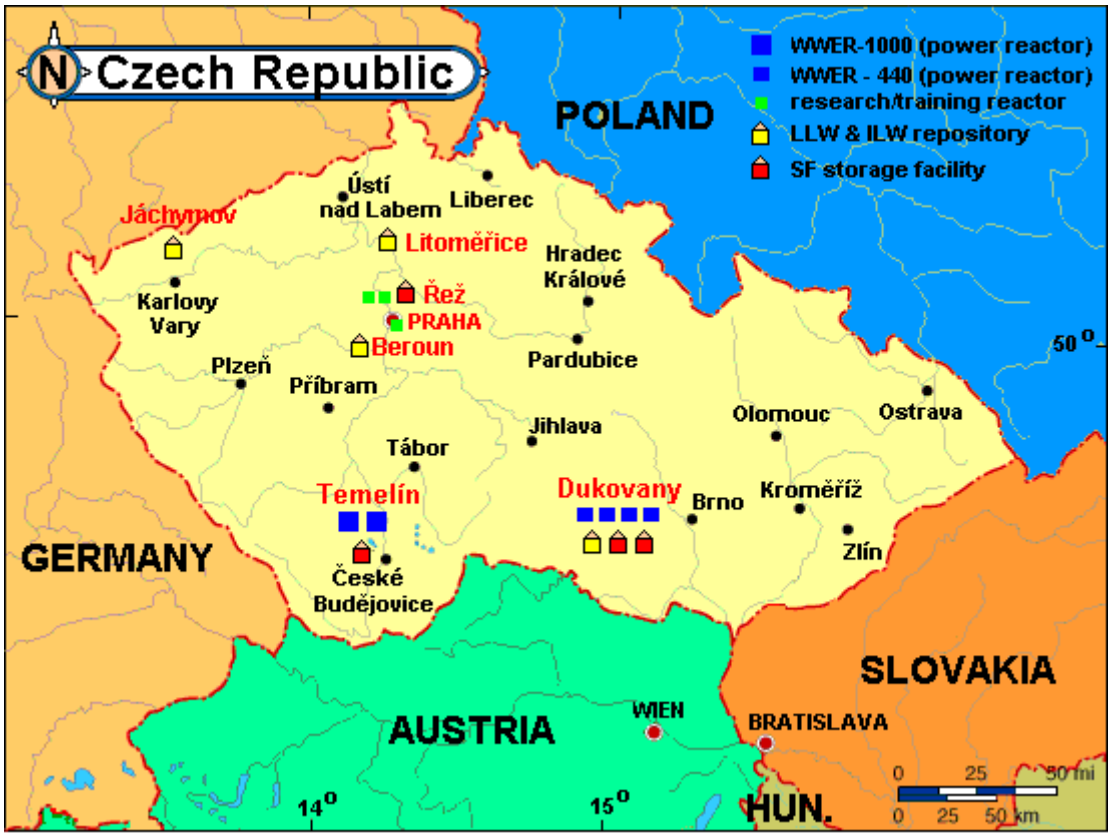

Fig. 1.1 Locations of selected nuclear installations and facilities subject to the Joint Convention in the Czech Republic

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 is in operation since December 2011.

SF generated by the operation of the research reactor LVR–15 in CV Řež s. r. o. may be stored in the HAW Storage Facility in ÚJV Řež, a. s., which is classified as a standalone nuclear installation in agreement with the Czech law. The other research reactors in CV 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.

RAW of institutional origin is generated in the CR by the use of radionuclides in medicine, industry and research. Producers of RAW give it for further treatment and processing to licensees holding authorisations for RAW management. These licensees are ÚJV Řež, a. s., UJP Praha a. s., Zam-servis s. r. o., ISOTREND s. r.o., VF a. s. and VÚHŽ a. s. In addition to RAW disposal facility 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 used for disposal of institutional RAW:

- RAW disposal facility Hostim in Beroun (active in the period of 1959-1964; closed in 1997),
- RAW disposal facility Richard in Litoměřice (institutional waste; in operation since 1964),
- RAW disposal facility 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 1.2 provides a summary of methods of SF management and management of individual RAW categories in the Czech Republic.

The differences in requirements of the Joint Convention and Directive related e.g. to the reprocessing of SF, management of SF and RAW from military applications, management of RAW containing NORM, etc., are not relevant under the conditions of the Czech Republic. Being the remaining requirements of Joint Convention and Directive almost identical, using effectively the available resources and minimizing the administrative burden, the Czech Republic has decided to prepare one National Report containing proofs of the implementation of requirements of both above cited documents. Therefore this report is officially delivered to both Secretariats, of the Joint Convention and EC.

Table. 1.1. Proof of implementation of Directive's articles in the National Report

Article of the Directive	Article of National Report	No. of pages	Article of the Directive	Article of National Report	No. of pages	Article of the Directive	Article of National Report	No. of pages
4.1	2.2	2.5	5.1 h)	6.2	2.5	9	6.2	see 5.1 h)
4.2, 4.4	9	3.5	5.2	2.2	see 4.1	10.1-10.2	6.7	see 5.1 g)
4.3	2.2	see 4.1	6.1- 6.3	5.3	10.5	11.1-11.2	2.2	see 4.1
5.1 a)	2.2	see 4.1	7.1	6.1	see 5.1 f)	12.1	12.4-12.5	2.5
5.1 b)	5.2.1	1.5	7.2-7.3	7.5., 8.5	8	12.2	2.2	
5.1 c) - e)	5.2.2	1.5	7.4	6.3	6			
5.1 f)	6.1	1.5	7.5	6.2	see 5.1 h)			
5.1 g)	6.7	1.5	8	6.2	see 5.1 h)			

Table 1.2 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 disposal facility)	Nuclear account	Long-term storage / ISFSF and SFSF Dukovany, SFSF Temelín (SF from NPP) + reprocessing in Russian Federation and storage / HAW Storage Facility (SF from research reactors)	DGR
Nuclear fuel cycle waste	Disposal in operating disposal facilities and in planned DGR	Nuclear account	Disposal in the operating disposal facility (Dukovany) and storage in operational systems (at NPPs)	DGR
Institutional waste	Disposal in operating disposal facilities and in planned DGR	Nuclear account	Disposal in operating disposal facilities (Richard, Bratrství, Dukovany), storage in Richard disposal facility and in other facilities (ÚJV Řež, a. s.)	DGR
Decommissioning liabilities	Deferred dismantling (NPP) and immediate dismantling (research reactors and other NIs), RAW will be disposed in Dukovany disposal facility	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 disposal facilities and in planned DGR; return to the country of origin	Licensee; if the licensee is not known then the state budget	Disposal in operating disposal facilities (Richard, Bratrství, Dukovany) and storage in Richard disposal facility	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. 157/2009 Coll., on mining waste management and amendments to certain acts and Atomic act, and therefore they are not covered by e.g. the Policy. This material of natural origin, placed in tailings and waste dumps, is from the workers and public radiation protection point of view regulated by SÚJB. The disposal facilities containing solely natural radionuclides are not considered nuclear installations under the Atomic Act.

2.2. Radioactive Waste Management and Spent Fuel Management Policy

Article 12 of the Directive:

2. The national programme together with the national policy may be contained in a single document or in a number of documents.

The Policy (i.e. national policy and practice according to the Joint Convention terminology and national policy and national programme according to the Directive terminology) 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). The Policy has been updated in 2010-2014 to comply with the current RAW management practices, the status of DGR development, changes in legal framework, governmental documents and international experiences and trends. Another reason for the update of the Policy were the requirements of the Directive and recommendations of IAEA and OECD/NEA. The draft of updated Policy has been approved by the Government on 15 December 2014. Before the final approval of the Policy by the Government the document has to be reviewed within the scope of SEA process. Ministry of Environment will initiate this process, which is expected to be finished in first half of 2016.

Article 4 of the Directive:

1. Member States shall establish and maintain national policies on spent fuel and radioactive waste management. Without prejudice to Article 2(3), each Member State shall have ultimate responsibility for management of the spent fuel and radioactive waste generated in it.

3. National policies shall be based on all of the following principles:

(a) the generation of radioactive waste shall be kept to the minimum which is reasonably practicable, both in terms of activity and volume, by means of appropriate design measures and of operating and decommissioning practices, including the recycling and reuse of materials;

(b) the interdependencies between all steps in spent fuel and radioactive waste generation and management shall be taken into account;

(c) spent fuel and radioactive waste shall be safely managed, including in the long term with passive safety features;

(d) implementation of measures shall follow a graded approach;

(e) the costs for the management of spent fuel and radioactive waste shall be borne by those who generated those materials;

(f) an evidence-based and documented decision-making process shall be applied with regard to all stages of the management of spent fuel and radioactive waste.

The following is crucial for RAW and SF management:

- adherence to a legal framework which does not permit any developments in RAW management which would be inconsistent with the requirements for the protection of people and the environment,
- guaranteed compliance with and enforceability of legal regulations,

- clear specification of the basic responsibilities of all legal entities and persons involved in RAW management,
- comprehensive coverage of all activities that might give rise to RAW or SF and the maintaining of a survey of such materials.

Such a system has already been created to a large extent in the Czech Republic and will be further developed in compliance with the basic principles of RAW management as defined by the IAEA and with the requirements of the Joint Convention. In addition, other principles of the Policy do comply with the requirements of the Atomic Act and its decrees on responsibility for the safety of RAW and SF management, minimization of RAW generation, interdependencies in RAW management, funding of RAW management etc.

Other principles of the Policy are:

- Only relevant licence holders are eligible to manage RAW and SF; licences are issued by the SÚJB provided that requirements specified in the Atomic Act and related implementing regulations have been met.
- RAW and SF management in the Czech Republic must be conducted in compliance with national strategic aims and internationally recognised principles (IAEA and OECD/NEA recommendations and EC requirements).
- All the costs of RAW and SF management are borne by the respective RAW and SF producers. The cost of the disposal of RAW and SF produced at the present time will be not a burden to future generations.
- RAW and SF producers are obliged to restrict RAW generation to a minimum level, provide SÚRAO with data on short-term and long-term RAW and SF production and the information required for the defining of the scale of charges and manner of payment to the Nuclear Account; charges for the disposal of LILW and for the disposal of SF and/or RAW which is unacceptable for disposal in near-surface disposal facilities are calculated separately.
- RAW and SF management licence holders are further obliged to maintain records of RAW and SF which document all the RAW and SF characteristics required by legislation.
- RAW is treated prior to disposal by the relevant SÚJB licence holders, the aim being that RAW including not being used sources of ionising radiation is disposed of without undue delay.
- SÚRAO maintains and optimises the operation of existing LILW repositories and is responsible for ensuring adequate disposal capacity for all the LILW which will be produced in the Czech Republic as a result of the peaceful use of nuclear energy and ionising radiation in the future.
- The basic Czech strategy for SF management consists of its direct disposal in a deep geological disposal facility which will be prepared for commissioning after 2065.
- Prior to the commissioning of a deep geological repository, SF and RAW unacceptable for disposal in near-surface repositories will be stored by producers or at facilities managed by SÚRAO.
- RAW and SF management and the development of a deep geological disposal facility are conducted in full compliance with relevant domestic legal regulations, international recommendations and standards which comply with globally recognised norms.
- Options for reducing the volume of SF and its radiotoxicity will be monitored and assessed on an ongoing basis.
- The public will be fully involved in the RAW and SF geological disposal facility development process and will be invited to actively participate in the fulfilment of individual stages of the

process. The site selection process will be based upon a partnership between SÚRAO and the communities concerned.

Article 5 of the Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

   (a) a national programme for the implementation of spent fuel and radioactive waste management policy;

Article 11 of the Directive:

1. *Each Member State shall ensure the implementation of its national programme for the management of spent fuel and radioactive waste ('national programme'), covering all types of spent fuel and radioactive waste under its jurisdiction and all stages of spent fuel and radioactive waste management from generation to disposal.*

2. *Each Member State shall regularly review and update its national programme, taking into account technical and scientific progress as appropriate as well as recommendations, lessons learned and good practices from peer reviews.*

The basic legal norms, which regulate licensing and approval process relating to nuclear installations and/or facilities with sources of ionising radiation are Act No. 183/2006 Coll., on land use planning and the building code (the Building Act) and the Atomic Act. Further related legislation includes Act No. 500/2004 Coll. (Administrative Procedure Act), Act No. 100/2001 Coll., on environmental impact assessment and the amendment of certain related Acts, and Act No. 106/1999 Coll., on free access to information. These Acts are further supplemented by various regulations of lower legal enforcement (for further details see Chapter 5).

In terms of the Building Act, the issuance of the three basic decisions required for the construction of a nuclear installation and category IV. workplace, (construction permission, building approval for routine operation and decisions concerning the dismantling of buildings) falls within the competence of the MPO, i.e. it is the relevant construction office for such decisions. The relevant building authority in terms of land planning permission (siting) is the MMR.

The Atomic Act specifies activities for which SÚJB authorisation is required in addition to the appropriate licences relating to siting, construction, commissioning, operation and decommissioning (closure in case of disposal facilities). This concerns licences for commissioning of nuclear installation or category IV. workplace, reconstruction or other changes which have an impact on nuclear safety, radiation protection, physical protection and emergency preparedness, the clearance of radionuclides, RAW management etc.

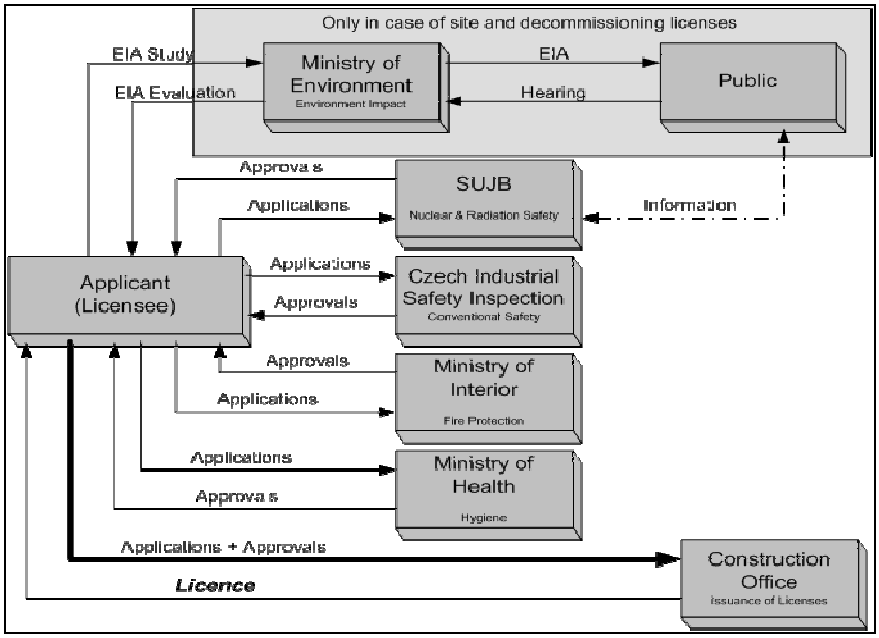

Fig. 2.1 Licensing and authorizations scheme for nuclear installations and category IV. workplaces

2.2.1 Management of LLW and ILW

The coolant used in the NPP primary cycle represents a prime source of liquid media activity. The processing of contaminated liquid media is aimed both at concentrating such activity into the smallest possible volume and the consideration of further stages in the RAW management process, primarily conditioning into a form which meets acceptability criteria for a given repository.

Solid RAW is generated mainly during regular reactor outages, routine cleaning and maintenance work, the decontamination of equipment and laboratories etc., and its composition depends on the operating mode of the reactor. One of the basic operations in the solid waste handling process consists of the sorting of the waste so as to determine those uncontaminated parts which can be safely cleared after their radiochemical control.

Technical solution for RAW collection, sorting, processing, conditioning and storage at NPPs are addressed in Chapters 4.2.1 and 4.2.2 and for disposal in Chapter 4.2.3. Details on the funding of RAW management at NPPs are covered by Chapter 6.2.

Ensuring the safe management of institutional RAW, i.e. RAW resulting from the use of ionising radiation in the industrial, health and research sectors, is considerably more complex, primarily due to the large number of producers and the diversity of the institutional waste produced. A total of 140 producers of such RAW are currently registered in the Czech Republic. The overwhelming majority of institutional RAE consists of LLW which can be disposed of in near-surface disposal facilities. Only a small amount of ILW and HLW is stored.

A number of organisations in the Czech Republic currently hold licences for RAW processing or treatment which entitle them to provide this service to other waste producers. Almost 90% of all institutional waste is processed and treated at ÚJV Řež, a. s. Institutional RAW is disposed of at

the Richard and Bratrství disposal facilities and limited amount at the Dukovany disposal facility (see Chapter 4.2.3). Details on the funding of institutional RAW are presented in Chapter 6.2.

Updated Policy assumes that in case of construction of new reactor units the current Dukovany disposal facility capacity will be fully used up by around 2050. Then a period of active and passive institutional control will follow. Its scope of and timetable will be set out in the relevant safety cases for Dukovany disposal facility closure. Similar approach will be implemented also for the closure of remaining two operational disposal facilities.

The capacity of the Bratrství repository will soon be exhausted; it is expected that the disposal of RAW at the facility will end around 2020. The disposal of waste containing natural radionuclides which, according to current Limits and Conditions, cannot be placed in the Dukovany or Richard repositories must therefore be ensured after this time. Two options concerning the disposal of such RAW are available: storage until the commissioning of the planned deep geological disposal facility or the utilisation of the Richard disposal facility should safety analysis prove that it can also be used for the disposal of this category of RAW.

It is envisaged that the current free capacity of the Richard repository available for RAW disposal will be exhausted by 2025, depending on the actual volume of RAW produced as a result of the - rehabilitation of environmental liabilities at ÚJV Řež, a.s. It is possible, however, that further disposal capacity at the Richard disposal facility will be made available by means of the adaptation of access tunnels and other unused space within the repository. In recent years, SÚRAO has adapted a number of excavated spaces at the Richard disposal facility and, based on this experience, assumes that the relevant adaptations will be made within two years of the issuance of the relevant SÚJB licence.

Research and development work will be closely related to the safe closure of the Bratrství disposal facility, proving the potential for Richard disposal facility reconstruction and the preparation of new disposal facilities, primarily for the disposal of waste containing natural radionuclides. Details of these projects are provided in Chapter 9 of updated Policy.

2.2.2 Management of SF and RAW not acceptable for disposal in near surface disposal facilities

The basic strategy of the Czech Republic consisted of the direct disposal of SF in a deep geological disposal facility planned for commissioning in 2065. Up to the time of the commissioning of the deep geological disposal facility, SF and RAW not acceptable for disposal in near-surface disposal facilities would be safely stored at the sites of producers or at SÚRAO installations. The safety of the future deep geological repository must be proved prior to construction by means of the conducting of long-term experiments in an underground laboratory.

ČEZ, a. s. is responsible for the storage of SF from power reactors in the Czech Republic. ČEZ's basic strategic variant envisages storage of SF from reactors in SF cooling pools (over a period of approximately 7 – 10 years) followed by its storage in dry storage facilities (over a period of approximately 40 – 60 years) which are located within the complexes of respective NPPs. Details

on the storage of SF are provided in Chapters 4.1.1 and 4.1.2. ČEZ, a. s. states in its strategy the intention to declare SF for RAW and to transfer it to SÚRAO for disposal after 2065.

It has been calculated that current storage capacity for SF produced by the EDU generating units currently in operation will be sufficient for 45 years of operation; capacity for the storage of SF from the currently operational ETE 1 and ETE 2 units will suffice for approximately 30 years of operation. Additional storage capacity will have to be built should the 40-year basic variant be adopted. In the case of the extension of the operation period beyond 45 years, storage capacity will also have to be increased for currently operational EDU units. Past experience has proved that the period from the start of preparations to storage facility commissioning amounts to a minimum of 10 years; this time period must be considered by the SF producer in terms of operational planning. Should the construction of new nuclear units be planned, activities concerning the storage of SF from such units must be launched well in advance.

SF is also generated as a result of the operation of the LVR-15 reactor operated by the CV Řež. With regard to the operation of other research reactors, e.g. the LR-0 research reactor at the CV Řež and the VR-1 reactor at the ČVUT, no spent nuclear fuel is generated due to their low heat production and short period of operation; slightly irradiated fuel only is generated which will probably be recycled following reactor closure (and used for the production of new fuel) or will be treated as SF.

SF from the LVR-15 enriched to more than 20% was previously transported to the Russian Federation for reprocessing according to either the Russian Research Reactor Fuel Return (RRRFR) programme (part of the Global Threat Reduction Initiative – GTRI) or the ÚJV Řež, a. s. programme for the removal of past environmental liabilities. The Czech Republic has since terminated the export of all highly-enriched fuel. Of the Czech SF currently in the Russian Federation, HLW amounting to roughly 0.74 m3 of vitrified waste containing fission products and minor actinides will be produced via the reprocessing process. The vitrified waste will be transported back to the Czech Republic in 700-litre casks containing 2 carbon steel canisters (the first portion following 2024 and the second sometime after 2033). This waste will be stored at ÚJV Řež, a. s. until the future deep geological disposal facility becomes available.

IRT-4M-type SF (the initial enrichment of fresh nuclear fuel up to 19.7%) will continue to be generated as the result of LVR-15 reactor operation. Following cooling at a wet storage facility, this SF will be reloaded into ŠKODA VPVR/M transport and storage casks in which it will be stored at the HLW facility. 16 ŠKODA VPVR/M storage containers with a total capacity of 576 fuel assemblies have been made available for this purpose - more than sufficient for the expected volume of this type of SF (the final required capacity is expected to be 8 casks).

Because of the difference between this type of SF and that from power reactors, data will be required for the safety assessment of its suitability for disposal in the deep geological disposal facility (primarily data on the rate of radionuclide release from the various SF components under repository conditions).

An integral part of the national SF management strategy and strategy of management of RAW not acceptable for disposal in existing facilities is the R&D programme for deep geological disposal facility. The understanding of the processes which may occur within the repository over a period of thousands, even hundreds of thousands of years forms one of the most important

research objectives. The operational period of DGR up to his closure (around 200 years) exceeds the typical duration of such a project. More details are provided in Chapter 7.7 and in Chapter 9 of the draft of updated Policy.

Article 5 of the Directive:

2. *Member States shall ensure that the national framework is improved where appropriate, taking into account operating experience, insights gained from the decision-making process referred to in Article 4(3)(f), and the development of relevant technology and research..*

Related to the planned construction of new units, expected long-term operation of existing units, need to have sufficient disposal capacities for institutional RAW and Directive requirements the Office has initiated, together with MPO and SÚRAO the review and update process of currently valid Policy. The review of the Policy follows requirements of Article 4.3 of the Directive and it aims, especially:

- to determine and refine strategically justified and scientifically, technologically, ecologically, financially and socially acceptable principles and aims concerning RAW and SF management in the Czech Republic;
- to maintain a system framework to aid the decision-making process at institutions and organisations responsible for RAW and SF management in the Czech Republic;
- to communicate in an understandable manner information on the long-term solution of RAW and SF management to all the stakeholders concerned and the general public and to allow them to fully participate in the fulfilment of the aims of the Concept;
- to create a framework for the assessment of progress achieved in the field of RAW and SF management and for the preparation of relevant reports as required by the IAEA Joint Convention and by the Directive.

The draft of updated Policy respects the requirements of Article 4.3 of the Directive, reflects experiences gained during the operation of existing disposal facilities and considers results of R&D projects defined by previous Policy from 2002 and evaluated in Chapter 12.2 of the draft of updated Policy. One of the tasks defined in original Policy was the harmonization of national legal framework (Atomic Act and related decrees) with EU legislation. This process is ongoing and it is expected to finish late 2015 or early2016. New atomic act will fix some legal and technical issues and will implement current recommendations of international organisations (IAEA, OECD) and EU legal documents related to the use of nuclear energy.

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 draft of updated Policy still 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 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 - HAW 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 m^3, 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 December 31, 2013 the four SF pools contained 2408 fuel assemblies with the total weight of heavy metals about 275 878 kg.

4.1.1.2. ISFSF Dukovany

ISFSF Dukovany, located on the NPP site, is designed for dry storage of SF using CASTOR-0/84 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, 2014.

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.

Fig. 4.2 Storage hall in 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, 2014 SFSF Dukovany contained 27 CASTOR-440/84M casks with the total number of 2268 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, 2013 the SF pool at unit 1 of NPP Temelín contained 444 FAs and 25 failed elements and the SF pool at unit 2 contained 459 FAs and 24 failed elements with the total weight app. 431 400 kg of heavy metal.

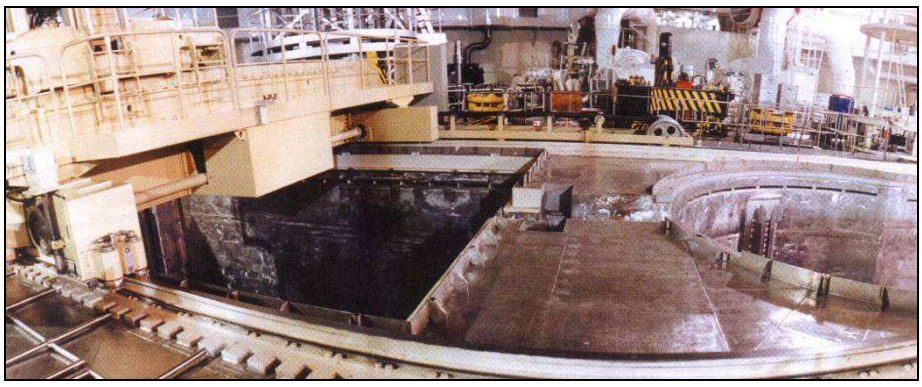

Fig. 4.3 Uncovered SF pool at NPP Temelín

4.1.2.2. SFSF 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, 2014 SFSF Temelín contained 18 CASTOR-1000/19 cask with 342 fuel assemblies in total.

Fig. 4.4 Storage hall in SFSF Temelín

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, 2013 the tank contained 22 fuel assemblies of IRT-4M type with the initial enrichment of 19.7% 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.

As at December 31, 2013 no FAs of IRT-4M type were stored in the SF storage facility. All SF with the initial enrichment higher than 20% wt. ^{235}U, i.e. 112 FAs of IRT-2M type with the initial enrichment of 36% wt. ^{235}U, has been transported to the RF for reprocessing in March 2013.

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

The HAW 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 HAW 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 HAW 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 HAW Storage Facility. Stage 2 of the refurbishment of the HAW Storage Facility included construction of a storage extension to the HAW 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 HAW 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 HAW Storage Facility as at December 31, 2013.

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 > 1mSv/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 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 disposal facility, non-generating heat)

  If RAW cannot be disposed in a RAW disposal facility 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 ±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. Facilities 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 m^3.

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

Removal of ion exchangers from the storage tank 0TW30B02 resp. 7TW30B02 started in 2010. The immobilization in aluminosilicates matrix SIAL®/ALUSIL® in mobile equipment was used for treatment of 185.5 tons of ion exchangers in total in order to achieve a form acceptable for RAW disposal facility Dukovany. The resulting volume of the product deposited in the RAW disposal facility was 377 m^3.

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 m^3 (4x550 m^3 + + 460 m^3) per double reactor unit,
- emergency tanks for radioactive concentrate with the volume of 460 m^3,
- tanks for active sorbents with the volume of 460 m^3 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.

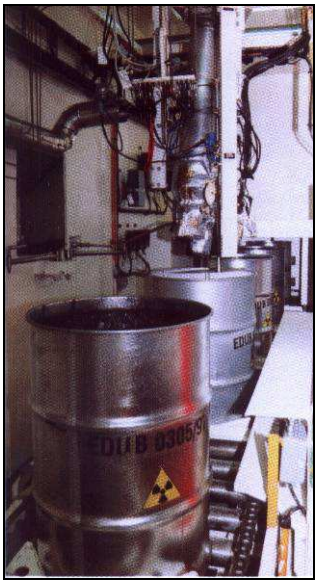

Fig 4.5 View of a bituminization line to process liquid RAW

Table 4.1 Comparison of the actually stored RAW with the operational limits and conditions for storage as at December 31, 2014

Waste type	Maximum Allowable Stored Amount	Actual Stored Amount
Liquid RAW - Active Water Concentrates	4000 m^3	700 m^3
Liquid RAW - Degraded Sorbents	460 m^3	155 m^3
Solid RAW Total	800 t	248 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 [Bq]**		
	Year		
	2011	**2012**	**2013**
Noble gases	$4.82.10^{12}$	$4.17.10^{12}$	$3.48.10^{12}$
Aerosols	$1.64.10^{7}$	$1.99.10^{7}$	$1.58.10^{7}$
Iodines	$1.86.10^{6}$	$9.74.10^{5}$	$1.19.10^{6}$
^{14}C	$7.52.10^{11}$	$7.50.10^{11}$	$7.91.10^{11}$
^{3}H	$7.26.10^{11}$	$9.41.10^{11}$	$9.55.10^{11}$
Total E (Sv)	$1.56.10^{-7}$	$1.55.10^{-7}$	$1.60.10^{-7}$
Percentage of discharge limit (%)	0.39	0.39	0.40
Radionuclide	**Liquid discharges [Bq]**		
	2011	**2012**	**2013**
^{3}H	$1.49.10^{13}$	$1.39.10^{13}$	$1.53.10^{13}$
Fission products	$2.30.10^{7}$	$7.34.10^{6}$	$6.59.10^{6}$
Total E (Sv)	$1.97.10^{-6}$	$1.76.10^{-6}$	$1.91.10^{-6}$
Percentage of discharge limit (%)	32.9	29.3	31.8

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. Since 2006 most cleared waste is disposed in Petrůvky waste dump and metallic waste is delivered to authorised customers. The Temelínec waste dump can be used practically only for disposal of rubble. Even if there is no need to regulate that, the NPPs perform regular waste dumps monitoring,
  - 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 (15 t),
  - 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 disposal facility, non-generating heat)

  If RAW cannot be disposed in RAW disposal facility 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,
- box pallets,
- waste shredder, and
- cable stripper.

- 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 disposal facility. 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 m^3.

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

In 2011-2013 3.2 t of sludge and 3.3 t of used ion exchange resins were solidified into aluminosilicate matrix SIAL®. The total quantity of the final form acceptable for disposal in RAW disposal facility Dukovany was 15 m^3.

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 m^3 (2 x 200m^3 + 2 x 60 m^3) for two units,

- emergency tanks for radioactive concentrate and sorbets with a volume of 200 m^3,
- active sorbent tanks with a volume of 200 m^3 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, 2014

Waste type	Maximum Allowable Stored Amount	Actual Stored Amount
Liquid RAW - Active Water Concentrates	520 m^3	192 m^3
Liquid RAW - Degraded Sorbents	200 m^3	52,1 m^3
Solid RAW Total	500 t	96,1 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 [Bq]		
	Year		
	2011	**2012**	**2013**
Noble gases	$4{,}83.10^{12}$	$2{,}44.10^{12}$	$2{,}38.10^{12}$
Aerosols	$2{,}28.10^{7}$	$3{,}99.10^{6}$	$1{,}97.10^{6}$
Iodines	$3{,}98.10^{7}$	$3{,}37.10^{5}$	$2{,}42.10^{7}$
^{14}C	$1{,}25.10^{12}$	$8{,}61.10^{11}$	$7{,}21.10^{11}$
^{3}H	$1{,}55.10^{12}$	$1{,}30.10^{12}$	$1{,}40.10^{12}$
Total E (Sv)	$2{,}52.10^{-7}$	$1{,}74.10^{-7}$	$1{,}47.10^{-7}$
Percentage of discharge limit (%)	0,63	0,44	0,37
Radionuclide	**Liquid discharges [Bq]**		
	2011	**2012**	**2013**
^{3}H	$5{,}68.10^{13}$	$5{,}54.10^{13}$	$6{,}38.10^{13}$
Fission products	$1{,}41.10^{8}$	$1{,}64.10^{8}$	$4{,}18.10^{7}$
Total E (Sv)	$2{,}38.10^{-6}$	$2{,}32.10^{-6}$	$2{,}66.10^{-6}$
Percentage of discharge limit (%)	79,2	77,2	88,7

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 µSv/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 µSv for discharged gas from nuclear power installations).

4.2.3. SÚRAO

4.2.3.1. RAW Disposal Facility Richard

This disposal facility 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 disposal facility. 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 disposal facility as at December 31, 2014 (incl. disposed sources)

Radionuclide	Total Activity [Bq]
^{3}H	3,62E+13
^{14}C	1,04E+13
^{36}Cl	9,05E+09
^{90}Sr	8,28E+12
^{99}Tc	4,34E+09
^{129}I	2,13E+07
^{137}Cs	3,51E+14
^{239}Pu	3,78E+12
^{241}Am	1,03E+13
Total activity of other α radionuclides	1,11E+12

Table 4.6 Inventory of RAW stored in the Richard disposal facility as at December 31, 2014 (incl. stored sources)

Radionuclide	Total Activity [Bq]
^{3}H	5,14 E+07
^{14}C	6,17 E+07
^{36}Cl	0
^{90}Sr	2.71E+11
^{99}Tc	0
^{129}I	1.21E+04
^{137}Cs	4.67E+14
^{239}Pu	9,12E+12
^{241}Am	9,14E+12
Total activity of other α radionuclides	3,54E+11

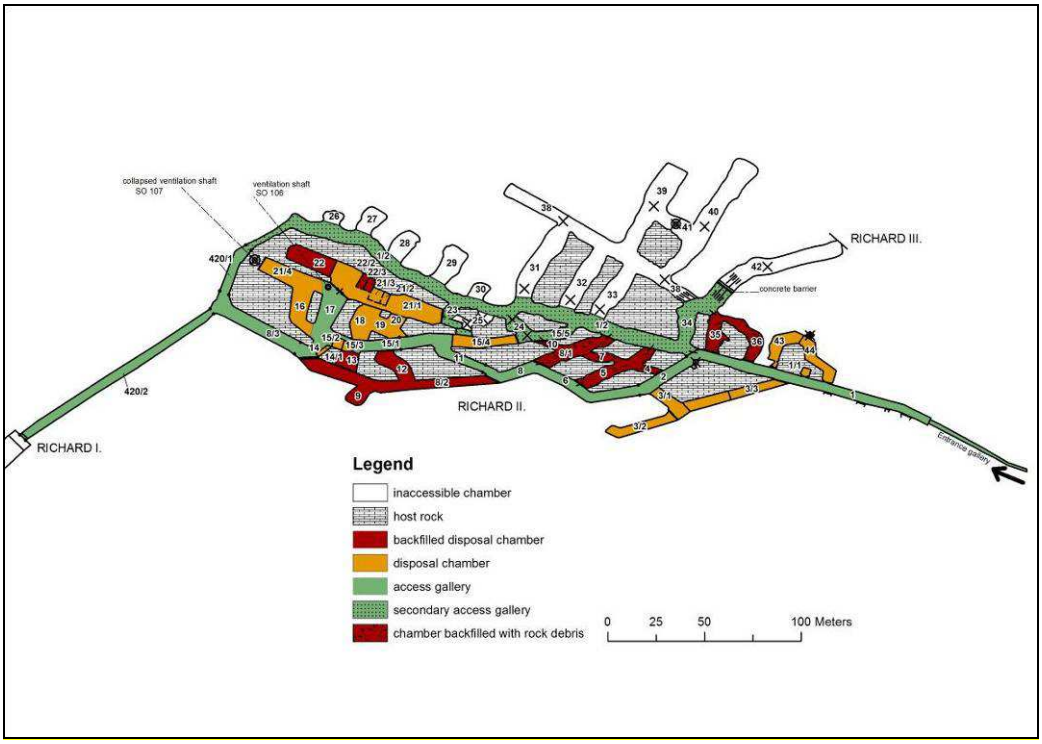

Fig. 4.6 RAW disposal facility Richard - layout

4.2.3.2. RAW Disposal Facility Bratrství

The disposal facility is used to dispose RAW containing natural radionuclides.

Table 4.7 Inventory of RAW disposal facility Bratrství at December 31, 2014

Radionuclide	Total Activity [Bq]
^{226}Ra	1.35E+12
U	5.56E+11
^{232}Th	1.37E+08

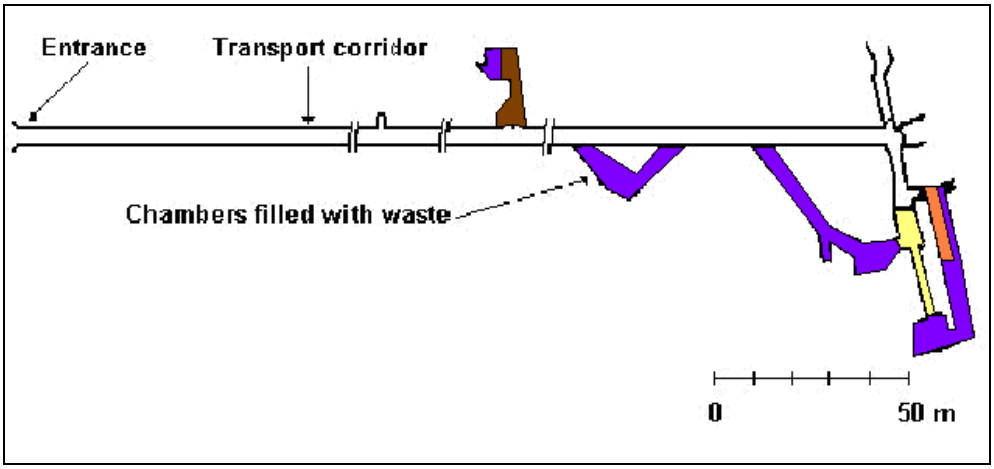

Fig. 4.7 RAW disposal facility Bratrství - layout

4.2.3.3. RAW Disposal Facility Dukovany

The disposal facility is used to dispose low- and intermediate-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 disposal facility Dukovany at December 31, 2014

Radionuclide	Total Activity [Bq]	Radionuclide	Total Activity [Bq]
^{14}C	1,99E+11	^{99}Tc	1,39E+09
^{41}Ca	3,15E+08	^{129}I	5,60E+08
^{59}Ni	7,82E+09	^{137}Cs	9,65E+12
^{63}Ni	1,02E+12	^{239}Pu	1,44E+08
^{90}Sr	9,44E+10	^{241}Am	6,42E+08
^{94}Nb	1,56E+09		

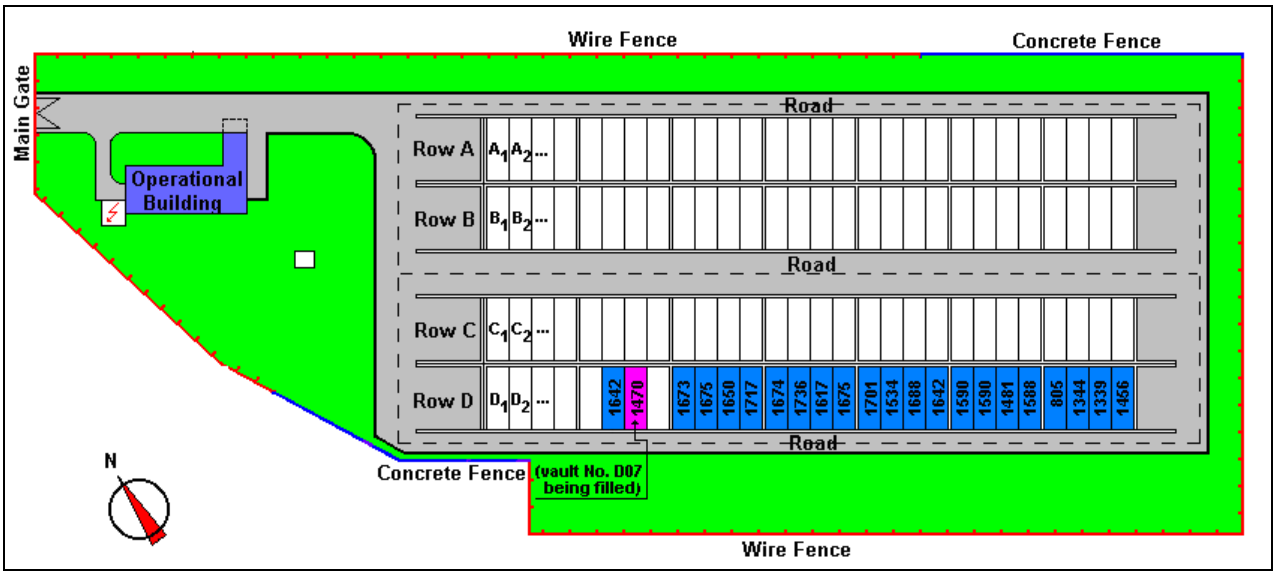

Fig. 4.8 Layout and current filling by drums (other containers or items not included) of the disposal units in RAW disposal facility Dukovany as at December 31, 2014

4.2.3.4. RAW Disposal Facility Hostim

The disposal facility 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 disposal facility Hostim - activity re-calculation in 1991

Radionuclide	Total Activity [Bq]	
	Gallery A	Gallery B
^{3}H	Estimate: Gallery A. equivalent max. 10^{10} Bq (the range of radionuclides produced in the former ÚJF)	$1.0.10^{11}$
^{14}C		$2.0.10^{10}$
^{137}Cs		$1.3.10^{10}$
^{90}Sr		$1.3.10^{10}$
^{60}Co		$5.8.10^{8}$
^{226}Ra		$3.3.10^{7}$
^{63}Ni		$1.9.10^{6}$
^{204}Tl		$1.5.10^{6}$
^{147}Pm		$1.1.10^{5}$
Total activity of radionuclides	max. 10^{10}	cca 10^{11}
	$< 10^{11}$	

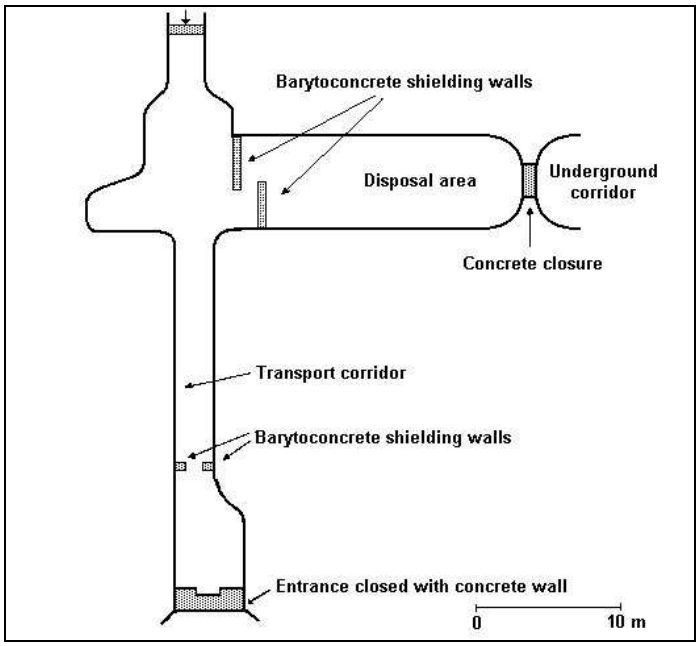

Fig. 4.9 RAW disposal facility Hostim - layout

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 111.2 m^3 (liquid RAW) and 183 m^3 (solid RAW), 160 m^3 of which for temporary solid RAW. The maximum volume of processed RAW, which can be stored in the building, is 32 m^3.

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 [m³]
Box No. 1	50
Box No. 2	50
Box No. 3	40
Box No. 4	140
Box No. 5	89,5
Box No. 6	79,89
Box No. 7	28
Box No. 8	70
Total	**547,4**

The estimated total activity of the stored RAW is 110 GBq (RAW) and 3 TBq (spent sealed sources), with the prevailing radionuclides ^{60}Co, ^{90}Sr and ^{137}Cs.

4.2.4.3. Building 211/8 - HAW Storage Facility

Table 4.11 Quantities of low and intermediate-level solid RAW

Box No.	RAW Volume [m³]
Box No. I	0
Box No. II	0
Box No. IV	47,7
Total	**47,7**

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

Table 4.12 SF inventory

SF	Qty	Location	Estimated activity	Prevailing radionuclides
No SF was stored in the HAW Storage Facility at December 31, 2014				

4.2.4.4. Storage Area for RAW

Within the scope of remediation of environmental liabilities in ÚJV Řež, a. s. all RAW stored at the Storage area Červená skála was removed. In recent time RAW and material suitable for decontamination and clearance with the help of MUM monitor was segregated from decommissioned technologies stored on this site. Also equipment stored inside ISO containers was removed incl. containers themselves. 16,31 m^3 of solid RAW has been treated and conditioned and 4 377 kg of waste material has been cleared; another 16 250 kg of this material has already been monitored for compliance with clearance levels and is ready for clearance. The site is regularly monitored by samples of surface water (rainwater).

The Storage area for RAW is not used anymore and also in the future it is not expected to use the site for RAW management.

4.2.4.5. Decay Tanks for RAW, Building 211/5

Another item of remediation of environmental liabilities in ÚJV Řež, a. s. was removal and conditioning of liquid RAW stored in decay tank "B" of Building 211/5.

In 2012 remotely controlled manipulator has been installed into the first mouth of decay tank "B". In the second mouth decay tank equipment for removal of solid RAW has been installed. This equipment was designed for the filling of internal boxes of Mozaik casks. Till the end of 2013 57 Mozaik casks has been loaded. Then loaded solid RAW has been conditioned by in-situ cementation in reloading pool in Building 250. The volume of conditioned RAW is 4.1 m^3 of higher active waste with a total activity of 1.02 TBq as at January 1, 2013, when the removal of RAW from decay tank has been completed. Then, during 2013, openings for visual control of lining of both decay tanks "A" and "B" were made. Decontamination of inner surfaces of tanks "A" and "B" is in progress.

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

5.1. Implementing Measures

Article 18 of Joint Convention:

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. Legal and Regulatory Framework

Article 19 of Joint Convention:

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

Article 5 of Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

   (b) national arrangements for the safety of spent fuel and radioactive waste management. The determination of how those arrangements are to be adopted and through which instrument they are to be applied rests within the competence of the Member States;

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

Article 5 of Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following::*

   (c) a system of licensing of spent fuel and radioactive waste management activities, facilities or both, including the prohibition of spent fuel or radioactive waste management activities, of the operation of a spent fuel or radioactive waste management facility without a licence or both and, if appropriate, prescribing conditions for further management of the activity, facility or both;

   (d) a system of appropriate control, a management system, regulatory inspections, documentation and reporting obligations for radioactive waste and spent fuel management activities, facilities or both, including appropriate measures for the post-closure periods of disposal facilities;

   (e) enforcement actions, including the suspension of activities and the modification, expiration or revocation of a licence together with requirements, if appropriate, for alternative solutions that lead to improved safety;

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. 255/2012 Coll., on inspection (Inspection Code), 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. 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. 255/2012 Coll., on inspection (Inspection Code).

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 meet the obligations specified in the Atomic Act.

In case of danger in delay SÚJB shall be entitled to order to reduce the power 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

Article 20 of Joint Convention:

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..*

Article 6 of Directive:

1. *Each Member State shall establish and maintain a competent regulatory authority in the field of safety of spent fuel and radioactive waste management.*

New phase of the establishment of a competent regulatory authority is related to the constitution of independent Czech Republic. The Czech National Council established SÚJB on

December 21, 1992 by Act No. 21/1993 Coll. In agreement therewith SÚJB after cessation of ČSFR assumed functions of the former ČSKAE in performance of state supervision of nuclear safety and nuclear materials. The competence of SÚJB has been established by Act No. 287/1993 Coll., on competence of the State Office for Nuclear Safety and related regulations and by Act No. 85/1995 Coll. (both replaced by Act No. 18/1997 Coll.).

5.3.1. Mandate and Competence of the Regulatory Body

Article 6 of Directive:

3. Member States shall ensure that the competent regulatory authority is given the legal powers and human and financial resources necessary to fulfil its obligations in connection with the national framework as described in Article 5(1) (b), (c), (d) and (e).

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,

b) radiation protection and emergency preparedness and shall inspect the adherence to the fulfillment of the obligations arising out of this Act;

c) shall monitor non-proliferation of nuclear weapons and carry out state supervision of nuclear items and physical protection of nuclear materials and nuclear installations;

d) 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;

e) shall issue authorizations for activities performed by selected personnel;

f) 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;

g) 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;

h) shall establish the emergency planning zone and, if applicable, its further structuring, and shall approve delineation of the controlled area;

i) in accordance with an implementing legal regulation, shall establish requirements on emergency preparedness of licensees, and shall inspect their fulfillment;

j) shall monitor and assess the exposure status and regulate exposure of individuals;

k) shall issue, register and verify personal radiation passport; related details shall be set out in an implementing legal regulation;

l) shall provide information to municipalities and District Authorities concerning radioactive waste management within their territory of administration;

m) 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;

n) 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;

o) 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;

p) 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;

q) 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;

r) shall approve a classification of nuclear installation or its components and nuclear materials into appropriate categories, from the physical protection viewpoint;

s) shall perform the function of the national authority for an international verification of a comprehensive ban of nuclear tests;

t) 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;

u) 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;

v) 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;

w) shall establish technical requirements to ensure technical safety of the specified equipment;

x) in agreement with the administrative authority, it shall supervise the activity of persons authorized by a special legal regulation;

y) 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 disposal facility,
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

Article 6 of Directive:

2. *Member States shall ensure that the competent regulatory authority is functionally separate from any other body or organisation concerned with the promotion or utilisation of nuclear energy or radioactive material, including electricity production and radioisotope applications, or with the management of spent fuel and radioactive waste, in order to ensure effective independence from undue influence on its regulatory function.*

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.

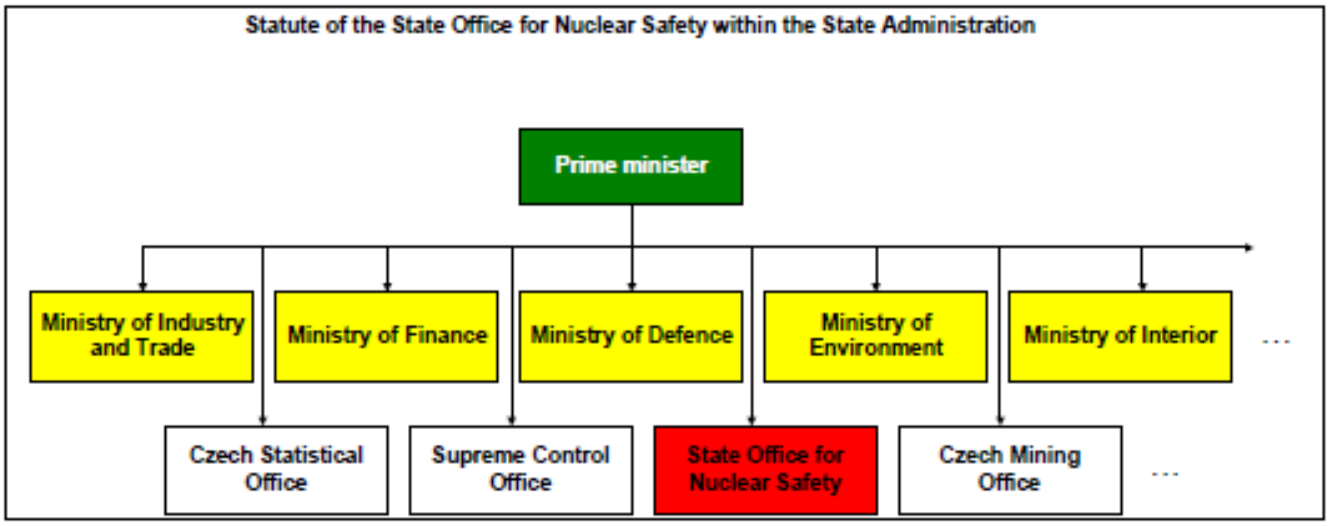

Fig. 5.1 Position of SÚJB within the structure of government bodies

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

The number of positions approved in the SÚJB budget for 2014 is 209 of which approximately 2/3 are held by nuclear safety and radiation protection inspectors. The approved SÚJB budget for 2014 was 396,289 mil. CZK and the real one 324,447 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.

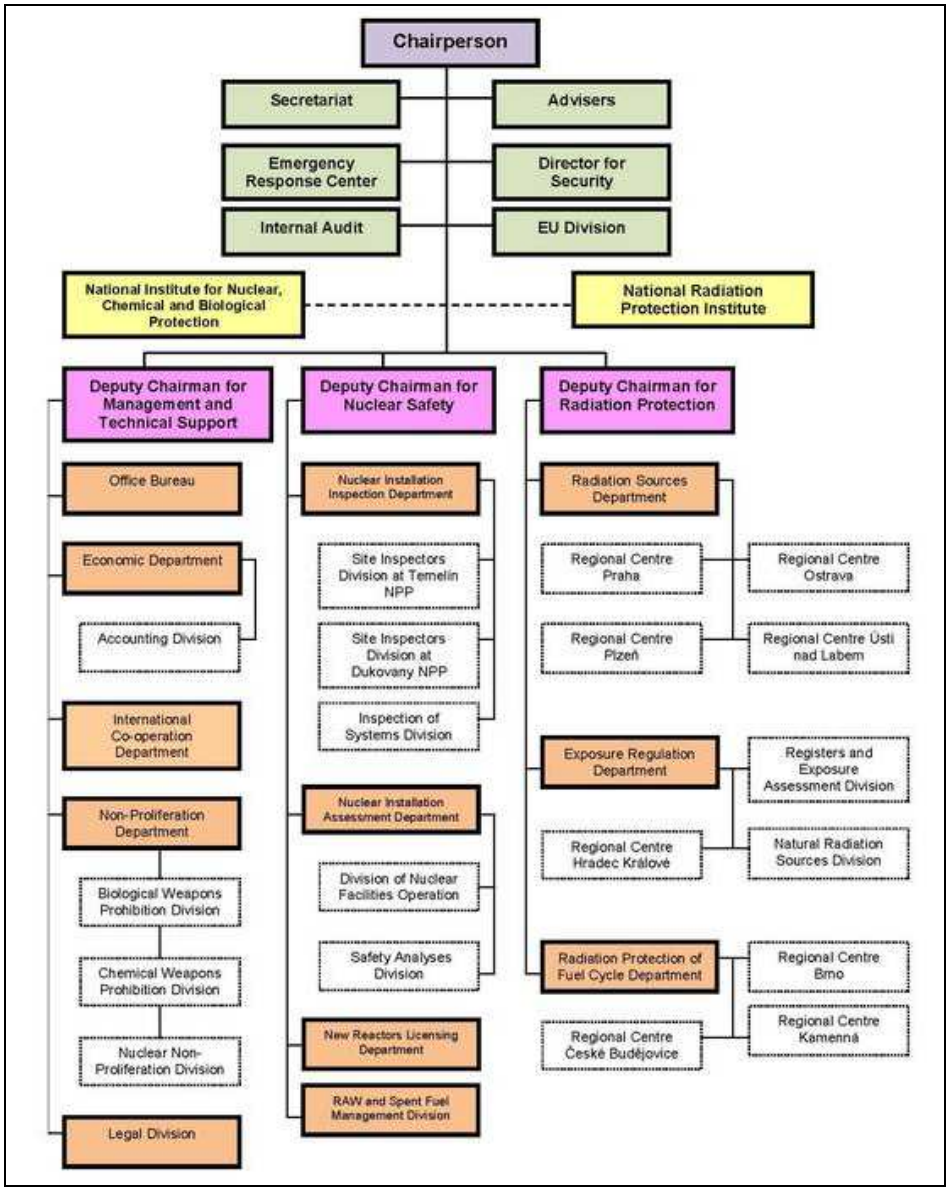

Fig. 5.2 SÚJB organizational structure

The development of basic indicators of SÚJB budget management in years 2008-2014 are showed in following Table 5.1. Total revenues were exceeded by 14 561 thous. CZK in 2014. In comparison to final budget 139,486 thous. CZK of savings were achieved. From 2011 the funding of R&D activities has been assigned to different agencies and to the Ministry of Education, Youth and Sports.

Table 5.1 Summary of SÚJB budget management (in thous. of CZK)

Basic budget indicator		2008	2009	2010	2011	2012	2013	2014
Total revenues		**5 084**	**5 503**	**7 363**	**12 215**	**56 860**	**180 331**	**184 961**
Total expenses		**365 736**	**406 676**	**351 900**	**322 302**	**310 322**	**322 185**	**324 447**
From which	- science and research	45 627	45 628	45 983	45	0	0	0
	- expenses for programming funding	92 406	95 395	64 819	123 872	106 478	116 578	109 175
	- salaries and other payments	110 588	130 208	131 311	93 381	97 533	98 849	104 741
	- other current expenses	117 115	135 445	109 787	105 004	106 311	106 758	110 531

In 2012 SÚJB successfully completed the project co-financed from the European Social Fund within the Operational Programme Human Resources and Employment – "Systematic Policy for Training and Development of SÚJB Employees". The two objectives of the project - development of a systematic policy for training and development of SÚJB employees and training of internal SÚJB lecturers have been met. In 2013 the Office fully incorporated results of the project into its training system regulated by the internal procedure VDS 039 "System of training and evaluation the SÚJB employees".

Individual plans of personal development (IPPD) for professional SÚJB employees have been developed or amended and a "credit system" has been introduced. The first running evaluation of IPPD has been performed in 2014.

A series of internal training workshops was prepared and launched in 2013 provided for by internal lecturers trained within the project. The internal trainings focus mainly on development and efficiency of the supervision

The additional training of inspectors again included a special course in nuclear technologies, which was organized based on a contract in the ČEZ, a. s. training center in Brno. More SÚJB site inspectors based at NPPs took trainings on a full-scale simulator of the NPP control system and thus they significantly improved their qualification for inspection activities.

In order to train SÚJB inspectors in other areas associated with the performance of their function the Office also used events organized by other training organizations.

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. Detailed results of these missions are listed in National Report under the Joint Convention, Revision 4.0 of March 2011.

Another independent evaluation of the SÚJB activities was conducted in 2013 in cooperation with IAEA within an IRRS mission. According to results presented by the experts in the final report, they praised particularly numerous good practices used by the Czech nuclear regulator and, at the same time, they submitted some recommendations which were supposed to contribute to overall improvement of performance of the regulatory system.

The mission has confirmed that SÚJB is an efficient and independent regulator which uses experienced, technically qualified and well-motivated personnel. In agreement with the IAEA action plan of nuclear safety, the mission reviewed how the Czech regulator used findings from the accident at NPP Fukushima-Daiichi, Japan, of March 2011. The mission observed that the Czech authorities carefully evaluated the lessons learned from the accident and defined and planned steps to further improve nuclear safety and radiation protection in the country. The mission particularly appreciated a high level of SÚJB independence and its power to propose new legislation to the government and to introduce regulations. The positives also included the fact that preparedness for and response to radiation and nuclear extraordinary events are well-coordinated with the national crisis infrastructure. The mission also declared the system for monitoring of radiation situation (MonRaS) as a good practice.

The IRRS team also identified areas where the overall performance of the regulatory system might be further strengthened. According to the mission, the Czech Republic´s government should introduce a national safety policy and strategy to ensure that the safety standards are present directly in a top-level document. The experts also recommended to further develop the SÚJB management system, particularly in respect to implementation of new measures and safety culture, including evaluation and improvement of efficiency of regulatory activities. According to the mission, the national (radiation) emergency preparedness plan, categorization of threats and renewal steps should be harmonized with IAEA safety standards. The Czech legislation as a whole should be compared with the latest IAEA safety standards on a running basis.

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

6.1. Responsibility of the Licensee

Article 21 of Joint Convention:

1. *Each Contracting Party shall ensure that primary responsibility for the safety of spent fuel o 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..*

Article 5 of Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

   (f) the allocation of responsibility to the bodies involved in the different steps of spent fuel and radioactive waste management; in particular, the national framework shall give primary responsibility for the spent fuel and radioactive waste to their generators or, under specific circumstances, to a licence holder to whom this responsibility has been entrusted by competent bodies;

Article 7 of Directive:

1. *Member States shall ensure that the prime responsibility for the safety of spent fuel and radioactive waste management facilities and/or activities rest with the licence holder. That responsibility can not be delegated.*
2. *Member States shall ensure that the national framework in place require licence holders, under the regulatory control of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as is reasonably achievable, the safety of the radioactive waste and spent fuel management facility or activity in a systematic and verifiable manner. This shall be achieved through an appropriate safety assessment, other arguments and evidence.*

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 disposal facilities. 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

Article 22 of Joint Convention:

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.

Article 7 of Directive:

5. Member States shall ensure that the national framework require licence holders to provide for and maintain adequate financial and human resources to fulfil their obligations with respect to the safety of spent fuel and radioactive waste management as laid down in paragraphs 1 to 4.

Article 8 of Directive:

Member States shall ensure that the national framework require all parties to make arrangements for education and training for their staff, as well as research and development activities to cover the needs of the national programme for spent fuel and radioactive waste management in order to obtain, maintain and to further develop necessary expertise and skills.

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.

Article 5 of Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

   (h) the financing scheme(s) for spent fuel and radioactive waste management in accordance with Article 9.

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). The financial mechanism for annual decommissioning provisions are defined in Decree No. 360/2002 Coll. Licensee creates an annual contribution to the decommissioning fund calculated as a division of estimated total decommissioning cost to the number of years passed from the time when licence had been issued to the expected end of decommissioning activities.

Institutional supervision of disposal facilities 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.

Article 9 of Directive:

Member States shall ensure that the national framework require that adequate financial resources be available when needed for the implementation of national programmes referred to in Article 11, especially for the management of spent fuel and radioactive waste, taking due account of the responsibility of spent fuel and radioactive waste generators.

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 209.076 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 0.216 mil. CZK/year. Since 2006, the provision of 0.285 mil. CZK/year has been created for decommissioning of SFSF Dukovany. For the decommissioning of SFSF Temelín 0.172 mil. CZK/year is created.

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 2013, in agreement with the Government Order No. 416/2002 Coll. deposited on the nuclear account the payment of 1 537.266 400 mil. CZK and the total amount paid to the nuclear account since 1997 amounts to about 18 408.438 865 mil. CZK;
- has created a provision for decommissioning of nuclear installations amounting to 7 602.596 137 mil. CZK (from which the provision for decommissioning of EDU it is 5 386.115 655 mil. CZK and for ETE it is 2 211.624 640 mil.CZK, for ISFSF Dukovany it is 2.287 322 mil. CZK, for SFSF Dukovany it is 1.878 900 mil. CZK and for SFSF Temelín it is

0.689 620 mil. CZK); the blocked funds as at December 31, 2013 amounted to 10 244.484 052 mil. CZK.

6.2.2. ÚJV Řež, a. s.

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

It means that the HAW Storage Facility would be decommissioned in 2045 where its radioactive contents are to be removed to a disposal facility - if permitted by the waste acceptance criteria of the existing disposal facilities. Subsequent storage of other RAW not complying with waste acceptance criteria and suitable to DGR will 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, 2013, ÚJV Řež, a. s. had created the provision for decommissioning amounting to 61.538 mil. CZK, from which the provisions for decommissioning of the HAW Storage Facility was 776 000 CZK.

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 2.130 600 mil. CZK/year and the total amount as at December 31, 2013 was 4.261 200 mil. CZK. The provision for LR-0 amounts to 461.2 thous. CZK and the total amount as at December 31, 2013 was 922.4 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. Financial reserve for decommissioning of LVR-15 and LR-0 reactors, created by their former operator – ÚJV Řež, a. s., was transferred to CV Řež account in 2014.

6.2.4. SÚRAO

SÚRAO has proposals approved by SÚJB for closure of disposal facilities, 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

Article 23 of Joint Convention:

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.

Article 7 of Directive:

4. Member States shall ensure that the national framework require licence holders to establish and implement integrated management systems, including quality assurance, which give due priority for overall management of spent fuel and radioactive waste to safety and are regularly verified by the competent regulatory authority.

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.

6.3.1.1. 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.

6.3.1.2. 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 disposal facilities 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 – HAW 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 HAW 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 - HAW 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 – HAW 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 disposal facility. 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 disposal facility siting,
- NI / RAW disposal facility construction,
- NI commissioning stages,
- NI / RAW disposal facility operation,
- reconstruction or other changes affecting nuclear safety, radiation protection, physical protection, or emergency preparedness of NI or RAW disposal facility,
- NI / RAW disposal facility closure and 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

Article 24 of Joint Convention:

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.

6.3.5. 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.

Currently a new Atomic Act and related decrees are under preparation to bring the radiation protection in line with the Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation and with ICRP 103.

6.3.6. Implementation of Radiation Protection Requirements

6.3.6.1. 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.

6.3.6.2. 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 μSv 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 legislative document. They are determined by SÚJB for each particular nuclear installation and set below 50 μSv/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.

6.3.6.3. 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.

6.3.6.4. 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 thermoluminiscent detectors controlled by the radiation monitoring laboratory of the particular NPP. Independent of those networks, the relevant regional centers of SÚJB perform measurements using thermoluminiscent 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 thermoluminiscent 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 thermoluminiscent 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, $^{239+240}Pu$ and ^{85}Kr in the atmosphere,
- ^{137}Cs, ^{90}Sr and ^{3}H 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.

6.3.7. 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,
- 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. But in general the inspections are focused on the control of the compliance of the facility or activity with license conditions, legal requirements, OLC and operating procedures.

6.5. Emergency Preparedness

Article 25 of Joint Convention:

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.

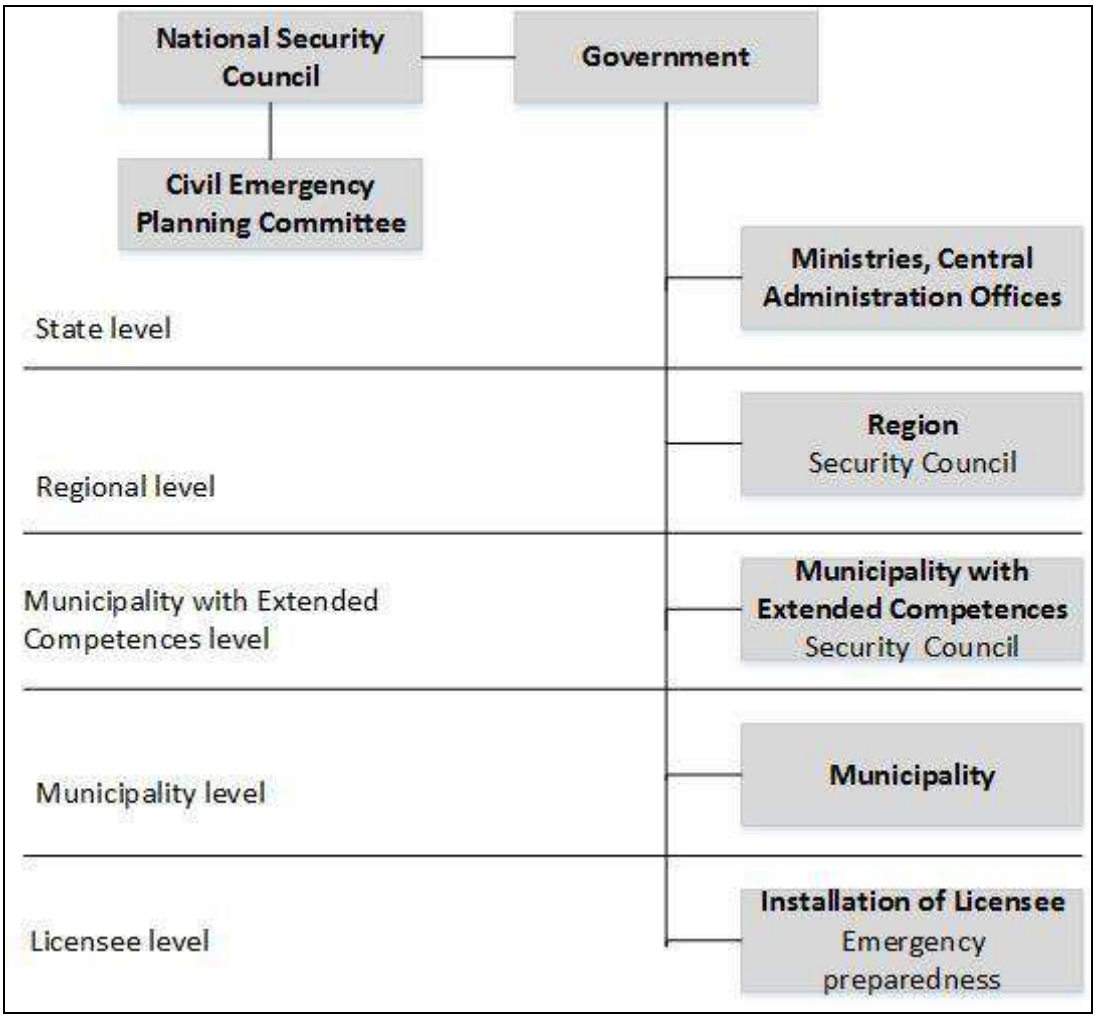

Fig. 6.1 Basic structure of emergency preparedness for extraordinary events in the Czech Republic

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.

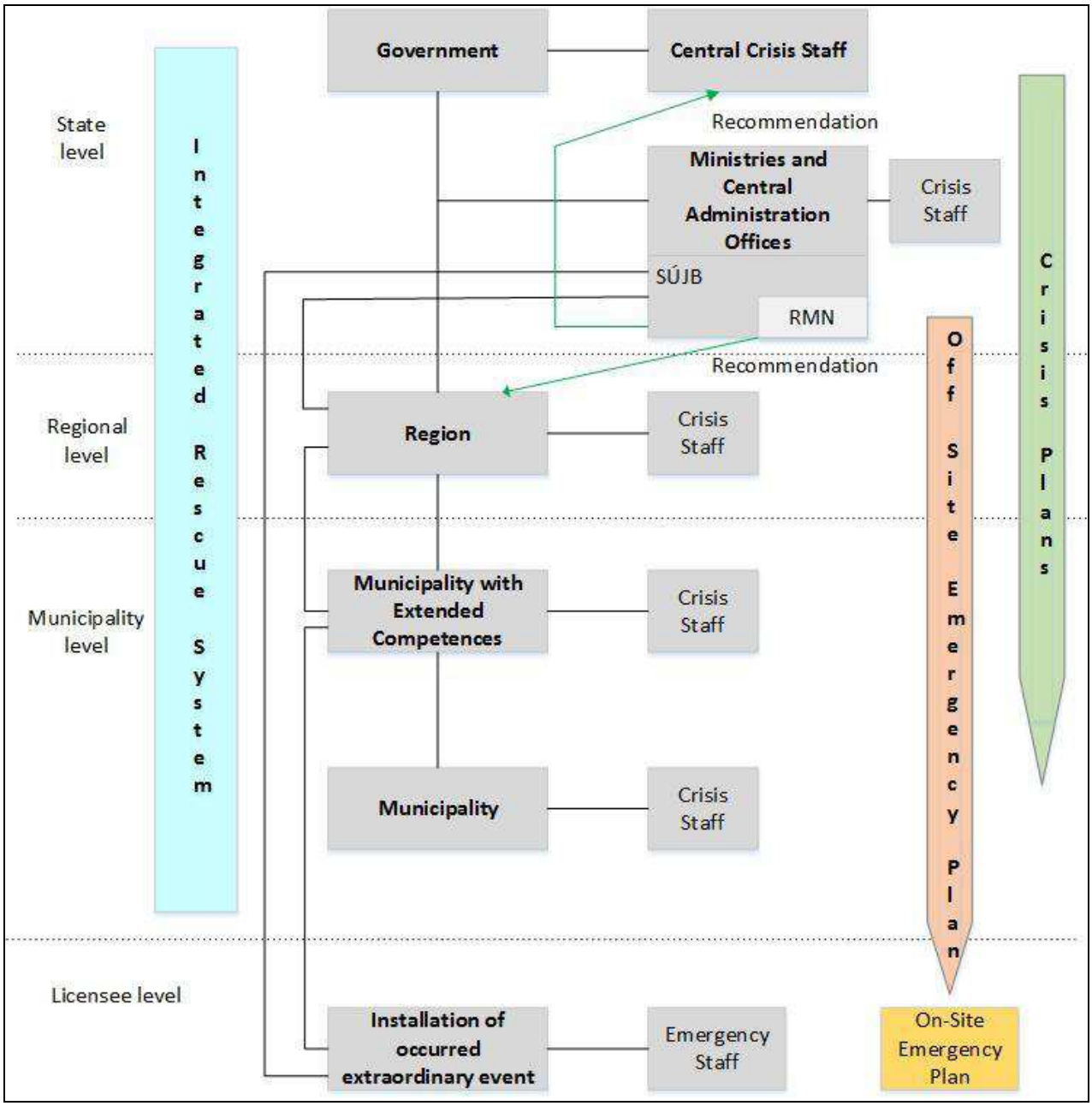

Fig. 6.2 Basic structure of emergency response to radiation accident in the Czech Republic

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 headed 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 disposal facility 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 disposal facility Dukovany (NI),
  - RAW disposal facility Richard (NI),
  - RAW disposal facility 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 licensee to operate a nuclear facility has prepared its on-site emergency plan to include extraordinary events in RAW management. SF management (ISFSF and SFSF Dukovany and SFSF Temelín) is included in the on-site emergency plans of NPPs.

The on-site emergency plans, or any amendments thereof, are 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 disposal facility 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 region offices in cooperation with municipalities with extended competences offices 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 controls the National Radiation Monitoring Network and works as its headquarters. In compliance with the provisions of the Crisis Act, the Emergency Response Center works as crisis management workplace, i.e. also support the activity of the Crisis Staff, including the service of Contact point 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 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

determination of the source term, 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 on site 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 release of radioactive materials and to provide information on the potential exposure off site based on the weather situation and its predicted progress, including specification and clarification of the radiation situation based on the information on radioactive release from the nuclear installation,
- specification of the source term of radioactive release and the range of affected area based on the data and information gathered by monitoring of the radiation situation using the teledosimetric systems of the nuclear installation, mobile groups, aircraft groups or any other activated components of the Radiation Monitoring Network while using the technical equipment and methodology or program tools,
- processing of background information necessary for decisions on 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

Article 26 of Joint Convention:

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.

6.7. Transparency

Article 5 of Directive:

1. *Member States shall establish and maintain a national legislative, regulatory and organisational framework ('national framework') for spent fuel and radioactive waste management that allocates responsibility and provides for coordination between relevant competent bodies. The national framework shall provide for all of the following:*

   g) national requirements for public information and participation;

Article 10 of Directive:

1. *Member States shall ensure that necessary information on the management of spent fuel and radioactive waste be made available to workers and the general public. This obligation includes ensuring that the competent regulatory authority inform the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations.*
2. *Member States shall ensure that the public be given the necessary opportunities to participate effectively in the decision- making process regarding spent fuel and radioactive waste management in accordance with national legislation and international obligations.*

The right of free access to information in the Czech Republic is regulated by the Act No. 106/1999 Coll. The act establishes rules for provision of information and conditions for the right to free access to information in agreement with the applicable Directive of the European Parliament and of the Council (2003/98/EC, on the re-use of public sector information). The right to information about the environment is regulated by the Act No. 123/1998 Coll., in agreement with the Directive of the European Parliament and of the Council 2003/4/EC, on public access to environmental information. It regulates the assurance of right to environmental information and the right to timely and complete environmental information, to creation of conditions for execution of the right and support of pro-active disclosure of environmental information by the liable entities. Every year SÚJB receives several inquiries concerning management of SF and RAW with reference to the above-mentioned legal regulations. The questions asked by the general public and the respective answers are made public on the SÚJB website, along with frequently asked questions and Internet conferences on selected spheres of SÚJB activities.

The obligation to inform the general public about management of RAW is imposed on SÚJB directly also in Section 3, Paragraph 2, letter k) of the Act No. 18/1997 Coll. The information shall include the quantity of generated RAW, the quantity of RAW stored in the existing disposal facilities and the number RAW transports (both within the country and international) performed in one calendar year. The information is made public once a year at the SÚJB website. The

information publically available at the SÚJB website also includes all the National Reports, including questions asked by the Contracting Parties and the respective answers and links to information made public by 2012 within the IAEA NEWMDB (Net Enabled Waste Management Database).

The general public is involved in the decision-making process concerning management of RAW and SF during the assessment of environmental impacts of installations for SF and RAW management (EIA) under the Act No. 17/1992 Coll., on the environment, and the Act No. 93/2004 Coll., on assessment of impacts of development concepts and programs on the environment. The environmental impact assessment issued by MŽP, which is responsible for implementation of the EIA process, is a precondition for issuance of SÚJB licenses for siting, construction and individual decommissioning stages of nuclear installations. The general public is involved in the decision-making process also under the Act No. 50/1976 Coll. (Building Act).

SÚJB also attends meetings with the general public and holders of licenses for management of RAW and SF, particularly in connection with public discussions to select locations for the deep geological repository for RAW. Twice a year SÚJB representatives also attend workshops on RAW management attended by the license holders.

In order to strengthen a transparent process to select a suitable location for the deep geological repository and to respect interests of the general public a Working Group for dialogue about the deep geological repository was established in November 2010, with a support provided by MPO and in cooperation with MŽP. Most members of the Working Group are representatives of local municipal authorities from locations considered for the deep geological repository, local ecological organizations, both chambers of the Czech Parliament, national institutions responsible for disposal of radioactive wastes (MPO, MŽP, SÚJB, SÚRAO) , as well as experts in humanities and technical fields and representatives of national ecological initiatives. On 15 May 2014 the Working Group organized a workshop in the premises of the Senate of the Czech Parliament entitled ”Deep geological repository and the role of the general public“ with the objective to:

- ensure legitimacy of the Working Group so that it can effectively see to transparency of and participation of the general public in decision-making processes in the individual stages of preparation of DGR,
- open a discussion about the current procedure for selection of a location for DGR and
- obtain positions from responsible governmental institutions and other stakeholders on the proposed legislation regulating preparations and construction of DGR.

During the year 2014 the Working Group has been transformed and now it works within the framework of the Government Council for Energy and Raw Materials Strategy of the Czech Republic. The transformation process has been finished on 6 January 2015, when the Minister of industry and trade and the Chair of the Council issued an independent Status of the Working Group. In this way the Working Group became one of advisory bodies of the Government Council for Energy and Raw Materials Strategy of the Czech Republic. Mission, main goals and rules of procedure of the Working Group are defined in the Status of the Working Group.

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

7.1. General Safety Requirements

Article 4 of Joint Convention:

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

Article 5 of Joint Convention:

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. After the power upgrade finished in 2013 the power each reactor has increased to 500 MWe. 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)

More design and operating details of SFSF Dukovany and CASTOR-440/84M casks 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 CrB_2+Al alloy with a natural content of ^{10}B. 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_2O_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

More design and operating details of SFSF Temelín and CASTOR-1000/19 casks are provided in the National Report of the Czech Republic under the Joint Convention, Revision 4.1 of September 2011.

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 December 31, 2013 the pools A and B contained no SF and in the pool B old experimental equipment is stored.

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 - HAW Storage Facility)

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

- RAW with higher activity, not complying with WAC for disposal in available facilities,
- solid non-standard waste.

Higher-activity RAW is kept fixed in concrete 216 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.	-	Empty
Box	III.	-	Non-standard waste
Box	IV.	-	Barrels with solidified RAW
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

Article 6 of Joint Convention:

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 (July 2014) 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

Article 7 of Joint Convention:

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 (July 2014) 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

Article 8 of Joint Convention:

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).

Article 7 of Directive:

2. *Member States shall ensure that the national framework in place require licence holders, under the regulatory control of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as is reasonably achievable, the safety of the radioactive waste and spent fuel management facility or activity in a systematic and verifiable manner. This shall be achieved through an appropriate safety assessment, other arguments and evidence.*
3. *As part of the licensing of a facility or activity the safety demonstration shall cover the development and operation of an activity and the development, operation and decommissioning of a facility or closure of a disposal facility as well as the post- closure phase of a disposal facility. The extent of the safety demonstration shall be commensurate with the complexity of the operation and the magnitude of the hazards associated with the radioactive waste and spent fuel, and the facility or activity. The licensing process shall contribute to safety in the facility or activity during normal operating conditions, anticipated operational occurrences and design basis accidents. It shall provide the required assurance of safety in the facility or activity. Measures shall be in place to prevent accidents and mitigate the consequences of accidents, including verification of physical barriers and the licence holder's administrative protection procedures that would have to fail before workers and the general public would be significantly affected by ionising radiation. That approach shall identify and reduce uncertainties.*

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. Periodic safety assessment after 30 years of NPP Dukovany operation, following new requirements of the IAEA guide NS-G-2.10, has been launched in 2013. The basic principle of this process is identical to previous safety re-assessments; i.e. preparation of safety evaluation reports for all 14 assessment areas, also covering the management of fresh and spent fuel.

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. In prescribed period in 2014 the operator of SFSF Dukovany will deliver the application for the operation of the facility for another 10 years.

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

The facility was in trial operation from September 2010 till December 2011 and after successful commissioning the operation licence has been issued. The licensing process has been based not only on the updated PpBZ but also on the „Evaluation of results of previous commissioning stages“, „Evidence of implementation of previous decisions and conditions of the Office“, „Evidence that facility and personnel are prepared for operation“, „Operation time schedule“, „Updated operational limits and conditions“ etc. The operational licence is valid till the end of 2021.

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 HAW 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 - HAW 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 keff = 0.459 ± 0.016. For the optimum moderation pool keff = 0.737 ± 0.017.

The heat output of the stored spent fuel was determined for Pool B in the HAW 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

Article 9 of Joint Convention:

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

(i) *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 Pool

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, 2013, 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 Pool

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 September 9, 2010 by placement of the first loaded cask into the SF storage facility. SFSF Temelín is in operation since December 2011.

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 4.0 of March 2011.

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 – HAW Storage Facility)

The working and technological procedures effective until 2006 for the operation of HAW 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 HAW Storage Facility (Building 211/8), Ref. No. DPP

2400.15, Edition 1, Revision 0, of November 15, 2011,

- Definition of the radiation controlled area of HAW 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,
- HAW 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 HAW Storage Facility, Ref. SM 016, Revision 00, of February 1, 2013,
- Emergency instructions of HAW Storage Facility, Ref. No. PRO 2404.09, Edition 1, Revision 0, of January 18, 2012,
- Decommissioning proposal for HAW Storage Facility (Building 211/8), Ref. 2400.04, System No. 28.00.00, Edition 1, Revision 0, Level II, ÚJV Řež a. s., of March 14, 2011,
- Quality assurance program, Operation of the HAW 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.

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

Article 10 of Joint Convention:

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 crystallinic rocks (granites or homogenous gneiss massifs) after 2050 and it should start operation after 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. Following the discussion with public SÚRAO expects the begin of geological works at several sites in 2016.

In May 2015 the site selection process reached a new phase, when for five of seven potential locations SÚRAO obtained an approval for the first phase of geological works using surface techniques.

The selection of two candidate sites has been several times postponed and at present time it is expected that they will be identified in 2020.

The disposal facility is expected to accommodate all RAW that cannot be disposed in near-surface disposal facilities, SF declared as RAW and, if needed, also HLW from potential reprocessing of SF form NPP Dukovany and NPP Temelín and SF and HLW from other nuclear sources. Four units of NPP Dukovany will generate a total quantity of 1740 t HM and two units of NPP Temelín will generate 1750 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 690 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 720 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 5010 t of HM. Based on the current estimates the demand for the disposal capacity of DGR may be about 10 000 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 are available from 2011 and they reflect both the requirements for the location selection and 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

Article 11 of Joint Convention:

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

Article 12 of Joint Convention:

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 sent 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 Petrůvky.

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 disposal facilities is demonstrated by compliance with the radiation protection limits. The limits to be observed are the annual effective dose equivalent for the workers at 20 mSv and an optimization limit for 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 for a license to operate the disposal facility (particularly in safety analyses from which operational limits and conditions for the disposal facility operation are derived) under Section 9, Paragraph 1, letter d) of the Atomic Act and in documents supporting the application for a license to manage RAW under Section 9, Paragraph 1, letter j) of the same Act. Before issuing the licenses SÚJB verifies compliance of the actual status with the documents by inspections.

8.2.3.1. RAW Disposal Facility Richard

RAW Disposal Facility Richard has been developed in a complex of the former limestone mine Richard II (inside the Bídnice hill - 70 m under the ground level). Its communication corridor is 6 - 8 m wide and 4 - 5 m tall. Individual disposal chambers are accessible from the corridor.

Since 1964 the disposal facility has been used to dispose institutional waste (RAW from utilization of radionuclides in medical care, industry and research). The total volume of adapted underground premises is almost 19 000 m^3, while the capacity for waste disposal is about a half of the volume and the rest are service galleries. Safety of the operating disposal facility is checked by a monitoring system in agreement with a monitoring program approved by SÚJB. The method of the disposal facility closing has been assessed by safety analyses.

Based on findings from hydrogeology, geology engineering, geotechnical and seismic surveys, construction expert reports and the condition of disposed containers it is possible to conclude that throughout the location all requirements for radiation protection and nuclear safety have been met on a long-term basis in compliance with the Atomic Act and its implementing regulations. The disposal facility has been operated based on a license issued by SÚJB.

Fig. 8.1 View into a disposal chamber of RAW Disposal Facility Richard

8.2.3.2. RAW Disposal Facility Bratrství

The disposal facility is designed exclusively for RAW containing natural radionuclides.

Fig. 8.2 View into a disposal chamber of RAW Disposal Facility Bratrství

The disposal facility 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 m^3. The disposal facility 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 disposal facility 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 disposal facility has been operated based on a license issued by SÚJB.

8.2.3.3. RAW Disposal Facility Dukovany

Fig. 8.3 Closing a full vault with concrete

RAW Disposal Facility 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 disposal facility has been in operation since 1995. The total volume for waste disposal is about 55 000 m^3 (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 disposal facility is checked by a monitoring system in agreement with a monitoring program approved by SÚJB. The method of the disposal facility closing has been assessed by safety analyses. The disposal facility is operated based on a license for operation issued SÚJB.

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

8.2.3.4. RAW Disposal Facility Hostim

RAW Disposal Facility Hostim was in operation in 1959 - 1964. It was built in 1959 in the limestone mine Alkazar nearby the village of Hostim by adaptation of two galleries driven in 1942 -1944. The total volume of the two galleries was about 1690 m^3. The disposal facility contains low-and intermediate-level waste from ÚJV Řež, a. s. and former ÚVVVR. The operation of the disposal facility was terminated in 1965.

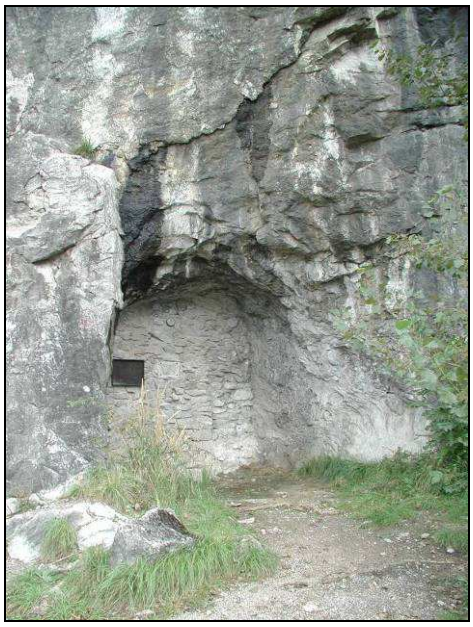

Fig. 8.5 Secured entrance into the RAW Disposal Facility Hostim

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 disposal facility.

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 disposal facility. The disposal facility 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 - HAW 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.),
- solidification of liquid and solid RAW by cementation - for both solid and liquid (concentrate) RAW.

In 2011-2013 the Building 241 has been reconstructed. The objective of reconstructions and modifications was to ensure a long-term, safe, reliable and economical operation of the equipment for RAW management. Another objective was to increase the capacity for RAW management to meet the contractual requirements (management of RAW from external producers, remedy of environmental liabilities in ÚJV Řež, a. s., etc.)

The reconstruction and modifications included update 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 reconstruction included 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 is equipped with additional technology (shot-blasting decontamination installation) to ensure optimized and up-to-date RAW management and to increase the capacity of the RAW management center.

Except above listed 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 remediated. No additional measures relating to radiation protection will be necessary during the liquidation.

8.2.4.2. HAW Storage Facility

The HAW 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 a tank of carbon steel lined by stainless 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 - HAW 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 HAW 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, hot chamber workplace (HK EK-10) was commissioned and it is used for SF EK-10 repacking,
- in 2007, an annex of HAW 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

Article 13 of Joint Convention:

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 disposal facilities 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 disposal facilities, 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 operating 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 HAW 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

Article 14 of Joint Convention:

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 disposal facility 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

Removal and processing of ion exchange resins from storage tanks 0TW30B02 and 7TW30B02 started in 2010. Mobile installation for conditioning into SIAL®/ALUSIL® matrix treated 185.5 t of ion exchange resins into the form suitable for disposal in RAW disposal facility Dukovany. The total volume of disposed RAW was 377 m^3.

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.

Mobile installation for conditioning into SIAL® matrix treated 3.2 t of sludge and 3.3 t of ion exchange resins in 2011-2013. The total volume of conditioned RAW disposed in RAW disposal facility Dukovany was 15 m^3.

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 Disposal Facility Richard

RAW Disposal Facility Richard is designed to dispose RAW containing artificial radionuclides.

The disposal facility 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 company "Čížkovické cementárny a vápenky".

In the early 1960s the mine work Richard II was identified as a potential disposal facility for low-level waste. The disposal facility 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 disposal facility premises occurs in the entrance portal and from ventilation chutes. Additional water gets into the disposal facility by condensation of water from forced ventilation. The seeping and condensing water in the disposal facility are drained into the mine drainage system. The mine water from the Richard disposal facility (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 disposal facility to monitor hydrogeological conditions in the concerned area, 9 of which for monitoring purposes and the remaining ones for prospecting purposes.

From the geotechnical viewpoint the mine can be considered as stable.

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

Radiation protection is performed by monitoring in agreement with the Monitoring program approved by SÚJB. A concept has been approved for the disposal facility's closure and decommissioning.

8.4.3.2. RAW Disposal Facility Bratrství

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

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

Two factors are specific for the disposal facility 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 disposal facility safety from the viewpoint of its stability.

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

8.4.3.3. RAW Disposal Facility Dukovany

RAW Disposal Facility 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 disposal facility are represented by the waste form itself (bitumen, compacted RAW), walls from reinforced concrete and asphalt-propylene layer. RAW disposal facility 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 disposal facility 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 the Monitoring program approved by SÚJB. A concept has been approved for the disposal facility's closure and decommissioning.

8.4.3.4. RAW Disposal Facility Hostim

RAW Disposal Facility Hostim 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 disposal facility 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 RAW Disposal Facility Hostim 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 Hostim disposal facility. The disposal facility has been closed since 1997.

The land over RAW Disposal Facility Hostim is administered by the Town Office in Beroun. The disposal facility is now in the protected landscape area Český kras and the national preserve Karlštejn. The disposal facility is not classified as an old mine work and therefore it is not supervised by the Ministry of the Environment. In 1990 the Hostim disposal facility was included into the system of disposal facilities 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. This evaporation system is under decommissioning at this moment following the authorisation of SÚJB No. SÚJB/OZ/23118/2012 from September 11, 2012.

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 - HAW 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 HAW 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 HAW 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 HAW Storage Facility.

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

8.5. Assessment of Safety of Facilities

Article 15 of Joint Convention:

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).

Article 7 of Directive:

2. Member States shall ensure that the national framework in place require licence holders, under the regulatory control of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as is reasonably achievable, the safety of the radioactive waste and spent fuel management facility or activity in a systematic and verifiable manner. This shall be achieved through an appropriate safety assessment, other arguments and evidence.

3. As part of the licensing of a facility or activity the safety demonstration shall cover the development and operation of an activity and the development, operation and decommissioning of a facility or closure of a disposal facility as well as the post- closure phase of a disposal facility. The extent of the safety demonstration shall be commensurate with the complexity of the operation and the magnitude of the hazards associated with the radioactive waste and spent fuel, and the facility or activity. The licensing process shall contribute to safety in the facility or activity during normal operating conditions, anticipated operational occurrences and design basis accidents. It shall provide the required assurance of safety in the facility or activity. Measures shall be in place to prevent accidents and mitigate the consequences of accidents, including verification of physical barriers and the licence holder's administrative protection procedures that would have to fail before workers and the general public would be significantly affected by ionising radiation. That approach shall identify and reduce uncertainties.

As described in the previous chapter 8.4., an applicant for a license for construction of a disposal facility 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. The fire safety of bituminised matrix is achieved by 4 steps:

1. Complex assessment of thermal stability of final product of conditioning of waste from storage tank performed at semi operational technological line in ÚJV Řež, a. s.
2. For every 15^{th} drum of conditioned waste from storage tank a differential thermal analysis is performed. According to the operational procedures the bituminised product is considered for thermally stable, if in the temperature range of 100 – 250 °C the difference of sample temperature in exothermal part of the DTA record does not exceed 10°C.
3. On-line control of inside temperature (cooling trend) in every single drum for about 24 hours.
4. Installation of recooling vessel for thermally unstable, loaded drums.

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 μSv which represents 0.2 % of the basic general limit 1 mSv/year.

8.5.3. SÚRAO

8.5.3.1. RAW Disposal Facility Richard

A revision of safety analyses for RAW Disposal Facility Richard was prepared in 2013 which is a continuation of safety analyses and their revisions performed in 1995, 1998, 1999, 2003 and 2008 and used as supporting documents for the application for a license to operate the disposal facility.

The safety analyses performed in 2003-2013 were supposed to verify the disposal facility capacity and to reassess the already proposed closure and decommissioning method. The efforts included safety evaluations for options with and without a backfilling material in the

disposal facility 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 disposal facility and underground water in case of barriers damage,
- scenario in which persons enter the disposal facility 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. 100 year after the closure of the facility. Individual doses calculated for the real disposal facility system (inventory, construction design, host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the disposal facility Richard Litoměřice have been proposed based on the comparison.

8.5.3.2. RAW Disposal Facility Bratrství

The safety analyses performed in 2003-2013 were supposed to verify the disposal facility 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 disposal facility 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 disposal facility and underground water in case of barrier damage, scenario in which persons enter the disposal facility 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. 100 year after the closure of the facility. Individual doses calculated for the real disposal facility system (inventory, construction design, and host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the Bratrství disposal facility have been proposed based on the comparison.

8.5.3.3. RAW Disposal Facility Dukovany

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

In 2012 safety analyses were completed that were based on operational experience in the disposal facility. The analyses were used to update the acceptance criteria for RAW Disposal Facility Dukovany in connection with other potential forms of RAW, incl. institutional waste, to be disposed here. Subsequently, waste acceptance criteria have been formulated for solidified RAW conditioned in bitumen, cement and aluminosilicate 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 disposal facility and underground water in case of barrier damage, scenario in which persons enter the disposal facility 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 closure of the facility. Individual doses calculated for the real disposal facility system (inventory, construction design, host rock environment) were compared with applicable limits and the acceptance criteria for RAW in the RAW Dukovany disposal facility have been proposed based on the comparison. The acceptance criteria are formulated separately for solidified and non-solidified waste

In 2012 the Operational Safety Report was updated within the licensing process for the RAW disposal facility 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 safety assessment anticipates that the disposal facility 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. Operational safety report has been updated in 2012 considering current RAW inventory and updated hydrogeological transport model.

8.5.3.4. RAW Disposal Facility Hostim

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 RAW Disposal Facility Richard). 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 disposal facility. The disposal facility 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. This evaporation system has been decommissioned based on the SÚJB licence No. SÚJB/OZ/23118/2012 from September 11, 2012.

8.5.4.2. Bldg. 211/8 - HAW 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 - HAW Storage Facility in ÚJV Řež a. s., ÚJV 1987,
- Final Safety Analysis Report for the HAW Storage Facility, Building 211/8, ÚJV, revisions from 1995, 2002.

8.6. Operation of Facilities

Article 16 of Joint Convention:

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 disposal facilities 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 disposal facilities 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 disposal facility 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 Disposal Facility Richard

The disposal facility'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 disposal facility took into account also Section 34 Paragraph 1 of the Act No. 44/1988 Coll.

The disposal facility 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 sampling point at the disposal facility entrance - 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 ^{3}H radionuclide in the atmosphere

The volume activity of ^{3}H has been monitored in three points in the disposal facility and it ranges from 1-3 kBq/m^{3}. The limit volume activity for the disposal facility atmosphere is 30 kBq/m^{3}.

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/m^3 in locations with increased radon concentration and at 1500 Bq/m^3 in other premises. In the course of 2014 the measured EOAR values ranged from 513 Bq/m^3 to 6 997 Bq/m^3 (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 is less than 0.08 MBq/y, which corresponds to the effective dose 0.60 mSv/year. The annual intake of equivalent volume activity from radon received by the disposal facility 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 RAW containing ^{60}Co, ^{137}Cs, ^{241}Am, ^{238}Pu and ^{239}Pu).

Table 8.1 Summary data on RAW Disposal Facility Richard

Beginning of operation	1964
Scheduled end of operation	not before 2025
Repository depth under the surface	70 - 90 m
Total volume adapted for the disposal facility	18 900 m^3
Filled volume of disposal chambers	6 898 m^3
Free volume	3 351 m^3
Access tunnel and other corridors (including that to Richard I)	8 652 m^3
Activity converted as in 2014	See chapter 4.2.3.1.

In 2014 two inspections of RAW management were conducted at the Richard disposal facility 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. Other inspections were related to the emergency and security arrangements, management of nuclear materials etc.

8.6.3.2. RAW Disposal Facility Bratrství

The disposal facility'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 ČBÚ 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 packaging used for RAW disposal is 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 RAW Disposal Facility Bratrství

Beginning of operation	1972
Scheduled end of operation	2025
Repository depth under the surface	More than 50 m
Total volume adapted for the disposal facility	3 500 m^3 (1 200 m^3 for disposal)
Filled volume of disposal chambers	856 m^3 (volume of disposed RAW 342,5 m^3)
Free volume	340 m^3 (the filling rate is about 40 %)
Activity converted as in 2014	see chapter 4.2.3.2

The monitoring of the disposal facility, persons and environment is performed in agreement with the Monitoring program for the Bratrství disposal facility approved by SÚJB. Inspections in the disposal facility 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 ^{226}Ra , ^{232}Th and U and on air activity caused by radon.

The air in the disposal facility is monitored based on a contract with SÚJCHBO Příbram – Kamenná. 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 disposal facility is mostly $RaSO_4$ in platinum cases (medical sources), Ra-Be neutron sources, laboratory waste containing natural radionuclides, depleted uranium and natural thorium (mostly as $Th(NO_3)_4 . 5H_2O$ and ThO_2).

The overall inventory of alpha radionuclides disposed in the disposal facility shall not exceed 1.10^{13} Bq.

In 2014 one inspection of RAW management and one inspection of radiation protection were performed in the Bratrství disposal facility. Results of the inspections did not indicate any

violation of the above mentioned regulations. Other inspections were related to the emergency and security arrangements, management of nuclear materials etc.

8.6.3.3. RAW Disposal Facility Dukovany

The disposal facility'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 disposal facility 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.

Table 8.3 Summary data on RAW Disposal Facility Dukovany

Beginning of operation	1995
Scheduled end of operation	2050
Repository depth under the surface	0 m
Total volume adapted for the disposal facility	cca 55 000 m^3
Filled volume	10 410 m^3
Free volume	45 100 m^3
Activity converted as in 2014	see chapter 4.2.3.3

The acceptance criteria establish requirements for the form of the disposed RAW, including the activity. The prevailing type of container used in the disposal facility 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.

In 2014 two inspections of RAW management were conducted at the Dukovany disposal facility 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. Other inspections were related to the emergency and security arrangements, management of nuclear materials etc.

8.6.3.4. RAW Disposal Facility Hostim

The disposal facility was closed based on the performed safety analyses in 1997.

Table 8.4 Summary data on RAW Disposal Facility Hostim

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 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 disposal facility Richard),
- hydrogeological evaluation of the location,
- evaluation of potential accident scenarios,
- monitoring system has been created (surface and underground water, geotechnical stability).

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 disposal facility has been filled with a concrete mixture and closed.

At the moment the disposal facility is in the regime of institutional control and his surroundings is monitored. The control has not identified any release of radioactive materials from the disposal facility 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,
- licence for decommissioning of the evaporation system categorized as category III workplace for processing of liquid RAW in the building 241 – Velké zbytky from 2012.

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 (2013),
- 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 - HAW Storage Facility

SÚJB has issued the following licenses concerning operation of the HAW Storage Facility:

- license for operation of a workplace in category IV with very significant sources of ionizing radiation, i.e. a workplace of the HAW Storage Facility - Building 211/8 from 2007,
- license for operation of a nuclear installation - a workplace with HAW Storage Facility at the site of ÚJV Řež a. s. from 2008,
- license for management of nuclear material in the HAW Storage Facility from 2008.

A resolution issued by SÚJB has approved the limits and conditions for operation of HAW 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 collected in shielding casks be due 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 document has 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 February 11, 2013.

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 October 19, 2010,
- Quality assurance program, Operation of the HAW 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 August 31, 2010,

In 2013 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 2400.04, Edition No. 1, Revision No. 0, valid from March 14, 2011,
- Proposed decommissioning method for workplaces in Building 241 "Velké zbytky" (RAW management facility), Reg. No. DPP 2400.34, Edition No. 1, Revision No. 0, valid from August 1, 2012,
- Proposed decommissioning method for the radiographic workplace, Reg. No. DPP2400.03, Edition No. 1, Revision No. 0, valid from March 14, 2011.

8.7. Institutional Measures after Closure

Article 17 of Joint Convention:

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

(i) records of the location, design and inventory of that facility required by the regulatory body are preserved;
(ii) 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
c) 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;
f) 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 disposal facilities even after their closure. Responsibility for the monitoring of disposal facilities 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 disposal facilities and monitoring of their impact on the environment".*

8.7.1. RAW Disposal Facility Richard

A method to close the disposal facility is provided in the Proposal of a closure method from 2014, 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 100 years after the closure of the disposal facility. A monitoring program for a period after the closure has not yet been proposed.

8.7.2. RAW Disposal Facility Bratrství

A method to close the disposal facility is provided in the Proposal of a closure method from 2013, 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 100 years after the closure. A monitoring program for a period after the closure has not yet been proposed.

8.7.3. RAW Disposal Facility Dukovany

A method to close the disposal facility is provided in the Proposal of a closure method approved by SÚJB (last version from 2012). Application of layers of sealing materials is anticipated to cover the disposal facility. 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 Disposal Facility Hostim

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

- access is prevented to the disposed RAW and the disposal facility 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 disposal facility surroundings.

9. Transboundary Movement – Article 27 of the Joint Convention and Articles 4.2 and 4.4 of Directive

Article 27 of 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.

Article 4 of Directive:

2. *Where radioactive waste or spent fuel is shipped for processing or reprocessing to a Member State or a third country, the ultimate responsibility for the safe and responsible disposal of those materials, including any waste as a by-product, shall remain with the Member State or third country from which the radioactive material was shipped.*

4. Radioactive waste shall be disposed of in the Member State in which it was generated, unless at the time of shipment an agreement, taking into account the criteria established by the Commission in accordance with Article 16(2) of Directive 2006/117/Euratom, has entered into force between the Member State concerned and another Member State or a third country to use a disposal facility in one of them.

Prior to a shipment to a third country, the exporting Member State shall inform the Commission of the content of any such agreement and take reasonable measures to be assured that:

(a) the country of destination has concluded an agreement with the Community covering spent fuel and radioactive waste management or is a party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management ('the Joint Convention');

(b) the country of destination has radioactive waste management and disposal programmes with objectives representing a high level of safety equivalent to those established by this Directive; and

(c) the disposal facility in the country of destination is authorised for the radioactive waste to be shipped, is operating prior to the shipment, and is managed in accordance with the requirements set down in the radioactive waste management and disposal programme of that country of destination.

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-feet ISO containers Type IP-2[1] 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 import of the incineration product (ash, powder) in the amount of about 15 pcs of 200 l drums of total weight of 2.5 t back to the Czech Republic continued in the reviewed period. This RAW is disposed in RAW Disposal Facility 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.

In the reviewed period the transports of solid combustible RAW from NPP Dukovany and Temelín to the company Studsvik Nuclear AB, Nyköping in Sweden, have been organized in 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.

Transports of solid, compressible waste from NPP Dukovany and NPP Temelín to the company JAVYS, a. s., Jaslovské Bohunice, Slovakia for high pressure compaction are performed since 2012. RAW is immediately after processing shipped back to the Czech Republic.

In 2013 two transports of incinerable solid RAW from NPP Dukovany and NPP Temelín to the company JAVYS, a. s., Jaslovské Bohunice, Slovakia for volume reduction by incineration were performed. The produced RAW was stored at the premises of JAVYS company at the end of 2013 and it is expected to be shipped back to the Czech Republic soon.

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

[1] According to Regulations for the Safe Transport of Radioactive Material 2005 Edition, Safety Requirements No TS-R-1 IAEA, Vienna 2005

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.

The last transport of 112 HEU assemblies of IRT-2M fuel type enriched to 36% ^{235}U consisted of 390 kg SF and contained 54 kg of uranium and plutonium. The transport was performed in March 2013 as combined one (road and railway) through the territories of the Czech Republic, Poland and then by boat to Russian Federation in agreement with legislative requirements of all involved countries. Since this time is the reactor LVR – 15 using only LEU fuel (IRT-4M, enriched to 19.7% ^{235}U).

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.

Table 10.1 Number and radioactivity of disused sealed sources stored in RAW disposal facility Richard

Radionuclide	Number of sources [pcs]	Total activity [GBq]
^{137}Cs	2903	3.97E+05
^{60}Co	4745	2.31E+05
^{14}C	1	3.44E-02
^{239}Pu	82	6.92E+03
^{241}Am	25627	7.78E+03
^{90}Sr	1026	2.06E+02
^{238}Pu	11	3.81E+00
^{226}Ra	27	3.62E-01
^{252}Cf	7	2.10E-03
^{22}Na	1	3.49E-04
^{129}I	2	1.21E-05
^{238}U	14	4.50E+01
^{232}Th	1	1.00E+06
^{55}Fe	5	7.45E+01
^{63}Ni	3	1.29E+00
^{89}Sr	1	1.45E-16
^{134}Cs	1	3.36E-06
Total	**34457**	**1.64E+06**

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.

Licensees 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 disposal facility. Sealed sources are usually put into a 200-l drum shielded by 5 cm thick concrete layer and backfilled by concrete. 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 disposal facility. 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.

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 disposal facility, separate premises in the disposal facility 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 reimport 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.*"

11. General Efforts to Improve Safety

11.1. Nuclear Power Plant Dukovany

The conditions for processing of solid RAW by high pressure compaction at external company JAVYS, a. s. Jaslovské Bohunice, Slovakia, have been fulfilled in 2012.

The incineration of ion exchange resins at external companies JAVYS, a. s. Jaslovské Bohunice, Slovakia and Studsvik Nuclear AB, Nyköping Sweden started in 2013.

Operational tests of alternative geopolymer matrix ALUSIL technology were performed in 2013 and since then the technology is in routine use.

Substantial reduction of production of ion exchange resins occurred in 2012. Since then used ion exchange resins are removed from technological systems, their volumetric activity is determined and, depending on the content of radionuclides, they are cleared, incinerated or conditioned.

11.2. Nuclear Power Plant Temelín

The conditions for processing of solid RAW by high pressure compaction at external company JAVYS, a. s. Jaslovské Bohunice, Slovakia, have been fulfilled in 2012.

The incineration of ion exchange resins at external companies JAVYS, a. s. Jaslovské Bohunice, Slovakia and Studsvik Nuclear AB, Nyköping Sweden started in 2013.

Substantial reduction of production of ion exchange resins occurred in 2012. Since then used ion exchange resins are removed from technological systems, their volumetric activity is determined and, depending on the content of radionuclides, they are cleared, incinerated or conditioned.

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 Disposal Facility Richard

Considering increased generation of institutional RAW in ÚJV Řež, a. s. a study of options for reconstruction of RAW Disposal Facility Richard is under preparation. Further sections of the facility could be used for the disposal of RAW. Study of variants will provide data for safety assessment which will evaluate the planned reconstruction according to the requirement of Atomic Act and Decree No. 307/2002 Coll., on radiation protection. Study of variants and feasibility study will be prepared in 2014-2016 and if safety assessment verifies the safety of reconstructed disposal facility the reconstruction itself will be done in 2018-2020.

11.4.2. RAW Disposal Facility Bratrství

A study of options and feasibility study for closure of disposal facility will be prepared in 2014-2018. It is expected that the facility will be closed in 2025.

11.4.3. RAW Disposal Facility 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 disposal facility premises and host environment.

11.4.4. RAW Disposal Facility Hostim

No further activities are foreseen.

12. Appendices

12.1. List of SF Management Facilities

Table 12.1 List of SF Management Facilities

Site	Facility name	Storage capacity [pcs of FA]	Storage capacity [t 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 HAW Storage Facility (ÚJV)	576	
	SF pool in HAW 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	**RAW Disposal Facility Richard**[2]	10 249 m^3
	RAW Disposal Facility Bratrství[3]	1 200 m^3
	RAW Disposal Facility Dukovany	55 000 m^3
	RAW Disposal Facility Hostim	1 690 m^3
ÚJV Řež, a. s.	**Velké zbytky**	
	- storage facility for liquid RAW	179 m^3
	- storage facility for solid RAW	183 m^3
	HAW Storage Facility	226 m^3
	Reloading site for RAW	1560 m^3

12.3. List of Nuclear Installations in the Decommissioning Stage

During the development of this National Report (July 2014) 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 Plzeň-Vochov, was decommissioned by decontamination and dismounting in 1995-1997. The workplace ceased to exist in 1997.

[2] total space mined out is about 19 000 m^3

[3] total space mined out is about 3 500 m^3

12.4. Current and Predicted SF Inventory

Article 12 of Directive:

1. *The national programmes shall set out how the Member States intend to implement their national policies referred to in Article 4 for responsible and safe management of spent fuel and radioactive waste to secure the aims of this Directive, and shall include all of the following:*

   c) an inventory of all spent fuel and radioactive waste and estimates for future quantities, including those from decommissioning, clearly indicating the location and amount of the radioactive waste and spent fuel in accordance with appropriate classification of the radioactive waste;

Table 12.3 SF Inventory as on December 31, 2013

Site	**Facility name**	**Number of stored FAs** [pcs]	**Weight of stored FAs** [t of HM]
Dukovany	SF pool reactor unit 1	632	73
	SF pool reactor unit 2	649	74
	SF pool reactor unit 3	508	59
	SF pool reactor unit 4	619	71
	Interim Spent Fuel Storage Facility	5 040*	581*
	Spent Fuel Storage Facility	2268*	261,5*
Temelín	SF pool reactor unit 1	444[4]	212
	SF pool reactor unit 2	459[5]	219
	Spent Fuel Storage Facility	342*	165,9*
Řež	Annex to HAW Storage Facility (ÚJV)	0*	0*
	SF pool in HAW Storage Facility (ÚJV)	0[6]*	0*
	Wet tank (CV Řež)	26[7]	
	RAW Storage Facility (CV Řež)	12[8]	

* as on 31 December 2014

Table 12.4 Predicted inventory of SF (in DGR) as provided in draft of new Policy (2014)

Operational period	EDU 1 - 4 [t TK]	ETE 1, 2 [t TK]	ETE 3,4 + EDU 5 [t TK]	**Total [t TK]**
40 y	1 740	1 750	---	3 490
60 y	2 430	2 470	5 010	9 910

Operational period	LVR 15 [pcs]
till 2018	136
till 2028	286

[4] + 25 leaking fuel rods
[5] + 24 leaking fuel rods
[6] in the dry channel is stored old experimental equipment
[7] fuel type IRT–4M, 19.7 % wt. ^{235}U
[8] in box no. V. is stored 3.87 kg of natural uranium – irradiated experimental fuel assemblies

12.5. Current and Predicted RAW Inventory

Article 12 of Directive:

1. *The national programmes shall set out how the Member States intend to implement their national policies referred to in Article 4 for the responsible and safe management of spent fuel and radioactive waste to secure the aims of this Directive, and shall include all of the following:*
   c) an inventory of all spent fuel and radioactive waste and estimates for future quantities, including those from decommissioning, clearly indicating the location and amount of the radioactive waste and spent fuel in accordance with appropriate classification of the radioactive waste;

Tab. 12.5 Inventory of solid LILW as of December 31, 2014

Licensee for RAW management	Facility	Used storage/disposal capacity
EDU	**Storage of liquid RAW**	
	- RAW concentrate tanks	700 m^3
	- storage tanks for active sorbents	155 m^3
	Collection, storage and processing of solid RAW	
	- sorting workplace and storage of solid RAW	248 t
ETE	**Storage and processing of liquid RAW (BPP)**	
	- storage tanks for active sorbents	192 m^3
	- storage tanks for radioactive concentrate	52,1 m^3
	Collection, storage and processing of solid RAW (BPP)	
	- sorting workplace and storage of solid RAW	96,1 t
SÚRAO	**RAW Disposal Facility Richard**	6 898 m^3
	RAW Disposal Facility Bratrství	856 m^3
	RAW Disposal Facility Dukovany	10 410 m^3
	RAW Disposal Facility Hostim	330 m^3
ÚJV Řež, a. s.	**Velké zbytky**	
	- storage facility for liquid RAW	104,79 m^3
	- storage facility for solid RAW	27,32 m^3
	HAW Storage Facility	35,28 m^3
	Reloading site for RAW	547,4 m^3

For further details see chapter 4.2.

Table 12.6 Predicted inventory of RAW as provided in draft of new Policy (2014)

Waste class	Waste origin	Volume/Weight
LILW (complying with WAC of operated disposal facilities)	*Operational RAW from NPPs (to RAW Disposal Facility Dukovany)* • 60 y of operational lifetime of existing NPP units • 60 y of operational lifetime of planned NPP units	 18 300 m^3 10 200 – 23 200 m^3
	RAW from NPPs decommissioning (to RAW Disposal Facility Dukovany) • 60 y of operational lifetime of existing NPP units • 60 y of operational lifetime of planned NPP units	 10 800 m^3 7 200 m^3
	Institutional RAW (mainly to RAW Disposal Facility Richard) • operational RAW (60 y) • RAW from historical liabilities and from NIs decommissioning	 2 000 m^3 1 500 m^3
LLW and HLW (not complying with WAC of operated disposal facilities – *to DGR*)	*Operational RAW* 60 y of operational lifetime of existing and planned NPP units	140 t
	RAW from NPPs decommissioning existing and planned NPP units	4 200 t
	Institutional RAW: • decommissioning of research reactor • stored at RAW Disposal Facility Richard	 20 t 64 t (189 pcs of drums)

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. **213/2010** Sb., on accounting for and control of nuclear material and on reporting of data required by EC regulations,
- 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. **215/1997** Sb., on criteria for siting nuclear facilities and very significant ionising radiation sources,
- 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 Trigger list items,
- 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.)
- Government Regulation No. **399/2011** Coll., on fees for professional activities of the State Office for Nuclear Safety

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. **255/2012** Coll., on inspection (Inspection Code), 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. **211/2004** Coll., on testing methods and the manner of taking and preparing control samples, 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,
- 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. **336/2004** Coll., that lays down technical requirements for medical devices and amending Government Order No. 251/2003 Coll., amending some Government Orders issued pursuant to Act No. 22/1997 Coll., on Technical Requirements for Products and on Amendments to Some Acts, as amended later, as amended by Government Order No. 212/2007 Coll., by Government Order No. 245/2009 Coll. and by Government Order No. 65/2011 Coll.,
- 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 security of the Czech Republic, as amended by act No. 300/2000 Coll.,
- Act No. **239/2000** Coll., on Integrated Rescue System and on amendment to certain related acts, as amended,

- Act No. **240/2000** Coll., on crisis management and on amendment to certain related acts (Crisis Act), as amended,
- Act No. **241/2000** Coll., on economic measures for crisis situations and on amendment to certain related acts, as amended
- 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 and on alteration of Act No. 425/1990 Coll., on district offices, regulation of their competence and other related provisions, as amended later and Act No. 320/2002 Sb., on changes and cancelation of some acts related to the closedown of district offices, as amended later (Act on Prevention of Serious Accidents),
- Government Order No. **522/2005** Sb., on the list of confidential information,
- Regulation of the Ministry of Interior No. **328/2001** Coll., on some details of the security of the Integrated Rescue System, as amended by decree No. 429/2003 Coll.,
- Regulation of the Ministry of Interior No. **380/2002** Coll., on the preparation and fulfilment of tasks to protect the population.

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 purpose-build 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, Revision 3.3 of September 2008 and Revision 4.0 of March 2011. Other documents, not mentioned in the above referred Revisions of the National Report and mostly developed after the publishing of last National Report in March 2011 are:

- Verification of stability of bitumen matrix for safety assessment update of RAW Disposal Facility Dukovany, Research report Z 3433, ÚJV Řež a. s., March 2012,
- Hydrogeological monitoring of RAW Disposal Facility Richard in 2012, Site: Litoměřice, Region Ústí nad Labem, Client: SÚRAO, Praha 1, Contractor: GEOTIP s.r.o., Praha 5,
- Hydrogeological monitoring of RAW Disposal Facility Bratrství in 2012, Site: Jáchymov, Region Karlovy Vary, Client: SÚRAO, Praha 1, Contractor: GEOTIP s.r.o., Praha 5,
- Safety report RAW Disposal Facility Dukovany, Update to licensing procedure, SÚRAO Praha, September 2012,
- Safety report RAW Disposal Facility Bratrství, Update to licensing procedure, SÚRAO Praha, September 2013,
- Update of hydrogeological transport model of radionuclides, RAW Disposal Facility Richard, ProGeo, s.r.o. 2013,
- Transport of radioactive substances, safety guide BN-JB-1.13, SÚJB, April 2011.

12.8. Overview of Final Reports by International Assessment Missions

An overview of reports from international assessment missions which took place from mid-2004 till the end of 2013 at NPP Dukovany, NPP Temelín and SÚJB:

- IRRS mission 2013 (SÚJB),

- Follow-up OSART 2013 (NPP Dukovany),
- Follow-up WANO Peer Review 2013 (NPP Temelín),
- Follow-up WANO Peer Review 2012 (NPP Dukovany),
- OSART mission 2012 (NPP Temelín),
- WANO Peer Review 2012 (NPP Dukovany),
- Follow-up SALTO mission 2011 (NPP Dukovany),
- OSART 2011 (NPP Dukovany),
- 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 Peer Review 2004 (NPP Temelín).