NATIONAL REPORT OF THE SLOVAK REPUBLIC

COMPILED IN TERMS
OF THE JOINT CONVENTION ON THE SAFETY
OF SPENT FUEL MANAGEMENT
AND ON THE SAFETY OF RADWASTE MANAGEMENT

August 2017

CONTENT

A INTRODUCTION 7

B CONCEPT FOR NUCLEAR FUEL MANAGEMENT (SNF) AND RADIOACTIVE WASTE MANAGEMENT (RAW) 12

B.1 Concept for Spent Nuclear Fuel Management (SNF) 12

B.2 Concept for Radioactive Waste Management (RAW) 13

B.3 Criteria Used to Define and Classify Radioactive Waste 15

C SCOPE OF APPLICATION OF THE CONVENTION 17

C.1 Safety of Spent Nuclear Fuel (SNF) Management and Radioactive Waste (RAW) Management 19

D SPENT NUCLEAR FUEL (SNF) MANAGEMENT AND RADIOACTIVE WASTE (RAW) MANAGEMENT FACILITIES 20

D.1 List and Description of Spent Nuclear Fuel (SNF) Management Facilities 20

D.1.1 Basic Characteristics of the Main Equipment for Spent Nuclear Fuel Management at NPPs of WWER type 20

D.1.2 Interim Spent Fuel Storage of JAVYS, a. s. (ISFS) 21

D.2 List and Description of Facilities for Radioactive Waste (RAW) Management 28

D.2.1 Facilities for Radioactive Waste (RAW) Management within NPP 28

D.2.2 Technology for Treatment and Conditioning of Radioactive Waste (TSÚ RAO) 29

D.2.3 Facility for Final Treatment and Conditioning of Liquid Radioactive Waste (FS KRAO) 30

D.2.4 Integral Storage Facility for RAW (IS RAW) - under construction 30

D.2.5 Facility for Institutional Radioactive Waste Management (IRAW) and Captured Radioactive Substances (ZRAM) 31

D.2.6 Radioactive Waste (RAW) Shipment 32

D.2.7 National Repository for Radioactive Waste (RÚ RAO) 34

D.3 List and Description of Facilities in Decommissioning and Facilities for Radioactive Waste (RAW) Management from Decommissioning, which are part thereof 36

D.3.1 NPP V1 Bohunice – In Decommissioning 36

D.3.2 NPP A1 Bohunice – In Decommissioning 38

D.3.3 Facilities for Management of Radioactive Waste (RAW) from Decommissioning – part of NPP A1 40

D.3.4 Mobile Facilities for Radioactive Waste (RAW) Management 40

D.3.5 Monitoring and sorting of soils, ... 41

D.4 Inventory of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) 41

E LEGISLATION AND REGULATION 42

E.1 Legislative and Regulatory Framework 42

E.1.1 Structure of the Regulatory Bodies 42

E.1.2 Legislation 45

E.2 Regulatory Authorities 50

E.2.1 Regulation of Nuclear Safety 50

E.2.2 Regulation in the Field of Health Protection Against Radiation 59

E.2.3 Regulation in the Field of Occupational Health and Safety 63

F GENERAL SAFETY PROVISIONS 66

F.1 Responsibility of the Licensee 66
F.1.1 Principles and Definition of Nuclear Safety and Radiation Protection 66
F.1.2 Policy of Nuclear Safety and Radiation Protection 67
F.1.3 Obligations of the Authorization Holders (Licensee) towards Regulator 69
F.2 Human and Financial Resources....70
F.2.1 Human Resources....70
F.2.2 Financial Resources....73
F.3 Quality Management System of the Operators 76
F.4 Radiation Protection....79
F.4.1 Legislation in the Field of Radiation Protection and its Implementation 79
F.4.2 Monitoring of Radioactivity by Licensee....80
F.4.3 Liquid and Gaseous Discharges 82
F.4.4 Dose and Exposure Limits of Personnel....87
F.4.5 Monitoring of Impacts of the Nuclear Installation on the Environment....88
F.5 Emergency Preparedness 90
F.5.1 Legislation in the Field of Emergency Preparedness....90
F.5.2 Implementation of Legislation in the Field of Emergency Preparedness....90
F.5.3 International Treaties and Cooperation....98
F.6 Decommissioning....99
G SAFETY OF SPENT FUEL MANAGEMENT....102
G.1 General Safety Requirements 102
G.1.1 Review and Inspection at Existing Facilities 103
G.2 Siting of Facilities 103
G.2.1 Legislation in the Field of Siting 104
G.2.2 Siting of Facilities for Spent Fuel Management 104
G.3 Design and Construction 106
G.4 Assessment of Safety of Facilities 108
G.4.1 General Principles of Safety Assessment....108
G.4.2 Operational Safety Assessment of Spent Fuel Management Facilities and Systems ..109
G.5 Operation of Facilities 109
G.5.1 Commissioning....109
G.5.2 Legislative Requirements for Commissioning and Operation....110
G.5.3 Limits and Conditions (L&C) for Spent Nuclear Fuel Management 110
G.5.4 Management and Operational Documentation for Operation, Maintenance and Taking Care of Equipment for Spent Nuclear Fuel Management....111
G.5.5 Technical Support for Operation 112
G.5.6 Analysis of Operational Events 113
G.6 Disposal of Spent Nuclear Fuel 114
H SAFETY OF RADIOACTIVE WASTE (RAW) MANAGEMENT 117
H.1 General Safety Requirements 117
H.1.1 Radioactive Waste (RAW) Generation Minimization Program....118
H.1.2 Connection between Stages of Radioactive Waste (RAW) Management....118
H.1.3 Assurance of Effective Protection of Individuals, Society and the Environment....119
H.1.4 Biological, Chemical and other Hazards 119

H.1.5 Limiting Impact on Future Generations and their inadequate load 119
H.2 Existing Facilities and Past Practices, Revision of Safety Assessments 119
H.3 Siting of Proposed Facilities 119
H.3.1 Legislative Requirements 120
H.3.2 Siting of Particular NI 120
H.4 Design and Construction of Facilities 120
H.5 Safety Assessment of Facilities 122
H.6 Operation of Facilities 123
H.6.1 Commissioning and Operation of Facilities 124
H.6.2 Limits and Conditions for RAW Management 124
H.6.3 Working Procedures 125
H.6.4 Engineering and Technical Support 125
H.6.5 Procedures for Waste Characterization and Sorting 125
H.6.6 Reporting of Events to the Regulatory Body 125
H.6.7 Conceptual Decommissioning Plans 125
H.6.8 Plans for Repository Closure 126
H.7 Institutional Measures after Repository Closure 127
H.7.1 Recording Keeping 127
H.7.2 Institutional Control 127
H.7.3 Intervention Measures 129
I TRANSBOUNDARY MOVEMENT OF SPENT NUCLEAR FUEL AND RADIOACTIVE WASTE 130
I.1 General Requirements for Safety at Borders 130
I.1.1 Basic Requirements for Safety Documentation 131
I.1.2 Issuance of Shipment Authorization 131
I.1.3 Approval of Transportation Equipment Type 133
I.1.4 Permit for Shipment of Radioactive Sources 134
I.2 Experience with Transboundary Shipment of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) 135
I.3 *Experience with the Transboundary Shipment of Radioactive Sources* 135
J DISUSED SEALED SOURCES 137
K GENERAL EFFORTS TO IMPROVE SAFETY 141
K.1 Implementation of Planned Measures from 2014 141
K.2 Planned Measures to Improve Safety 144
K.3 International Missions 144
K.4 Transparency and Public Relations 145
L ANNEXES 149

Abbreviations

ALARA	As Low As Reasonably Achievable
BIDSF	Bohunice International Decommissioning Support Fund
BSC	Bohunice RAW Treatment Center
BSVP	Storage pool for spent nuclear fuel
CCS	Central Crisis Staff
ČSKAE	Czechoslovak Atomic Energy Commission
EIA	Environmental Impact Assessment
ERC	Emergency Response Centre
ERO	Emegency Response Organization
FS KRAO	Facility for Final Treatment and Conditioning of Liquid Radioactive Waste
IAEA	International Atomic Energy Agency
IED	Individual dose equivalent
INES	International Nuclear Event Scale
IRAW	*Institutional Radioactive Waste*
IRRS	Intergrated Regulatory Review Service
ISFS	Interim Spent Fuel Storage
ISFSF	Interim Spent Fuel Storage Facility
IS RAW	*Integral Storage Facility for Radioactive Waste*
IMS	Integrated Management System
JAVYS, a. s.	Nuclear and Decommissioning Company / Jadrová a vyraďovacia spoločnosť
KED	Collective dose equivalent
KHP	Hermeticity test of fuel cladding
KRAO	Liquid radioactive waste
L&C	Limits and Conditions for operation
MDV SR	Ministry of Transport and Construction of the Slovak Republic
MH SR	Ministry of Economy of the Slovak Republic
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MV SR	Ministry of Interior of the Slovak Republic
MZ SR	Ministry of Health of the Slovak Republic

MŽP SR	Ministry of Environment of the Slovak Republic
NI	Nuclear Installation
NPP	Nuclear Power Plant
NPP A1	Nuclear Power plant A1 Jaslovské Bohunice
NPP V1	Nuclear Power Plants V1 Jaslovské Bohunice (Units 1 & 2)
NPP V2	Nuclear Power Plants V2 Jaslovské Bohunice (Units 3 & 4)
PHARE	EU Initiative for economic integration of CEE countries
PRAO	Solid radioactive waste
PS	Operational set
PSA	Probabilistic safety assessment
QA	Quality Assurance
RAW	Radioactive waste
RF	Russian Federation
RÚ RAO	National Repository for Radioactive Waste
SE, a. s.	Slovenské elektrárne, joint stock company
SE, a. s. - VYZ	Decommissioning of NI and radwaste and spent fuel management, former plant of SE, a. s.
SHMÚ	Slovak Hydrometeorological Institute
SNF	Spent Nuclear Fuel
SR	Slovak Republic
STN	Slovak technical standard
TK	Transportation container
TK C-30	Transportation container for SNF of C-30 type
t_{TK}	Tons of heavy metal uranium
TSÚ RAO	Technology of treatment and conditioning of RAW
TV	Television
UBN	Event without consequences
ÚJD SR	Úrad jadrového dozoru Slovenskej republiky/ Nuclear Regulatory Authority of SR
ÚKŠ	Central Emergency Staff
US NRC	United States Nuclear Regulatory Commission
ÚVZ SR	Public Health Authority of SR
VBK	Fibre-concrete container

VNAO	*Very low level radioactive waste*
VUJE, a. s.	VUJE, a. s. Trnava – Engineering, design and research organization
WWER	Water-water power reactor
VZT	Air management
WANO	World Association of Nuclear Operators
ZFK	Facility for fixation of sludge
ZRAM	Captured radioactive materials
ZS	Fuel loading machine
ZSSR	Union of Soviet Socialist Republics

A Introduction

The Slovak Republic deposited the instrument of ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereinafter the "Joint Convention") on 6 October 1998. The presented National Report describes measures adopted with the aim to comply with the provisions of the Joint Convention. It was compiled in accordance with article 32 of the Joint Convention and its structure respects the Guidelines regarding the form and the structure of national reports (INFCIRC 604 Rev3). ***New or updated information compared with the previous National report is indicated by Italic letters.***

In Slovakia there are 4 units with nuclear reactors of WWER-440/213 type in operation. Two at Jaslovské Bohunice site (NPP V2) and two at the Mochovce site (NPP Mochovce 1,2). Two units of WWER440/230 type (NPP V1) are in the decommissioning process. Spent fuel from these units was transported to the Interim Spent Fuel Storage – ISFS. A small portion of SNF from WWER-440 reactors (697 fuel assemblies) was repatriated to the former Soviet Union prior to 1987.

At the Jaslovské Bohunice site, there is also NPP A1 (heavy water reactor cooled by carbon dioxide HWGCR – 150 MW_e), which used natural uranium as fuel. NPP A1 was shut-down in 1977 following an accident (INES 4) and is curremtly decommissioned. The spent nuclear fuel from this NPP was repatriated to the Russian Federation. Transports of spent fuel were completed in 1999.

Technologies for treatment of radioactive waste are at Jaslovské Bohunice site (called Technology for Treatment and Conditioning of Radioactive Waste (TSÚ RAO), and at Mochovce site (called Final treatment of liquid RAW (FS KRAO).

National repository of low active radioactive waste (RÚ RAO) has been in operation since 1999 at the Mochovce site.

Interim Spent Fuel Storage Facility (ISFSF) has been in operation at Bohunice site since 1987, where a project to increase safety and storage capacity was implemented.

Detailed description of the technology for SNF and RAW management can be found in the following chapters of this report. The licensees for operation and decommissioning of nuclear installations are SE, a. s. and JAVYS, a. s. The list of nuclear installations according to the Joint Convention is contained in Annexes L I. and III.

By resolution No. 256/2014 the Government adopted the Policy, Principles and Strategy for Further Development of Nuclear Safety. The aim of the document is to summarize and strengthen the principles to protect the public and the environment from harmful effects of ionizing radiation associated with peaceful uses of nuclear energy.

The document is linked with other strategic documents like:

- Program Declaration of the Government for the period 2012 – 2016,
- Energy Security Strategy of SR (2008),

- Strategy for the back-end of the peaceful use of nuclear energy in the Slovak Republic (this document was updated by the document the National Policy and National Program for the Management of Spent Nuclear Fuel and Radioactive Waste in SR in 2015),
- Fundamental Safety Principles of the International Atomic Energy Agency No. SF-1.

State regulation over nuclear safety over management of radioactive waste and spent nuclear fuel is performed by the Nuclear Regulatory Authority of SR (ÚJD SR). The basic law on the peaceful use of nuclear energy is Act No. 541/2004 Coll. (Atomic Act). ÚJD SR also carries out supervision over nuclear installations under the Act No. 50/1976 Coll. on Spatial Planning and Construction (Building Act) as a special building authority with the competence to issue decisions for permitting siting of nuclear installations.

State *health* regulation over radiation protection is provided by the Public Health Authority of the SR (ÚVZ SR) in accordance with the provisions of Act No. 355/2007 Coll. on protection, promotion and development of public health *and on amendments to certain laws*.

The labour inspection – to ensure occupational health and safety at nuclear installation, is performed by the Labour Inspectorate pursuant to Act No.125/2006 Coll. Verifying compliance with safety requirements of classified technical equipment and technical equipment is performed by authorized legal entities in accordance with the Act No. 124/2006 Coll. on occupational health and safety.

Environmental impact assessment of NI is the competence of the Ministry of Environment of SR and it is conducted in compliance with the Act No. 24/2006 Coll. on Environmental Impact Assessment.

Slovakia is a party to all international treaties and conventions in the field of peaceful use of nuclear energy.

The previous National Reports from y. 2003, 2005, 2008, 2011, *2014* are on the website of ÚJD SR: www.ujd.gov.sk.

Implementation of measures resulting from the *5th* Review Meeting (as contained in the Rapporteurś report for Slovakia)

a) Completion of construction and commissioning of the repository for very low level radioactive waste in RÚ RAO Mochovce.

The first module of repository for very low level waste for disposal of VNAO from the decommissioning of NPP A1 was commissined in 06/2016. Currently, the construction of a second module for VNAO from decommissioning of NPP V1 with a planned commissioning date in 2018 is under way. The details can be found in chap. D.2.6.

b) Implementation of a deep repository strategy, including public involvement/public consultations, site selection criteria, etc.

For the final stage of spent fuel management, the so called dual path scenario is considered:

i) monitoring, i.e. development of a national deep repository for direct disposal of spent nuclear fuel and radioactive waste (not disposable at the National Repository for RAW in Mochovce) and

ii) participation in activities that could lead to an international deep repository, jointly owned and operated by several countries under relevant international treaties, to evaluate in complexity the idea of joint international deep repository by the end of 2020.

In terms of public involvement in the project „Deep repository – site selection stage 1“, the implementation was completed in 2016 by the preparation of the following documents/materials: „Strategy for working with the public regarding deep repository development in SR“, „Information and promotional materials about development of a deep repository“ and „Draft legislation for stimulating the municipalities concerned during exploratory works and following the siting of the deep repository“. The project continues with the „Deep repository – site selection, stage 2 – Part 1“, which starts in 2017 by development and preparation of economic stimulation of locations affected by the development and operation of the repository.

c) Complete the deep repository strategy by 2016.

In 2016, the implementation of the project, stage 1 „Deep repository – site selection“ was completed, including a proposal for further development of a deep repository in SR. „Criteria for selection and evaluation of deep repository sites“ were updated. A „Detailed work plan for the period 2017 - 2023 and a proposal for further steps in the development of deep repository in SR“ was prepared. In 2017, a project for geological activities will be developed for two selected sites. In the following period, field surveys and work with the public will be carried out in pre-selected sites, so that by 2030 (in case of abandoning the dual path strategy) it will be possible to decide definitely about the location of the deep repository in Slovakia. In case of abolition of the dual path, the aim is to ensure development and operation of Deep Repository by 2065. For the details see Section G.6.

d) Complete the construction of facilities for centralized collection, sorting and storage of institutional radioactive waste and radioactive materials.

The storage facility for long-term storange of IRAW and ZRAM originating from the whole territory of SR until their final disposal was built in the immediate vicinity of the RÚ RAO in Mochovce. The facility was put into operation in 02/2016, after which all IRAW, until then stored in JAVYS at NPP A1 Jaslovské Bohunice site, were transferred into this new facility.

e) Complete the construction of an Integral Storage Facility at Bohunice.

Construction of an Integral storage facility for RAW in Jaslovske Bohunice for the purposes of long-term or temporary storage of radioactive waste generated from decommissioning started in 07/2015. The Integral Storage Facility for RAW will consist of a self-standing building of a hall type

with modular arrangement, with the possibility of further expansion. The integral storage facility with triple function will temporarily store solid RAW originating from the decommissioning of NI. This waste consist of materials that will later be released into the environment (decay function of the storage) and of radioactive waste intended for further treatment – disposable at RÚ RAO Mochovce (balancing function of the storage) and of waste that requires safe long-term storage (function of the storage). The expected date of commissioning of the Integral storage facility for RAW is December 2017.

f) Construction of a dry storage for spent nuclear fuel in Bohunice.

ISFS at Jaslovské Bohunice (in operation since 1987) is used for storage of fuel assemblies in a wet pool. After its reconstruction (change in the geometry of the layout of stored assemblies) the ISFS has a higher final storage capacity (of 14,112 spent fuel assemblies). Reconstruction also provided for higher seismic resistance and extension of lifetime of the NI ISFS to 50 years.

For further operation of nuclear power plants in SR, it is envisaged to expand the capacity of the current ISFS – by construction of a dry storage facility for SNF for additional 18,600 spent fuel assemblies. The new storage facility was subject to environmental impact assessment according to Act 24/2006 Coll. on environmental impact assessment. The process of selecting the contractor for the design documentation and construction of new storage capacity for SNF at Jaslovské Bohunice site started in 01/2017 in accordance with the requirements for storage capacity. For details see Section D.1.2.

g) Preparation of stage III of NPP A1 decommissioning.

In accordance with the National Program for Spent Fuel and Radioactive Waste Management the process of decommmissioning of NPP A1 continues after completing stage II.

In order to ensure continuous process of decommissioning of NPP A1, the licensing documentation was developed needed for the review by the state administration authorities. At the same time, for the decommissioning of NPP A1 stage III and IV, and management of RAW from decommissioning, documentation was drafted according to Article 37 of the Euratom Treaty, based on which the European Commission issued positive opinion of the European Commission No. 2015/C 362/1,. In 2016, ÚVZ SR authorized the activities „Stage III and IV of decommissioning of the nuclear installation of NPP A1“ and ÚJD SR by Decision No. 369/2016 also authorized stages III and IV of decommissioning of the nuclear installation NPP A1. For details see Section D.3.2.

h) Completion of stage II of decommissioning of NPP V1.

The stage II of decommissioning of NPP V1 started on 01 January 2015 and was in compliance with the approved licensing documentation (ÚJD SR Decision No. 900/2014 of 23 December 2014) with the expected deadline for completion 31 December 2025. The decommissioning of NPP V1 is implemented through partial projects. The individual projects cover all activities necessary for the removal of the nuclear installation from the scope of the Atomic Act (dismantling of equipment, demolition of buildings, waste management from NPP V1, decommissioning, including treatment and safe disposal of radioactive waste in the National Repository for RAW in Mochovce,

or safe storage of radioactive waste in the Integral Storage Facility in Jaslovske Bohunice). Following the completion of decommissioning of NPP V1, the site will be released for any further industrial use. The current state of decommissioning of NPP V1 has been continuously monitored, and is in line with the plan for stage II of the decommissioning of NPP V1 as of 31 December 2016. For details see Section D.3.1.

i) Revision of the National Emergency Response Plan and implementation of related actions to ensure its effectiveness, and

j) Revision of the National Emergency Response Plan related to the results from the IRRS mission.

The Ministry of Interior of the Slovak Republic in cooperation with the involved public authorities (e.g. ÚJD SR, ÚVZ SR) and organizations continues in the preparation of the National Emergency Plan. In the preparation of the National Emergency Plan, the most recent IAEA safety standards (e. g. GSR- Part 7, GS-G-2.1 etc.), as well as the EU legislation (e.g. Directive 2013/59/Euratom) are taken into account.

Implementation of measures resulting from the *5th* Review Meeting (as contained in the Final Summary Report)

The Contracting Parties at the 5th Review Meeting agreed that National Reports for the next Review Meeting should address, as appropriate, the following issues:

a) Staffing, staff development, reliability of funding and other human resources areas;
See Chapter F.2.

b) Maintaining or increasing public involvement and engagement on waste management, to provide public confidence and acceptance;
See Chapter K.3.

c) Developing and implementing a holistic and sustainable management strategy for radioactive waste and spent fuel at an early stage; and
See Chapter B.

d) Management of disused sealed sources.
See Chapter J.

B Concept for Nuclear Fuel Management (SNF) and Radioactive Waste Management (RAW)

Article 32 of the Joint Convention

1. *In accordance with the provisions of Article 30 each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address:*
   - *i) Spent fuel management policy;*
   - *ii) Spent fuel management practices;*
   - *iii) Radioactive waste management policy;*
   - *iv) Radioactive waste management practices;*
   - *v) Criteria used to define and categorize radioactive waste.*

B.1 Concept for Spent Nuclear Fuel Management (SNF)

The basic concept for the SNF and RAW management is defined by the National Policy and National Program for the Management of Spent Fuel and Radioactive Waste (adopted by Government Resolution No. 387/2015) which is an update of the previous Strategy for the Back-end of the Peaceful Use of Nuclear Energy in the Slovak Republic.

Basic features of the current concept for spent nuclear fuel management in SR can be summarized as follows:

1. Nuclear reactors operated in SR apply open fuel cycle. Currently it is not possible to realize a closed fuel cycle, because the WWER-440 reactors in SR are not licensed to use *reprocessed* MOX fuel.
2. For SNF management it is not considered to export SNF for reprocessing to abroad and a subsequent return of products from reprocessing (Pu, U, high active radwaste) back to SR.
3. Short-term storage of SNF (3 - 7 years following its removal from the reactor) is provided by *storage* pools near the reactors (BSVP), located at each reactor.
4. Long-term storage of SNF (40 - 50 years *and more* after its utilization in the reactor) is in a separate storage facility for SNF at Bohunice site – Interim Spent Fuel Storage (ISFS).
5. *The long-term goal in the concept of the SNF management is the enhancement of capacity of the current ISFS for the needs of the nuclear power plants in SR with the dry storage technology and monitoring of the dual path scenario for the final stage of spent fuel management, namely by developing a national deep repository for direct disposal of spent nuclear fuel and radioactive waste not disposable at the National Repository for RAW in Mochovce, and by participating in activities that could lead to international deep repository, i.e. repository jointly owned and operated by several states on the basis of relevant international treaties.*
6. *Future decisions in the field of SNF management will reflect the technical and legislative development that is taking place in the European Union and in the world.*

Interim Spent Fuel Storage at Jaslovské Bohunice (in operation since 1987) is being utilized for storage of spent fuel assemblies in a type storage facility (wet storage). After its reconstruction based on a change in geometry of arrangement of disposed assemblies, the ISFS *currently* has higher final storage capacity (14,112 of spent fuel assemblies. The reconstruction also provided for higher seismic resistance and prolongation of the service life to a *minimum of* 50 years.

For future needs of nuclear power plants enhancement of capacity of the current ISFS is under preparation. The prepared change represents enhancement of existing storage capacity at Jaslovské Bohunice site for additional 18,600 spent fuel assemblies using dry technology.

The whole production of SNF from the NPP A1 (HWGCR reactor type, in operation from 1973 till 1977) was exported to the former ZSSR and then to the Russion Federation until 1999. Small portion of SNF from WWER-440 reactors (697 fuel assemblies) was exported to the former ZSSR prior to 1987.

B.2 Concept for Radioactive Waste Management (RAW)

Characteristics of the current management of radioactive waste in SR:

1. Radioactive Waste (RAW) Generation Minimization Program.
2. Maximal *use of the current technology equipment* for treatment and conditioning of radioactive waste (RAW), which are located in Jaslovské Bohunice and Mochovce - TSÚ RAO and FS KRAO.
3. Basic methods for solidification of liquid radwaste, radioactive sludge and spent ion exchange resins into a form for final disposal are the following technologies: cementation, bituminization and solidification in a matrix SIAL (geopolymer) and incineration.
4. The volume of solid radwaste is minimized by compacting, incineration and preventive measures.
5. Treated liquid or solid RAW is placed into fiber-concrete containers covered with active sealing, made of cement mixture and concentrates. These containers are suitable for transport and storage, as well as for disposal in the *National Repository for RAW*.
6. For treatment of intermediate level radwaste or radwaste with high trans-uranium content (specific liquid radwaste from storage of spent fuel from NPP A1 as sludge and chrompik – $K_2Cr_2O_7$) there is a vitrification technology provided for.
7. Very low level RAW *is disposed of* at the Mochovce site in the premises of RÚ RAO. *The first module of the repository for very low level waste for VNAO from NPP A1 was put into operation in 06/2016. Currently construction of the second module of storage facilities for VNAO from NPP V1 is under way.*
8. Available technology (*high pressure* compacting, cementation, etc.) is *used* for treatment and conditioning of metal RAW. Low level metal waste i*s treated by* fragmentation and decontamination, followed by release of decontaminated material into the environment. *With regard to the increase in metal RAW that cannot be released into the environment, Facility for melting of metal RAW is currently under way for its treatment and further recycling.*

9. *Materials contaminated with radioactive substances meeting the criteria for release* to the environment (in particular building materials) *are separated and treated prior to release (by crushing) with* subsequent use.

10. *Institutional RAW and disused sealed sources (ZRAM) are stored in the „Facility for the management of IRAW and ZRAM" that was built and put into operation in 02/2016 at Mochovce site until their final treatment, conditioning and disposal. Institutional RAW and ZRAM are conditioned into the* form acceptable for permanent storage, using standard technology used for RAW from nuclear installations.

11. Long-term storage of *treated* RAW *(e.g. Chrompik vitrificate)* is *provided for in* specially adapted premises *at the Jaslovské Bohunice site*.

12. Conditioned RAW from operation and decommissioning of NPP, as well as conditioned institutional RAW meeting the acceptance criteria *are stored in RÚ* RAO in Mochovce.

13. Radioactive waste *that does not meet the criteria for disposal in RÚ RAO is* stored long-term at the site of the nuclear power plants. *The integral storage facility for RAW is built at Jaslovské Bohunice site for storage of RAW that cannot be disposed at* RÚ RAO*. The integral storage facility for RAW consists of a self-standing building object of a hall type with modular arrangement with the possible further extension, with the date of commissioning in 12/2017*.

14. RAW that does not meet the storage criteria for surface type of repository, *will be disposed in the* deep repository. *At present, the stage 1 of the site selection for the deep repository has been completed, and stage 2 is under preparation, which will be implemented from 2017.*

15. The RAW transports *are realized exclusively* using *approved* transport f*acilities*.

16. The costs of t*ransporting and* management of RAW from decommissioned *nuclear installations and the costs of shipment and management of SNF from the decommissioned NPPs are covered by* National Nuclear Fund and BIDSF funds. The costs of *shipments and* management of RAW *and SNF* from the NPP operation *are covered* from the operational costs of producers of radioactive waste and *SNF*.

Matrix

Type of Liability	*Long term Management Policy*	*Funding of Liabilities*	*Current Practice / Facilities*	*Planned Facilities*
Spent Nuclear Fuel	*Two options: Geological disposal or multinat. solution*	*National Nuclear Fund*	*Long-term storage in ISFS (Interim Spent Fuel Storage)*	*Dry storage facility, Geological disposal*
Nuclear Fuel Cycle Waste	*Geological / Surface disposal*	*National Nuclear Fund*	*Disposal of low level RAW (National Repository for low-level RAW)*	*Geological disposal for highly-active RAW*
Institutional wastes	*Storage facility in operation at Mochovce / Repository*	*Repatriation or financial guarantee*	*Storage facility in operation at Mochovce / Repository*	*Disposal in existing disposal facility (with some exceptions)*
Decommissioning Liabilities	*Immediate Decommissioning*	*National Nuclear Fund + EU Funds*	*Immediate continuous decommissioning; Repository for contaminated soil and building materials at Mochovce repository; + Integral storage facility for radioactive waste at Jaslovské Bohunice*	
Disused Sealed Sources	*Storage facility in operation at Mochovce / Repository*	*Repatriation or financial guarantee*	*Storage facility in operation in at Mochovce*	*Disposal*

B.3 Criteria Used to Define and Classify Radioactive Waste

In the Slovak Republic (the Act No. 541/2004 Coll.) radioactive waste shall mean any unusable material in gaseous, liquid or solid form, which due to the content of radio-nuclides or due to the level of their contamination with radionuclides cannot be released into the environment.

The limit of concentrations allowing release radioactive substances to the environment for the individual radionuclides is stated in Annex 3 to the Government Regulation No. 345/2006 Coll.

Classification of radioactive waste *(according to the IAEA GSG-1)* is based on their *activity* and is defined by Section 5 of the ÚJD SR Decree No. 30/2012 Coll., laying down the details of the requirements for the management of nuclear materials, radioactive waste and spent nuclear fuel:

a) **transient radioactive wastes** whose activity falls below the limit value for their introduction to the environment during storage;
b) **very low-activity radioactive waste,** whose activity is slightly higher than the limit value for their introduction to the environment, contain mainly radionuclides with a short half-life,or also a low concentration of radionuclides with a long half-life, and which during storage require a lower degree of isolation from the environment through a system of engineered barriers, as in the case of surface-type radioactive waste repositories;
c) **low-activity radioactive waste**, whose average specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, is less than 400 Bq/g, maximum specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, is locally less than 4000 Bq/g, does not produce residual heat, and following treatment meet safe operating limits and conditions for surface-type radioactive waste repositories;
d) **medium-activity radioactive waste**, whose average specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, is equal to or over 400 Bq/g, may produce residual heat and measures for its removal are less than in the case of highly active radioactive waste, and which following treatment do not meet safe operating limits and conditions for surface-type radioactive waste repositories;
e) **highly-active radioactive waste**, whose average specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, exceeds values specified for low-activity radioactive waste requiring measures for the removal of residual heat and can be deposited only in an underground-type radioactive waste repository.

C Scope of Application of the Convention

Article 3 of the Joint Convention

1. *This Convention shall apply to the safety of spent fuel management, when the spent fuel results from 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 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 defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention. However, this Convention shall apply to the safety of management of spent fuel or radioactive waste from military or defence programmes, if and when such materials are transferred permanently to and managed within exclusively civilian programmes.*
4. *This Convention shall also apply to discharges as provided for in Articles 4, 7,11,14, 24 and 26.*

This report provides information on the implementation of the Joint Convention for nuclear installations in the SR. The link between the chapters and the individual articles of the Joint Convention is shown in Table C.1.

Table C.1: Reference Index

Title of chapter in the National Report	Article of the Joint Convention
B. CONCEPT FOR SPENT NUCLEAR FUEL AND RAW MANAGEMENT	32
C. SCOPE OF APPLICATION	3
D. SNF AND RAW FACILITIES	32
E. LEGISLATION AND REGULATION	
E.1. LEGISLATIVE AND REGULATORY FRAMEWORK	18 & 19
E.2. REGULATORY AUTHORITIES	20
F. GENERAL SAFETY ASPECTS	
F.1. LIABILITY OF THE AUTHORIZATION HOLDER	21
F.2. HUMAN AND FINANCIAL RESOURCES	22
F.3. QUALITY MANAGEMENT SYSTEM OF OPERATORS	23
F.4. RADIATION PROTECTION	24
F.5 EMERGENCY PREPAREDNESS	25
F.6. DECOMMISSIONING	26
G. SAFETY OF SNF MANAGEMENT	
G.1. GENERAL SAFETY REQUIREMENTS	4
G.1.1 REVISIONS AND INSPECTIONS OF EXISTING INSTALLATIONS SAFETY	5
G.2. SITING OF FACILITIES	6
G.3. DESIGN AND CONTRUCTION	7
G.4. SAFETY ASSESSMENT OF FACILITIES	8
G.5. OPERATION	9
G.6. DISPOSAL OF SNF	10
H. SAFETY OF RAW MANAGEMENT	
H.1. GENERAL SAFETY REQUIREMENTS	11
H.2. EXISTING FACILITIES AND PROCEDURES IN THE PAST	12
H.3. SITING OF PROPOSED FACILITIES	13
H.4. DESIGN AND CONSTRUCTION OF FACILITIES	14
H.5. SAFETY ASSESSMENT	15
H.6. OPERATION OF FACILITIES	16
H.7. INSTITUTIONAL MEASURES AFTER CLOSURE OF REPOSITORY	17
I. TRANSBOUNDARY MOVEMENT OF SNF AND RAW	27
J. DISUSED SEALED RADIOACTIVE SOURCES	28
K. MEASURES TO INCREASE SAFETY	
L. ANNEXES	

C.1 Safety of Spent Nuclear Fuel (SNF) Management and Radioactive Waste (RAW) Management

The scope of this Report covers information on the safe management of spent fuel from nuclear energy installations, including transportation and inventory of spent fuel.

The most important facilities in terms of spent fuel management are listed in Annex I.

Currently in Slovakia there are not facilities for reprocessing of spent fuel or facilities for high active waste management and for other products (plutonium, uranium) from reprocessing of spent fuel. Reprocessing of spent fuel is not yet part of the concept for spent fuel management (see B.1). Spent fuel produced at the nuclear installations of SR is currently not being reprocessed abroad either with the intention to return the products to the SR. Spent fuel from NPP A1 and part of spent fuel produced by WWER-440 reactors, which was exported to ZSSR / RF in the past, was exported without returning high active RAW and products from reprocessing back to the SR.

D Spent Nuclear Fuel (SNF) Management and Radioactive Waste (RAW) Management Facilities

Article 32 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

a) Is being held in storage at radioactive waste management and nuclear fuel cycle facilities;

b) Has been disposed of; or

c) Has resulted from past practices;

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

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

D.1 List and Description of Spent Nuclear Fuel (SNF) Management Facilities

D.1.1 Basic Characteristics of the Main Equipment for Spent Nuclear Fuel Management at NPPs of WWER type

The main facilities:

- Fuel charging machine (CM),
- Spent fuel pool (BSVP),
- Spent fuel pool reserve grid,
- Spent fuel pool coverage,
- Transport channel sealing plate,
- Transport container pit,
- Transport container stands,
- Spent fuel transport container suspension,
- Inspection shaft,
- Sealed capsule for damaged fuel assemblies,
- Platform over transport container shaft,
- Service platform for spent fuel transport container in reactor hall,
- Stand under the spent fuel transport container,
- Overhead electric crane 250/32/2 t.

A detailed technical description of this equipment is found in the National Report of y. 2003.

With regard to the overall concept of modernization of units and the safety improvement programs at NPP V1 and NPP V2 and on the basis of analysis of several significant operating events, several modifications have been implemented until y. 2002 on transport technology part equipment for spent fuel handling.

The most significant include the following:

- Modernization and reconstruction of electrical parts of TV-systems and system of fuel charging machine (automatic process control with options of manual, emergency and simulation mode of fuel charging machine).
- Supply and repair of system for operative KHP in reactor core – "Sipping in-core test".
- Supply of a special semi-automatic manipulator for removal of foreign objects from reactor pressure vessel and reactor internals.
- Installation of remote electric control of spent fuel transport container suspension.
- Safety modification of TK C-30 container navigation to *universal nest*.
- Supply of portable demi-water heater for TK C-30.

The main criterion for these modifications was to limit the human factor in occurrence of operational events, safety improvement in handling spent fuel, equipment reliability, operational safety of technologies and of these units as a whole.

For NPP Mochovce two pieces of equipment were purchased additionally, which allow more effective performance of works on the reactor during outages:

- Equipment for detecting untight fuel assemblies "Sipping in core" was complemented with a flow activity analyzer MAK-8. The device consists of a bell, which can be used to check the entire core, except fuel cells of control rods in 66 steps. The bell moves within the reactor core using a working rod of the fuel charging machine. Fuel cells of control rod are checked in KHP casings.
- Equipment for removal of fallen objects from the core will be placed on the reactor dividing platform. From the control panel it is possible to detect a fallen object in the core by using TV system. A head with interchangeable tools can be used to capture such object and place it in a transport container.

D.1.2 Interim Spent Fuel Storage of JAVYS, a. s. (ISFS)

BASIC TECHNICAL DATA FOR ISFS - JAVYS, a. s.	
Maximal storage capacity	14 112 fuel assemblies
Storage capacity as at 31 December 2013	*13 980 fuel assemblies*
Number of pools	3 operational + 1 backup
Ground-plan of the building	45m x 70m
Total built up area	95 000 m^3
Possibility of extending it	2 - 3 pools
Method of storage	KZ 48 baskets, T-13
Maximal temperature of pool water	50 °C

Capacity of purification system of pool water	25 m^3/h
Method of transportation of spent fuel	Rail wagons, TK C-30 containers
Pool size, length x width x depth	23,4 x 8,4 x 7,2 m
Number of baskets per pool	98 of KZ-48 type

ISFS is a nuclear installation intended for temporary and safe storage of spent nuclear fuel from WWER-440 reactors. It is designed as a wet storage. Into operation was put in 1986. Active operation began in 1987.

The ISFS is a standalone building without any construction link to the buildings within the premises of other nuclear installations at Jaslovské Bohunice. The building is divided to container section and storage section. The storage section consists of 4 storage pools *with one pool designated as a reserve pool*. The storage pools are interconnected with a transport channel. Each pool can be separated from the transport channel with hydro locks. The spent fuel is stored inside baskets located in the pools under water, which at the same time is also a shielding and removes the residual heat from the spent fuel assemblies.

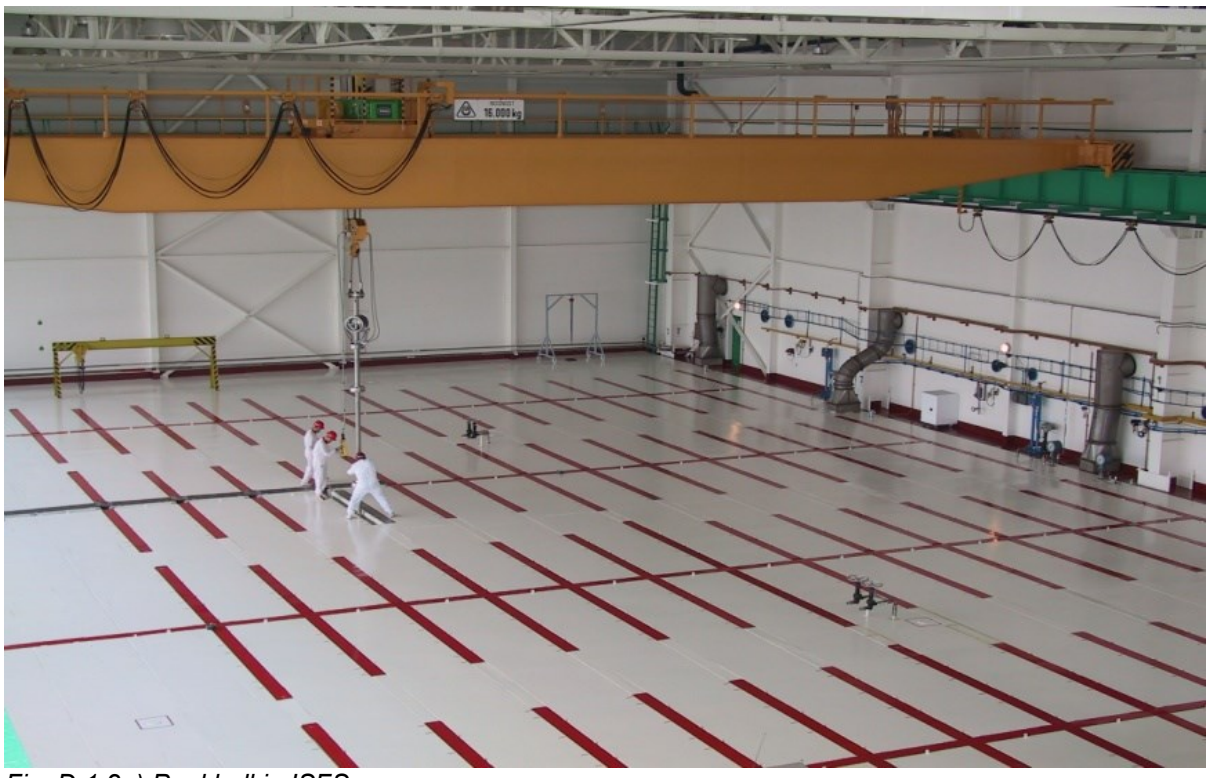


Fig. D.1.2a) Pool hall in ISFS

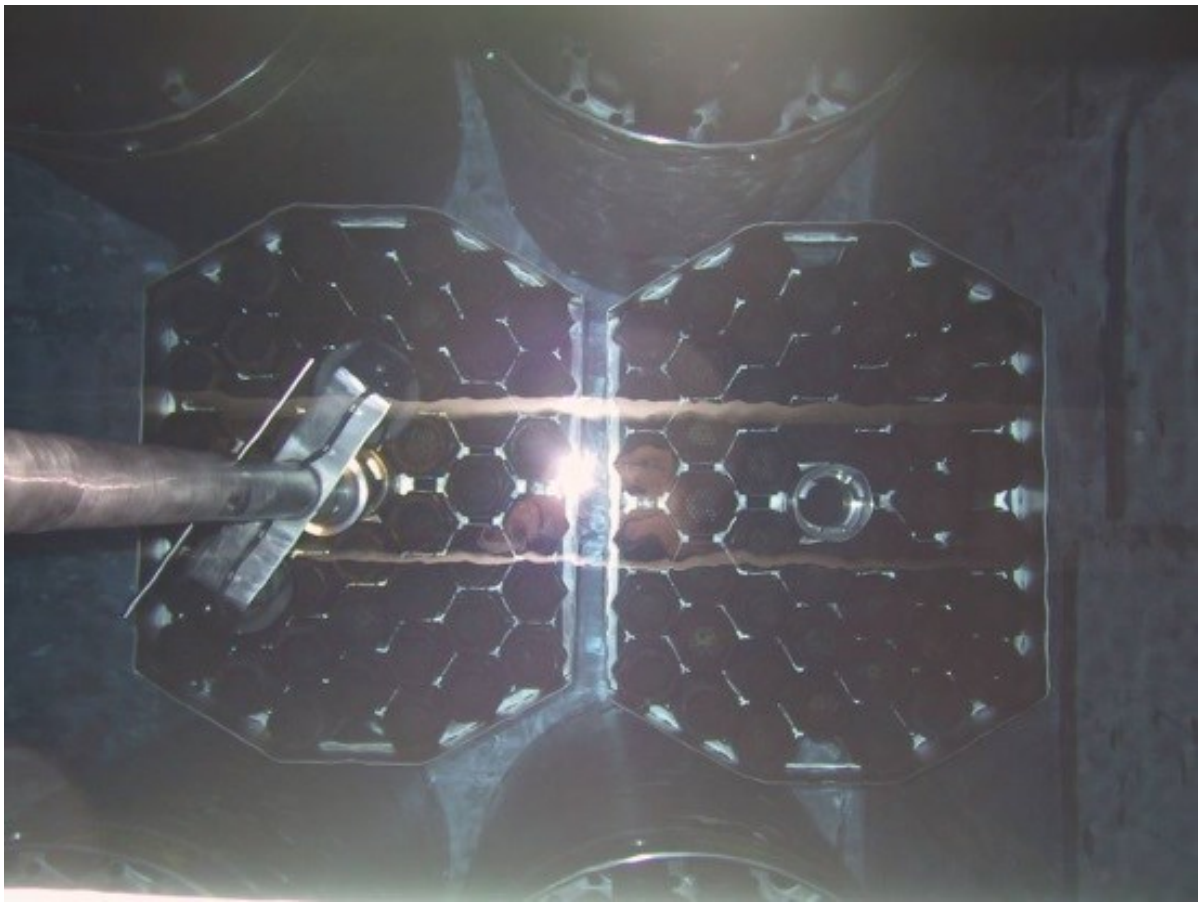


Fig. D.1.2b) Spent fuel cask

The pools are equipped with double lining (carbon steel and stainless steel) with an inter-space, from which leaks are draught into the system of leaks.

The interim spent fuel storage was reconstructed in the period 1997 – 1999 for the purpose of increasing its storage capacity, life extension and enhancing the seismic resistance of the structure. *The ISFS has its own* ***cooling and treatment station****. Due to the increased requirements for the removal of residual heat from the spent fuel (increased fuel burn-up, increased number of SNF) the original cooling system has been replaced by a new system.* The overall storage capacity of ISFS after reconstruction and seismic enhancement is nearly three times higher compared to the designed capacity (increase from the original 5 040 to the current 14 112 fuel assemblies).

Part of the reconstruction was also the project of seismic reinforcement of ISFS *aimed at increasing* the resistance of construction and technological structures. The evaluation revealed the necessary modifications of the building structures and technology that were then carried out in the framework of the project of „Seismic reinforcement and extension of storage capacity of ISFS Bohunice“. By implementing this project the achieved status is that even after a seismic event all safety functions of ISFS will be secured up to the level set for the Jaslovské Bohunice site (80 MSK 64) and its life was extended by minimum 50 years.

Apart from the changes and modifications of the original construction solution and technological equipment of the ISFS, which resulted from the requirements for seismic reinforcement and extension

of the storage capacity, further changes and modifications have been made, which increased the safety level of the ISFS, *such as:*

- Installation of a manipulator MAPP 400 for transferring spent fuel;
- *Increasing the capacity of the air-conditioning system* of control rooms, ventilation at the entry to the ISFS, modifications to the air-conditioning system,
- *Increasing the capacity of the pool water filtration system* with a filtration unit to capture micro-organisms in pool water, including disposal of filter inserts,
- Modification of the decontamination system;
- Installation of detection system for fuel assemblies tightness (Sipping in Pool) and monitoring of corrosion on the pools lining;
- Modernization of the system and instrumentation for radiation control of ISFS*, etc.*

Based on the IAEA document (SSG-15 Storage of Spent Nuclear Fuel) and ÚJD SR Decision No. 152/2000, a ***monitoring program*** *has been progressively implemented since 2001, focusing on:*

- *Building structures, such as the foundations of the ISFS building, concrete structures of spent fuel pools, supporting steel elements and structures, encasement of the ISFS building,*
- *Pressure vessels and piping systems (cooling, purification and decontamination system),*
- *Corrosive damage to equipment and technology that is in contact with the coolant for the spent fuel pools (construction of pools, transport equipment),*
- *Rotary machines (selected pumps and fans),*
- *Power supply systems and components (transformers, generators, motors and wiring),*
- *Spent nuclear fuel (shipping).*

New monitoring points were installed to monitor settlement of the ISFS building, including monitoring of groundwater level. The ISFS pool lining condition is monitored by assessing the condition of material samples located in the pools and using the acoustic emission method. For monitoring the fuel condition, the Sipping in Pool system is used and an inspection stend to monitor the fuel, where non-destructive checks of fuel rods is be performed.

Periodic Assessment of ISFS (ISFS PSR)

The assessment was carried out in accordance with the legislation in force as at 30 November 2008. The emphasis in this assesment was placed on meeting the requirements of the *then valid* ÚJD SR Decree No. 50/2006 Coll. and the ÚJD SR Safety Guide BNS I.7.4/2006 Periodic safety assessment.

The period under assessment, from 2001 to 2008, follows after the project of seismic reinforcement and extension of storage capacity, which was implemented in the period from 1997 to 1999.

As a result of the analyses, a set of corrective measures divided into groups according their priorities is listed in chapter 5 of document “Integrated plan of realization of corrective measures”. From 32 corrective measures 21 have been evaluated as measures having high priority (implementation by the end of 2012), 7 having medium priority (implementation by the end of 2013) and 4 low priority (implementation by the end of 2014).

Examples of high priority measures:

1. Ensure completion of project documentations of that the requirements described in Regulation 53/2006 Coll. Section 16 Paragraph 2 Letter g (conditions for the carriage of heavy loads over the spent nuclear fuel storage facilities) are fulfilled.
2. Add relevant chapters to the ISFSF Safety report reasoning limits and conditions.
3. Include to the program of environmental monitoring measurement of alpha activity of radionuclides collected on aerosol filters from ISFSF air-condition quarterly (or biannually).

Examples of medium priority measures:

1. Ensure completion of project documentation for spent fuel disposal concept after the end of the storage.
2. Process as a controlled document list of devices that are subject to the requirements of legislation to monitor their service life.

Examples of low priority measures:

1. Establish a system of periodic review of the implementation of the limits and conditions
2. Develop a methodology according to SAT WENRA, Issue Q.4.2 and determine expert guarantee its correct application.

During the assessment there were no findings that would have such high safety relevance that would require immediate action.

Following the periodic safety review and on the basis of ÚJD SR Decision No. 444/2010, authorization for the following 10 years of operation was granted.

Note: In 2013, the amendment to the *Atomic Act No. 143/2013* Coll. set the licensing of operation of all nuclear installations for an unlimited period of time (Previously limited to a *period of maximum* 10 years. *Periodic assessment after 10 years of operation remains valid).*

The deadlines for *meeting corrective actions* were met.

Stress Tests for the ISFSF

In July 2011 ÚJD SR requested JAVYS to prepare similar analysis as for the NPPs also for the ISFSF. Following events have been considered:

1. earthquake stronger than envisaged in the project,
2. extreme floods beyond what was envisaged in the design,
3. other external environmental conditions that could be the Bohunice site for induced loss of safety functions,
4. extended time of complete loss of own electrical power consumption,
5. extended period of incapacity of residual heat removal,
6. degradation in terms of cooling the spent fuel storage pools.

In 2012 JAVYS realized “Program evaluation – review ISFSF response to the Fukushima event type”. Chapter "Seismic event" has been added to an operating document "Addressing failure conditions in ISFSF".

Fig. D.1.2c) Transport containers TK C-30

Fig. D.1.2d) Transport of TK C-30 by special transport hitch

Impact of decommissioning of NI V1 on the operation of ISFS

Due to the fact that the ISFS is closely interconnected with parts of NPP V1 in decommissioning, it is necessary to change some technological systems of ISFS specified in the project „Modification of the power plant and installation of new systems“, which during 2016 was at the stage of selection of the contractor for the project implementation.

Project deals with the construction, or modification of the following ISFS technological systems:

- *ISFS systems,*
- *Building substitute supply of demineralized water,*
- *Building of substitute removal of low activity contaminated water,*
- *Installation of pipe connections for regeneration and decontamination solutions,*
- *Building entrance gate for trucks to enter the new pumping station of ISFS, etc.*

Increasing storage capacity for SNF

As of 31 December 2016, 11,766 SNFs were stored in ISFS representing 83.4 % of its maximal designed capacity. Due to the actual filling of the wet ISFS, the capacity of which, with the current trend, will be sufficient approx. until 2024, in 2013 an investment project „Increasing storage capacity for SNF at Jaslovské Bohunice site“ was approved.
Increasing the current srorage capacity of the ISFS at Jaslovské Bohunice site represents an extension of its storage capacity by a total of 18,600 SNF in two stages, while the first stage is an extension by 10,100 SNF and the second stage is an extension by 8,500 SNF. Due to the current operation of the wet ISFS, there will be civil structures and technological connections with the new storage capacity. In 2016, the process of environmental impacts assessment under Act No. 24/2006 Coll. was completed, which recommended the dry technology for SNF storage, using storage containers (canisters) with a maximum of 85 SNF placed into reinforced concrete storage modules. Statement of the MŽP SR on „Increasing storage capacity of the Interim Spent Fuel Storage at Jaslovské Bohunice site“ was issued under No. 1604/2016-3.4/hp on 11 February 2016. Currently the project is at the stage of selection of the contractor for the design documentation and implementation of works. The deadline for putting into operation of the first module for dry storage of SNF is scheduled for 2021.

Transport container C-30 TK is designed for on-site transportation from Unit*s NPP V2* to ISFS JAVYS, a. s. at the Jaslovské Bohunice site or off-site transport of SNF from the units of NPP Mochovce. TK is transported on a special railway wagon.

Fuel stored in the basket is transported in a container in a water environment with a nitrogen cushion (wet transport), or with cooling gas - nitrogen (dry transport). The transport packaging set C-30 is moved by using 130 t crane into the receiving shaft by a special transport suspension from the transportation rail corridor. After performing the necessary handling in the receiving shaft, container de-sealing and lid removal, the basket with the spent fuel is moved to the respective position in the storage pool by a trap and 16 t crane.

D.2 List and Description of Facilities for Radioactive Waste (RAW) Management

D.2.1 Facilities for Radioactive Waste (RAW) Management within NPP

NPPs with WWER-440 are equipped with the following facilities for treatment and storage of RAW:

Facilities for treatment of solid RAW are represented by collecting equipment, sorting equipment, washers, dryers, low pressure compactor and fragmentation equipment. These are used for fragmentation of large size metal SRAW.

Facilities for treatment of liquid RAW are represented by purification (filtration) stations with ion exchange resins (ŠOV 1, 4, 5 – single block; ŠOV 2, 3, 6 - common), evaporating distillation equipment, treatment plant of contaminated oil, connecting assembly of concentrate homogenization and pumping stations.

Facilities for gaseous RAW management are represented by ventilation systems are provided with filters to capture aerosols and iodine. During 2003 - 2004 replacement of original iodine filters of Soviet provenience with iodine filtration stations took place. As part of completion of the fragmenting workplace a new exhaustion system was installed for the workplace. On the basis of decision of ÚVZ SR the operator of NPP V1 from 2012 is not obliged to monitor discharges of noble gases and iodine-131 (NPP V1 is under decommissioning).

Facility for storage of solid RAW

The method of storing solid RAW depends on the type of RAW and from its packaging:

- Solid RAW for incineration and high pressure compacting is stored in 200 litres MEVA drums in storage shafts *and metal RAW to be melted*,
- Metal solid RAW is stored in box pallets (only at NPP Jaslovské Bohunice 3&4 and NPP Mochovce);
- For example, medium and high level solid RAW from the reactor is stored in special packaging, in stainless steel cylindrical containers at a special storage facility, which is accessible directly from the reactor hall and is formed as a set of vertical metal cylindrical shafts embedded in mass concrete to shield radiation;
- Other solid RAW with higher activity in shielded drums and with these in shielded boxes;
- Air-conditioning filters in metal packages placed in storage shafts;
- Oversized solid RAW is freely stored in designated storage shafts.

Facilities for storage of liquid RAW are tanks for storage of untreated liquid RAW and concentrates. Contaminated oils are stored in jerry cans put into MEVA drums, resp. directly in MEVA drums, to which they are pumped from the tanks.

The concentrate is stored in stainless steel tanks with a capacity from 415 up to 550 m3.

Exhausted ion exchange resins are stored in stainless steel tanks with a capacity from 150 up to 450 m^3, which are located in leak proof concrete shafts capable of capturing the entire volume of the tank in the event of failure.

D.2.2 Technology for Treatment and Conditioning of Radioactive Waste (TSÚ RAO)

Technology for treatment and conditioning of RAW:

- Bohunice RAW Treatment Centre - BSC *includes the following* technology for the *safe treatment and conditioning of RAW*:
  - Solid radwaste sorting,
  - *Liquid radwaste concentration,*
  - *Solid radwaste and liquid radwaste incineration,*
  - Solid radwaste high pressure compacting,
  - *Liquid radwaste and solid radwaste cementation,*
  - Storage and transport of solid radwaste *and liquid radwaste,*
  - *The resultant product is fiber-concrete containers for conditioned RAW by cementation, which meets L&Cs for storage, transport and final disposal in National Radioactive Waste Repository;*
- Bituminous lines designed for treatment of concentrates and sorbents and the purification station for active water *for treatment of liquid radwaste from NPP V1 and NPP V2*;
- Discontinuous bituminization line designated for treatment of saturated sorbents,
- Wastewater treatment plant for treatment of liquid radwaste from NPP A1;
- Fragmentation plant and large capacity decontamination plant for metal RAW *serve* for *decontamination and* treatment of metal RAW;
- Workplace for processing air filters,
- Workplace for crushing used power cables.

Following the periodic safety review *and based on the ÚJD SR Decision No. 498/2010, authorisation for operation* for the following 10 years of operation, on 30 December 2010.

Note: In 2013, the amendment to the Atomic Act No. 143/2013 Coll. sets the authorization for operation for all nuclear installations for an unlimited period of time (Previously limited to maximum of 10 years. Periodic assessment after 10 years of operation remains valid).

Fig. D.2.2 Bohunice RAW Treatment Center (BSC)

D.2.3 Facility for Final Treatment and Conditioning of Liquid Radioactive Waste (FS KRAO)

The FS KRAO *is situated in the NPP Mochovce site in the immediate vicinity of NPP Mochovce 1&2. It was put into operation in 2007. It includes the following technologies for safe treatment and conditioning of liquid radwaste:*

- *Liquid radwaste concentration,*
- *Bitumenisation of concentrates,*
- *Bitumenisation of ion-exchange resins (sludge),*
- *Cementation of liquid radwaste and solid radwaste,*
- *Preparation of fibre-concrete container for transport.*

The FS KRAO facility in Mochovce, the following categories of liquid radwaste are treated and conditioned:

- *Concentrates,*
- *Ion-exchage resins (sludge).*

The resultant products is *also fibre-concrete container with conditioned RAW with cementation,* meeting the L&Cs for storage, transport and disposal in National Radioactive Waste Repository.

D.2.4 *Integral Storage Facility for RAW (IS RAW) - under construction*

At Jaslovské Bohunice site a new facility for RAW storage will be built, originating from decommissioning of NPP A1 and NPP V1. The facility will be located within the JAVYS premises, at Jaslovské Bohunice site.

The start of construction was in May 2014, completion of construction is scheduled for November 2017 and the expected end of operation in 2087.
The IS RAW is not a production facility, the facility will be used only for interim storage of solid and solidified RAW.

The new IS RAW will be used exclusively for storage of:

- *Solid or solidified RAW prior to their further treatment at facilities within JAVYS (storage of liquid RAW or SNF will not be allowed in the proposed facility),*
- *Conditioned RAW using various technologies into solidified (solid) form, originating from the decommissioning of NI at the site until the time when it can be transferred to a place for permanent disposal,*
- *Solid RAW for a period, during which their activity is decreasing to a level allowing their release to the environment.*

D.2.5 Facility for Institutional Radioactive Waste Management (IRAW) a*nd Captured Radioactive Substances (ZRAM)*

The original centralized system for collection of Institutional Radioactive Waste Management (IRAW) in the SR was disrupted due to the separation of the Czecho-Slovak Republic. Establishment of a new national system was imposed by government resolution No. *610/2009*, which has designated responsibility for storing the captured contaminated radioactive materials within SR to SE, a. s. - VYZ, while from 1 April 2006 the commitments were transferred to Nuclear and Decommissioning Company (JAVYS, a. s.).

The Government of the Slovak Republic by its Resolution No. 610 from 2 September 2009 approved the draft procedure for institutional radioactive waste management and for captured radioactive materials and charged JAVYS, a. s., with constructing a complex facility for accepting, sorting and long-term safe storage of such materials.

IRAW and ZRAM management represents a set of the following activities:

- *Collection,*
- *Characterization,*
- *Sorting,*
- *Treatment,*
- *Conditioning,*
- *Storage,*
- *Disposal.*

A centralised facility for safe storage of IRAW, ZRAM originating from the whole teritory of Slovakia, until the period of their further management was built at Mochovce and put into operation in 02/2016. Subsequently, all IRAW stored at the TSÚ RAO facility at Jaslovské Bohunice site was transferred into the facility for IRAW and ZRAM management.

D.2.6 Radioactive Waste (RAW) Shipment

In order to ensure the concept of RAW, IRAW and ZRAM management, a transport system was established providing for shipment of:

1. Solid and liquid RAW within Jaslovské Bohunice premises;
2. Solid RAW between Jaslovské Bohunice – Mochovce sites,
3. Institutional RAW and ZRAM from the whole territory of SR to Jaslovské Bohunice, *resp. Mochovce.*

The shipment of RAW is performed in certified transportation equipment on means of transport meeting the conditions of the European Agreement on international carriage of dangerous goods (ADR), or the Regulation concerning international carriage of dangerous goods (RID), Act No. 541/2004 Coll. and the Decree of ÚJD SR No. 57/2006 Coll.

The shipment of RAW is arranged fully by JAVYS, a. s.

Fig. D.2.6a) Transport of fibre concrete containers to the National Repository of RAW

Fig. D.2.6b) Transport of solid RAW at Jaslovské Bohunice site and between Jaslovské Bohunice and Mochovce site

Fig. D.2.6c) Transport of KRAO at Jaslovské Bohunice site

D.2.7 National Repository for Radioactive Waste (RÚ RAO)

The National Repository for Radioactive Waste (*put into operation in 2001)* is a near-surface type, designed for disposal of solid and solidified low activity RAW from operation and from decommissioning of nuclear installations. The Repository site is located about 2 km northwest from NPP Mochovce site.

The basic safety requirement for a repository is that during its operation, period of institutional control and after its completion no leakage of radionuclides to the environment shall occur that would cause radiation exposure exceeding the values *of radioactive substance* set by valid legal regulations.

The repository is built in a geological formation with low permeability and high sorption capacity. Artificial layer of compacted clay represents an additional barrier against radioactivity leakage. A drainage system mouthing into monitoring shafts, which enables to control eventual water leakages from each disposal box, is built between it and the disposal boxes. Other basic engineering barriers against leakage of radionuclides to the environment include concrete structure of the repository, fibre-concrete container and solidified form of radioactive waste.

Fig. D.2.7a) VBK after measurements taken at Gamma scanner prior to disposal into disposal boxes of the repository arranged as double-rows

The Repository is currently formed by a system of disposal boxes arranged into two double-rows, 40 boxes each. The capacity of one box is 90 fibre-concrete containers (VBK). The total *present* capacity of the repository is 7,200 containers with total volume of 22,320 m^3. The inside volume of VBK is 3,1 m^3. Compacted and bituminized waste are fixed with active or non-active cement mixture.

Following the periodic safety review, ÚJD SR issued its Decision No. 490/2011 authorizing operation of RÚ RAO at Mochovce. ÚJD SR has imposed an obligation to implement corrective actions according to priorities and deadlines identified during the periodic assessment (not later than 2014). The relevant corrective actions were implemented within deadlines given in the ÚJD SR Decision.

Note: In 2013, the amendment to the Atomic Act No. 143/2013 Coll. sets the authorization for operation for all nuclear installations for an unlimited period of time (Previously limited to maximum of 10 years. Periodic assessment after 10 years of operation remains valid).

In order to be able to proceed continuously with disposal of RAW a second double row of disposal boxes was built and put into operation. The third double row of disposal boxes will be built until 2018.

The repository site allows for expansion up to *7,5* disposal double rows, i. e. for disposal of approx. *27* thousand VBK containing RAW.

The first and the second double rows are protected from meteorological impacts by *halls ensuring that* the storage area is covered over the entire process of disposal operations until it is replaced by a definitive cover.

For the disposal of very low level radioactive waste, i.e. waste, the activity of which is only slightly above the limits for their release into the environment (contaminated soil, crushed concrete from decommissioning) separate storage facilities have been built within the existing National RAW disposal at Mochovce site. In the years 2015 and 2016, the first stage of repository for VNAO was completed with a capacity of 20,000 m^3 VNAO from the decommissioning of NPP A1. On 04 July 2016 ÚJD SR by Decision No. 338/2016 authorized the operation of this part of VNAO repository.

Fig. D.2.7b) Disposal of VNAO in the first stage of VNAO repository with a disposal capacity of 20 000 m^3 for RAW from the decommissioning of NPP A 1

Until 2019, the second stage of VNAO repository will prepared with a disposal capacity of 9,000 m^3 for VNAO from the decommissioning of NPP V 1.

D.3 List and Description of Facilities in Decommissioning and Facilities for Radioactive Waste (RAW) Management from Decommissioning, which are part thereof

D.3.1 NPP V1 Bohunice – In Decommissioning

Nuclear power plant V1 (NPP V1) is located in Jaslovské Bohunice site.

NPP V1 has 2 pressurized water reactors of WWER-440/230 type. NPP V1, Unit 1 was commissioned in December 1978 and Unit 2 in March 1980.

In accordance with the Government Resolution No. 809/1998 operation of Unit 1 was terminated by as at 31 December 2006 and the operation of Unit 2 by 31 December 2008.

Following the removal of spent nuclear fuel from NPP V1 to the ISFS and based on the positive opinion of the European Commission according to Article 37 of the Euratom Treaty, *ÚJD SR issued its Decision No. 400/2011* for the stage 1 of decommissioning of this power plant*, which came into force on 20 July 2011*.

Decommissioning of NPP V1 has been implemented in two stages.

The scope of works of stage 1 of decommissioning *(2011 – 2014*) *included dismantling of* euipment and removal of structures of the secondary circuit, that is outside the controlled area of the nuclear power plant, which are *not* needed *or* suitable for *further* use. *During this stage, the documentation necessary for obtaining license for the stage 2 of decommissioning of NPP V1 was prepared. After reviewing the above documentation, ÚJD SR issued its Decision No. 900/2014 containing:*

- *Authorization for stage 2 of decommissioning of NI NPP V1;*
- *Authorization for the management of RAW;*
- *Authorization for the management of nuclear materials.*

The activities of stage 2 of decommissioning of NPP V1 (2015 – 2025) are focusing on dismantling of facilities and structures of the primary circuit located in the controlled area, i.e. decommissioning of the nuclear island. Dismantled will be also other not needed external objects at the NPP V1, tanks, underground piping and cable channels. After the site is restored to its original condition (or demolition) the site will be released from regulatory control according to the Atomic Act.

Currently there are *51* BIDSF projects completed and the implementation of another *11* projects is under way. There are *6* projects in a preparatory phase and another *7* projects are planned. JAVYS, a. s., after obtaining the decomissioning license, *performs* activities representing irreversable changes to the power plant technologies, such as: *modifications of essential service water systems*, *dismantling of diesel-generators and* transformers, 220 kV substations, equipment in the machinery room on TG and electrical buildings, modification of the 110 kV switchgear, modifications of power supply systems for self-consumption and *after the shutdown of NPP V1* transfer of systems for the needs of other NIs crossing the premises of decommissioned NI NPP V1 and *other scheduled* activities.

Fig. D.3.1 Machinery room after dismantling of the technological part

D.3.2 NPP A1 Bohunice – In Decommissioning

Nuclear Power Plant A1 with heterogeneous reactor KS-150, was designed for electric output of 143 MW. Natural metal uranium was used as fuel, heavy waster (D_2O) as moderator and carbon dioxide (CO_2) as coolant - *HWGCR*.

The A1 NPP was connected to the power distribution network in December 1972. After an operational accident in January 1976 *(first accident)* the operation was restored, after another operational accident in February 1977 technical, economical and safety analyses were conducted and on the basis of their results, in 1979 the Government with its Resolution No. 135/79 decided *not to continue in operation* of NPP A1.

Activities aimed at decommissioning of NPP A1 have commenced. Due to the absence of legal regulations for decommissioning of nuclear power plants at that time any partial issues were solved on a case-by-case basis and the individual activities were approved as modifications having impact on nuclear safety. The works concentrated on:

- Removal of consequences of the operational event,
- Preparation of fuel export to ZSSR / RF,
- Development and subsequent implementation of RAW management technologies.

The first integrated documentation for decommissioning of NPP A1 was developed in 1992. The currently valid concept and the time schedule for decommissioning of NPP A1 was passed by the Government Resolution No. 227/92. Government Resolutions Nos. 266/93, 524/93, 877/94 and

649/95 approved this time schedule, including a comprehensive procedure. **Updated documentation for the initial stage of decommissioning** was elaborated during 1994 - 1996. In 1999 ÚJD SR issued Decision No*. 137/1999* for the **stage 1 of decommissioning**, i. e. to achieve the state declared in this documentation from the current base line:

- All spent fuel is removed from the long-term storage and media representing the highest potential risk are solidified or re-stored into new tanks,
- Most of the liquid RAW from operation has been *treated or is safety stored*.

On 18 June 2009 an authorization was issued by means of ÚJD SR Decision No. 178/2009 for the second stage of decommissioning of NPP A1 in accordance with the Plan for the Second Stage of Decommissioning of NPP A1, which enabled to continue with a continual alternative in the process of decommissioning of NPP A1. The following period was focused in particular on decommissioning of external objects of the nuclear installation of NPP A1, on the issue of handling contaminated soil and RAW management produced by the main generating Unit of NPP A1.

The current status of NPP A1 can be characterized as follows:

- Export of spent fuel to the Russian Federation was completed in 1999 (based on an inter-governmental treaty from 1956);
- *Medium* for the cooling of spent nuclear fuel: Chrompik (aqueous solution of chromium and potassium dichromate - $K_2Cr_2O_7$) *is continuously* vitrified, sludge in sleeves and *sludge* at the bottom of the pool for long-term storage is solidified into geopolymers, dowtherm (an organic liquid mixture of diphenyl and diphenyloxide – originally coolant for fuel cells) *was* purified and incinerated or *fixed into geopolymer matrix*. More than 99 % of water activity of the long-term storage pool was captured on special sorbents. Liquids from the long-term storage pool was processed by concentration on the evaporator. The bottom sediments *were transferred t*o a new storage tank;
- Liquid operational waste (concentrates) were bituminized, *liquid waste from decommissioning of NPP A1* and together with other waste from Jaslovské Bohunice site are gradually conditioned and disposed at the repository;
- Storage of solid RAW, object 44/20, was reconstructed, waste removed, sorted and stored in a controlled manner. Part of these RAW has been *treated*, conditioned and disposed;
- *The original, not operated storage tanks that posed* the greatest potential risk for the environment were *decontaminated* and *removed*.

Technological equipment with induced activity or higher level of contamination i*s continuously* dismantled within the next stages of decommissioning, *where stage 2 was implemented until 31 December 2016*.

In 2016, ÚVZ SR issued an authorization, by which authorizes the activities „Stage III and IV of decommissioning of the nuclear installation of NPP A1“ and ÚJD SR issued the Decision No. 369/2016 of 11 August 2016, by which authorizes stages III and IV of decommissioning of the nuclear installation NPP A1.

D.3.3 Facilities for Management of Radioactive Waste (RAW) from Decommissioning – part of NPP A1

At present, RAW has been removed, sorted and stored in 200 dm^3 drums. The incinerable RAW is transported to the incineration plant at BSC. The sorting facility is used for sorting solid RAW produced from operation of NPP A1 compacted into packages for burnable, not burnable, compactable and metal. *Workplaces for RAW management from decommissioning are equipped with different technologies.*

Workplace for contaminated concrete (PNKB) management

The workplace is made of PNKB containment*, in which large parts of concrete blocks are gradually decontaminated in an abrasive manner*.

Vitrification Plant of Chrompik (VICHR)

Vitrification plant is for fixation of radioactive chrompik into a glass matrix of boric silicate type to achieve significant volume reduction and to enhance the storage safety of this specific radioactive liquid waste.

Manipulation box for handling medium level radioactive materials *allows*:

- cutting materials and sampling,
- clamping and machining of high level contaminated materials,
- handling samples (insertion, removal from containers),
- detailed visual inspection of objects,
- taking photos of objects.

Fragmentation workplace for long-term storage cases *allows*:

- fragmenting metal parts of long-term storage without inner content,
- inserting fragments into empty barrels or shielded 200 l barrels (shielding of pre-concrete reinforced barrels and barrels with steel insert),
- measuring the dose rate on the drum surface and overall activity in the drum,
- performing inner rinsing of scissors, knives, working chamber, filling and discharging head,
- trapping the rinsing medium in trapping tanks,
- placing the lid on the drum and putting the drum into transport container for drums

and other technologies.

D.3.4 Mobile Facilities for Radioactive Waste (RAW) Management

Facility for fixation of sludge (**ZFK)**. This facility located in ISO containers and relocatable according to the decommissioning needs, was commissioned in 2007 and it enables fixing RA sludge with specific beta, gamma activity of cca 10^9 $Bq.kg^{-1}$ into a cement matrix. Currently it treats bottom sediments, concentrated from all external tanks of NPP A1.

Workplace for sorting contaminated soils is an autonomous *technology*, transportable by regular means of transport; requires power supply. It comprises of 4 functional mutually linked units:

- Preparation of soils,

- Transportation of soils for monitoring,

D.3.5 Monitoring and sorting of soils,

- Shipment of soils after monitoring and sorting from the workplace.

For **solidification of RA sludge into geo-polymer matrix SIAL** 4 mobile fixation technological units were designed, produced and completed for supply treatment of sludge at NPP A1 and other NPPs. Product of these plants is sludge fixed in SIAL matrix in steel drums with a capacity of 60 dm^3 or 200 dm^3.

For decontamination of some equipments, such as tanks, pipes and others, **decontamination circuit mobile facilities** identified as DEZA-OD were designed and manufactured. These facilities consist of several modules, which are mutually interconnected and enable to perform pre-disassembly decontamination of equipments and pipe lines in closed hydrodynamic circuit. Decontamination is performed with the help of decontamination solutions. In the present time, one of these facilities is installed at NPP A1 and another one at NPP V1.

D.4 Inventory of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW)

Inventory of SNF and RAW is listed in Annexes IV and V.

E Legislation and Regulation

E.1 Legislative and Regulatory Framework

Article 18 of the Joint Convention

Implementing Measures

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

Article 19 of the Joint Convention

Legislative and Regulatory Framework

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.*
2. *This legislative and regulatory framework shall provide for:*
   - *i) The establishment of applicable national safety requirements and regulations for radiation safety;*
   - *ii) A system of licensing of spent fuel and radioactive waste management activities;*
   - *iii) A system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence;*
   - *iv) A system of appropriate institutional control, regulatory inspection, documentation and reporting;*
   - *v) The enforcement of applicable regulations and of the terms of the licence;*
   - *vi) A clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and 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.*

E.1.1 Structure of the Regulatory Bodies

Regulation of the peaceful use of nuclear energy is performed by the governmental bodies and organizations within the framework of their competence defined by the respective acts according to the structure described in fig E.1.1.

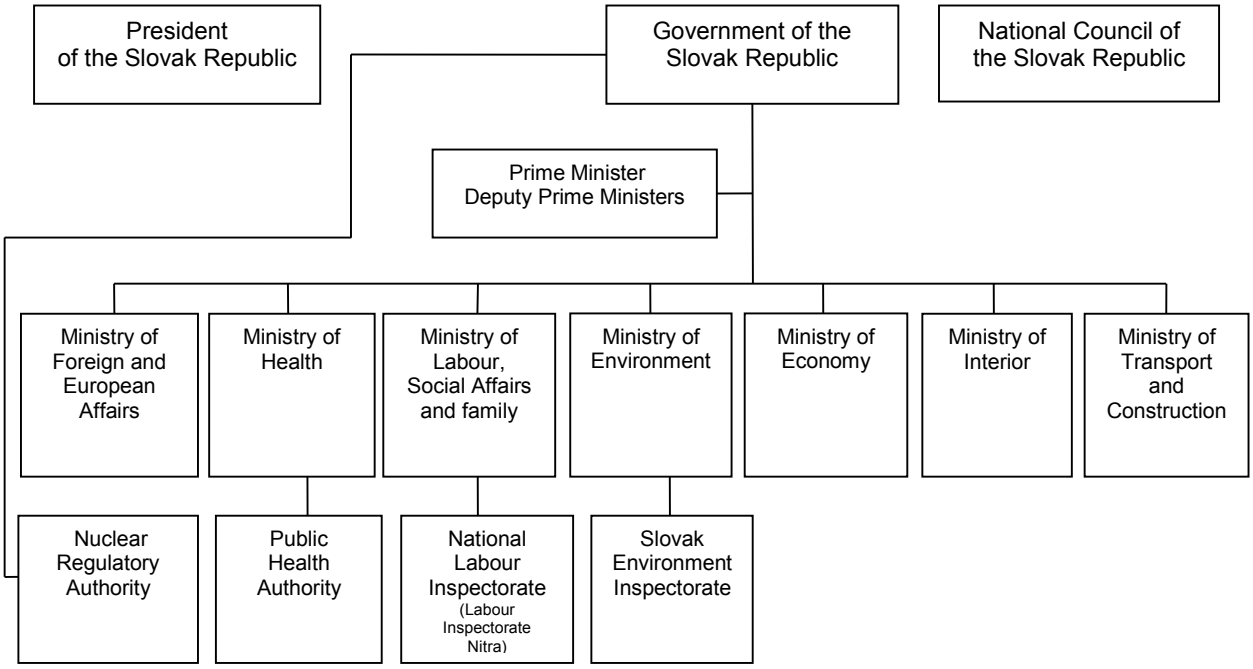


Fig. E.1.1 Structure of regulatory bodies

Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR)

ÚJD SR is a central state administration authority. It executes state regulatory activities in the field of nuclear safety of nuclear installations, including management of radioactive waste, spent fuel and other parts of the fuel cycle, as well as transport and management of nuclear materials including their control and record keeping system. It is responsible for the assessment of goals of nuclear energy program and of quality of the classified equipment, as well as for commitments of the Slovak Republic under international agreements and treaties in the said field.

Ministry of Health of the Slovak Republic (Public Health Authority of SR)

Ministry of Health of the Slovak Republic is a central body of state administration for health care, health protection and other activities in the health service. The public administration *in the field of publich health care is* performed by *public health care authorities established by the Act No. 355/2007 Coll. on the protection, support and development of health care and on amendments to certain laws.* The Ministry´s competence includes, *in accordance with the current scientific knowledge on the impact of physical, chemical and biological factors on public health, the setting of limits and values of permissible load by these factors, as well as exposure limits and conditions for the management of radioactive waste in terms of their potential impact on the public health.*

Public Health Authority of SR draws up proposals for the main directions and priorities of state health policy in the field of health protection, evaluates the impacts of harmful factors on the health of population at the national level.

Ministry of Environment of the Slovak Republic (MŽP SR)

MŽP SR is a central body of state administration of the Slovak Republic (inter alia) for the creation and protection of the environment. The following bodies report to the Ministry of Environment:

- The Slovak Environmental Inspectorate, through which MŽP SR fulfils the role of the main state regulator in environmental matters.
- The Slovak Hydro-meteorological Institute and others.

MŽP SR provides, inter alia, the assessment process of strategic documents carried out also under the Protocol on Strategic Environmental Assessment, in conformity with the Convention on the Assessment of Environmental Impacts in a Transboundary Context (Espoo Convention). MŽP SR under the Act governs also the procedure on assessment of anticipated impacts on the environment of proposed activities before deciding about their siting or prior to their authorization pursuant to special regulations in accordance with the Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment and under the Espoo Convention.

The aim of this procedure is to provide high level environmental protection, including health aspects, i. e.:

a) Ensuring thorough consideration of environmental aspects, including health aspects in preparation of policies and legislation;
b) Setting clear, transparent and effective procedures for strategic environmental assessment;
c) Ensuring participation of the public on strategic environmental assessment; and
d) Through this, by subsequent integration of environmental aspects, including health aspects, into measures and instruments proposed for promoting sustainable development.

Ministry of Interior of the Slovak Republic (MV SR)

The Ministry of Interior of the Slovak Republic is a central state administration authority for, amongst others, the conceptual management and control of fire prevention, the preparation of an integrated rescue system including civil protection of the population and property, public order and personal security. In case of accidents at a nuclear installation, it is involved in management and carrying out rescue works, organizes and provides for the operation of the notification and warning centre of the Slovak Republic, development, operation and maintenance of information systems for collection of radiation data, operation of the integrated meteorological system, etc. It provides for a 24 hours permanent service, which fulfils the role of the national contact point of the Slovak Republic vis-à-vis the International Atomic Energy Agency in Vienna and a competent body of the European Commission (ECURIE) in Luxembourg.

Ministry of Economy of the Slovak Republic (MH SR)

The Ministry of Economy of the Slovak Republic is a central state administration authority for, amongst others, nuclear energy industry, including the management of nuclear fuel, storage of radioactive waste, prospecting and exploration of radioactive raw materials and their extraction.

Ministry of Labour, Social Affairs and Family of the Slovak Republic (MPSVR SR)

The Ministry of Labour, Social Affairs and Family of the Slovak Republic is a central state administration authority for, among others, safety and health protection at work and labour inspection. State administration on labour inspection is executed by state administration bodies MPSVR SR, the National Labour Inspectorate and labour inspectorates.
MPSVR SR oversees and controls the National Labour Inspectorate and is responsible for the execution of labour inspection. The National Labour Inspectorate is a governing body for labour inspectorates, which performs supervision of compliance with laws and other regulations to ensure safety and protection of health at work at the workplaces (including nuclear installations) in accordance with Act No. 125/2006 Coll. on labour inspection.

Ministry of Transport and Construction of the Slovak Republic (MDV SR) and Department of Health Officer (ÚVHR)

MDV SR is a central administration body for railway, road, water and air transport, electronic communications, postal services, tourism and construction. In terms of transports of fresh and spent nuclear fuel, MDV SR is one of the authorities participating in the permitting process. According to Section 28 par. 13 sub-par. c) of the Atomic Act, MDV SR approves the emergency transport schedule containing measures during an incident or accident in course of transport of radioactive materials.

Within its competence ÚVHR MDV SR in the field of use of nuclear energy issues permits for transport of fresh and spent nuclear fuel and defines conditions for performance of these activities, it performs state health supervision over radiation protection in course of transport according to the Act No. 355/2007 Coll. on the protection, support and development of health care.

E.1.2 Legislation

E.1.2.1 Introduction

The legal structure for regulation of the nuclear safety consists of laws, which were reviewed in the period of Slovakia's accession to the European Union and shortly after the accession. In this period an extensive approximation of the legal order of the Slovak Republic to the law of the European Community and of the European Union took place. Some pieces of legislation are in force still from the period before the accession to the EU.

The legal system of the Slovak Republic is structured as follows:

1. The Constitution is the supreme basic law of the State and it is adopted by the *National Council of the Slovak Republic by at least 3/5 majority of all Members of Parliament* – it is generally binding.
2. *Constitutional laws – also adopted by the National Council of the Slovak Republic by at least 3/5 majority of all Members of Parliament – are generally binding.*
3. Acts stipulate the fundamental rights and obligations specifying principles in various areas; these are passed by the Parliament – they are generally binding in nature.

4. Governmental ordinances are subordinate to acts and are passed by the Government - they are generally binding in nature.
5. Regulations (decrees) are rules issued by the central state administration authorities (such as ministries *and other central government authorities*) in order to set the particulars for implementation of legal acts and governmental regulations - they are generally binding in nature.
6. Slovak Technical Standards (STN), European Technical Standards (STN EN) and International Technical Standards (STN ISO) – *are as recommendation*.
7. Guidelines (manuals) contain detailed requirements and recommended steps to be taken to ensure that the requirements are met. These are issued by the regulatory authorities.
8. By-laws (such as directives and orders) are internal organizational rules of a regulatory authority or a nuclear installation operator.

E.1.2.2 Acts in the field of State Regulation

Use of nuclear energy is governed by **Act No. 541/2004 Coll.** on peaceful use of nuclear energy (the Atomic Act) *and on amendments to certain laws*. It came into effect on 1 December 2004 and repealed the previous Atomic Act No. 130/1998 Coll., as well as all its implementing decrees. Since the Atomic Act is in force, it has been amended *fifteen* times.

The Atomic Act lays down conditions for safe use of nuclear energy exclusively for peaceful purposes in accordance with the international treaties concluded by the Slovak Republic.

The licensee is liable for nuclear damage caused by each individual nuclear event:

a) Nuclear installation with a nuclear reactor or nuclear reactors for energy purposes during commissioning and during operation up to 300 000 000 EUR,
b) Other nuclear installations during commissioning and during operation, transport of radioactive materials and all nuclear installations in the decommissioning phase up to 185 000 000 EUR.

In accordance with the Atomic Act, the nuclear installation is defined as a set of civil building objects and the necessary technology in the configuration set by the design designed for:

1. Generation of electric energy or for research in the field of nuclear energy, part of which is a nuclear reactor or nuclear reactors, which will utilize, or are utilizing controlled fission chain reaction,
2. Management of nuclear materials in volumes greater than one effective kg except for storage areas, containers and shelters, where nuclear material is used as shielding material for radioactive sources, facilities for treatment of uranium ore and storage of uranium yellowcake,
3. Management of spent nuclear fuel,
4. Management of radioactive waste, or
5. Uranium enrichment or fabrication of nuclear fuel.

Act No. 143/2013 Coll. amended the Atomic Act No. 541/2004 Coll. and Act No. 238/2006 Coll. on the National Nuclear Fund due to a consistent transposition of the Council Directive of 19 July 2011,

establishing the Community framework for the responsible and safe management of spent fuel and radioactive waste (Directive 2011/70/Euratom).

As a result of transposition of Council Directive 2014/87/Euratom of 08 July 2014, amending Council Directive 2009/71/Euratom, establishing a Community framework for nuclear safety of nuclear installations, the transposition deadline – 15 August 2017, ÚJD SR prepared an amendment to the Atomic Act. The amendment to the Atomic Act also partially transposes Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from ionizing radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (the so called „new Basic Safety Standards"), *tightens in particular the safety requirements for nuclear installations (in-depth protection, nuclear safety culture, qualified staff, contractors), introduces new definitions (abnormal operation, design basis, design-basis accident, severe conditions),regulates transparency, public access to information, emergency preparedness and response, the contact point and also introduces peer reviews (self-assessment – 10-year cycle and thematic reviews – 6-year cycle). The amendment was published in the Collection of Laws of SR under No. 96/2017 and entered into force on 01 August 2017.*

Civil liability for nuclear damage suffered as a consequence of a nuclear accident is governed by ***Act No. 54/2015 Coll. on civil liability for nuclear damage and its financial coverage*** *and entered into force on 01 January 2016. Among others, it sets an amount of 300 000 000 EUR as the operator´s financial liability limit for nuclear damage caused by nuclear incident at a nuclear installation for energy purposes, and an amount of 185 000 000 EUR as a limit of financial liability of the operator for other nuclear installations, the transport of radioactive materials and nuclear installations in decommissioning.*

Generally binding legal regulations implementing the Atomic Act and issued by ÚJD SR in a form of decrees are listed in Annex VI.

ÚJD SR also issues safety guides to explain and specify in more details the legal requirements (Annex VI.).

Act No. 575/2001 Coll. on Organization of Governmental Activities and of Central State Administration (so called Competence Act) defines the framework of tasks and responsibilities of central state administration authorities. The provision on ÚJD SR is in section 29 of the valid Competence Act.

Act No. 251/2012 Coll. on the energy sector, repealed the original Act No. 656/2004 Coll. on the energy sector. The Energy Act, as one of the fundamental legal regulations, governs the terms and condition for doing business in the nuclear energy sector as well as the rights and obligations of legal entities doing business in this field and state supervision and control over doing business in the energy sector.

Act No. 250/2012 Coll. on regulation in network industries governs conditions and the method of regulation in network industries. Network industry includes also the power generation sector. Activities performed in the network industries are considered as regulated activities, which require permit from the Regulatory Office for Network Industries.

Act No. 24/2006 Coll. on environmental impact assessment and on amendments and complements to certain laws, as amended, effective from 1 February 2006 repealed and replaced the previous Act No. 127/1994 Coll. on environmental impact assessment. The Act was amended by Act No. 287/2009 Coll. of 19 June 2009 and by Act No. 145/2010 Coll. The Act No. 145/2010 Coll. also amends other laws, in particular Act No. 50/1976 Coll. on land use planning and the building code (the Building Act), as amended, and the Atomic Act in matters related to access of public to environmental information and public participation in the decision-making on licensing of proposed activities. With the aim to strengthen and ensure high environmental protection, the Act establishes a procedure for expert and public environmental impact assessment of:

1. strategic documents prior to their approval (*for example, concept* for radioactive waste and spent nuclear fuel management, the national program of radioactive waste and spent nuclear fuel management); and
2. proposed activities prior to the decision on their siting or prior to their approval according to special regulations (construction of nuclear installations and relating activities).

The Act defines activities that are obligatory subject to international assessment from the aspect of their environmental impact:

3. nuclear power plants and other nuclear reactors (with the exception of research facilities for production and conversion of fissile and enriched materials, with maximal thermal output not exceeding 1 kW of permanent heat load),
4. facilities determined exclusively for production or enrichment of nuclear fuel, for spent nuclear fuel re-processing or its storage, as well as disposal and treatment of radioactive waste.

Act No. 24/2006 Coll. was amended in 2009 with the objective:

- to specify the procedure on changes in proposed activities,
- to specify the procedure for making the decision, which of the activities not listed in the annex to the law are subject to assessment,
- to govern assessment with a transboundary context,
- inform the public after the adoption of the decision on permitting the proposed activity,
- to involve the public in the process of environmental decision-making.

After amendment of Act No. 24/2006 Coll., (by Act No. 145/2010 Coll.), the scope of public participation was extended to natural persons and legal persons having interest in procedures of environmental decision-making. In case of natural person, it shall be a person older than 18 years of age who submits a written statement, which shows his/her interest in the decision-making and in the follow-up licensing proceedings he/she is a participant to the proceeding. This amendment further governs the concept of civil initiative, as well as the method of proceedings, involvement in the process and electing a representative from this circle of people. The civil initiative, the same way as civil association and non governmental organisation subject to statutory conditions, has the position of a party to proceedings according to special regulation.

The Ministry of Environment of the Slovak Republic is the competent authority to assess transboundary environmental impacts.

Act No. 238/2006 Coll. on National Nuclear Fund for the Decommissioning of Nuclear Installations and for the Management of Spent Nuclear Fuel and Radioactive Waste (Act on Nuclear Fund). The Nuclear Fund is an independent legal entity, which is managed by the Ministry of Economy. The Fund has its own bodies (Council of Administrators, Supervisors Board, Director, managers of sub-accounts, auditor). The sources of the Nuclear Fund are various – contributions paid by the licensees, charges collected by the operators of the transmission and the distribution systems in the prices of supplied electricity directly from end customers (serving for compensation of the so called "historical debt"), fines imposed by ÚJD SR, interests earned on deposits, subsidies and contributions from the EU, from the state budget, and others. The details on the method of collection and payment of mandatory contributions, including its calculation, is specified by the Government Regulation No. 312/2007 Coll.

Act No. 355/2007 Coll. on the protection, promotion and development of public health. The Act establishes requirements for the protection of public health, defining health authorities, their competence, the basic conditions for the implementation of activities leading to radiation exposure, and activities relevant for radiation protection and the release of radioactive substances and radioactive contaminated materials from administrative control, defines the requirements for professional competence, tests of professional competence and issuing certificates of professional competence of persons in the field of radiation protection, determines the activities leading to exposure which need to be authorized and activities that are subject to reporting, state health supervision and penalties for violation of obligations in the field of radiation protection. Implementing regulations are listed in Annex VI.

Act No. 125/2006 Coll. on labour inspection and Act No. 82/2005 Coll. on undeclared work and on illegal employment governs the labour inspection, through which it promotes protection of employees at work and execution of state administration in labour inspection, defines the competencies of bodies of state administration in labour inspection and their competence in exercising supervisory powers according to special regulation (Act No. 264/1999 Coll. on technical requirements for products and on conformity assessment amended by Act No. 133/2013 Coll.), establishes rights and obligations of labour inspector and duties of natural and legal entities. Related generally binding legal regulations are listed in Annex VI.

Act No. 124/2006 Coll. on occupational health and safety lays down the general principles for prevention and the basic conditions for ensuring occupational health and safety, to exclude risks and factors underlying the emergence of industrial accidents, occupational diseases and other damage to health from work. An integral part of occupational health and safety is the safety of technical equipment. The follow up generally binding legal regulations are listed in Annex VI.

According to the **Act No. 50/1976 Coll. on land use and the building code** (the Building Code) amending the Atomic Act No. 541/2004 Coll., ÚJD SR became a special building authority for constructions of nuclear installations and construction related to nuclear installation located within the premises of a nuclear installation. Prior to issuing decision on siting of a structure relating to a structure,

part of which is a nuclear installation, the building authority is obliged to request a binding opinion from ÚJD SR, which may condition its consent by fulfilment of conditions.

E.1.2.3 Draft Legislation

In 2013, preparatory work were launched for the new Atomic Act. ÚJD SR set up a working group to prepare this legal regulation. Due to the transposition deadline for the Council Directive 2014/87/Euratom (15 August 2017) and due to the large number of comments on the new Atomic Act, ÚJD SR decided to prepare only an amendment to the existing Atomic Act as a measure for transposition of above-mentioned directive. Work on the new Atomic Act will be renewed in the second half of 2017. The rationale for its preparation is the development of legislation in SR over the last decade and its new challenges*, the implementation of measures from the IRRS 2012 Action Plan – e.g. reducing the number of decisions issued in respect of modification on the NI and related increase in the inspection activity of the Authority,* the change of operator´s ownership structure, access to environmental information by the public concerned, access to justice, practical experience of law enforcement, new WENRA requirements, implementation of the new form of exercising public authority by electronic means (E-Government), or more stringent personal data protection.

E.2 Regulatory Authorities

Article 20 of the Joint Convention

Regulatory Body

1. *Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in article 19, and provided with adequate authority, competence and financial and human resources to fulfil 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.*

E.2.1 Regulation of Nuclear Safety

E.2.1.1 State Regulation in the Field of Nuclear Safety

The Nuclear Regulatory Authority of SR (ÚJD SR) was established on 1 January 1993 and its competencies arise from the Act No. 575/2001 Coll. (the Competence Act) as amended. ÚJD SR is an independent state regulatory authority that reports directly to the Government and is headed by the Chairperson appointed by the Government. The regulatory authority's independence from any other body or organization engaged in development or utilization of nuclear energy is applied in all relevant fields (legislation, human and financial resources, technical support, international cooperation, enforcement instruments).

In accordance with the Act No. 575/2001 Coll. (the Competence Act), ÚJD SR inter alia ensures the state regulation of nuclear safety at nuclear installations, including regulation of radioactive waste and spent fuel management and other phases of the fuel cycle, as well as of nuclear materials, including their control and record keeping.

The key piece of legislation in the field of nuclear safety is the Atomic Act. On the basis of this act, ÚJD SR decrees and decisions are prepared and issued. Besides the generally binding legal regulations, ÚJD SR issues also safety guides to assist licensees to meet the generally binding regulations (see Annex VI.). In the authorization procedure related to nuclear installation, standards and recommendations of the International Atomic Energy Agency are used and applied. The same way knowledge from the OECD/NEA and the European Union is applied.

Decision can be generally characterized as an act of the application of law. It means that it is the application of rights and obligations laid down in a generally binding legal provision in a particular case to a particular subject. Decisions issued by administration authorities are also referred to as individual administrative acts. The obligations imposed by a decision are enforceable and the failure to perform them can be sanctioned. Decisions are in principle subject to the possibility of bringing an action to court for judicial review of the decision. However, the court does not review those decisions that are excluded from its juristiction under *Section 7 of Act No. 162/2015 Coll. the Judicial Administrative Procedure – effective from 01 July 2016.*

ÚJD SR issues various types of decisions: on approval, on license, on authorization, on sanction or measure imposition, on determination of a new licensee, on verification of professional competency, on documentation review and other.

The competence of ÚJD SR is provided in the extensive Section 4 of the Atomic Act *(https://www.ujd.gov.sk/ujd/WebStore.nsf/viewKey/AA_541_2004_en/$FILE/At_Act_541_2004.pdf).*

ÚJD SR issues annual reports on the status of nuclear safety of nuclear installations and on its activities in the previous year. It presents the report once a year, always by 30 April, to the Government of SR and subsequently to the National Council of SR. The annual reports are available at http://www.ujd.gov.sk.

E.2.1.2 Nuclear Installation Authorization Procedure

The authorization procedure for nuclear installation consists of 5 major stages: siting, construction, commissioning, operation and decommissioning. Before granting an authorization for operation, the regulatory authority carries out inspection under the approved schedule of particular stages of nuclear installation commissioning (testing, fuel loading, physical start up, energetic start up, trial operation). The main regulatory authorities and the authorization procedure for construction operation decommissioning are shown in picture E.2.1.2.

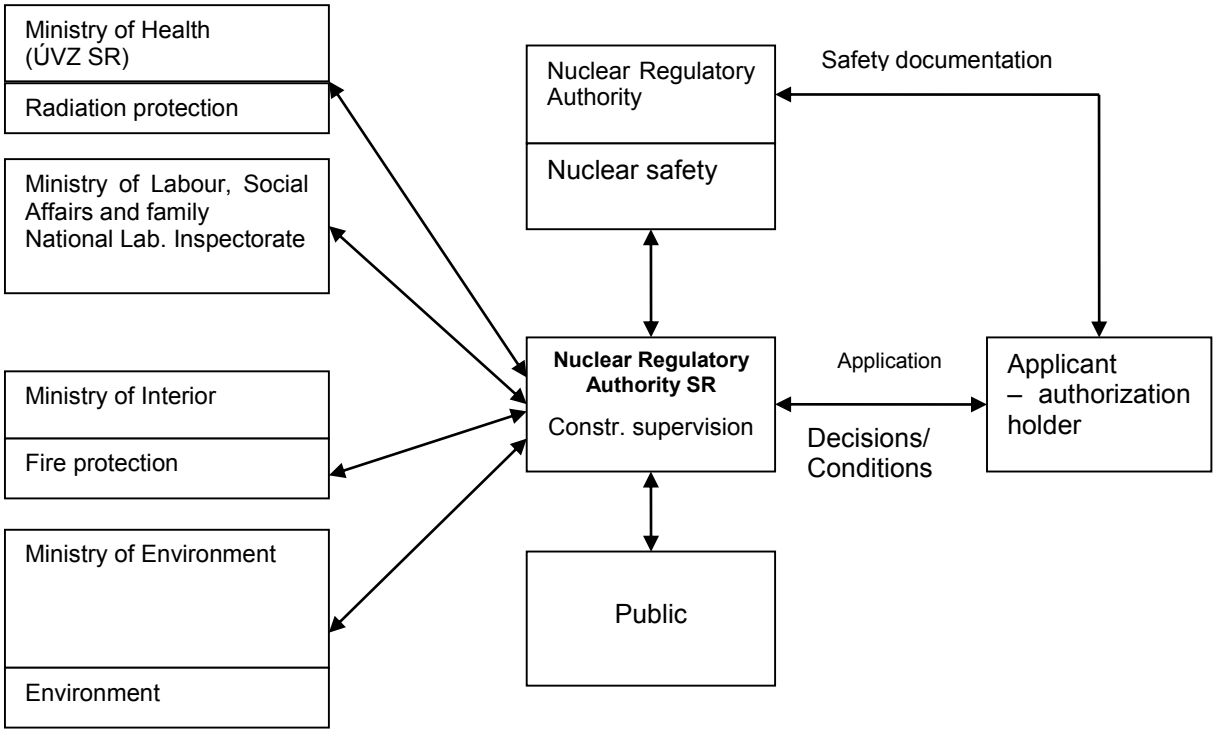


Fig. E.2.1.2. Authorization procedure

The basic conditions for authorization is the elaboration and submission of safety documentation listed in the annexes of the Atomic Act, necessary for issuance of particular types of decisions and for meeting the legislative requirements for nuclear safety. An essential criteria is also the fulfilment of conditions of preceding approval procedures and decisions of regulatory authority.

Decision about siting of nuclear installation is issued by the affected Municipal Office depending on the site of planned construction of NI, which decides based on the approval issued by ÚJD SR and positions of other regulatory authorities (Public Health Authority, Labour Inspection authorities, etc.). Authorization to construct a nuclear installation, permit for early use of a building (part of it is also authorization for commissioning of a nuclear installation), approval for temporary use of the construction (part of it is authorization for trial operation) and the decision on final approval of the building (including license for operation of a nuclear installation) issued by ÚJD SR as a building authority. ÚJD SR exercises its competence as a building authority and state administration authority for nuclear safety at the same time in a single proceedings, in which its decisions are based on its own partial decision (partial approval of the safety documentation), as well as based on opinions from the relevant regulatory bodies – the Public Health Authority of SR (radiation protection), the National Labour Inspectorate (labour inspection and occupational health and safety) and other bodies and organizations of state administration (fire protection, civil protection). When issuing authorizations and licenses by ÚJD SR, the obligations of ÚJD SR and of other affected bodies are defined by the Act No. 50/1976 Coll. (the Building Act), Act No. 541/2004 (the Atomic Act), ÚJD SR Decree No. 430/2011 Coll. on the requirements for nuclear safety *as amended by ÚJD SR Decree No. 103/2016 Coll.,* MŽP SR Decree No. 453/2000 Coll., *implementing certain provisions of the Building Act, and No. 55/2001 Coll. on land use planning*

documents and PSVR SR Decree No. 508/2009 Coll., laying down the details of ensuring occupational health and safety for work with technical devices - pressure, lifting, electric and gas, and establishing technical equipment considered as qualified technical equipment as amended.

Documentation, attached to the application for issuance of certain decisions of ÚJD SR and essential for submission, is listed in the Annexes No. 1 and 2 to the Atomic Act. Details concerning the scope, content and the method of preparation of documentation are defined in the ÚJD SR Decree No. 58/2006 Coll. as amended by the ÚJD SR Decree No. 31/2012 Coll.

E.2.1.3 Regulatory Authority – ÚJD SR

Organization structure is illustrated in Fig. E.2.1.3.

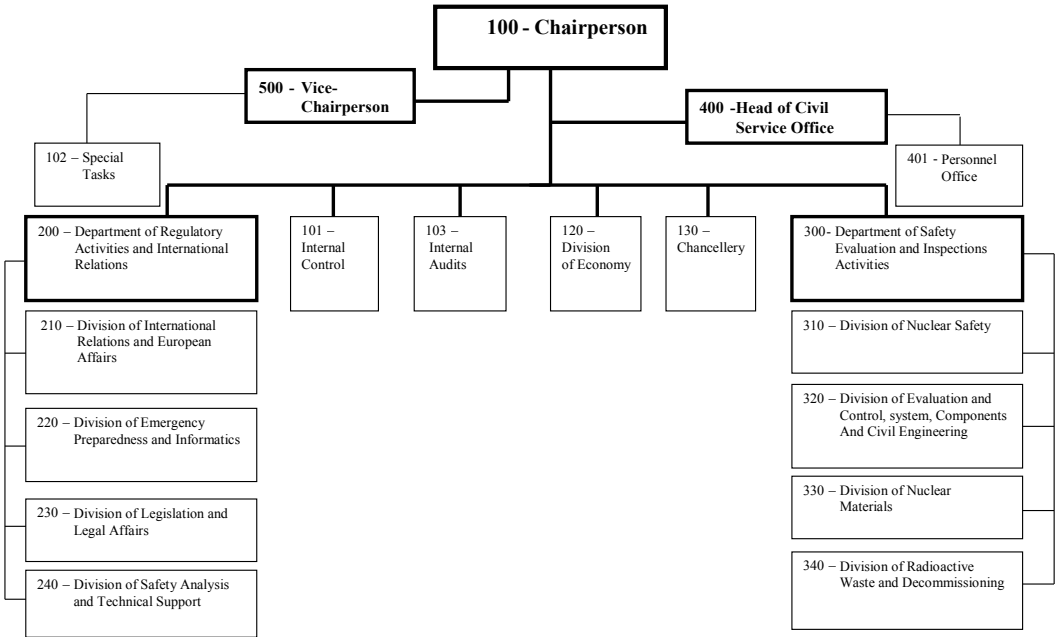


Fig. *E.2.1.3 Organizational structure of ÚJD SR*

The Authority has been continuously improving its management system. In 2002, the process oriented internal quality management system was introduced with the aim to achieve more effective and more efficient fulfilment of its tasks. In the following period, this management system was extended to all activities of the Authority. As the basis for quality assurance in the activities of the Authority, the following standards were adopted: STN EN ISO 9001:2008 standard and the IAEA GS-R-3 documents. Partially, the requirements from STN EN ISO 9004:2001 standard and other standards of STN EN ISO line are being applied. The basic document of this system is the Quality Manual formulating the Quality Policy, setting the quality objectives, which the Authority intends to achieve in relation to the population of the SR, as well as to the international community. The set quality objectives, as well as functioning of the whole system, are subject of internal audits, as well as regular annual assessments. For all processes the Authority has relevant guidelines developed, as well as system of other governing acts, management, support, inspection procedures, and others. The CAF system (Common Assessment

Framework) is also used to assess and improve the activities of the Authority. Activities relating to the management system are managed by the Board for the management system headed by the chairperson of the Authority. The Board develops concept for further development of the management system. In doing this it takes into account experiences from implementing management systems in the state administration and international recommendations in the field of management of regulatory bodies for nuclear safety.

E.2.1.4 Role of the Regulatory Authority

Pursuant to the Atomic Act ÚJD SR discharges state regulation of nuclear safety of nuclear installations, in which in particular:

1. Performs inspections of workplaces, operations and premises of nuclear facilities, operations and premises of holders of consents or licenses and in doing that it controls compliance with the obligations resulting from this Act, from generally binding legal regulations issued on the basis of this Act, operational regulation issued by the licensee, compliance with the limits and conditions for safe operation and safe decommissioning, quality *management* system, as well as obligations resulting from decisions, measures or regulations issued on the basis of the Atomic Act;
2. Controls fulfilment of commitments under international treaties, by which the Slovak Republic is bound in the field of competencies of ÚJD SR;
3. Controls the system of staff training, training programs for professionally qualified staff, training programs for selected staff of licensees and controls professional competence of staff, as well as special professional competence of staff of licensees;
4. Identifies in-situ the status, the causes and consequences of selected failures, incidents or accidents at a nuclear installation or an event during transport of radioactive materials; during investigation of an incident, accident or event during transport of radioactive materials performed by other bodies it participates as a mandatory party in such investigation;
5. Checks performance of mandatory inspections, reviews, operating controls and tests of classified equipment with respect to nuclear safety;
6. Orders elimination of deficiencies having impact on nuclear safety, physical protection, emergency preparedness;
7. Reviews nuclear safety, physical protection and emergency preparedness independently from the licensee;
8. Checks the content, updates and exercising of emergency plans, which it approves or reviews, and organizes trainings on these;
9. Conducts in-situ reviews at workplaces, in operations and premises of applicants for issuing authorization or license and holders of authorization or license, including control of compliance with the quality *management* system.

Regulatory Methods to Verify Operator's Compliance with Authorization Conditions

Inspections

The tasks in the field of state regulation are exercised by ÚJD´s nuclear safety inspectors. The nuclear safety inspectors during fulfilment of their tasks follow ÚJD´s internal directive "Inspection Activity of ÚJD SR". The Directive sets an uniform procedure for inspections, for processing and assessment of annual inspection plans, for management of ÚJD´s inspection program, for processing of documentation of inspection activities, and for analysis of ÚJD´s inspection activities.

Inspection plan is a tool for continuous and systematic evaluation of inspection activities at nuclear installations and during transports and controls of nuclear materials. As a rule, such plans are developed for the period of one year and they cover in a complex way all areas of regulation of nuclear safety.

Inspections follow inspection procedures that are part of the ÚJD´s Inspection Manual. For inspection activities with no developed inspection procedures, individual inspection procedures are conducted.

Types of Inspections

In general, inspections are planned and unplanned – as the first level of division. In the second level, the planned and unplanned inspections are divided to routine, special and team inspections.

Planned Inspections:

By routine inspections, the nuclear safety inspector verifies the assurance of compliance with requirements and conditions of nuclear safety, conditions of the installation, compliance with approved limits and conditions and with selected operational provisions. Routine inspections are performed mainly by site inspectors at the corresponding installation. In case of inspection, focus of which exceeds the professional competencies of the site inspector, inspection is performed by nuclear safety inspectors from the Department of Safety Evaluation and Inspection Activities and Department of Regulatory Activities and International Relations of ÚJD SR. Routine inspections follow the procedures contained in the Inspection Manual.

Special inspections are performed by nuclear safety inspector in accordance with the basic inspection plan. Special inspections focus on specific areas, in particular on the verification of compliance with the requirements and conditions of regulation pursuant to section 31 of the Atomic Act.

Special inspections normally follow procedures contained in the Inspection Manual.

Team inspections focus on the verification of compliance with requirements and conditions of regulation pursuant to section 31 of the Atomic Act, normally within several areas in parallel. Team inspections are planned for areas selected on the base of long-term assessment of operator's results emerging from the analyses of inspection activities. Team inspection is an inspection, in which several departments participate.

Unplanned Inspections:

Unplanned inspections are performed by nuclear safety inspectors as routine, special or team inspections. These inspections respond to the conditions at the NI (for example, commissioning phases) or events at NI. ÚJD SR thus responds to the situation at NI.

Rules valid for all types of inspections:

- inspections are announced in advance. However, they can also be unannounced, if their focus and nature requires to do so,
- the corresponding site inspector is notified in advance of the inspection. Generally, the site inspector participates in the inspection,
- any inspection performed by more than a single inspector has a head of inspection team appointed.

Inspection Protocol

Every performed inspection must be documented in a form of a protocol or a record. Binding measures to repair the detected findings are included in the protocol. They must be formulated clearly so as to impose the responsibility to eliminate detected deficiencies, and must be comprehensible with unambiguously set deadlines for their fulfilment.

Analysis of Inspection Activity

Analysis of inspection activity comprises statistical evaluation of the findings. The objective of the statistical evaluation is to determine the distribution and the frequency of inspection findings. Based on the evaluation of the trends of the inspection findings, it is possible to modify the inspection plan for the upcoming period, particularly in those areas where the most deficiencies have been identified.

Sanction

Pursuant to authorization for operation and RAW management, the requirements and conditions of nuclear safety approved and introduced by the regulatory authority are monitored. The regulatory body may impose fines to the operator, as well as to his employees, when nuclear safety is violated. In case of non-observance of requirements and violation of legal provisions, regulatory body is entitled to impose sanctions including financial fine to the authorization holder.

E.2.1.5 International Cooperation

Cooperation with the International Atomic Energy Agency (IAEA)

Cooperation between the SR and the IAEA in the field of technical projects has been extraordinarily successful. Part of this cooperation is that expert missions focusing on nuclear safety review, in the health service, on evaluation of material degradation of primary circuit components, etc. are taking place.

Significant part of regional projects related is to issues of nuclear safety. Internships of foreign experts, seminars, workshops and trainings with broad international participation are being organized under regional projects in the SR.

The self-assessment of ÚJD SR following the methodology of the Integrated Regulatory Review Service (UN/IAEA) carried out by ÚJD SR in 2011 was reviewed by the IRRS mission in 2012.

The mission visiting SR reviewed the following 11 areas:

- Government responsibilities and functions,
- Global nuclear safety regime,
- Responsibilities and functions of ÚJD SR,
- Management system,
- Issuing authorizations/licenses,
- Safety review and assessment,
- Conducting inspections,
- Law enforcement,
- Development of laws, decrees and guides,
- Emergency preparedness and response,
- Consequences of the accident at the nuclear power plant at Fukushima.

The IRRS mission confirmed a high level of regulation. It highlighted the work that has been done so far at ÚJD SR and ÚVZ SR, and the enthusiasm of their employees. Conclusions from the mission were categorized as proposals for improvements and recommendations, which ÚJD SR transposed into the Action Plan to address the measures resulting from the IRRS mission.

By conducting self-assessment and the follow-up IRRS mission and by implementing the Action Plan for improvements, the activity of ÚJD SR shall become more effective, and increase the efficiency in providing services and meet the ligitimate needs and requirements of the stakeholders. The relevant provisions of the Atomic Act, the requirements of the Council Directive 2009/71/EURATOM, the IAEA and internal normative acts of the ÚJD SR shall be met. At the same time it shall contribute to the fulfilment of the National Quality Program of SR. The Action Plan for strengthening the regulatory framework was approved by the Government in November 2012.

The follow-up mission, aimed at controlling the performance of the Action Plan of improvements, should take place in February 2015.

Cooperation with the Organization for Economic Cooperation and Development/ the Nuclear Energy Agency (OECD/NEA)

Representatives of SR attended the government experts meeting on third party nuclear liability, the meetings of government experts in the Committee for Safety of Nuclear Installations (CSNI) and the committee for nuclear regulatory activities, the committee on radioactive waste, as well as other committees and working groups.

Cooperation with the European Commission and the countries of the European Union

Representatives of ÚJD SR attend meetings of expert groups of the EU Council and the European Commission on a regular basis with the aim to exchange knowledge on reviews of the level of nuclear

safety of nuclear installations in Europe. They participate in developing the EU legislation in selected areas.

Bilateral Cooperation

Formal (on the basis of international treaties) and informal cooperation exists with all neighbouring countries (Czech Republic, Poland, Ukraine, Hungary and Austria), as well as with other countries (such as Armenia, Bulgaria, Germany, France, Finland, Slovenia, the US). The cooperation focuses on exchange of experience in the field of peaceful use of nuclear energy, developing the system of emergency preparedness, accident analyses, etc.

Forum of state nuclear safety authorities of countries operating NPPs of WWER type

Forum of state nuclear safety authorities of countries operating NPPs with WWER type of reactors was established with the aim of mutual exchange of experiences in construction and operation of nuclear power plants of WWER type. These activities are also supported by the IAEA and other developed countries having a nuclear program. Ad hoc working groups have been set up dealing with the current issues of nuclear safety and state regulation.

Network of Nuclear Regulatory Bodies of countries with small nuclear program

Network of Regulators of Countries with Small Nuclear Program (NERS) was established in 1998 from the initiative of the Swiss Regulator (HSK) with the aim to enhance cooperation and exchange of experiences among countries with similar nuclear program. ÚJD SR has been taking an active part in the activities of NERS on a regular basis.

E.2.1.6 Financial and Human Resources of the Regulatory Body – ÚJD SR

The budget Chapter of ÚJD SR is linked to the state budget with its revenues and expenditures. Since 1 January 2008, annual contributions for execution of state regulation in nuclear safety have been introduced into the legal order of SR. The Act No.94/2007 Coll. amending the Atomic Act imposes an obligation to the licensees to pay annual contributions for execution of state regulation in nuclear safety. The basic principle of the adopted law is to secure sufficient funding for regulatory activities relating to nuclear safety, for maintaining the expertise of its staff and for their stabilization, for safety research and it aims at reducing demand on the state budget by raising other external sources. The Act stipulates rules for determining the amount of annual contribution and the method of calculating the contribution. The amount of annual contribution depends on the type of nuclear installation and the type of issued license.

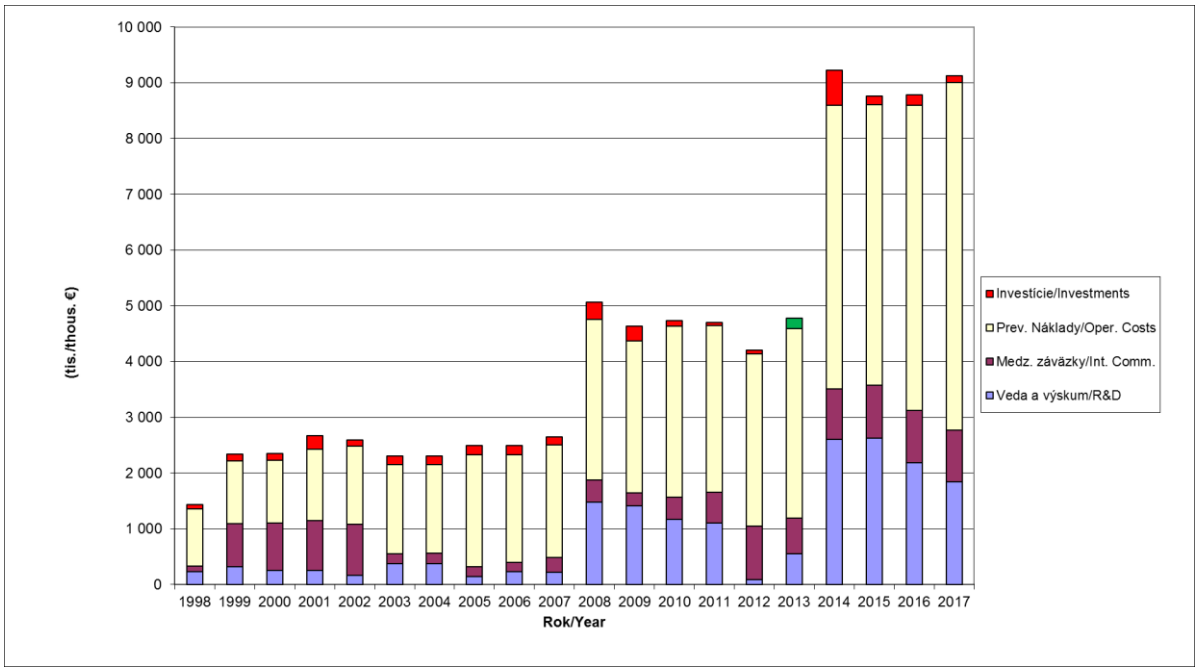


Fig. E.2.1.6 Structure of the budget chapter

The *2017* budget breakdown for ÚJD SR stipulated a determined total number of employees *126* of which *110* are civil servants and *16* employees working in public interest.

ÚJD SR approves and evaluates the annual training program for its employees. In addition, ÚJD SR has a training software at its disposal (LMS i-Tutor), which includes a training and testing module according to the demands and requirements for training. The system is on the office server and each employee has its own access code. Employees can, thus, deepen their knowledge of general overview (legislation, international relations, etc.) as well as their own specialization (operation, decommissioning, radioactive waste management, emergency planning, etc.). This is a form of e-learning (Computer Based Training) for employees as self-study.

E.2.2 Regulation in the Field of Health Protection Against Radiation

E.2.2.1 State regulation in the field of health protection against radiation

The Ministry of Health of SR (MZ SR) is the central body of state administration for health care, health protection and other activities in the field of health services. The state administration in health protection is executed by the MZ SR and by the Public Health Authority (ÚVZ SR), possibly by special authorities exercising the competence in the relevant sector (transport, defence, internal affairs). The Ministry´s competence includes, among others, setting the exposure limits and conditions for the *management of radioactive waste* in terms of their potential impact on *public health*.

Regulation of health protection against radiation is provided by the Public Health Authority according to the provisions of Act No. 355/2007 Coll. on protection, support and development of the public health. The body of public health supervision at the nuclear installations is ÚVZ SR.

The Public Health Authority of SR carries out permanent and continuous supervision over radiation protection in nuclear installations in the field of radiation protection and at workplaces, where activities, for which it has issued authorisation, determines conditions for carrying out activities leading to irradiation, activities important in terms of radiation protection and for releasing radioactive substances and radioactive contaminated objects and materials from the administrative control, determines limit doses for the optimization of radiation protection for individual activities leading to exposure and individual sources of ionizing radiation, monitors and controls the radiation exposure of staff with sources of ionizing radiation by checking compliance with the exposure limits and checking the rationale for activities leading to exposure, checks compliance with the limits for radioactive releases into the atmosphere and hydrosphere, assesses the radiation load on components of the environment, assesses the health condition of the population in the near and wider neighbourhood of workplaces with sources of ionizing radiation.

The Public Health Authority of SR provides in the field of radiation protection, inter alia:

- Conditions for the implementation of activities leading to exposure, and the release of radioactive substances and radioactive contaminated objects and materials out of administrative control;
- Determines the dose limits to optimize radiation protection for individual activities leading to exposure and individual sources of ionizing radiation;
- Issues permits for activities leading to exposure a permits for release of radioactive substances and radioactively contaminated objects under administrative control;
- Exercises state health supervision in nuclear installations *and at the workplaces, where activites are performed, for which it issued authorization;*
- Orders measures to prevent occurrence of diseases and other health disorders due to exposure by ionizing radiation;
- Performs monitoring of radiation situation and data collection on the territory of the SR for the purposes of exposure assessment and impact assessment of radiation on the public health and manages the activity of the radiation monitoring network and *creates, provides for and manages* activities of the radiation monitoring network;
- Issues directives and guides for ensuring radiation protection in implementing activities leading to exposure when releasing radioactive substances and radioactively contaminated materials from administrative control;
- *Maintains register of activities leading to exposure, for which the Public Health Authority or the Regional Public Health Authority issued authorization and activities leading to exposure, which it registered based on notification;*
- Maintains central register of sources of ionizing radiation and a central register of doses, and issues personal radiation passes to external staff,
- *Provides guidance and information to persons who came into contact with radioactive sources or have been irradiated;*
- Provides information to the public on radiation situation, extraordinary events and on potential exposure, on the risks caused by exposure and on measures and interventions to reduce the irradiation during radiation accidents;

- Searches workplaces and facilities, where abandoned radioactive sources may occur;
- Cooperates with the European Commission and the relevant bodies and institutions of the Member States and represents the SR in international organizations in matters of radiation protection.

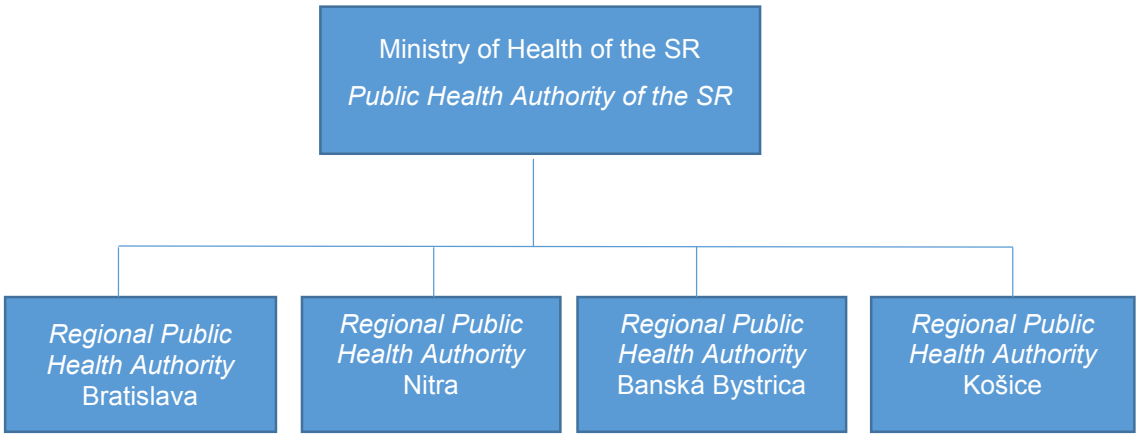


Fig. E.2.2.1 Structure of state regulation in the field of health protection against radiation

Authorization of activities leading to exposure in relation to nuclear installations issued by ÚVZ SR does not correspond with granting the final licence, however it is a necessary pre-condition for its issue.

E.2.2.2 Authorization Procedure

When permitting activity leading to exposure the procedure under the Act No. 71/1967 Coll. on administrative proceedings is followed. The Act No. 355/2007 Coll. on protection, support and development of public health sets the conditions for issuing authorization in more details.

E.2.2.3 Regulatory Methods to Verify Compliance with License Requirements by the Operator

The state health supervision is carried out by staff of the Public Health Authority and the staff of the Regional Public Health Authority.

The person performing state health supervision is, inter alia, entitled to enter land plots, to premises, facilities and operations and to other premises of controlled entities, require the necessary escort, taking samples in the quantity and extent necessary for the examination, request the necessary information, documents, data and explanations, accompanying documents, technical and other documentation, to impose fines and measures to eliminate deficiencies found. The person performing state health supervision may, for example, prohibit the use of devices and appliances, which pose direct threat to health, order the closure of the facility or its part, if it detects a risk of damage to health, order the implementation of measures to limit the exposure of staff and population, order the safe removal of disused or damaged sources of ionizing radiation, radioactive waste or radioactive substances, to order the development of special operating rules, working procedures and methodologies for conducting an activity leading to exposure, to prohibit activities or operations, to order carrying out of special measurements, analyses or examinations for the purpose of assessing factors harmful to health and their impact on health. Supervision over radiation protection in activities leading to exposure is carried

out, a priori, by assessing the proposal for activity leading to exposure at the stage of its licensing and then continuously by the nature of the risk posed.

The control system of compliance with the obligations and requirements for radiation protection assurance laid down by acts and compliance with conditions and obligations laid down in the authorization for the activity leading to exposure is especially provided by a system of targeted in situ inspections. Very effective tool and information source is also the complex system of reports, information and announcements on nuclear installation situation, on employees exposure, on extraordinary events and on radioactive waste management, which the operator shall provide continuously in writing or in electronic form to the regulatory authority within the time limits laid down in the authorization.

During in situ inspection, the following items are inspected in particular:

- *Current state of radiation protection,*
- Equipment state,
- Regime observance,
- Monitoring system state, monitoring plan observance and keeping of records of results,
- Documentation on operation,
- Documentation on radiation protection assurance,
- Operational procedures,
- Records of discrepancies, results of event investigations.

In situ inspections are often connected with the inspection measurements of radiation situation and sampling by the regulatory employees.

Inspections are mainly focused on special area important from the viewpoint of radiation protection, *such as*:

- *Control of health protection against radiation during the power reactor operation,*
- *Control of health protection against radiation during general overhaul,*
- *Control of monitoring discharges, data recording and assessment of their impact on the population dose load,*
- *Control of the implementation system and application of the ALARA principle,*
- *Control of ensuring health and professional competence of staff with radiation sources,*
- *Control of radioactive waste management,*
- *Control of system for releasing contaminated materials from administrative control, including the control of landfills of this material,*
- *Control of fulfilment of the monitoring plan in the vicinity and assessing the impact of operation of the power plant on the radioactivity of environmental components,*
- *Control of radiation situation in the area,*
- *Control of preparedness for emergency situations and their material supply, control of shelters, gathering areas and checking that the protection of the staff in the areas of forced stay during accidents is ensured,*
- *Control of ensuring fulfilment of the traumatological plan, etc.*

Further checks are carried out according to actual needs:

- *Transport of radioactive materials,*
- *Transport of spent nuclear fuel,*
- *Events, incidents and accidents,*
- *Participation in emergency exercise.*

E.2.3 Regulation in the Field of Occupational Health and Safety

E.2.3.1 Role of the Regulatory Authority

State administration in the field of labour inspection is executed by:

a) Ministry of Labour, Social Affairs and Family of the Slovak Republic;
b) National Labour Inspectorate;
c) Regional Labour Inspectorate Nitra, it oversees compliance with the legal regulations and other regulations to ensure occupational health and safety at the workplaces of a nuclear installation on the whole territory of the Slovak Republic.

Labour inspection means:

a) Supervision of compliance (among others) with:
   1. employment regulations governing labour relations;
   2. legal regulations and other regulations to ensure occupational health and safety, including regulations governing factors of working environment;
   3. legal regulations which regulate the ban on undeclared work and illegal employment,
   4. obligations arising from collective agreements and other;
b) Drawing liability for breaches of regulations contained under letter a);
c) Providing free advice to employers, natural persons as entrepreneurs, but not employers, and to employees within the scope of basic expert information and advice on ways how to effectively comply with the regulations contained under a).

Obligations of the operator of nuclear installations, legal entities and natural persons vis-à-vis bodies of labour inspection arise from the Act No. 124/2006 Coll. on occupational health and safety, Act No. 125/2006 Coll. on labour inspection and the implementing regulations to the given acts (listed in Annex VI.).

E.2.3.2 Activity of the Labour Inspectorate Nitra

Labour Inspectorate Nitra ensures labour inspection to the extent as provided by the Act No. 125/2006 Coll. and oversees in particular whether the following conform to the requirements of labour protection:

- Selection, location, arrangement, use, maintenance and control of the workplace, working environment, work equipment;
- Workflows, working time, organization of labour protection and system of its management;
- Investigates the causes of an industrial accident which has caused death or serious injury, *the causes of* major idustrial accident, safety, technical and organizational causes of occupational disease and

the risk of occupational disease, keeps their records and if necessary, investigates the causes of the occurrence of other work accidents,
- By means of binding opinion imposes requirements for ensuring safety and protection of occupatioal health when licensing and approving structures and their changes,
- Withdraws authorization, certificates, licenses issued or documents to a natural person or a legal entity for performing activity according to special regulations;
- Discusses offences, takes decisions on imposing fines for offences and on ban of activity according to special regulations.
- *Verifies compliance with the scope and conditions of authorizations, certificates and licences issued under this law and special regulations,*
- *Decides to impose fines under Sections 19 and 20 and under special regulation.*

Within the scope of competencies given by the Act No. 125/2006 Coll. on labour inspection, the Labour Inspectorate Nitra performs supervision at all workplaces of nuclear facilities in the Slovak Republic.

The Labour Inspectorate is independent in performing labour inspections and executes labour inspections through labour inspectors.

Besides the classic work of labour inspections the Labour Inspectorate Nitra also performs labour inspections relating to the condition of occupational health and safety, including the safety condition of the technical equipment - pressure, lifting, electrical and gas - in accordance with the decree of the Ministry of Labour, Social Affairs and Family of the Slovak Republic No. 508/2009 Coll., providing for the technical equipment that is considered as classified technical equipment. It also carries out labour inspection on the technical equipment which are designated products after their placement on the market *or making available on the market* or after their putting into service.

According to the degree of risk, the types of technical equipments are divided into group A, group B or group C. “Group A” contains technical equipments with high degree of threat, “Group B” are technical equipments with higher degree of threat and “Group C” are technical equipments with lower degree of threat. Technical equipments of Group A and technical equipments of Group B are considered as classified technical equipments.

E.2.3.3 Methods of supervision by the labour inspection body

During inspection, the labour inspector is authorized *especially* to:

- Enter freely and at any time the premises and the workplaces that are subject to labour inspection under the terms of the relevant regulations concerning workplaces of nuclear installations;
- Perform control, test, investigation and other acts aimed at establishing whether the regulations to ensure occupational health and safety are complied with;
- Request documents, information and explanations relating to application of regulations to ensure occupational health and safety;
- Request submission of documentation, records or other documents necessary for labour inspection purposes and to request copies thereof;

- Take the necessary samples of materials or substances that are used or which are being handled, for the purposes of analysis;
- Require proof of identity from an individual being at the workplace of an employer and to ask for explanation for the presence.

Based on the results of labour inspection and the severity of facts found, the labour inspector is entitled (among others) to:

- *Propose technical, organizational and other measures necessary to remedy the situation,*
- *Order removal of identified deficiencies within the time limits specified,*
- *Order measurements, inspections, tests and other necessary measures,*
- *Impose fines for offences under special regulation and other.*

The Nitra Labour Inspectorate is authorized to carry out labour inspection at *workplaces of* nuclear installations, focusing on *to prevent industrial accidents,* safety and health at work, the safety of technical *equipment*, checking relevant documentation, etc.

Based on the results of inspection the labour inspector proposes measures, imposes measures and obligations to adopt measures for removal of breaches of regulations found and their causes and an obligation to submit to the Labour Inspectorate Nitra information on fulfilment of measures to remove the breaches of regulations found and their causes.

F General Safety Provisions

The authorization holder according to Atomic Act is obliged to establish the necessary organizational structure, to define the responsibilities, professional competencies, procedures and resources to ensure quality of nuclear installations and general safety provisions. In compliance with Act 541/2004 Coll. the authorization holder is obliged to ensure nuclear safety, physical protection, emergency preparedness, including their verification, to comply with the documentation reviewed or approved by the Nuclear Regulatory Authority of SR, to adhere to the limits and conditions of safe operation or limits and conditions of safe decommissioning. Further he is obliged to comply with the technical and organizational requirements provided by the generally binding legal regulations.

The authorization holder may authorize performance of work activities only to persons meeting the conditions set in Section 24 of the Atomic Act and in compliance with the Decree No. 52/2006 Coll. of the Nuclear Regulatory Authority of SR on professional competence, shall identify all job positions, where working activities are being performed that have impact on nuclear safety, and other job positions with direct impact on nuclear safety together with a description of work activities in the documentation of the quality system.

F.1 Responsibility of the Licensee

Article 21 of the Joint Convention

Responsibility of the licence holder

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

F.1.1 Principles and Definition of Nuclear Safety and Radiation Protection

In sense of Act No. 541/2004 Coll. (Atomic Act) nuclear safety shall mean the technical status and ability of a nuclear installation or transport equipment and the status and ability of its staff to prevent the uncontrolled development of a fission chain reaction or the unsanctioned release of radioactive substances or ionising radiation into the workplace environment or the natural environment and the ability to limit the consequences of incidents and accidents at nuclear installations or consequences of nuclear events during shipment of radioactive materials.

The authorization holder shall be liable for nuclear safety.

Radiation protection is, under the provisions of Act No. 355/2007 Coll., defined as protecting humans and environment from exposure and its effects, including the means to achieve this.

The license holder is obliged to observe the basic principles of radiation protection, requirements to ensure radiation protection of staff and residents during activities leading to exposure and to limit generation of radioactive waste to the necessary extent.

A level of nuclear safety, reliability and health protection at work and safety of technological facilities, protection of health from ionizing radiation, psychical protection, emergency preparedness and fire protection must be achieved upon using nuclear energy so as to keep the life, health, working or environment-related hazards as low as reasonably achievable according to the available state-of-the-art knowledge; at the same time, exposure limits shall not be exceeded. Upon new significant information being obtained about the risk and consequences of the use of nuclear energy, the above-mentioned level must be reassessed and necessary measures shall be taken to meet the conditions pursuant to the Atomic Act.

Detailed principles of spent nuclear fuel and radioactive waste management are stated in the chapters G and H.

In Slovakia it is possible to dispose only radioactive waste that is produced on its territory.

In case of shipments of radioactive waste and spent nuclear fuel produced on the territory of Slovakia, for treatment or reprocessing in a Member State or a third country, the ultimate responsibility for safe disposal of these materials, including waste, which is generated as a by-product, is the Slovak Republic.

Radioactive waste produced in the Slovak Republic can be disposed in another Member State or a third country only on the basis of an international treaty concluded between SR and that other state or a third country, which will enter into force no later than at the time of shipment of radioactive waste and which takes into account the recommendations of the European Community for Atomic Energy, under the conditions contained in the Atomic Act *in accordance with the provisions of Sections 16 to 16.1),* Section 21 par. 13).

F.1.2 Policy of Nuclear Safety and Radiation Protection

The purpose of the safety policy of nuclear installations for operators is to set safety goals, requirements, fundamentals, principles, responsibility, measures and methods of their performance for all areas of safety, such as nuclear safety and radiation protection, environmental safety, operational safety, technical safety, construction and physical safety, occupational health and safety and fire protection, safety of integrated system and telecommunication network, classified information protection, emergency planning and civil protection, personal safety, administration safety, financial safety, protection of company´ reputation and planning of activity continuity.

The policy of safety is pursued by internal acts as well as by inspection of their observance across all levels of company management.

Compliance with and fulfilment of the safety policy content by all employees is one of the main priorities and objectives; Safety is an integral part of all activities.

The following main requirements, fundamentals and principles of nuclear safety and radiation protection are set to achieve the safety goals:

- Nuclear safety and radiation protection is overriding and superior over any other interests of the company.

- Every employee is liable for nuclear safety and radiation protection in the scope of his competencies, responsibilities and duties.
- The principles of safety culture apply in all activities relating to nuclear installations.
- Principles of defense in-depth strategy: multi-level, mutually overlapping measures, focused mainly at prevention, but also at accident mitigation, are applied in nuclear installation designs and activities related to the operation of nuclear installations.
- Systems and components of relevance to safety are periodically tested with the aim to verify their functionality and serviceability.
- Safety audits of the respective safety systems are conducted on a periodical basis.
- Integrated management system is developed in line with the requirements of the Slovak legal order, of regulatory authorities, of IAEA recommendations and of the requirements of STN EN ISO 9001:*2015*, STN EN ISO 14001:*2015*, STN OHSAS 18001:2007 a STN ISO/IEC 20000-1:2008 standards.
- The latest knowledge and experience from operation of nuclear installations in the country and abroad are permanently utilized.
- International assessments and reviews are regularly used for independent assessment of nuclear safety and radiation protection level.
- An open dialogue with the public, local and regional state administration and self-governing authorities is applied.
- Currently occurring safety risks concerning nuclear safety and radiation protection are identified, analyzed, classified, and managed across all management levels. More serious hazards are submitted to the Nuclear Safety Committee, an advisory body of the top management of the operator.
- Operators invest adequate material and financial means to deliver the safety goals and meet the safety requirements, fundamentals and principles of nuclear safety and radiation protection, and to improve education and qualification of employees.

The primary responsibility for nuclear safety and radiation protection is with the specific persons listed as statutory body of the licensees (Boards of Directors in case of joint stock companies), who determine and pursue the application of the main goals, requirements, fundamentals and principles of nuclear safety and radiation protection in all activities related to the nuclear installations, from their siting, design, construction, commissioning, operation until decommissioning, including management of spent nuclear fuel and radioactive waste. The obligations following the primary responsibility are delegated to the executive management through authorization of persons and the description of the organizational rules of the company.

F.1.3 Obligations of the Authorization Holders (Licensee) towards Regulator

The operator is obliged to provide for sufficient financial and human resources to ensure nuclear safety, including the necessary engineering and technical support in all areas related to nuclear safety. The authorization holder (licensee) shall give priority to safety aspects over all other aspects of the authorized activity.

The obligations of the operator are provided primarily by the provisions of laws listed under E.1.2.2.

Any modifications to nuclear installation affecting nuclear safety during construction, commissioning, operation, decommissioning, closure of repository or after closure of repository may be implemented only after a preceding approval or permission of relevant regulatory authorities has been obtained and in special cases after having obtained the statement (opinion) of the European Commission. Other modifications must be notified by the operator, or submitted for review.

The authorization holder shall issue operating procedures for the performance of activities at a nuclear installation, in particular service, maintenance, control and testing of classified equipment. These procedures shall be in accordance with the conditions of the authorization. The authorization holder shall update and complete these procedures according to the current state of the nuclear installation.

The operator has the obligation to report to the regulatory authorities events at nuclear installations and in case of incidents and accidents also to other organizations and to the public, to take action to prevent recurrence.

The holder of authorization has the obligation to provide information to the public on nuclear safety. This obligation does not change the responsibility of ÚJD SR to provide the public with its own independent assessment.

In practice, the operator of a nuclear installation uses other essential specialized organizations, in the field of maintenance, operation or research. These specialized organizations have the function of so-called technical support organizations and are involved through their activities in supporting reliable and safe operation of nuclear installations, since the works, which they carry out, cannot be provided for by the operator with his own human resources, nor in organizational, technical and knowledge terms.

The licensee is given the obligation to identify for all radioactive waste a suitable system for their treatment in at least two alternatives justifying the choice of one of them.

The licensee is required, during operation, to hand over radioactive waste within one year of their production and spent nuclear fuel immediately after fulfilling the requirements for its safe transport and storage, to the legal entity – JAVYS, a. s. – authorized by the MH SR and by ÚJD SR.

The producer of radioactive waste is responsible for safe management of radioactive waste up to their disposal, and the licensee operating the facilities for the management of radioactive waste and spent fuel is responsible for safety of these facilities.

The licensee´s responsibility is to check and verify before closing the repository its readiness and also the readiness of the staff and the compliance of the documentation with its current status.

F.2 Human and Financial Resources

Article 22 of the Joint Convention

Human and Financial Resources

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

i) Qualified staff are available as needed for safety related activities during the operating lifetime of a spent fuel and 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;

F.2.1 Human Resources

Quality of human resources represent the principal precondition for a safe, reliable, economical and environmentally friendly operation of nuclear installations. The term “quality of human resources” is understood as a set of professional, health-related and mental capacities of the staff to perform activities at nuclear installations. From the aspect of impacts of working activities on nuclear safety, the staff of the authorization holder is classified into two basic groups:

- Employees having direct impact on nuclear safety – licensed employees, whose special competence is verified by an exam (written exam, oral exam and verification of competences on a representative full-scale simulator) and a practical test for licensed employees before an examination commission established by ÚJD SR, which issues License of special competence *(currently this category is no longer in JAVYS, a. s.);*

- Employees with impact on nuclear safety – professionally competent employees, whose Professional competence was verified by a panel established by the operator of specialized facility in a form of written and oral exam and to whom Certificate of Professional competence has been issued.

Special competence of employees according to the Act No. 541/2004 Coll. on peaceful use of nuclear energy means a set of expertise, practical experience, principal attitudes and knowledge of generally binding legal regulations and operating procedures issued by the authorization holder to ensure nuclear safety that is necessary for performing work activities having direct impact on nuclear safety.

Professional competence means a complex of professional knowledge, practical experience, knowledge of generally binding legal regulations and operating procedures issued by the authorization holder, necessary to perform work activities by the employee of an authorization holder. Professional competence is acquired by successful completion of Professional training at a specialized facility.

The overall working (professional, health and mental) competency of staff to carry out working activities at nuclear installations is the responsibility of the authorization holder. The authorization holder authorizes his personnel to perform working activities. An “Authorization to Perform Working Activities“ as part of the Integrated Management System (IMS) for quality assurance of a nuclear installation – an authorization holder. The Authorization to Perform Working Activities is issued for a given position and concrete nuclear installation only for those selected and professionally competent employees of the

authorization holder, who have valid Licenses of Special Professional Competency or Certificates of Professional Competency. The authorization is an evidence of working competency of an employee in relation to the regulatory authorities.

Each position within the system of professional training has defined requirements for education, experience, professional training, health or mental capabilities. The direct supervisor of the employee is responsible for meeting these requirements.

The professional training system of the authorization holder staff is updated on the base of operational experience, performed organizational changes, technical solutions (modernization) on installation, requirements of regulatory authorities, audits, reviews and recommendations of IAEA. It is provided for by necessary human, financial and material resources.

The professional training of the authorization holder staff and third parties (third parties represent contractors) is being conducted in accordance with documents of quality assurance management program, which is set up and maintained in accordance with:

- Generally binding legal regulations of the Slovak Republic;
- the IAEA standards, recommendations and guides;
- STN EN ISO 9001:2009, STN EN ISO 14001:2005 and STN/ISO/IEC20000-1 series standards;
- Management documentation in the Quality System.

Diagram of the system of staff training:

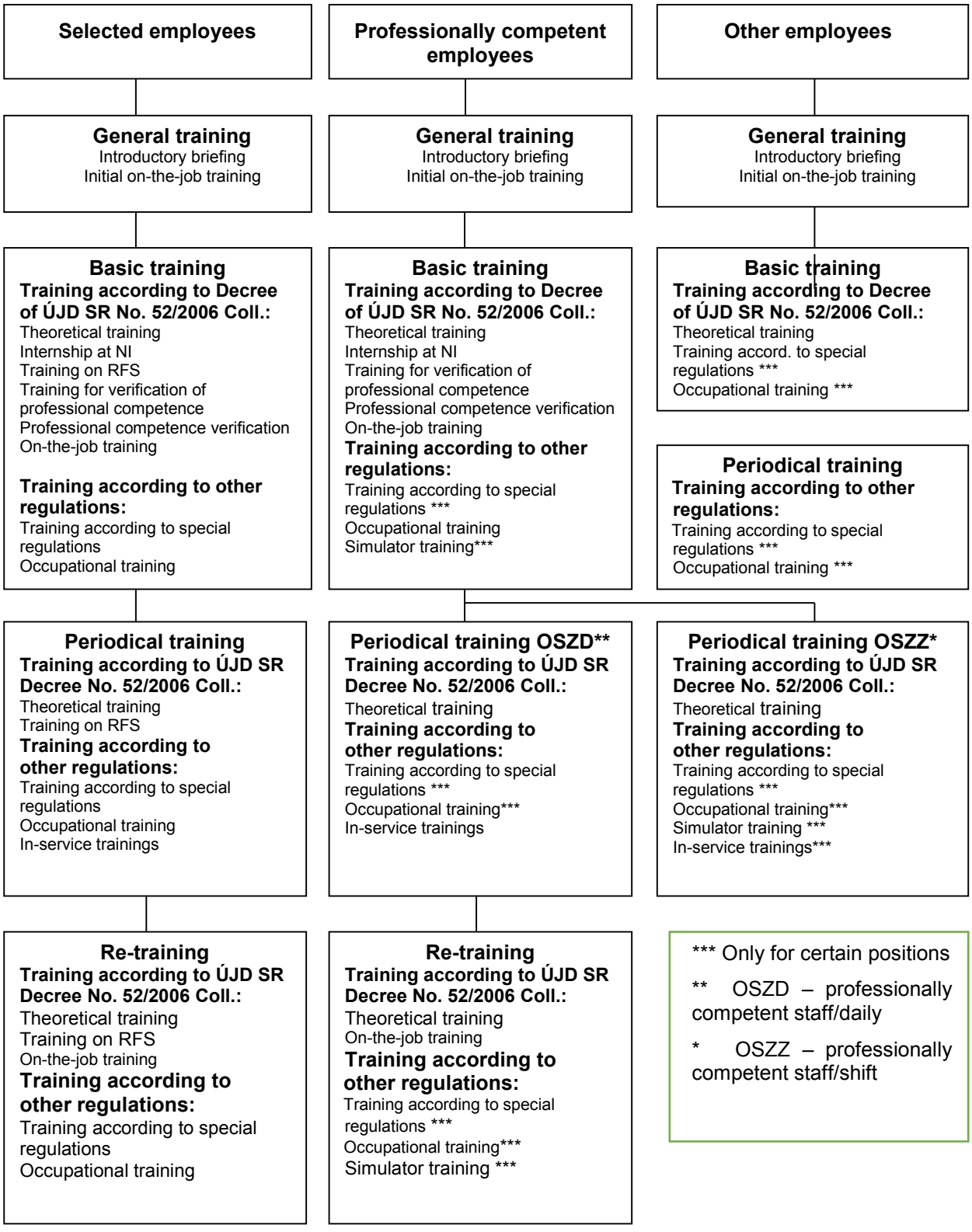


Fig. F.2.1 Chart of Professional training system for employees

With respect to impacts on nuclear safety, employees are allocated to the relevant type and phase of professional training and divided according to the performed working activities into six categories that are further subdivided into occupational groups and subgroups, following occupational orientation:

Category 1 - the selected personnel are the employees with university education who perform working activities with direct impact on nuclear safety (permanent crew of control room, shift supervisor, supervisory physicist, shift start-up engineer and senior start-up supervisor).

Category 2 - technical and administrative professionally competent employees of operation, maintenance and technical support departments with university education or secondary education.

Category 3 - operating shift and operating professionally competent staff, including employees involved in maintenance activities at technological facility with impact on nuclear safety.

Category 4 - professionally competent maintenance employees (except for engineers) – employees involved in maintenance activities at technological facility with impact on nuclear safety.

Category 5 - professionally competent employees in charge of NI decommissioning and handling RAW and SNF fuel with impact on nuclear safety.

Category 6 - other employees assigned to professional training on NI.

JAVYS, a. s. only has categories 5 and 6.

Operator of specialized facility

Professional education and training of employees of authorization holder, as well as of employees of contractors, is carried out at the operator of a specialized facility, who is a holder of authorization for professional training issued by ÚJD SR upon written application after reviewing the technical equipment used during the training and professional competency of applicant‘s employees. The practical exercise (internship and on-the-job training) is carried out within the premises of the operator on the basis of licence from ÚJD SR for professional staff training. Professional training is carried out in compliance with the ÚJD SR decree No. 52/2006 Coll. on professional competence and with the approved system of professional training according to the training programs.

F.2.2 Financial Resources

One of the principles of nuclear and radiation safety of operators is the commitment to have necessary financial means to meet nuclear and radiation safety and to provide for continuous training and improvement of qualification of the staff. In order to fulfil this commitment, financial strategies of companies were developed that would enable, among the tasks mentioned, also fulfilment of the program for technological development.

Financial strategy of the operators is defined as providing for funding operation and investment needs of the company by optimal utilization of own and external resources.

Financing RAW, SNF Management and Decommissioning of Nuclear Installations

The Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Installation and for Management of Spent Nuclear Fuel and Radioactive Waste (Act on Nuclear Fund) sets rules for management, contributions and the scope of activity of the Fund for Decommissioning of Nuclear Facilities.

The purpose of establishment and activity of the National Nuclear Fund is to collect and administer financial resources (resources of the Fund) determined for the back-end of nuclear energy and grant these resources in sufficient amount in a transparent and non-discriminatory manner to the applicants for covering of lawful expenses incurred in connection with activities related to the back-end of nuclear energy under conditions mentioned in the Act and in compliance with Slovakia´s commitments resulting from the Joint Convention.

The Fund resources are funds paid as:

a) obligatory contributions of the authorization holders for operation of nuclear installations generating power,
b) transfer from the budgetary expenditure account of the MH SR as a levy is collected by the system operators (transmission system and distribution systems),
c) penalties imposed by ÚJD SR according to a specific legal provision,
d) interest payments (revenues) from deposits on nuclear fund accounts,
e) voluntary contributions from natural and legal entities,
f) subsides and contributions from the EU funds and other international organizations, financial institutions and funds provided to cover the expenses of back-end nuclear energy,
g) subsides from the state budget,
h) revenues from financial operations,
i) other resources, if required by a special regulation,
j) fees from the applicants for issuing permit for activities leading to exposure by a radioactive source represent a financial guarantee.

Currently among the basic (majority) resources of the Fund are the mandatory contributions by the operators of nuclear installations generating electricity, and by Government regulation No. 426/2010 Coll. from 1 January 2011 also the transfer from the budgetary expenditure account of the MH SR as levies collected by the operators of the transmission system and the distribution systems.

The Fund forms targeted sub-accounts from the obtained resources, structured in the following way:

a) sub-account for decommissioning of nuclear installations operated at the Jaslovské Bohunice site including the management of radioactive waste from their decommissioning, structured as analytical accounts:
   - Nuclear power plant A1,
   - Nuclear power plant V1,
   - Nuclear power plant V2,
b) sub-account for decommissioning of NPP Mochovce including the management of radioactive waste from its decommissioning,
c) sub-account for decommissioning of nuclear installations, which will be commissioned after the entry in force of the Act on Nuclear Fund, including the management of radioactive waste from their decommissioning,
d) sub-account for management of orphan nuclear materials and radioactive waste,

e) sub-account for siting, geological research, preparation, design, construction, commissioning, operation and closure of radioactive waste or spent fuel repositories including monitoring after the closure of these repositories and including respective research and development,

f) sub-account for institutional inspection of repositories,

g) sub-account for storage of nuclear spent fuel at the nuclear installations themselves,

h) sub-account for reimbursement of expenses determined for administration of the Fund and expenses related to the administration of the Fund,

i) sub-account for reimbursement of expenses for the management of institutional radioactive waste.

Resources of the Fund are kept on individual sub-accounts and on individual analytical accounts proportionally in relation to the amount of contributions paid by respective authorization holders for operation of nuclear installations generating power, or on the amount of transfer from the budgetary expenditure account of the Ministry of Economy.

The Fund´s resources are kept on individual sub-accounts and individual analytical accounts in proportion to the amount of contributions paid by the respective license holders for operation of nuclear power installations, or to the amount of the transfer made from the expenditure budgetary account of the MH SR.

Resources of the Fund may be used to cover eligible costs incurred in connection with activities related to the back end of the nuclear energy referred to in the Act. The resources from the Nuclear Fund can be granted to the applicants as a special purpose grant based on written application supported by a project with technical and economic justification. Funds can only be granted upon meeting the conditions defined by the Act No. 238/2006 Coll., and after their approval by the Fund´s Board of Trustees. Once approved, the resources from the Nuclear Fund are provided under a Grant Agreement.

Financial means of the Nuclear Fund can be used for:

a) shutdown of nuclear installation,
b) decommissioning of nuclear installations including management of radioactive waste from this decommissioning,
c) management of spent nuclear fuel and radioactive waste after termination of operation of originating nuclear installation,
d) management of nuclear materials and radioactive waste, whose originator is unknown,
e) purchase of land for placing a spent nuclear fuel and radioactive waste repository,
f) prospecting, geological survey, preparation, design, construction, commissioning, operation and closure of repositories,
g) administration and activities relating to Fund administration,
h) payment of insurance for liability of the operator of nuclear installation, which is in decommissioning,
i) back-end of management of institutional radioactive waste and for activities related to it up to the amount of contribution paid as financial guarantee.

Units of NPP V1 were shutdown in 2006 and 2008. Costs for shut down and decommissioning of NPP V1 are financed from the following resources:

- from resources of SE, a. s. and JAVYS, a. s., during shut down;
- from the BIDSF funds. When SR acceded to the EU the Bohunice International Decommissioning Support Fund – BIDSF was established, through which the EU, in the budgeting period 2007 – 2013 and 2014 - 2020, provides financial resources in order to mitigate the economical impacts of the early shutdown of NPP V1. The Ministry of Economy SR decides about the use of these funds to finance various national projects in the energy sector, besides other also preparation of decommissioning of NPP V1 itself (modifications to the technological systems related to shutdown and decommissioning of NPP V1, licence documentation, conditioning and disposal of RAW and decommissioning activities of NPP V1), improving energy efficiency, modifications in the overhead transmission system focusing on safety and reliability of power supplies. NPP V1 *has so far* drawn these funds through approx. *60* individual or consequtive projects, the number of which *will* continue to rise in line with the progress of works on decommissioning of *NPP V1*;
- from the Funds resources, in accordance with the Grant Agreement for the relevant year on the basis of approved applications for the decommissioning of NI NPP *V1*, for co-financing of selected BIDSF projects, for financing compensations for contractors of BIDSF projects, *for financing of induced supporting costs of decommissioning of NI NPP* V1, and other activities according to the Act No. 238/2006 Coll.

F.3 Quality Management System of the Operators

Article 23 of the Joint Convention

Quality Assurance

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

Legislative Requirements

The quality system always follows the current national and international requirements and is based on:

- Meeting the requirements of legal provisions of the Slovak Republic;
- Meeting the IAEA recommendations;
- Meeting international standards ISO 9001; ISO 14001 and OHSAS 18001 and ISO/IEC 20000-1,
- Implementation of internal needs of the company when developing an effective management system.

Act No. 541/2004 Coll.

According to the Atomic Act a specific condition for issuance of authorization or permission (i. e. licence) for construction of nuclear installation, its commissioning, operation, decommissioning, *closure of a repository* and other activities is the approval of the documentation of quality assurance system.

The operator is obliged to establish the necessary organizational structure, procedures and resources for quality assurance (further referred to as “quality system“).

The ÚJD SR Decree No. 431/2011 Coll. as establishes details of requirements for the scope, content, hierarchy, structure and review of the quality management system of the applicant for the license and of the license holder.

The quality management system documentation is covered by STN EN ISO 9001 standard, and by ÚJD SR Decree No. 431/2011 Coll.

The requirements for quality assurance are contained in programs of quality assurance:

- Preliminary program of nuclear installation quality assurance, which includes basic requirements for quality assurance for all stages of nuclear installation,
- Stage program for quality assurance of nuclear installation, which includes requirements a given stage of nuclear installation existence (from design to decommissioning, *in case of a repository only after its closure*).

The requirements for quality assurance of classified equipments are determined in quality plans for these equipments.

Quality system of operator is built and implemented in through the Integrated Management System (IMS). It is a management system that meets requirements on safety management and environmental quality and protection, pursuant to the recommendation of the IAEA No. GS-R-3 and IAEA No. GS-G-3.1.

Policies Declared and Implemented by the Licensee (Operator)

Overall objectives and direction of action on quality, environment, safety and professional training of the staff are laid down in policies declared by the operator:

- Integrated Management System Policy;
- Safety Policy;
- Professional staff training policy.

The top management sets **Quality Goals** to accomplish the quality policies. The Quality Goals are elaborated into concrete tasks of particular divisions.

The Quality Goals are also determined in order to assure safe, reliable, effective and environment friendly operation and decommissioning of nuclear installations.

The basic instrument to meet policies and goals is the maintenance and improvement of the integrated management system - **IMS**.

All activities within the processes identified by IMS are managed so as to minimize negative impacts on the environment, health and safety of the population *and employees* and to be in line with the legal framework. The IMS primary principles are:

- every employee is liable for the quality of his own work,
- any quality-affecting activities are carried out in accordance with valid provisions,
- IMS is linked to good experience in the area of management system as well as the best national and international experience,
- management is responsible for elaboration, implementation, permanent monitoring, efficiency assessment and further development of IMS system including staff training,
- IMS is built as a uniform management system that contains all implemented activities and procedures significant in respect to organization's goals achievement.

Building an Integrated Management System on the basis of Quality Management System - IMS

IMS is implemented in accordance with the applicable national legislation, the IAEA documents No. GS-R-3 and IAEA No. GS-G-3.1, ISO 9001; ISO 14001, OHSAS 18001 and ISO/IEC20000-1 standards. Integrated management system of the operator is process oriented.

The effectiveness of the Integrated Management System is verified by:

- internal audits carried out within the framework of integrated management system for quality, environmental protection, occupational health and safety*, nuclear safety, radiation protection and IT security – in a* form of individual or combined internal audits *under internal company regulations*,
- supervisory audits of external certificate companies, which have certified integrated management system and
- inspections conducted by the ÚJD SR.

Any findings identified during the audits, inspections and reviews are subject to analysis at the corresponding level of the top management. Based on analyses, remedial measures are taken; their implementation is controlled.

Role of the Regulatory Authorities

Activities and roles of ÚJD SR with respect to state regulation of nuclear safety of nuclear installations in the field of quality assurance are given by Act No. 541/2004, as well as Decrees No. 430/2011 Coll. and 431/2011 Coll.

Inspection´s of the Nitra Labour Inspectorate is focusing on the control of legal entities and natural persons performing certain activities (manufacture, installation, repair, reconstruction, inspections, tests, revisions, maintenance, import of equipment, ...) on the equipment subject to labour inspection regiime. When verifying professional competence also the physical condition – technical equipment of legal entities and natural persons is verified.

F.4 Radiation Protection

Article 24 of the Joint Convention

Operational Radiation Protection

1. *Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime 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 does limitation which have due regard to internationally endorsed standards on radiation protection; and*
   - iii) *Measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.*
2. *Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:*
   - iv) *To keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and*
   - v) *So that no shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for does 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, 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.*

F.4.1 Legislation in the Field of Radiation Protection and its Implementation

Radiation protection according to the Act No. 355/2007 Coll. is defined as protection of people and the environment from exposure and from the effects of radiation, including the means for achieving it.

The issues of health protection against ionizing radiation are regulated by the Act No. 355/2007 Coll. on Protection, Support and Development of Public Health.

The aim of the legal regulation is to protect the health and the environment against harmful effects not only of ionizing radiation, but also against other factors that could endanger health, in the most effective way. Along with the cited Act, the European Commission Directives were transposed in the form of governmental ordinances. These are binding for all the ministries (Annex VI.).

- Government Regulation No. 345/2006 Coll. on the basic safety requirements for the protection of health of the staff and of the population from ionizing radiation, which transposes the Council Directive 96/29/Euratom of 13 May 1996;
- Government Regulation No. 340/2006 Coll. on the protection of health of people from adverse effects of ionizing radiation during medical irradiation, transposing the Council Directive 97/43/Euratom of 30 June 1997;
- Government Regulation No. 346/2006 Coll. on the requirements for securing radiation protection of external staff exposed to the risk of ionizing radiation during their activities in the controlled zone, transposing Council Directive 90/641/Euratom of 4 December 1990;
- Government Regulation No. 348/2006 Coll. on the requirements for securing the control of high activity sources and orphan sources, transposing Council Directive 2003/122/Euratom of 22 December 2003.

Details on ensuring the Act No. 355/2007 Coll. are stated in the implementing regulations, Annex VI.

At the time of preparation of the National Report, a draft new radiation protection law was under preparation, to transpose the requirements *of the Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from ionizing radiation into the legislation of the Slovak Republic.*

F.4.2 Monitoring of Radioactivity by Licensee

Pursuant to the Act No. 355/2007 Coll. on protection of health, support and development of public health, each natural person and each legal entity performing activities, during which harmful factors to health occur or arise, is obliged to secure their quality and quantity of detection at the workplace and in its surroundings. Regarding ionizing radiation the details of requirements for monitoring of ionizing radiation are provided for the relevant Government Ordinance and in the Decree No. 545/2007 Coll. of MZ SR.

The licensee is obliged to develop a monitoring program and to ensure compliance with it. Monitoring must be continuous, periodical or operative. Monitoring plan according to the type of activity must contain monitoring in standard operation, in predictable deviations from standard operation, during radiation incidents and radiation accidents.
It is structured into parts governing the monitoring of:

a) a workplace with sources of ionizing radiation;
b) surroundings of a workplace with sources of ionizing radiation;
c) *personal monitoring of staff,*
d) discharges of radioactive materials from the workplace with sources of ionizing radiation to the environment.

The monitoring plan shall contain:

a) Variables important with respect to radiation protection, which shall be monitored, the method, range and frequency of measurements;
b) Guidelines for evaluation of measurement results and the method of record keeping;
c) Reference values and measures if these are exceeded;
d) Specification of measurement methods;
e) Specification of parameters of used types of measuring instruments and equipment.

Monitoring plan must permit control of compliance with the limits of exposure of the staff and the public and the limits for release of radioactive substances into the environment and to demonstrate that the radiation protection is optimized. Results of monitoring must be recorded by the operator so that if needed they can be used to estimate personal doses.

Personal monitoring means to establish the personal doses. For workers of category A personal monitoring must be done systematically *by assigned personal dosimeters.* If based on monitoring or calculation there is a suspicion that the exposure limits for workers with sources or ionizing radiation may be exceeded, then when establishing the personal doses conditions and circumstances of exposure are taken into account. Personal monitoring can be performed by an authorized dosimetry service according to special regulation.

Personal dosimeter must allow measurements of all types of radiation contributing to the external exposure of a worker during activities leading to exposure. If a single personal dosimeter does not allow such measurements, other personal dosimeters must be used; this does not apply, if it is technically not possible to use a personal dosimeter to monitor a particular type of ionizing radiation. In such case the estimate of dose to the staff is done using results of workplace monitoring or by calculation.

At workplaces with open radioactive sources, which can lead to internal exposure of workers, also the internal exposure must be evaluated. Intakes of radionuclides and effective dose is evaluated by measuring the activity of radionuclides in the body of a worker or his excreta, by measuring concentration of radionuclides in the air, measuring contamination of a workplace and converted to radionuclide intake using relevant factors and models of the respiratory and digestive tract.

The licensee shall, in compliance with the applicable laws, regularly submit personal monitoring results to the Central register of doses of the Public Health Authority, no later than 30 days after delivery of results of personal dosimetry by an authorised dosimetry service, and in case of work of employees abroad, the licensee is required to notify results of personal doses of staff no later than 3 months after returning from work abroad. Exceeding the exposure limits must be notified by the licensee immediately after their discovery. The licensee is required to archive the results of personal dosimetry until the workers reach 75 years of age or at least for 30 years after completion of working with radiation sources and to present them during inspections to the inspectors.

Fig. F.4.2 Monitoring of radioactivity on the surface of fibre-concrete containers

F.4.3 Liquid and Gaseous Discharges

Indicative values of liquid and gaseous discharges limits are stated in Annex II.

Pursuant to Act No. 355/2007 on protection, support and development of public health the operator is obliged to submit policies for discharges of radioactive materials into the environment for approval to the state regulator, in the program of quality assurance for radiation protection. The Act further provides for the scope of the necessary documentation for approval of application for discharging radioactive materials into the air, surface water or sewer.

The governmental Ordinance No. 345/2006 Coll. on Basic Safety Requirements for Health Protection of Workers and the Public Against Ionizing Radiation in Annex No. 3 (Criteria of release of radioactive substances into environment) states:

"It is allowed to release radioactive substances from a nuclear installation into atmosphere and surface waters, when assured that the effective doses as a consequence of such release in respective critical group of population will not annually exceed 250 μSv. This value is considered to be the indicative value for designing and construction of nuclear installation. When there are more nuclear installations in one site, which influence the dose of population in the same critical group, this value also refers to the total exposure from all nuclear installations at the site or the region". This means that the limit dose is the basic criterion for control of setting the currently valid indicative value for discharged activities of radioactive materials stated in Annex II. (control of not exceeding the above mentioned criterion – not exceeding the effective dose – was done by a software through the relevant geographical model and conversion factors). Based on the request from the state regulatory authority new applications for authorization to discharge will now be limited by the effective dose calculated from proposed indicative value activities for the relevant nuclear installation.

Measurements performed with the purpose to balance or evaluate dose load of population are conducted with the help of classified measurement devices, which are verified by bodies of state metrology pursuant to metrological provisions.

Discharges of RA-materials into atmosphere are continuously monitored in ventilation chimneys of nuclear installations (radionuclides with long half-lives emitting beta, gamma radiation in aerosols) in order to control not exceeding the indicative values. Samples are at the same time taken in the samplers with a view to ascertain radionuclide composition and balancing. Requirements for balancing individual radionuclides are defined in the relevant decisions of the state regulator for individual nuclear installations.

The basic balance of annual *indicative values* of radioactive material discharges are complemented with reference values, the aim of which is to continuously monitor the operational status of the nuclear facility:

- Investigation levels, exceeding of which initiates investigation of the current status,
- Intervention levels, exceeding of which activates the action to reduce the relevant discharge.

JAVYS, a. s., discharges gaseous releases from four chimneys (the main generating Unit of NPP A1 + bituminization plant, Bohunice Conditioning Centre, Interim Spent Fuel Storage, NPP V1). From these

ones until 21 October 2011 only the chimneys of NPP V1 and the ISFS have their *indicative values* for gaseous discharges and others were determined for "ventilation chimneys within the premises of NPP A1". From 21 October 2011 a decision of ÚVZ SR is in effect, which determines the bituminisation line, the Bohunice treatment centre (TSÚ RAO), main reactor block of NPP A1 not as one unit, but as 3 separate facilities with discharge points to the atmosphere: VK 46 part A, VK 46 part B and VK 808. The ISFS facility is further assessed separately as VK 840.

- VK 46A – objects: 28, 30, 32, 34
- VK 46B – objects: 809 a 41
- VK 808 – objects: 808, 44/10, 44/20 and ZFK
- VK 840 – object: 840

Investigation level for the mixture of radionuclides beta and gamma in aerosols discharged through ventilation chimneys within the premises of TSÚ RAO and NPP A1 valid from 2006: **10 Bq.m^{-3}.**

Table F.4.3a) Gaseous discharges until 2011 identified as ISFS and from 2012 marked as VK 840

ISFS	Aerosols beta / gamma	
Year	Discharge [MBq]	% *of indicative value*
1994	33,62	11,20
1995	23,90	7,97
1996	12,92	4,31
1997	20,38	6,79
1998	23,95	7,98
1999	27,12	9,04
2000	25,31	8,44
2001	12,48	4,16
2002	50,42	16,81
2003	0,65	0,22
2004	1,50	0,50
2005	3,06	1,02
2006	0,87	0,29
2007	1,26	0,42
2008	0,55	0,18
2009	0,53	0,18
2010	0,41	0,14
2011	0,36	0,12

VK 840	Mixture of radionuclides (alfa/beta/gama)	
Year	Discharge [kBq]	% *of indicative value*
2012	504,238	0,17
2013	272,383	0,09
2014	*156,686*	*0,05*
2015	*177,288*	*0,06*
2016	*140,814*	*0,05*

Gaseous discharges from ISFS are shown in Table F.4.3a).

Liquid discharges from ISFS are accumulated, measured and released together with liquid discharges from NPP V1.

The approach towards liquid radioactive discharges is principally the same as in the case of gaseous ones. A peculiar case is the limitation and the following monitoring of liquid discharges from the RAW repository in Mochovce (see Annex III.), where are limited activities of potentially measurable radionuclides.

Liquid discharges are monitored at the source – *tank ready for discharging*. This means that the values for total volume activity and eventually for volume activity of tritium of samples taken from ponds of particular technological units are measured before they are released. Based on results of analysis and comparison with *indicative values*, waters from the ponds are returned back into technological procedures or to treatment station of waters for purification or are released into environment via the waste water control plant (into the Váh river).

Values of radioactive material discharges into atmosphere and hydrosphere from NPP A1 and technologies of RAW treatment and conditioning between 1994 - 2013 are shown in the following tables (table F.4.3a and tables F.4.3b1, F.4.3b2 or table F.4.3c). It can be stated that throughout the monitored period, the *indicative values* for radioactive material discharges have not been exceeded, while discharges of corrosion and fission products into atmosphere have been deep below the authorized *indicative values.*

According to the decision of ÚVZ SR (department of health protection against radiation) OOZPŽ/7119/2011 from 2012 TSÚ RAO and NPP A1 are assessed separately as 3 separate discharge points VK 46/A, VK 46/B and VK 808:

Table F. 4.3b1) Gaseous discharges from NPP A1 and treatment technologies of TSÚ RAO discharged through VK 46/A

NPP A1 + TSÚ RAO	Aerosols beta / gamma		Sr 89, 90		Aerosols alpha	
Year	Discharge [MBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*
1994	2,20	0,23	33,20	0,12	155,00	1,76
1995	4,11	0,44	289,00	1,03	418,00	4,75
1996	7,16	0,76	770,00	2,77	781,00	8,88
1997	10,42	1,11	680,00	2,44	1710,00	19,43
1998	16,87	1,79	1180,00	4,20	730,00	8,30
1999	21,50	2,29	540,00	1,93	809,00	9,19
2000	21,62	2,30	158,10	0,56	973,57	11,06
2001	20,70	2,20	207,51	0,74	997,12	11,33
2002	75,75	8,05	1683,21	6,01	78,32	0,89
2003	25,38	2,7	921,42	3,29	24,84	0,83
2004	15,47	1,65	409,87	1,46	28,41	0,32
2005	25,24	2,68	355,44	1,27	20,03	0,22
2006	10,46	1,09	443,13	1,58	41,99	0,48
2007	4,05	0,42	151,92	0,54	9,81	0,11
2008	18,56	1,97	81,70	0,29	6,11	0,07
2009	3,92	0,42	149,00	0,53	16,84	0,19
2010	3,37	0,36	292,26	1,04	20,33	0,23
2011	2,629	0,28	161,37	0,58	14,45	0,164

Table F. 4.3b2) Gaseous discharges from VK 46/B

VK 46/B	Radionuclides (beta/gama)		Strontium (^{90}Sr-beta)		Transuranium (alfa/gama)	
Year	Discharge [kBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*
2012	149,706	0,106	10,973	0,261	0,854	0,065
2013	216,576	0,154	5,153	0,123	1,556	0,118
2014	*32,064*	*0,023*	*7,223*	*0,172*	*0,685*	*0,052*
2015	*23,901*	*0,017*	*6,358*	*0,151*	*0,301*	*0,023*
2016	*36,092*	*0,026*	*6,778*	*0,161*	*0,368*	*0,028*

Table F. 4.3b3) Gaseous discharges from VK 808

VK 808	Radionuclides (beta/gama)		Strontium(^{90}Sr-beta)		Transuranium (alfa/gama)	
Year	Discharge [kBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*	Discharge [kBq]	% *of indicative value*
2012	514,548	0,365	37 731	0,898	1,007	0,076
2013	254,618	0,181	11,736	0,279	0,335	0,025
2014	*120,806*	*0,086*	*7,743*	*0,184*	*0,454*	*0,034*
2015	*297,447*	*0,211*	*7,442*	*0,177*	*0,362*	*0,027*
2016	*91,207*	*0,065*	*8,176*	*0,195*	*0,364*	*0,028*

Tabuľka F. 4.3b4) Gaseous discharges from VK 46/A

VK 46/A	*Radionuclides (beta/gama)*		*Strontium(^{90}Sr-beta)*		*Transuranium (alfa/gama)*	
Year	*Discharge [kBq]*	*% of indicative value*	*Discharge [kBq]*	*% of indicative value*	*Discharge [kBq]*	*% of indicative value*
2012	*1 850,373*	*0,281*	*78,826*	*0,402*	*19,184*	*0,311*
2013	*1 272,809*	*0,193*	*27,533*	*0,140*	*6,084*	*0,099*
2014	*565,089*	*0,086*	*13,329*	*0,068*	*5,811*	*0,094*
2015	*424,747*	*0,065*	*16,367*	*0,084*	*4,056*	*0,066*
2016	*311,043*	*0,047*	*13,537*	*0,069*	*4,095*	*0,066*

Discharges to the Váh river from TSÚ RAO and NPP A1 consist of two types of waters:

- Service water – originating from operations of TSÚ RAO and NPP A1
- Remediation pumping of groundwater – originating from the N-3 drill, object 106

Table F. 4.3c) Liquid discharges from NPP A1 and the conditioning technology of TSÚ RAO

Váh river	Tritium		Corrosion and fission products *(alfa/beta/gama)*	
Year	Discharge [GBq]	% *of indicative value*	Discharge [MBq]	% *of indicative value*
1994	840	1,92	24,47	0,064
1995	1958,48	3,1	50,631	0,13
1996	505,08	1,16	33,8	0,09
1997	11850	27,12	29,665	0,08
1998	249,87	0,57178	130,7	0,34395
1999	1120	2,56293	169,3	0,44553
2000	740,8	1,69519	87,68	0,23074
2001	3023	6,91762	67,874	0,17862
2002	589,009	1,34785	90,566	0,23833

2003	2258,26	5,16763	86,867	0,2286
2004	2411,095	5,5174	85,296	0,22446
2005	2141,8	4,90114	70,511	0,18556
2006	1000,4	8,93	76,01	0,48
2007	237,827	2,59	89,21	0,74
2008	212,30	2,12	135,10	1,13
2009	186,64	1,87	114,85	0,96
2010	225,72	2,26	116,81	0,97
2011	346,423	3,464	60,074	0,501
2012	228,934	2,289	23,042	0,192
2013	110,654	1,107	10,126	0,084
2014	*156,686*	*1,567*	*6,964*	*0,058*
2015	*177,288*	*1,773*	*12,528*	*0,104*
2016	*140,814*	*1,408*	*8,427*	*0,070*

Dudváh	*Tritium (^3H)*		Corrosion and fission products *(alfa/beta/gama)*	
Year	*Discharge*	*% of indicative value*	*Discharge [MBq]*	*% of indicative value*
1994	211,2	48,33	36	9,5
1995	0,213	0,05	3,905	1,03
1996	0,13	0,03	1,69	0,44
1997	0,048	0,01	0,495	0,13
1998	0,004	0,00092	1,016	0,27
1999	0,002	0,00048	0,532	0,14
2000	0,00027	0,000063	0,223	0,06
2001	0,00021	0,000047	0,046	0,01211
2002	0,0014	0,00032	0,463	0,12184
2003	0,0005	0,00011	0,013	0,00342
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	20,38	55,08	13,17	10,98
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0,002	0,005	0,357	0,297
2012	0,001	0,002	0,162	0,135
2013	0	0	0	0
2014	*0*	*0*	*0*	*0*
2015	*0*	*0*	*0*	*0*
2016	*0*	*0*	*0*	*0*

Gaseous and liquid discharges from the nuclear equipments for RAW and SNF management placed at the NPP in operation are not monitored separately, but together with the rest of discharges from these nuclear power plants (identical input into environment). They form a smaller part of the total discharges. These limits have not been exceeded in all years of operation; released activities have been deep below the authorized limits.

In the liquid discharges from RÚ RAO during the whole period of operation no such activity has been identified, which would exceed the normal levels of rain and surface water. Evaluation of yearly liquid discharges for the period 2004 - 2013 is shown in table F.4.3d).

Table F.4.3d) Yearly liquid discharges – water from the runoff RÚ RAO

Year	Volume of discharged water - m^3	Yearly discharged activity kBq (fulfilment of L&C -%)			
		H^3	Cs^{137}	Co^{60}	Sr^{90}
2004	4 140	3 870 (0.02)	301 (1,31)	275 (1,22)	186 (0,07)
2005	6 774	6 430 (0,03)	142 (0,62)	135 (0,60)	149 (0,06)
2006	5 821	5 610 (0,03)	931 (0,41)	105 (0,47)	64 (0,03)
2007	3 272	3 300 (0,02)	589 (0,26)	7,85 (0,03)	7,8 (0,003)
2008	6 098	6 120 (0,03)	128 (0,56)	189 (0,84)	792 (0,32)
2009	969	8 687 (0,046)	111 (0,48)	154 (0,69)	179 (0,07)
2010	11 126	20 845 (0,111)	357 (1,566)	399 (1,781)	684 (0,28)
2011	4 458	5 994 (0,032)	152 (0,66)	180 (0,804)	341 (0,139)
2012	3 405	12 482 (0,066)	1 019 (4,47)	798 (3,56)	130 (0,053)
2013	7 491	18 744 (0,099)	1 403 (6,15)	815 (3,64)	570 (0,23)
2014	*6 129*	*15 336 (0,082)*	*108 (0,47)*	*100 (0,446)*	*406 (0,17)*
2015	*2 450*	*6 130 (0,033)*	*64 (0,281)*	*57 (0,254)*	*621 (0,26)*
2016	*2 724*	*6 816 (0,036)*	*58 (0,254)*	*33 (0,147)*	*57 (0,233)*

F.4.4 Dose and Exposure Limits of Personnel

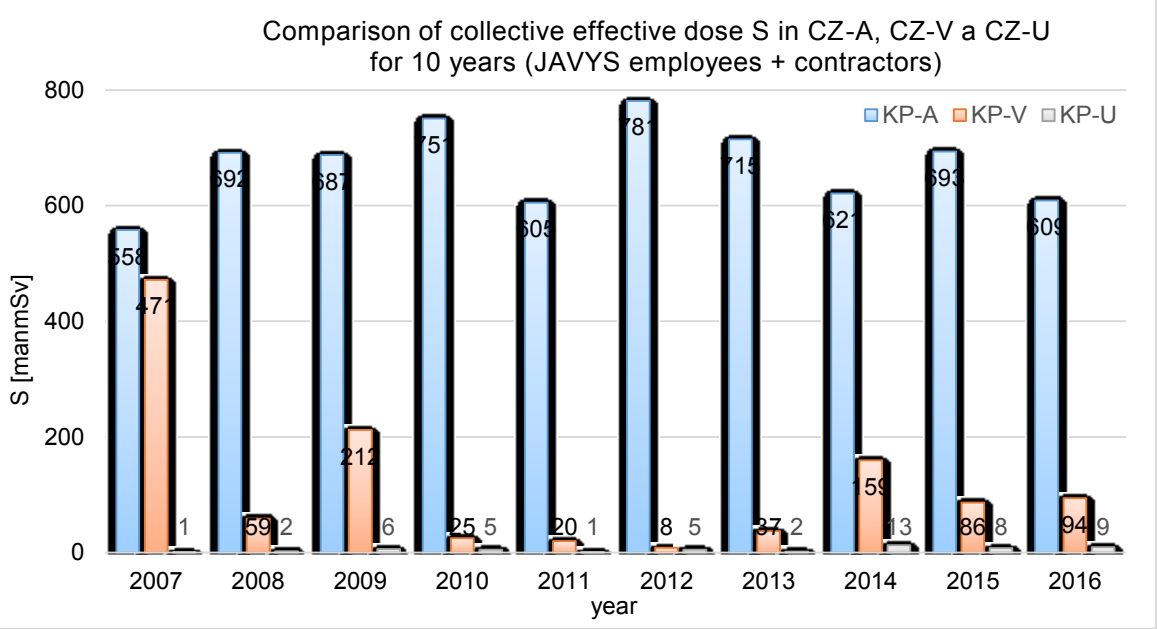
Dose and exposure limits of personnel and of particular groups of employees are determined by the act in line with recommendations of ALARA commission in an annual period, while the determined own intervention limits, of which the cause of excess is evaluated and which are justified, are lower than the values determined by legislation.

For all types of works the basic principles of radiation protection are taken into account:

- *principle of reasoning the activity,*
- ALARA principle,
- principle of limitation of doses and risks.

Graphical representation of an average collective effective dose at NPP A1 and the RAW treatment and conditioning technology for the period from 2007 to 2016 is shown in table F 4.4. Achieved KED values in the period from 2000 to 2013 are a reflection of activities performed at NPP A1 and on the treatment plants.

Table F.4.4 Collective effective dose in controlled zone (CZ) of NPP A1 and TSÚ RAO and ISFS (A) NPP V1 (V) and RÚ RAO and FS KRAO (U)



F.4.5 Monitoring of Impacts of the Nuclear Installation on the Environment

Impact of nuclear installations at the Bohunice site is evaluated in two ways:

1. By monitoring of radiation quantities directly in the environment and by laboratory evaluation of environmental samples. Yearly there are about 2,000 environmental samples being evaluated from the surroundings of the nuclear installations at Bohunice site, which are evaluated at the Laboratory of Radiation Control of the surroundings of SE-EBO. The following values are monitored:
   a) The volume activity of aerosols in continuous abstractions of air;
   b) atmospheric deposition of radioactivity;
   c) volume activity of milk;
   d) volume activity of drinking surface waters;
   e) volume activity of ground waters;
   f) radioactivity of agricultural products (clover, barley, wheat, ...);
   g) radioactivity of soil;
   h) continuous measurement of dose rates and gamma spectrometric measurements in the field;
   i) measurements of doses in the surroundings of NI.
2. Using analytical method – yearly values of discharged radioactive materials are entered as input values for the calculation program. The program, to which more data are entered (continuous annual meteorological situation, demographical statistical data, conversion factors defined by the relevant international institutions), is designed to calculate the impact of a nuclear installation on the surroundings. The Program is approved by the state regulator – ÚVZ SR.

Results of measurements and calculations are published in information reports on a quarterly and annual basis in a printed form and are submitted to the bodies of state regulation and bodies of public

administration. The same applies also for the area of NI at Mochovce – RÚ RAO. **Based on the conclusions from the above mentioned annual reports for 2008 – 2013 the radiological impact of the NI to its surroundings is negligible.**

The annual IED for three most loaded groups of population calculated from the monitoring data are depicted in the Sheet F.4.5. These IED are considerable lower than IED received by the population from the natural background. The individual dose equivalent from the natural background in the surrounding of NPP Bohunice and NPP Mochovce is 100 to 10 000 times higher than the IED values presented in the table, despite the fact that IED calculations are considerably conservative.

Fig. F.4.5 Monitoring equipment at the National Repository of RAW

Table F.4.5 Calculated yearly IED for the groups of population in the vicinity of NPP Bohunice

Year		IDE [Sv]		
		Infants	7-12 years	Adults
1998		1,64 E-7	1,11 E-7	6,61 E-8
1999		6,63 E-8	8,67 E-8	8,29 E-8
2000		1,49 E-7	2,05 E-7	1,92 E-7
2001		1,79 E-7	2,31E-7	2,28 E-7
2002		1,96 E-7	2,25 E-7	2,21 E-7
2003		7,59 E-8	9.33 E-8	8.96 E-8
2004		1,32 E-7	1,49 E-7	1,46 E-7
2005		1,18 E-7	1,6 E-7	1,51 E-7
2006		1,09 E-7	1,44 E-7	1,37 E-7
2007		1,91 E-7	2,24 E-7	2,19 E-7
2008		1,37 E-7	2,16 E-7	2,12 E-7
2009		1,20 E-7	2,07 E-7	2,02 E-7
2010		7,97 E-8	1,56 E-7	1,51 E-7
2011		1,39E-7	1,98Ee-7	1,98E-7
2012		1,32E-7	2,09E-7	2,09E-7

2013		1,24E-7	2,06E-7	2,10E-7
2014		*1,25 E-7*	*2,07 E-7*	*2,12 E-7*
2015		*1,23 E-7*	*1,95 E-7*	*1,98 E-7*
2016		*9,97 E-8*	*1,56 E-7*	*1,58 E-7*

F.5 Emergency Preparedness

Article 25 of the Joint Convention

Emergency Preparedness

1. *Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.*
2. *Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.*

F.5.1 Legislation in the Field of Emergency Preparedness

In the legislation of SR the emergency preparedness, planning and emergency plans are governed by several pieces of legislation listed in Annex VI.

Basic legislation also includes other laws in the field of crisis management and partially emergency planning.

- Constitutional Act No. 227/2002 Coll. on State Security at Wartime, State of War, State of Crisis and State of Emergency, as amended, which concerns, inter alia, management of situations relating to terrorist and violent criminal acts,
- Act No. 42/1944 Coll. on civil protection of the population.
- Act No. 387/2002 Coll. on governance of state in crisis situations outside the time of war and warfare.
- Act No. 129/2002 Coll. on integrated rescue system.
- Act No. *128/2015* Coll. on the prevention of major industrial accidents *and on amendments to certain laws as amended by Act No. 91/2016 Coll.*
- Act No. 45/2011 Coll. on critical infrastructure,
- Act No. 179/2011 Coll. on economic mobilization and on amendments to Act No. 387/2002 Coll. on managing the state in crisis situations beyond the time of war and the state of war.

F.5.2 Implementation of Legislation in the Field of Emergency Preparedness

F.5.2.1 National Organization of Emergency Preparedness

The Act No. 387/2002 Coll. establishes the scope of powers of the public authorities in managing the state in crisis situations outside time of war and hostilities, the rights and obligations of legal entities and of individuals in preparing for emergencies outside time of war and hostilities, and in resolution of these, and sanctions for breach of obligations established by this Act.

Crisis management bodies are: Government of the Slovak Republic; the Security Council of the Slovak Republic; ministries and other central government authorities; the National Bank of Slovakia; security

council of the region, district office; security council of the district; municipality.

The Government of the Slovak Republic, as the supreme authority of crisis management, in compliance with the Act No. 378/2002 Coll. establishes a Central Crisis Staff as its executive body that coordinates the activity of government bodies, local government bodies and of other components designed to resolve a crisis situation during a crisis period, i. e. during resolution of an incident or an accident of a nuclear installation or during transport of nuclear material (but does not have a preventive function).

The chairman of the Central Crisis Staff is the Minister of Interior of the Slovak Republic.

In order to provide for the necessary measures to cope with the emergency situation at the nuclear installation and to protect the public and having impact on the economy in case of an accident, the national organization of emergency preparedness (fig. F.5.2) is structured in three levels:

The first level consists of emergency response *organization of* nuclear installations, whose main functions are management of works and measures within the nuclear installations.

Another function of this level is to inform state administration authorities at the *local and national* level.

The second level is organized at regional level and it consists of crisis staff of local government and self-government, the territory of which falls within the area of risk. *The emergency planning zone of nuclear installations for storage and management of spent nuclear fuel and radioactive waste are defined by the decisions of ÚJD SR:*

- *The size of the emergency planning zone for NI RÚ RAO by the ÚJD SR Decision No. 784/2015;*
- *The common size of the emergency planning zone for NI V1, A1, TSÚ RAO and ISFS by the ÚJD SR Decision No. 719/2014;*
- *The size of the emergency planning zone for NI FSK RAO by the ÚJD SR Decision No. 5/2007.*
  All emergeny planning zones above were defined as the area delimited by the fences of the relevant NI.

The third level *(national)* consists of Central Critaff of the Slovak Government with its supporting unist (such as: Emergency Response Centre of ÚJD SR – ERC, Radiation Monitoring Network Centre – ÚRMS, Central Monitoring and Control Centre – CMRS *and other*). The role of Central Crisis Staff is to deal with an extraordinary situation, if the scope of the extraordinary event extends beyond the territory of the region.

F.5.2.2 Professional and Technical Resources of a national organization of emergency preparedness

ÚJD SR´s Emergency Response Centre (hereinafter referred to as “ERC“) is a technical support vehicle to monitor NI operation and assess technical condition and radiation situation in the event of a nuclear or radiation emergency, and to forecast emergency evolution and consequences by course of Atomic Act. The Centre at the same time serves as a CCS technical support vehicle.

The Slovak Centre of Radiation Monitoring Network (hereinafter referred to as “SCRMN“) is a technical support body intended to provide an effective monitoring system involving the monitoring systems of the respective government departments.

CCS may invite representatives of Radiation Monitoring Network Centre in an emergency situation.

Central Monitoring and Control Centre (CMRS)

A Central Monitoring and Control Center (CMRS) to monitore, manage, evaluate and support of activities within the state administration. The CMRS of Ministry of Interior of the Slovak Republic consists of spatial, personnel, documentation and technological resources with information, communication and other technologies.

General tasks for the CMRS are:

- To collect information on the extent and nature of the crisis phenomenon. This includes information about the event, extraordinary event, information about the status of forces and resources,
- To consolidate information from various sources into a comprehensive operational picture to support the decision-making at the highest level,
- To coordinate the activity in crisis situations with other national organizations operating in the process of crisis management,
- To provide an instrument for cooperation with neighbouring countries, with regional / coalition partners in those cases when the crisis transcends the national boundaries,
- To provide mechanism for communication and dissemination of information.

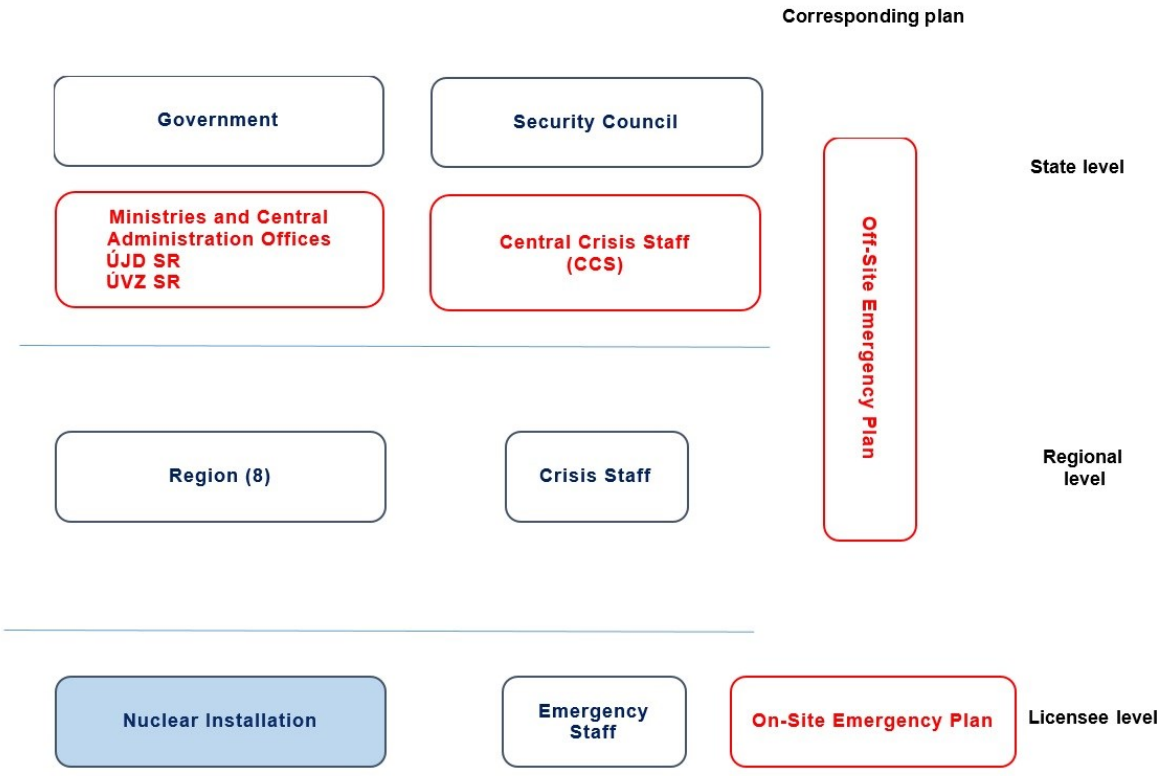


Fig. F.5.2.2 National organization of emergency response (simplified)

Emergency Response Centre (ERC)

In compliance with the valid legislation ÚJD SR created an Emergency Response Centre (ERC) as a means for evaluation of the course and consequences of incidents and accidents at NI that are significant from the view of their potential impact on the surroundings, preparation of proposed measures or recommendations for further procedure. ERC is included in the system of emergency preparedness of SR and it cooperates in preparation of recommendations with the CCS*, Ministry of Interior of the Slovak Republic and district offices at the seat of the region within the emergency planning zone*. CCS may invite experts from various ministries to solve the incident. The relationship between individual entities involved in managing measures to protect the general public in case of incident or accident with an impact of radioactive materials on the environment is illustrated in fig. F.5.2.1.

For the work of ERC the ÚJD SR established from its staff - specialists and other staff an emergency headquarters of the Office. The main functions of the emergency headquarters are:

- To analyze the status of nuclear installation in case of an event;
- To develop projections for development of event – incident or accident and radiological impacts on the general public and on the environment;
- To propose recommendations for measures to protect the general public and to refer them to the CCS, the relevant district offices at the seat of the region;
- To prepare supporting documentation and recommendations for the Chairperson of the Office, who is a member of CCS;
- To supervise activities of the authorization holder for operation of NI during emergency;
- to inform the EC, the IAEA and the neighbouring countries according to the obligations of SR, for which the Office is the coordinator (multilateral and bilateral treaties), to inform the media and the public.

Emergency headquarters is sufficiently staffed with experts of the ÚJD SR and can work in three series to ensure continuity of work also during real events, which may last longer than *12* hours. Each series has its own management consisting of the chairman, an assistant and heads of expert groups.

The groups are as follows:

- Reactor safety group;
  - Subgroup of site inspectors;
- Radiation protection group;
  - Subgroup of mobile dosimeter;
- Logistical support group;
- Information and PR group.

The Radiation Monitoring Network (RMS)

The basis of the RMS in a normal situation are permanent monitoring elements within selected offices of public health care, the Slovak Hydrometeorological Institute, systems of civil protection, the Armed Forces of the SR, the National Veterinary and Food Institute in Nitra, Laboratories of radiation control of the vicinity of nuclear installations, specialized workplaces of universities, research institutes, some

other organizations, possibly accredited private establishments.

In the event of an accident, besides the permanent components also other mobile and laboratory components would be involved into operative monitoring, to perform monitoring based on the instructions from the Centre of Radiation Monitoring Network.
The whole territory of the Slovak Republic has continuous monitoring of radiation situation by means of stationary systems:

- Teledosimetric system of the holder of authorization for operation of NI at the Bohunice and Mochovce sites in the distance within 21 km (resp. 20 km),
- Stationary monitoring systems – the Armed Forces of the SR, MŽP SR (SHMÚ).

Data from monitoring are provided SHMÚ in real time also to the EURDEP network administered by the European Commission, the data of which are available to all member states through a protected web site.

F.5.2.3 Emergency Documentation

To cope with emergency at nuclear installations and their consequences on the environment, emergency documentation has been developed defining the procedure and organization of work during individual levels of emergency at various levels of the national emergency preparedness, described in chapter F.5.2.1.

The licensee has developed internal emergency plans, laying down the organization of emergency response and its implementation relating to coping with emergency and protection of personnel. The internal emergency plan allows for the recognition and classification of an emergency event according to international recommendations and which *allow the* introduction of effective response to minimize or eliminate the consequences.

Plans for public protection in the area under risk are developed at regional level including measures on protection of public, health, property and the environment and links to the on-site emergency plan.

ÚJD SR has emergency procedures and regulations governing the activities of the ERC of ÚJD SR that are updated on a regular basis.

All these documents and procedures are developed on the bases of national legislation, as well as the international recommendations of the IAEA and the European Union legal framework relevant for the field of emergency planning.

Act No. 128/2015 Coll. on the prevention of major industrial accidents and on amendments to certain laws amended the Act No. 42/1994 Coll. on civil protection. The amendment adjusted the competence of the Ministry of Interior of the Slovak Republic so that it corresponded to its position as the central state administration authority in the field of civil protection.

The amendment also clarified the provision on cooperation in the field of civil protection at international level, primarily with the authorities of the European Union and its Member States.

F.5.2.3.1 On-site Emergency Plans

On-site emergency plans and the related documents are developed so as to ensure protection and preparation of staff for the case of occurrence of a significant leakage of radioactive materials into the working environment or the surroundings, and measures have to be taken to protect the health of persons at the nuclear installation or of the population in the surrounding areas while creating a system, the goal of which is to introduce effective preventive measures.

The purpose of the on site emergency plan is to ensure preparedness of NI staff for implementation of planned measures in case of occurrence of an event at NI, with the emphasis on securing the basic objectives:

- To reduce the risk or to mitigate the consequences of event on the equipment, staff and the population in the vicinity of NI,
- To prevent severe health damage (e. g. death or severe injury);
- To reduce the risk of probability of occurrence of stochastic effects on health (e. g. cancer and serious inheritable phenomena).

The aim of the on site emergency plan is to provide for activity of Emergency Response Organization (hereinafter only as “ERO“), i. e. planning and preparation of organizational, personnel and material and technical means and measures to successfully cope with crisis and emergency according to the classified event.

ERO consists of units, ensuring in particular:

- technical support,
- logistical support and protection of personnel,
- information for state authorities and the public,
- monitoring of the radiation situation.

F.5.2.3.2 Public Protection Plan (Off site Emergency Plans)

Protective measures are part of the public protection plans, which are developed by district offices and municipalities located in the area of threat of nuclear installation defined by a distance within 21 km in case of NPP V2 Bohunice and a distance 20 km in case of NPP Mochovce. These Public Protection Plans are linked to the internal emergency plan of the holder of authorization.

The Public Protection Plans developed for the territory of a region are subject to review process by the ÚJD SR and approval by the Ministry of Interior of the Slovak Republic. They contain a detailed description of method for implementation of measures, while selected measures include activity depending on the severity and the time sequence of an incident or accident, including available and usable power and resources for rescue works and securing implementation of measures to protect the public. Part of the documentation is also the methodology of activities, databases and requisites necessary for effective and correct decisions.

In an extraordinary event having a nature of a radiation incident at NI, the local authorities - the crisis management bodies, provide for measures in accordance with the public protection plans. These activities are carried out by the relevant crisis staffs that work together with the CCS of the Government.

In case of incident or accident at a nuclear installation with release of radioactive materials the competent authority managing the rescue works within its territorial competence:

- The municipality and the mayor, if the event does not exceed the territory of the municipality;
- The District Office and the manager of the district office, if the event exceeds the territory of a municipality, but does not exceed the territory of a district;
- The District office at the seat of a region and the manager of the district office at the seat of a region, if the even exceeds the territory of a district, but does not exceed the territory of a region;
- The Government of SR and the Prime Minister, if the event exceeds the territory of a region.

Each of these authorities manages relief works within its territorial competence and prepare proposals of measures to address the crisis.

F.5.2.3.3 Emergency Transport Rules

For shipment and transportation of fresh and spent nuclear fuel, nuclear materials and radioactive waste, the holder of authorization for transport develops, according to Act No. 541/2004 Coll. and the ÚJD SR Decree No. 55/2006 Coll., an emergency transport rules (hereinafter only as "ETR"). The aim of these ETR is to ensure preventive and protective measures for the case of incident or accident during transport. The licensee for transport of radioactive materials shall develop ETR for transport of above mentioned materials on the roads and railways, which fall under its administration. After ETR is reviewed by ÚJD SR and by other involved bodies, these Rules are approved by the Ministry of Transport and Construction of the Slovak Republic.

F.5.2.4 Warning and Notification Systems for the Public and for the Personnel

Warning of the public and notification of public authorities, organizations and staff is done in accordance with the Act No. 42/1994 Coll. on civil protection of the public and Decree of MV SR No. 388/2006 Coll. on the details of providing technical and operational conditions for the information system of civil protection.

A warning and notification system is provided by the licensee through an electronic siren network for early warning and notification of staff and persons that are present in the premises of nuclear installations and *in case of license holders for operation of nuclear power plants also of* residents within the 21 km emergency planning zone of the NI NPP Bohunice 3&4, and 20 km emergency planning zone of NI NPP Mochovce 1&2. It is fully interconnected with the national system, but if needed it can be activated and utilized also locally, for example in the event of flooding.

Both nuclear installations, in order to speed up the notification, using a system of automatic telephone notification to individuals. This notification system is linking not only the emergency committees of nuclear installations, but also central government authorities, local government authorities, mayors of municipalities in the areas under threat.

Initiating warning and notification of authorities, organizations and staff is the decision – *in case of facilities for the management of RAW and SNF - the head of shift operations of JAVYS, a. s. (or* shift

supervisor of *SE, a. s. in case of an event at nuclear power plants).* Regular testing of the means of notification and warning system are performed once a month.

F.5.2.5 Systems for Maintaining Emergency Preparedness

At both sites the licensee (SE, a. s. and JAVYS, a. s.) there are shift exercises organized twice a year and site emergency exercises once a year, attended by all employees of nuclear installations on site, and national emergency exercise organized in cooperation with the authorities of local government and self-government, ERC of ÚJD SR, or other units of ERO (fire departments, health services, armed forces, etc.) once in 3 years.

Each drill is attended by observers and jury who upon completion of the drills evaluate their course and measures are taken to improve activities of the respective ERC units based on their conclusions. These measures are subsequently reviewed and the plant management and Authority inspectors deal with their implementation.

F.5.2.6 Facilities and Means of Emergency Preparedness

These are designed to provide ERO activities with available instrumentation for rapid detection and continuous evaluation of events. For the ERO, the following means of emergency response are available:

- *Unit control rooms are the primary centre for the emergency response management;*
- *Emergency Control Centre is the workplace of the Emergency Committee. It is located in a shelter, which is activated in case of an incident or accident.*
- Civil protection shelters are utilized for initial sheltering of shift personnel and the intervention personnel and they also serve to obtain individual protection equipment and specialized gear for the intervention units.
- Civil protection assembly points serve for gathering staff (not included in Emergency Response Centre) and other persons present on the territory of NI. These are equipped so that they create conditions for a short-term stay of staff using at the same time the individual protection equipment, *and gathering staff before possible evacuation.*
- In-house Medical Centre (IMC) intended for the basic medical support, providing pre-medical and medical assistance and preparation for transfer of affected persons to specialized medical centres. Part of the IMC is a decontamination node and workplaces for measuring internal contamination of persons.
- Communication means and equipment installed within the territory of NI:
  a) public telephone network of the Slovak Telecom;
  b) energy sector telephone network;
  c) satellite handsets;
  d) mobile telephones;
  e) special purpose radio network;
  f) Multitone paging network;
  g) in-house radio and operating (Unit) radios.

F.5.3 International Treaties and Cooperation

F.5.3.1 Information System of the European Union ECURIE (European Community Urgent Radiological Information Exchange)

The most important act in the field of emergency preparedness is the Council Decision 87/600/Euratom, on the basis of which the notification network European Community Urgent Radiological Information Exchange (ECURIE) operates.

After the accession of Slovakia to the European Union, Slovakia also became part of ECURIE system. ÚJD SR is a point of contact in this system and a competent body with a 24-hours permanent service. The point of contact for ECURIE system is identical with the point of contact for the IAEA Convention on Early Notification of a Nuclear Accident. Both contact points are provided for by ÚJD SR as the competent Authority. The contact point for the ECURIE system is backed-up by a *warning* point – at the Ministry of Interior SR. There is a national coordinator and its deputy appointed for the ECURIE system.

F.5.3.2 Conventions in the Deposit of the International Atomic Energy Agency

The Slovak Republic is a signatory to international conventions on early notification of nuclear accident and on mutual assistance in case of nuclear accident, thereby ensuring international cooperation in minimizing the potential consequences of a nuclear accident. Conventions relate primarily to the technical and organizational aspects of measures aimed at reducing the impacts of radiation on humans and on the environment as a consequence of accidents at nuclear installations.

Convention on Early Notification of Nuclear Accident and Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency

The Slovak Republic notified its succession to both Conventions on 10 February 1993 with the date of effect from 1 January 1993. The technical coordinator for meeting the provisions of the Convention is ÚJD SR, which is also the point of contact of SR for early notification of a nuclear accident. Through ÚJD SR the Slovak Republic regularly attends international exercises. Since the Conventions are in force, no accident occurred on the territory of the Slovak Republic, which would require meeting the provisions of the Conventions. ÚJD SR regularly participates in exercises that test the functionality of the international system of notification of a nuclear accident, as provided by these Conventions.

F.5.3.3 Agreements and cooperation with neighbouring countries

In connection with Article 9 of the Convention on Early Notification of a Nuclear Accident the Slovak Republic succeeded to or concluded bilateral agreements in the field of early notification of a nuclear accident, information exchange and cooperation with all neighbouring countries but also with other states in Europe. The agreements lay down the form, method and the scope of information provided to the contracting parties in case of an accident relating to nuclear installations or nuclear activities, and designate the coordinators of points of contact. The purpose of these agreements is to contribute to minimizing the risk and consequences of nuclear accidents, as well as to create a framework for bilateral cooperation and information exchange in areas of mutual interest in connection with peaceful use of nuclear energy and protection from radiation.

F.5.3.4 Slovakia´s participation in international exercises

In terms of emergency preparedness ÚJD SR is involved in two systems of international warning and notification: the ECURIE system, which works within the EU, and in the USIE system, which was established in compliance with the Convention on Early Notification of a Nuclear Accident, which is coordinated by the IAEA. Both of these international organizations carry out regular exercises to verify the connection and response. ÚJD SR and the *warning point* at the Section of Crisis Management of Ministry of Interior of the SR have responded in time in all these exercises over the past years.

An important event in 2015 was the INEX 5 table top exercise, organized by the OECD/NEA. The exercise dealt with aspects of emergency planning and response, on information and mutual communication between the countries and international organizations in the event of a natural disaster involving the potential hazard from a source of ionizing radiation.

Based on the outcomes of this exercise the Government by its resolution No. 536/2016 acknowledged that several areas of emergency preparedness at national level need improvement. They including finalization of National Emergency Plan, improvement of radiation monitoring system as well as arrange for financing of hospitals that would receive contaminated persons in case of nuclear emergency.

In addition to these exercises, at least one major international exercise is being held annually, to test the functionality of the EU *ECUREX Early Warning and Emergency Accident System* and other IAEA exercises of level ConvEx 2 and ConvEx3. Slovakia has been actively involved in all these exercises.

F.6 Decommissioning

Article 26 of the Joint Convention

Decommissioning

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

i) Qualified staff and adequate financial resources are available;

ii) The provisions of article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;

iii) The provisions of article 25 with respect to emergency preparedness are applied; and

iv) Records of information important to decommissioning are kept.

A qualified personnel is required during the whole decommissioning process since 1998 according to the Atomic Act (currently in the wording of Act No. 541/2004 Coll.) and when applying for decommissioning authorization the operator is obligatory to submit the documentation on the system of professional training of staff, training programs for selected and professionally qualified staff and documents on meeting the qualification requirements for selected staff and for professionally qualified staff to the ÚJD SR for review.

All works in the decommissioning phase are subsequently performed by personnel, which is specially instructed together with practical exercises on models prior to implementation (according to work schedule) of technically demanding work operations.

Financial Resources. The licensee is obliged to provide for special purpose funds during the operation to cover the costs of decommissioning since 1995 (see F.2.2).

Application of radiation protection measures is ensured according to the Act on Public Health No. 355/2007 Coll. Continuity of radiation protection procedures and requirements applied during operation (see F.4.) is maintained in accordance with the safety documentation submitted by the operator to the state regulator body when applying for decommissioning. This documentation includes decommissioning plan characterizing radiation sources in the given premises and assurance of radiation protection of personnel and surrounding during the decommissioning process. It also analyses possible emergency conditions with description of mitigation procedures and appraisal of the consequences (dose loads of personnel).

Routine activities during decommissioning are performed according to operational procedures. Non-standard activities are performed according to approved work schedules. Detailed procedure of works is described for every performed activity enabling to achieve pre-set success criteria. Scope and time of performed works is specified, dose loads of personnel when using specific protective devices is evaluated.

The issues of exposure regulation are regularly analyzed during the meetings of the “ALARA” commission prior to approval of work schedules. Dose loads are regularly evaluated by the Nuclear Safety Committee. The evaluation of personnel dose load is periodically discussed with ÚVZ SR representative with an emphasis on the most exposed works.

Limits for gaseous and liquid discharges are set by the Chief Hygienist and are part of the documentation submitted to ÚJD SR for approval. Gaseous discharges reach ones to tens of MBq, representing ones % of annual limit. Liquid discharges reach values (except for tritium) of tenths to ones of MBq, representing tenths to ones % of annual limit. Tritium activity in liquid discharges represents tenths to ones % of annual limit.

Application of emergency measures is currently ensured in compliance with the requirements of Act No. 541/2004 Coll. (see F.5).

Documentation for authorization of the decommissioning stage contains, in compliance with the requirements of Act No. 541/2004 Coll. l and the ÚJD SR Decree No. 58/2006 Coll.:

- Limits and conditions of safe decommissioning;
- Quality system documentation and requirements for quality decommissioning;
- On-site emergency plan;
- Plan of decommissioning stage;
- Concept of decommissioning for the period after the authorized decommissioning stage;
- Plan of physical protection, including a contract with the Police Corps, as well as description of the method of implementation of aviation activities at the premises or near NI;
- Radioactive waste management and shipment plan and plan for conventional waste management from decommissioning;
- Document providing evidence on financial coverage of liability for nuclear damage;

- Program of inspections of selected equipments;
- Operational procedures determined by ÚJD SR;
- Professional training system for employees;
- Training programs for licensed employees;
- Training programs for professionally competent staff;
- Documents on meeting the qualification requirements for licensed staff and professionally competent staff;
- Public protection plan for regions in the area at risk;
- Modifications to boundaries of the nuclear installation;
- Modifications to the size of the area endangered by nuclear installation;
- Categorization of classified equipment into safety classes.

Plan of decommissioning describes the status of nuclear installation at the beginning and at the end of the relevant decommissioning stage and planned activities in the given stage, including their impact on the personnel of the nuclear installation and surrounding of the nuclear installation; it contains a statement that financial means necessary for implementation of the described activities will be provided and that the capacity of facilities for spent fuel and radioactive waste management will be in accordance with the decommissioning strategy and schedule. The decommissioning plan or decommissioning stage plan includes also an analysis of potential emergency situations and their consequences. Plan of decommissioning stage also contains an analysis of possible emergency situations and their consequences. Part of the decommissioning plan or plan of decommissioning stage are outcome of control of radiation situation completed during the previous stage of decommissioning or shutting down the operation of NI and draft program of controls and monitoring of radiation situation after completing that stage of decommissioning.

Records of information essential for decommissioning are kept in accordance with approved quality assurance programs for operation and decommissioning. Their list is presented in the decommissioning conception plan submitted prior to the nuclear installation commissioning.

Final decommissioning documentation includes:

- final description of the site of the decommissioned nuclear installation and of all works performed during decommissioning,
- summary data about amount and activity of disposed or long-term stored radioactive waste and about amount of other waste and materials released into environment,
- list of data to be kept after the decommissioning completion with storage period identification,
- results of the final independent radiation situation control supported by an independent verification including a statement of the regulatory authority for radiation protection.

The final documentation on decommissioning presents criteria for release of the site for unlimited utilization and contains data to what extent they were met. In case the criteria were not fully met, it presents limitations in the land use and measures taken to ensure control of the land.

G Safety of Spent Fuel Management

G.1 General Safety Requirements

Article 4 of the Joint Convention

General Safety Requirements

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

In so doing, 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 of 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 impact on future generations greater than those permitted for the current generation;

vii) Aim to avoid imposing undue burdens on future generations.

General safety aspects of spent fuel management are described in Chapter F.

Nuclear safety during siting, design, construction, commissioning, operation and decommissioning is subject to fulfilment of general safety requirements for nuclear installations and subject to, special requirements for nuclear installations with nuclear reactor and special requirements for nuclear installations for treatment, conditioning or storage of SNF. Fulfilment of safety requirements is required by legislation and controlled through regulatory body inspections. The requirements for nuclear safety of nuclear installations must be complied with at the stages of their siting, design, construction, commissioning, operation and decommissioning and their fulfilment is manifested in the documentation prescribed by legislation, assessment or approval of which is a condition for issuance of relevant license.

Fulfilment of the following conditions of safe SNF management is required by legislation since 1976 (safety documentation and its assessment by regulatory authorities) with detailed safety analyses for particular stages of nuclear installation since 1978 - 1979:

- Maintain sub-criticality,
- Ensure after-heat removal,
- Minimise the effects of ionising radiation on operating personnel, the public and the environment,
- Have regard for the properties affecting nuclear safety such as toxicity, flammability, explosiveness and other dangerous properties.

Fulfilment of the condition for minimization of radioactive waste occurring in relevance with SNF is explicitly required by the legislation since 1987.

Assessment of the impact on future generations is part of impact assessment of activities on the environment (valid in full since 1994) and is a part of the National Strategy for Spent Fuel Management (or RAW). Future generations are entitled to the same level of protection as the current one. This results

in a requirement to asses (the Act No. 24/2006 Coll.) and manifest (Act No. 541/2004 Coll. and No. 355/2007 Coll., Government Ordinance 345/2006 Coll., Decree 545/2007 Coll.), that the waste disposed into the repository will never cause radiation load of population higher that it is admissible in the present time.

The operator proves the fulfilment of these requirements in the terms of a preliminary safety report and in safety reports submitted prior to the construction and commissioning of the nuclear installation. Periodic verifications are carried out during operation in order to ensure that the physical state and operation of the nuclear installation is constantly in line with the design and applicable safety requirements. Operators have a quality assurance system in place covering all activities relevant to safety. Following safety analyses, tests, reviews and operating experience, operators have defined limits and conditions, observance of which is strictly controlled during operation. Written procedures are developed to handle or mitigate the consequences of predictable events and accidents. The application of the "defence in-depth" principle also contributes to the prevention of incidents and accidents.

G.1.1 Review and Inspection at Existing Facilities

Article 5 of the Joint Convention

Existing Facilities

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

The list and the description of facilities for spent fuel management is in point D.1.

Safety assessment of spent fuel management facilities is under section G.4.

In case some safety aspects were not assessed for existing facilities in the respective time of their siting, construction and operation, being not required by the previous legislation, it has been performed later in accordance with the altering legislation in the respective stage of the nuclear facility life cycle (see G.1). Since 1998, ÚJD SR can bind authorization (license) on fulfilment of conditions (this means: the regulatory body could ask for additional safety assessment and it has applied this possibility in case of NPP A1 and NPP V1) and since 2004 the duty of periodical safety assessment with periodicity of 10 years is explicitly established.

Based on the recommendations from regular inspections of the facilities by regulatory authorities and from international missions (IAEA), measures to increase safety of nuclear installations are required.

G.2 Siting of Facilities

Article 6 of the Joint Convention

Siting of Proposed Facilities

1. *Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed spent fuel management facility*
   - *i) To evaluate all relevant site-related factors likely to affect the safety of such facility during its operating lifetime;*
   - *ii) To evaluate the likely safety impact of such facility on individuals, society and the environment;*
   - *iii) To make information on the safety of such a facility available to members of the public;*
   - *iv) To consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility,*

and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

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.*

G.2.1 Legislation in the Field of Siting

The siting of a nuclear installation is subject to ÚJD SR´s approval under the Atomic Act. Assessment of all factors concerning the site, which could influence the safety of the nuclear installation and its safety-related impacts on individuals, society and environment, is required by legislation since 1979 and in full scale for the environment since 1994. Informing the public on safety of installation prior to its siting and consultations with stakeholders in vicinity of installation are legislatively regulated since 1976, in full scale since 1994. The obligation of the operator to continuously inform the public on nuclear safety is included in the legislation of SR since 1998.

ÚJD SR decides on the issuance of approval for siting of the nuclear installation construction upon a written application supported by pre-set documentation and on the base of the European Commission´s statement according to the following provisions:

- Article 37 of the Treaty Establishing the European Atomic Energy Community,
- Council Regulation (Euratom) No. 2587/1999 of 2 December 1999,
- Commission Regulation (EC) No. 1209/2000 of 8 June 2000.

To assess the impact of nuclear installation on the environment, as well as the potential impact on the surroundings of the nuclear facility (external hazards), ÚJD SR issues its opinion in accordance of Act No. 24/2006 Coll. on environmental impact assessment.

Special conditions for approval of siting of a nuclear installation is the following documentation:

1. Assessment of impact of a nuclear installation on the environment, as well as evaluating the potential impact of the surroundings on the nuclear installation;
2. Quality requirements for a nuclear installation;
3. Proposal of nuclear installation boundaries.
4. Proposed size of an area endangered with nuclear installation;
5. Reference safety report.
6. Reference report on the decommissioning method.
7. Project proposal for physical – technical solution at nuclear installation on the level of reference project.
8. Reference report on the method of RAW and spent fuel management.

G.2.2 Siting of Facilities for Spent Fuel Management

The siting of facilities for SNF management has not taken place in full scope according to the requirements of the ESPOO Convention only for the nuclear installation NPP A1 (siting at the end of 50-ties) and NPP V1 (siting at the beginning of 70-ties). Transport of SNF from NPP A1 into RF has been completed in 1999. Since that time treatment of RAW has taken place within the decommissioning

of the A1 NPP. Safety assessment of the facility and its safety-related environmental impacts has been performed according to the valid legislation at the end of the 90-ties. Safety assessment of NPP V1 was performed after the reconstruction of NPP V1 in 2001.

Requirements for nuclear safety of the nuclear installation during its siting are characterized by the territory features. Features, which exclude the nuclear installation siting on such territory, are stated in the Annex No. 2. of the Decree No. 430/2011 Coll.:

a) under operating conditions or in the event of an operational occurrence, it is not possible to ensure that the set doses of population exposure are not exceeded on the territory,

b) the maximum calculated earthquake intensity value on the territory reaches or achieves 8 degrees on the international earthquake intensity scale - MSK,

c) the territory is threatened by the consequences of mining, irruptions of mine water or powerful tremors resulting from mining activities, extraction of gas or oil or there are reserves of tailwater on it,

d) the territory is subject to geodynamic and karst phenomena threatening the stability of the rock mass on the land, such as caving, motional and seismically active faults, fluidification of the ground, tectonic activity or other phenomena, which may alter the inclination of the surface of the environs beyond the established technological requirements,

e) the territory contains a protected area for natural medicinal sources, underground and surface sources of drinking water,

f) the territory contains notified mining areas for the extraction of raw materials,

g) the territory extends into a protected area for industrial or other economic facilities with which there may be undesirable operational clashes.

With regard of SNF management at NPP V1, NPP V2, the following aspects of siting of NPP V1, V2 are important:

- Transports of SNF are performed exclusively on the railway communications of (on a railway siding on the site of NPP Bohunice and JAVYS, a. s.),
- When siting, principle of 3 km exclusion zone for permanent settlement is applied,
- Interim spent fuel facility was constructed and commissioned on 1987 in the site of the NPP Bohunice.

Seismic load of the locality Jaslovské Bohunice (within the scope of safety improvement designs of NPP V1, V2 and ISFS) was re-assessed and measures for improve seismic resistance of NPP V1 and ISFS were implemented.

The original design of NPP Mochovce was elaborated based on the knowledge of seismic risk in the locality from the period of preparation and designing of NPP Mochovce in the 80-ties.

Since that time the seismicity of the Mochovce site was several time reevaluated based on new information gained from geological survey.

G.3 Design and Construction

Article 7 of the Joint Convention

Design and Construction

Each Contracting Party shall take the appropriate steps to ensure that

i) The design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;

ii) At the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;

iii) The technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.

Legislative requirements for provision of suitable measures to restrain radiation impacts of facilities for SNF management including impacts from discharges or leakages are valid since the end of 70-ties. Evidence on their fulfilment is submitted in the documentation to be attached to the application for approval of nuclear installation construction. Documents on fulfilment of safety requirements including requirements on quality of technologies have been later complemented for NPP A1 and NPP V1 (see G.2.2).

Documents of conceptual plans for future decommissioning of nuclear installations already during design stage are legally required since 1998. Preliminary conceptual plans are submitted with the documentation to be approved according to the Atomic Act. For those nuclear installations, which did not have elaborated Conceptual Decommissioning Plans during design and construction, these documents have been additionally finalized until 2000. Preliminary proposal for the method of repository closure, especially stabilization, covering and building of drainage covering systems, is included in the preliminary safety report.

The construction proceeding of nuclear installation constructions is covered by § 43 to § 85 of the Act No. 50/1976 Coll. and the Atomic Act (No. 541/2004 Coll.). The construction of nuclear installation can be performed only by a holder of a valid building permission. The construction proceeding is covered also by the Decree of MŽP SR No. 532/2002 Coll. on Requirements of Construction. ÚJD SR decides upon issuance of building permission for construction in line with § 66 of the Act No. 50/1976 Coll.

The required documentation necessary for nuclear installation construction includes:

- Preliminary safety report providing evidence of meeting the legal requirements on nuclear safety based on the data considered in the design,
- Project documentation needed for building permission proceedings,
- Preliminary plan of management of radioactive waste, spent nuclear fuel including their transport,
- Preliminary conceptual plan for decommissioning,
- Classification of classified equipment into the safety classes,
- Preliminary plan for physical protection,
- Quality system documentation and nuclear installation quality requirements and evaluation thereof,
- Preliminary on-site emergency plan,
- Preliminary limits and conditions for safe operation,

- Preliminary inspection program of nuclear installation prior to its operation,
- Preliminary outline of the boundaries of the nuclear installation,
- Preliminary definition of the size of the area at risk by nuclear installation,
- Other documentation required according to the Construction Act.

Constructions of nuclear installations involving special interventions into the earth crust, such as underground repositories, are governed by the Act No. 44/1988 Coll. on Protection and Utilization of Mineral Resources (mining law).

Design and construction of spent nuclear fuel storage must enable the following:

a) Securing sub-criticality at 5 % min. during all operational conditions, 2 % during operational events, either by suitable set-up of spent nuclear fuel or by placing a solid neutron absorbent into the storage space; efficiency of the solid absorbent use is proved by calculation or experiment,
b) Permanent removal of residual heat produced by spent nuclear fuel from the premises of its storage; heat removal is secured by natural or compulsory streaming of cooler so the temperature of spent nuclear fuel would not exceed the limit value,
c) Its full or partial decontamination,
d) Safe handling of spent nuclear fuel,
e) Record keeping and control of stored spent nuclear fuel,
f) Ensuring adequate physical protection of storage area,
g) Prevention of heavy objects falling into the area of spent fuel storage,
h) Effective purification, re-fill and capture of cooling media leakages in wet storage of spent fuel.

Building structures, technological systems and components important to nuclear safety of the nuclear installation shall be designed, manufactured, assembled, and tested so as to ensure their reliable function. The manufacturers and suppliers of the classified equipments (equipments important in terms of nuclear safety), their materials and accessories are obliged to present results of selected quality production inspections and tests of properties of components, equipments, base material, welded joints and weld deposits, material properties and composition as well as findings and removed deficiencies identified by inspection in the documentation. In cases when special technological procedures may influence resulting properties of used materials and products, performance of additional tests must be ensured in advance (e. g. keeping evidence samples). Control systems must enable monitoring, measurement, registration, and management of values and systems important in terms of nuclear safety. Devices and controls shall be designed and arranged so as to allow that maintenance has constantly enough information on operation of the nuclear installation. The control room shall enable safe and reliable control of the operation.

The concept of safety of *RAW and spent fuel management facilities the principles of* "defence in depth" strategy are applied accordingly, which are generally used worldwide for design and operation of nuclear power plants. When assessing the safety of NI, ÚJD SR assesses the ability of the facilities to fulfil the safety functions in accordance with the design in order to ensure the required level of defence in depth.

G.4 Assessment of Safety of Facilities

Article 8 of the Joint Convention

Assessment of Safety of Facilities

Each Contracting Party shall take the appropriate steps to ensure that

i) Before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

ii) Before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessment referred to in paragraph i).

G.4.1 General Principles of Safety Assessment

Basic requirements for nuclear safety and safety assessment are determined by the Atomic Act (No. 541/2004 Coll.).

The legislation has laid down during 1970 - 80s the obligation of the operator to submit a safety report prior to every issuance of authorization for a nuclear installation life stage (siting, construction, operation) decommissioning, with assessment of radiation risks for the installation and its surrounding. Since 1994 the legislation requires a systematic complex safety and environmental assessment of impacts of the nuclear installation prior to its siting. The increase of requirements for safety is continuously reflected in the legislation.

Similar requirements are valid for spent nuclear fuel (SNF) and RAW repository, including the assessment of risks resulting from their existence for periods after their closure.
During the operation or during decommissioning of a nuclear installation the holder of authorization is obliged to perform periodical, complex and systematic assessment of nuclear safety taking into account the latest knowledge in the field of nuclear safety assessment and to adopt measures to eliminate the deficiencies found. The authorization holder is obliged to perform periodical safety assessment since 2004 based on the requirements of the Atomic Act No. 541/2004 within the intervals and the extent laid down by a binding legal regulation issued by ÚJD SR in 2006 and amended in 2012 *and 2016*.

In 2011 a program was developed to review responses of ISFS to relevant events of „Fukushima“ type and subsequently in 2012 this program was evaluated. Results of evaluation were incorporated into operational regulations and corrective actions were implemented to improve nuclear safety (for details see chap. D.1.2).

Safety of spent fuel and RAW management facilities, in particular those, which are part of the nuclear power plants, is assessed by international missions (mainly the IAEA).

On overview of issued safety reports and their assessment by the regulators and an overview of international safety missions at the spent nuclear fuel and RAW management facilities is in Annex VII.

G.4.2 Operational Safety Assessment of Spent Fuel Management Facilities and Systems

Safety assessment of transport systems and of spent fuel management is part of the overall safety assessment of NPP Bohunice, NPP Mochovce Units and JAVYS, a. s. and is conducted as follows:

- By the operator in regular reports and evaluations of nuclear safety, radiation safety, occupational health and safety, technical safety of equipment and operation and in evaluations of spent fuel handling, or shipments, sent to ÚJD SR and also in overall annual assessments of the nuclear fuel cycle within the quality system at the individual NPPs in operation.
- By an independent science, research and design engineering organizations with the relevant licenses from ÚJD SR (VUJE, a. s. and other) in operational safety reports and analyses.
- Routine inspections by ÚJD SR and the IAEA within the agreed or set time schedules at NPP Bohunice, NPP Mochovce Units and at JAVYS, a. s. and protocols from the inspections.

G.5 Operation of Facilities

Article 9 of the Joint Convention

Operation of Facilities

Each Contracting Party shall take the appropriate steps to ensure that

i) The licence to operate a spent fuel management facility is based upon appropriate assessments as specified in Article 8 and is conditional on the completion of a commissioning 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 licence 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.

G.5.1 Commissioning

As part of commissioning of Units of NPP V1, NPP V2 according to the programs of non-active and active tests the transport technology part was tested in connection with the reactor and units auxiliary system tests. Based on the results of tests the operational procedures for transport technology part, reactor and units were specified.

The transport technology part equipment and systems for spent fuel management were tested under non-active and active conditions of the Units.

After completion of pre-complex testing and complex testing, each transport technology part system had an “Assessment of pre-complex testing, complex testing“ prepared, which documented the development and meeting of the set goals.

Based on the negative experience with tightness of simple linings at most of WWER-440 units, the construction of pool lining at NPP V2 was modified by Energoprojekt (general designer for NPP V1, V2) and GDt SKODA project from the original simple stainless-steel lining to a double lining with leak outlet between the linings.

All other nuclear installations have been commissioned according to standard programs approved by regulatory bodies in line with the legislation, based on the IAEA recommendations.

G.5.2 Legislative Requirements for Commissioning and Operation

The requirements for commissioning and operation of nuclear installations are laid down in Section 19 of Act No. 541/2004 Coll. Requirements for the management of spent nuclear fuel are laid down in Section 21 of Act no. 541/2004 Coll. This Act further specifies the requirements for nuclear safety, professional competence, quality assurance, physical protection, notification and assessment of operational events and emergency preparedness. Further details and other requirements are in the relevant ÚJD SR Decrees (see Annex VI.).

ÚJD SR shall issue the licence for commissioning and for operation after submission of written application, with the following documentation being attached (e. g.):

- Limits & Conditions of safe operation,
- List of classified equipment as classified into safety classes,
- Nuclear installation commissioning program, split up into stages,
- Quality system documentation and requirements on the quality of the nuclear installation, and their evaluation,
- Operational procedures,
- On-site emergency plan,
- Preliminary Safety Report,
- Radioactive waste and spent fuel management plan, including their transport,
- Conceptual plan of decommissioning of the nuclear installation,
- Professional training systems for employees,
- Off-site emergency plan for regions within the area at risk.

In this relation the following IAEA documents are applid (e. g.)

- SC 50-C-O “Nuclear power plant operational safety”,
- *GS-R-3 „Management System for facilities and activities“,*
- *GS-G-3.1 Application of the Management System for Facilities and Activities.*

G.5.3 Limits and Conditions (L&C) for Spent Nuclear Fuel Management

Limits and Conditions of safe operation is the basic legislative document containing permissible values of parameters of nuclear installation facilities and defines its operating regimes. The document is

developed on the basis of legislative requirements (the Act No. 541/2004 Coll. and ÚJD SR Decree No. 31/2012 Coll. I), with regard to which the operator shall:

- Submit the approved preliminary L&C before issuing an authorization for construction of NI by ÚJD SR;
- Submit the approved L&C before issuing an authorization for commissioning of NI and operation of NI by ÚJD SR;
- Any subsequent changes to L&C shall be submitted to ÚJD SR for approval, supported by their safety justification;
- Comply with the L&C, while ÚJD SR ensures control of compliance.

The document for spent fuel management facilities contains the basic limits and conditions:

for BSVP:

- Water level in the ponds for storage and refuelling (assurance of sufficient water layer to protect personnel against radiation from fuel).
- H^3BO^3 concentration
- in the storage pond (assurance of sub-criticality in the fuel pond).
- Cooling of storage pond water (assurance of residual heat removal) for transport means and others.

Documents containing basic limits and conditions for ISFS:

LAP - Limits and conditions	
13-LAP-001	Limits and conditions of safe operation of ISFS
13-LAP-002	Justification for limits & conditions of safe operation of ISFS

G.5.4 Management and Operational Documentation for Operation, Maintenance and Taking Care of Equipment for Spent Nuclear Fuel Management

SNF management at NPP units WWER type is a part of nuclear fuel cycle, for which the following relevant management QA - documentation and its subsequent operational documentation has been developed:

a) Procedural documentation:
   - "Operation of Nuclear Power Plants" directive;
   - Record keeping and control of nuclear materials;
   - Handling, shipment and storage of spent nuclear fuel;
   - Handling, storage and transport of spent fuel to NPP V1.

b) Technological operational procedures:
   - Shipment of spent nuclear fuel from Units of WWER-440 to the ISFS, storage and handling of SNF;
   - Operation of electric hoists in the ISFS;
   - Inspection stand SVYP-440 for monitoring SNF.

Reviews, revisions, maintenance, tests, and complex care of equipments for SNF management are performed according to the quality documentation and approved schedules. Obligations, responsibilities and competencies of the personnel are defined in descriptions of their work positions.

SNF management at the ISFS is part of the nuclear fuel cycle, for which relevant management documentation and subordinated operational documentation is developed:

- Operating procedures,
- Normative operating procedures,
- Technological operating procedures,
- Schedules of service inspections of selected equipment,
- Technological operating procedure – technology.

Inspections, maintenance tests and complex care for the equipment to manage SNF are carried out according to the instructions developed overall for transport technology part and for individual systems and equipment. Obligations, responsibilities and competence of staff are set in the job descriptions.

The licensee shall make records and keep data on operation of a nuclear installation that is important for decommissioning, contained in the conceptual plan for decommissioning. At the same time it is obliged to provide for special purpose funds to cover the decommissioning costs (contributions to the Nuclear Fund).

G.5.5 Technical Support for Operation

Organizational units of operator include departments of technical support and safety, the main goal of which is inter alia the following:

- Supervision over compliance with the nuclear safety rules during operation and assessment of any design modifications and modes of operation with respect to nuclear safety;
- Organization of off-site and on-site radiation inspection, personal dosimetry inspection and surveillance of observance of rules of radiation safety, organization of measures for health protection of employees and citizens in the surrounding of NPP against ionizing radiation by application of ALARA principle;
- Seismic activity monitoring;
- Improvement of safety, reliability and operational effectiveness;
- Development of operational procedures for normal and accident operation and other operational documentation and its permanent updating;
- Event analysis, elaboration of their analysis and the whole organization of feedback of own and foreign nuclear installations;
- Recordkeeping of nuclear materials, calculation of fuel loads and strategy of fuel cycle, supervision over nuclear safety during fuel exchange and physical start-up.

In ensuring the above listed tasks the operator cooperates with external support organizations.

Research and Development

ÚJD SR has supported various research tasks under its Research & Development Program (R&D) e. g.: "Application of burnup credit (BUC) in the criticality calculation of the WWER-440 fuel assemblies" in cooperation with Nuclear Power Plants Research Institute (VUJE, a. s.). The aim was to examine possibilities of the WWER-440 spent fuel storage and transport with higher original enrichment in the existing storage and transport facilities. It consists of an analysis of options for shipment and storage of spent nuclear fuel from the WWER-440 with the initial enrichment of up to 5% ^{235}U in an existing transport container C-30 with T-12 or KZ-48 casks and in the spent fuel pools at the reactor.

In order to have validated results three Slovak organizations (VUJE, a. s., JAVYS, a. s., ÚJD SR) have joined an international consortium focused on further investigation of nuclide composition of WWER-440 spent fuel within the framework of project ISTC #3958. ÚJD SR also developed guidelines for the application of BUC in Slovakia.

Another R&D project focused on determination of the relation between the spent fuel residual heat generation and surface temperature of the transport container C-30.

G.5.6 Analysis of Operational Events

Article 27 of the Act No. 541/2004 Coll. defines operational event categories (failures, incidents, accidents), notification obligations of the operator toward regulators, requirements for identification of causes of operational events and requirements for public information. Also the IAEA and the WANO expectations in the field of feedback from events are elaborated in the internal documentation in addition to the legal requirements.

Every operational event is recorded and systematically assessed. The whole process involving analysis of operational events, their notification and archiving is carried out and co-ordinated by selected employees of the Department of Nuclear Safety.

At the meetings of commissions for operational events management (Failure Commission, Extraordinary Failure Commission), members of which are leading employees of department of safety operation, administration and maintenance, the relevant commission approves the analysis and takes corrective measures to eliminate root causes of events so they are not recur.

Within the proactive approach aimed at prevention of operational events occurrence, the operators have elaborated a system of dealing with near miss events and events without consequences (UBN). In 2004, NPP Mochovce and NPP Bohunice started a project in co-operation with the Comenius University called "Improvement of safe operation and safety culture by applying the near miss event concept (NSP/03-S10)". This project has been completed in 2005 and its output brought further improvement of dealing with near-events UBN in the mentioned power plants.

Another proactive approach is to utilize experience from operational events of other nuclear power plants, especially from the WANO and the IAEA databases. Operators have developed various procedures and criteria, under which they assess the applicability of knowledge from events at other

nuclear power plants. Result of this assessment is approval of preventive measures to avoid occurrence of similar events.

The effectiveness of operational events management is annually assessed in the annual reports on operational events and reports on nuclear safety and reliability. Result of these assessments is the implementation of measures of organizational character aimed at continuous improvement of the processes of operational events feedback.

G.6 Disposal of Spent Nuclear Fuel

Article 10 of the Joint Convention

Disposal of Spent Fuel

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.

Records are kept on spent nuclear fuel management, which are preserved for future disposal and contain the following:

a) identification data on spent nuclear fuel,
b) history of irradiation in nuclear reactor,
c) isotopic composition of spent nuclear fuel after its removal from nuclear reactor,
d) placement of spent nuclear fuel,
e) data on tightness of spent nuclear fuel coating,
f) data listed in the approved limits and conditions of safe operation.

Systematic development of a deep geological repository (GR) for permanent disposal of SNF and high level RAW started in 1996. In the period from 1996 until 2001, the following tasks were dealt with during the development:

- Design and implementation activities,
- Source term, near and far interactions,
- Siting,
- Safety analyses,
- Public involvement.

Five candidate sites were selected in the process of the step-by-step assessment during the period, where basic field research was performed. In addition to that, partial reports summarised international experience in the deep geological repository development, directions and plans in all areas were set, expert teams for solution of individual issues were established, and co-operation started with organizations dealing with deep geological disposal in Belgium, Switzerland, the Czech Republic and Hungary.

In 2014, within the meaning of the Council Directive (European Union) 2011/70/EURATOM establishing the (European) Community framework (for atomic energy) for the responsible and safe management of spent nuclear fuel and radioactive waste, the „*Draft National Policy and the* National Program for the

ma*nagement of spent nuclear fuel* and radioactive waste in *SR*" was developed in Slovakia and *approved in 2015 by Government Resolution No. 387/2015.*

In accordance with the above document, the Slovakia opted for a dual track approach:

- Direct disposal of SNF in a deep geological repository of suitable properties (the priority option),
- Disposal of SNF in an international repository.

In 2012/2013, activities were launched to continue in the National Program for the development of a deep repository. The first stage of activities related to the „new" development of a deep disposal in the Slovak Republic *was* completed in 2016. Within this stage, *the following activities were completed*:

- *Comprehensive evaluation of the work done so far in the project of development of deep repository, including a summary of the results achieved within the framework of international activities in the area concerned, and evaluation of the results in the form of comprehensive summary document.*
- *Updating the document "Criteria for the selection and evaluation of sites".*
- *Analysis of the possibilities of economic and non-economic instruments to support the implementation of deep repository.*
- *Development of strategy for public relations for the area of development of deep repository in the SR.*
- *Information and promotional materials on deep repository development.*
- *Updated study on the feasibility of a deep repository in the SR.*
- *Draft legislation to stimulate the affected municipalities during exploration works and after siting of deep repository.*
- *Detailed Schedule of Works for the period 2017 to 2023 and the proposal for the next steps in the development of a deep repository for RAW and SNF in the SR.*
- *In accordance with the outputs from the project „Deep repository – site selection, stage 1", in 2017 in the framework of the project „Deep repository – site selection, stage 2 – Part 1", the „Project on geological task" was developed in accordance with Act No. 569/2007 Coll. on geological works (Geological Act) as amended, and the Decree No. 51/2008 Coll. implementing the Geological Act as amended, which will be prepared for all geological activities and work for the Tríbeč and western part of Rimavska kotlina sites. In the next period, further work will be realized to select the site (field exploration works, public relations, etc.) from among the pre-selected sites, so that it would be possible to take a decision by 2030 (in case of cancellation of the dual path) about the siting of the deep repository in SR.*
- *Project „Deep repository – site selection, stage 2 – Part 1" will also address the following important partial objectives in the development of deep repository for the spent fuel and radioactive waste management listed in the National Program:*
  - *The development of a framework program for R&D in the field of deep disposal and creation of internal conditions for its implementation,*
  - *Creation and preparation of implementation of a system of economic stimulation of locations affected by the development and operation of repositories.*
- *Putting the deep* repository into service *is expected to be approximately in* 2065.

The National Program for the development of international repositories proposes:

- *Participation in activities that could lead to an international deep repository, i.e. a repository jointly owned and operated by several states based on relevant international treaties; it is expected that the economic as well as other benefits of such solution for the final stage of management of spent nuclear fuel, will ultimately outweigh the geopolitical and social barriers that are hindering the practical implementation of such a solution, depending on the development of both solutions, a decision will be taken and periodically reassessed as for which of the paths will eventually be implemented,*
- by 2020 to evaluate the developments in the given area and based on this development to make a decision, whether Slovakia will continue in these activities or completely abandons the idea of deep geological repository shared with another country (countries).

H Safety of Radioactive Waste (RAW) Management

This part relates to similar requirements of the Convention as part G, which deals with the requirements of the Convention regarding spent fuel management. Since the requirements for safety, procedures and legislation regarding spent fuel and RAW management are often identical, where appropriate, references are made to the relevant chapters in Part G.

H.1 General Safety Requirements

Article 11 of the Joint Convention

General Safety Requirements

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

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

i) ensure that criticality and removal of residual heat generated during radioactive waste management are adequately addressed;

ii) ensure that the generation of radioactive waste is kept to the minimum practicable;

iii) take into account interdependencies among the different steps in radioactive waste management;

iv) provide for effective protection of individuals, society and 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.

General safety requirements of RAW management are similar as by SNF and are described in the chapter G.1.

The producer of radioactive waste is liable for safe radioactive waste management prior to its placement to the repository.

Radioactive waste shall be managed so as to:

a) maintain sub-criticality,
b) secure residual heat removal,
c) minimize effects of ionizing radiation on maintenance, population and environment,
d) take into account the properties that influence nuclear safety, such as toxicity, flammability, explosiveness and other hazardous properties.

Radioactive waste generation and radioactive waste management shall follow technical and organizational measures so that their amounts and activity are kept as low as reasonably achievable.

The conditioning of radioactive waste consists of activities leading to production of a form suitable for its transport and disposal or for its storage.

All activities during radioactive waste management shall be directed to its safe disposal.

For RAW inventory see Annex V.

H.1.1 Radioactive Waste (RAW) Generation Minimization Program

The requirement for minimization of RAW generation is laid down in the Atomic Act (No. 541/2004 Coll.). *Act No. 355/2007 Coll. imposes an obligation on the license holder to limit the production of radioactive waste to the necessary extent*. The minimization system is elaborated at every nuclear installation in line with legislative requirements. Fulfilment of programs for RAW generation minimization is controlled annually in the "Report on RAW Management". This report proposes new measures to minimize RAW generation for the next period and evaluates their fulfilment.

The "Draft procedure for measurement of low-contaminated materials from NPP V1, V2 operation and their release into environment" and "Methodology for release of low-contaminated waste into environment from NPP V1, V2 operation" were implemented for radioactive materials containing radioactive nuclides underneath the level enabling their release into environment. Authorization for release of RA-materials into environment was issued in 2003 by the Public Health Care Office of SR for the locality of Jaslovské Bohunice and in 2004 for Mochovce site.

H.1.2 Connection between Stages of Radioactive Waste (RAW) Management

Basic information for correct identification and categorization of RAW during packaging and handover, or during takeover for the purpose of treatment and conditioning in the relevant technological facility provides document "Generic cataloque of radioactive waste" (PP 15-INŠ—001, rev. 3), which was prepared by JAVYS, a. s.

The document also defines principles and conditions for RAW acceptance to be treated and conditioned so as to meet the requirements for creating a product during the treatment and conditioning of these RAW, which would comply with criteria for permanent disposal in RÚ RAO Mochovce and would not endanger safety operating personnel during any further manipulations of RAW including transports. The criteria of acceptance are included in limits and conditions of relevant installation.

A part of the document "Plan of radioactive waste and spent nuclear fuel management including their transport", which is submitted by the operator and reviewed by ÚJD SR prior to construction and operation of RAW management facilities, are also descriptions and analyses of RAW streams containing the following activities:

- Storage of untreated RAW;
- RAW treatment,
- Storage of intermediate products,
- Shipment between individual steps,
- RAW conditioning.

Prior to starting the RAW management itself, it is necessary to characterize the physical and chemical and radiochemical properties of a specific type of RAW, stated on the accompanying sheet of RAW in the packaging (required by the ÚJD SR Decree No.30/2012 Coll.). The accompanying sheet is handed over together with RAW at individual stages of activities relating to RAW management.

Safety requirements on particular activities are listed in the ÚJD SR Decree No. 30/2012 Coll.

Before commissioning and during operation, operational procedures, which take into account relations between individual steps of RAW management, are elaborated and improved. The devolving of RAW within JAVYS, a. s. between the producer of RAW and JAVYS, a. s. is subject to by operational procedures and is contractually covered.

H.1.3 Assurance of Effective Protection of Individuals, Society and the Environment

For description see G.1.

H.1.4 Biological, Chemical and other Hazards

For description see G.1.

H.1.5 Limiting Impact on Future Generations and their inadequate load

For description see G.1.

H.2 Existing Facilities and Past Practices, Revision of Safety Assessments

Article 12 of the Joint Convention

Existing Facilities and Past Practices

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

i) The safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;

ii) The results of past practices in order to determine whether any intervention is needed for reasons of radiation protection, bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.

For description see G.1.1.

The RAW management facilities when commissioned complied with the safety requirements laid down in the valid legislation. They were gradually harmonized with the increased requirements according to the legislative conditions (see Annex VII., Table 1.). The ČSKAE Decree No. 67/1987 Coll., which laid down safety requirements for RAW storage, has allowed their implementation within five years. The ÚJD SR Decree No. 190/2000 Coll. has required an accompanying sheet of RAW and consistent recordkeeping of RAW. The records in electronic form for RAW occurred before 2000 has been gradually completed based on partial written background documents, or in case of “the historical waste”, they were removed, sorted and categorized according to the requirements on the accompanying sheet of RAW. ÚJD SR Decree No. 30/2012 Coll. is valid today for the area of RAW and SNF management.

H.3 Siting of Proposed Facilities

Article 13 of the Joint Convention

Siting of Proposed Facilities

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for

a proposed radioactive waste management facility;

i) To evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime as well as that of a disposal facility after closure;

ii) To evaluate the likely safety impact of such a facility on individuals, society and the environment, taking into account possible evolution of the site conditions of disposal facilities after closure;

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

iv) To consult the Contracting Parties in the vicinity of such 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.

H.3.1 Legislative Requirements

For description see G.2.1.

H.3.2 Siting of Particular NI

Legislative requirements and procedures for the design and construction of RAW management facilities are defined in the Authority´s Decrees Nos. 430/2011 and 30/2012. The requirements for the issuance of a building permit is as described in Section H.4 are combained in Act No. 50/1976 Coll., and Act No. 541/2004 Coll. ÚJD SR decides about issuing a building permit for the construction of a nuclear facility based on a written application for a building permit supported by the documentation as specified by the Building Act.

The work on the implementation of project for the first phase of repository for very low-level waste *(VNAO from the decommissioned NPP A1)* in RÚ RAO *started in August* 2014 *and was put into use in 07/2016. Work on the second phase of VNAO repository (VNAO from the decommissioned NPP V1) started in September 2016. Expected completion is November 2017.*

In March 2017 the construction – „Disposal facility for Low level waste (building of the third double-row)" was launched. Scheduled putting into operation is expected in 04/2019 (see D.2.7).

For an integral storage facility – storage for RAW from decommissioning (see Annex VII., Table 1) the *EIA documentation was prepared and reviewed according to them valic Act No. 127/1994 Coll.* Due to change in the location of the facility in the period 2011 - 2012 new environmental impact assessment was carried out in accordance with the Act No. 24/2006 Coll. On 10 September 2012 MŽP SR issued its final opinion. From January 2014 activities related to construction of the integral storage facilities have been launched. The planned start of the use of storage capacities is end *of* 2017.

H.4 Design and Construction of Facilities

Article 14 of the Joint Convention

Design and Construction of Facilities

Each Contracting Party shall take the appropriate steps to ensure that

i) The design and construction of a radioactive waste management facility provide for suitable measures to limit possible radiological impact on individuals, society and the environment, including those from discharges or uncontrolled releases;

ii) At the design stage, conceptual plans, and if necessary, technical provisions for the decommissioning of a radioactive waste

management facility other than 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.

Legislative requirements and procedures for the design and construction of RAW management facilities are defined in the Authority´s Decrees Nos. 430/2011 and 30/2012. The requirements for the issuance of a building permit is as described in Section E.2 are combained in Act No. 50/1976 Coll., and Act No. 541/2004 Coll. ÚJD SR decides about issuing a building permit for the construction of a nuclear facility based on a written application for a building permit supported by the documentation as specified by the Building Act.

In accordance with ÚJD SR Decree No. 58/2006 Coll. laying down the details on the scope, content and method of preparation of documentation of nuclear facilities needed for individual decisions, the design of a nuclear facility must respect and comply with the principles and requirements for ensuring radiation protection of employees, of the population and of the environment, and their continuous and emergency monitoring. Facilities in contact with radioactive substances must be designed, sited and shielded so that the risk of exposure of persons in the nuclear facility during all operating conditions is as low as reasonably achievable, taking into account the technical, economic and social factors, and that the exposure is lower than the set limits. The design must include technical safety measures and procedures to control and mitigate possible radiological consequences. It must ensure that operating conditions that can result in high radiation doses or release of radioactive substances, have a very low incidence rate (probability) and the operating conditions that have high incidence rate have only negligible or no potential radiological consequences. The project must be designed so that it contains appropriate means of warning the population and notifying persons present at the nuclear installation and in the emergency planning zone during incidents and accidents.

In accordance with the ÚJD SR Decree No. 58/2006 Coll. laying down the details on the scope, content and method of preparation of documentation of nuclear facilities needed for individual decisions, as amended by the Decree No. 31/2012 Coll. and the Decree No. 102/2016 Coll. Taking into account the decommissioning requirements in the design of a nuclear facility is one of the requirements for the content of the Reference Report on the method of decommissioning, which is submitted to the Authority as a first-level conceptual document in the hierarchy of decommissioning plans together with the request for approval of the siting of the nuclear facility. As it results from the general requirements, the design of nuclear facility must, through design features, take account of planned decommissioning and take into account expected levels of contamination and activation of the nuclear facility at the end of the service life.

As regards a RAW repository besides general requirements there are specific requirements which inter alia regulate the conditions for closure of the repository and for the period after its closure. The design must take into account the inventory and properties of radioactive waste deposited and must contain technical solutions for the isolation from the environment not only during operation, but also after closure during institutional control of the repository within the determined period of its active and passive part. It

must be ensured that the design will provide a multi-barrier protection system, with a suitable combination of engineering features and natural features of the area with a view assure long-term safety upon closure of the repository. The preliminary proposed solution for the cover, the method of closure and ensuring the possibility of radioactive waste removal, is part of the design and is presented as part of the documentation for the siting and then also for the construction. It is required that safety of the repository during the projected lifetime is preferrably achieved by passive elements, including gravitational drainage system and that the need for active elements after the closure of the repository is minimized.

In accordance with Decree No. 30/2012 Coll. the design, without reducing the tightness of the barriers, should allow for monitoring of characteristic properties, such as water penetration into the repository or release of radioactive substances into the environment also during institutional control after closure.

The requirements for the technologies used in the design and during construction of the facility for radioactive waste management are defined in the Act No. 541/2004 Coll. and in Decrees No. 430/2011 Coll. and No. 30/2012 Coll. building structures. Technological parameters relevant to nuclear safety and operational reliability of equipment for radioactive waste management should be designed, manufactured, installed and tested in order to ensure their reliable function. Systems, structures and components shall be designed according to the relevant technical standards, their selection meets the reliability objectives of a facility for radioactive waste management in terms of nuclear safety and the design was verified in similar previous applications. The design of such facility takes into account operational experience and available results from research programs from similar nuclear facilities. During the construction of facilities for radioactive waste management, it is necessary to ensure the compliance check of installed systems, structures, components or their parts with the design documentation and the quality assurance requirements, records are made and maintained on the checks performed.

H.5 Safety Assessment of Facilities

Article 15 of the Joint Convention

Safety Assessment of Facilities

Each Contracting Party shall take the appropriate steps to ensure that

i) Before construction of a radioactive waste management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;

ii) In addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following the 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 an environmental assessment shall be prepared when deemed necessary to complement the assessment referred to in paragraph i).

Radioactive waste management facilities are subject to Act No. 24/2006 Coll. on environmental impacts assessment and considering the nature of the activity, the construction of facilities for radioactive waste management is subject to transboundary impact assessment. The Final Opinion of Ministry of Environment of the Slovak Republic recommending implementation of the proposed activity, i.e. the

construction of facilities for radioactive waste management, is part of the documentation required for the issuance of a building permit.

The documentation needed for a building permit of a radioactive waste disposal facility includes also a preliminary safety report demonstrating compliance with the legal requirements for nuclear safety on the basis of data considered in the design.

Construction of a repository, like any other nuclear facility, is subject to the issuance of an authorization and submission of the relevant documentationm under the Atomic Act. This package also includes a Preliminary Safety Report containing a systematic safety assessment.

In accordance with Decree No. 30/2012 Coll., safety analyses of the repository represent a comprehensive risk assessment related to the radioactive waste disposal and the demonstration of functionality and safety of the entire storage system in terms of its possible impacts on humans and environment. Safety analyses also include sensitivity analyses and uncertainties. When developing safety analyses, account shall also be taken of the period of institutional control following the closure of the repository. The safety assessment is based on the limit values for doses set for the relevant scenarios by ÚVZ SR.

The documentation for the commissioning of a nuclear installation and its operation must include a pre-operational safety report that particularises the preliminary safety report. As required by the Decree No. 30/2012 Coll., the license holder, prior to launching the operation, shall check the readiness of a nuclear facility for operation, and verify and record the compliance of the licensing documentation, including the Preliminary Safety Report, with the current state of the nuclear facility.
In accordance with the requirement of the Atomic Act, during the operation of a NI regular, comprehensive and systematic safety assessment should be carried out, taking into account the current state of knowledge and adopt measures to eliminate identified deficiencies and to prevent their recurrence in the future (see Chapter G.4.1).

H.6 Operation of Facilities

Article 16 of the Joint Convention

Operation of Facilities

Each Contracting Party shall take the appropriate steps to ensure that

i) The licence to operate a radioactive waste management facility is based upon appropriate assessments, as specified in Article 15, and is conditional on the completion of a commissioning 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 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) programs 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.

H.6.1 Commissioning and Operation of Facilities

Authorization for commissioning of nuclear installation and operation of nuclear installation is issued by ÚJD SR in compliance with the Act No. 541/2004 Coll. – see G.5.1, G.5.2.

Under the wording of the Atomic Act (No. 541/2004 Coll.), the operation of the nuclear installation is structured into trial operation and operation. After assessment of the report on evaluation of the preceding stage of nuclear installation commissioning, ÚJD SR issues an approval for the next stage of commissioning based on the application of the authorization holder.

The Authority issues the approval for trial operation after submission of written application with attached report on evaluation of nuclear installation commissioning. This approval constitutes a part of the approval for early use of construction for trial operation according to a special provision. After positive evaluation of the trial operation, the Authority will commence upon the proposal of the authorization holder the construction approval proceeding.

The issuance of approval for operation is subject to submission of a report on evaluation of the nuclear installation commissioning stage and of a record of preparedness of the nuclear installation and the employees for permanent operation.

All RAW management facilities have a valid approval of ÚJD SR for their operation issued under the above mentioned conditions.

H.6.2 Limits and Conditions for RAW Management

For all nuclear installations there are limits and conditions (L&Cs), the format and content of which follows the IAEA guides *SSG-40, WS-G-6.1* and US NRC.
The following is stated by each limit condition:

- aim of the limit condition,
- text of the limit condition,
- validity of the limit condition (to which regime of JZ it applies),
- activity of operational personnel in case the limit condition is not met,
- requirements on inspection – they determine frequency, type and scope of inspections and tests of systems and equipments.

The fulfilment of limits and conditions is continuously monitored by the maintenance staff and by technical support personnel.
An amendment to the provision with relevant justification is drafted in case of necessity for L&C modification and this modification comes into force after its approval by the regulatory body.

Regulatory Departments of nuclear safety of the operator elaborate periodically quarterly and annually a report on nuclear safety, which is submitted to the management. The report includes also evaluation of the whole area of L&C. The number of changes of L&C, the period of unavailability of safety systems and eventual violation of L&C serve as indicators.

H.6.3 Working Procedures

The system of RAW management is elaborated in detail in the procedural and operational documentation in order to ensure fulfilment of requirements of the ÚJD SR Decrees *No. 30/2012 Coll.* and No. 57/2006 Coll.

Procedures, principles and instructions for operational documentation processing is described in detail in relevant directives and guidelines of the QA system. Every operational document passes through annotation and approval process in particular concerned departments and at the end, it is approved by the top management of the organization. The same procedure also governs the process of changes and amendments of individual documents of the used documentation:

- Operational documentation
- Documentation of inspections and testing of equipment
- Technological and working procedures for maintenance

Results obtained during activities are reflected into modifications of such procedures as well as to modifications in limits and conditions.

H.6.4 Engineering and Technical Support

For description see G.5.5.

H.6.5 Procedures for Waste Characterization and Sorting

Basic information for correct labelling and categorization of RAW by its packaging and devolving/acceptance for the purpose of treatment in particular treatment centres provides document “Generic cataloque of radioactive waste” (PP 15-INŠ—001, rev. 3), which was prepared by JAVYS, a. s. (see H.1.2).

H.6.6 Reporting of Events to the Regulatory Body

The system of reporting events to the regulatory body is the same for all nuclear installations (see G.5.6).

H.6.7 Conceptual Decommissioning Plans

Conceptual decommissioning plans are included in the documentation submitted prior to the commissioning of a nuclear installation and they specify preliminary conceptual decommissioning plans (see G.3, H 4.1). Conceptual decommissioning plans document the presumed conditions after operation termination and contain goals and procedure of decommissioning including financial demands estimation, description of presumed radiation situation and amounts and activities of radioactive waste;

they state requirements on capacity of installations for radioactive waste management and requirements on gathering and record keeping of data important for planning of decommissioning.

Conceptual decommissioning plans shall be updated as part of the periodic *update of the National Policy and the National Program for the Management of SNF and Radioactive Waste.*

H.6.8 Plans for Repository Closure

Act No. 541/2004 Coll. on the peaceful uses of nuclear energy (the Atomic Act) defines the closure of the repository as administrative and technical activities after finishing the RAW disposal into the repository. Authorization for closure of the repository and institutional control is issued by ÚJD SR upon presentation of an application of the license holder for operation of a repository, supported by the required documentation. The license holder shall take measures to ensure that after closure of the repository records are maintained, institutional control is carried out and corrective action is taken as necessary in case of unplanned release of radioactive substances (Section 22 of the Act). The documentation required for the application for closure of a repository, according to Annex 1 to the law, inter alia, shall contain the following:

- *Overall assessment of the state of the repository and its operation, including a description of changes and modifications and their safety assessment.*
- *Total inventory of disposed RAW.*
- *Plan for repository closure and institutional control, including safety analyses.*
- *Monitoring Program including suggestions for possible measures, etc.*

This plan for closure of the RÚ RAO repository includes a number of activities and administrative measures, e. g.:

a) materials, technologies and procedures used to fill gaps between the storage boxes, to stabilize disposed packed forms of radioactive waste of the storage system, including system in order to preserve,
b) a program for decontamination and dismantling of unnecessary buildings and above-ground areas,
c) a description and method of ensuring the radioactive waste management produced during activities referred to in par. b),
d) maintenance and repair plan of individual components of the repository during the period of active part of institutional control,
e) the extent of activities carried out under the passive part of the institutional control of the repository,
f) the method for the long-term preservation and transfer of information,
g) specified safety analyses of the long-term safety of the repository at the stage post-closure, in connection with the current data and verified by an independent organization. etc.

To reduce the likelihood of intrusion into the repository, there are considerations to build an object that will warn about the existence of a repository in the long run.

The final overlay of the repository addresses numerous security measures for the repository and its integration into the surrounding landscape.

From a time perspective, the closure of a repository is foreseen after the decommissioning of all currently existing nuclear facilities (including NPP Mochovce 3&4) and treatment and disposal of RAW, which will be approximately in 2100.

H.7 Institutional Measures after Repository Closure

Article 17 of the Joint Convention

Institutional Measures after Closure

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; and

iii) if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

All the above-mentioned measures are described in the Pre-operational Safety Report for the RÚ RAO Mochovce. These measure will be elaborated in detail well before the completion of operation.

H.7.1 Recording Keeping

All information on disposed radioactive waste including the placement of containers, amount and activity of radioactive waste, their property specifications, composition of particular package forms is during operation kept in compliance with operator's procedures. The scope of records kept after repository closure is specified by ÚJD SR in the conditions for license for repository closure.

The whole documentation about the repository and the disposed waste after the end of operation shall be handed over from present operator (JAVYS, a. s.) to an entity designated by the State, which will carry out post-operational monitoring and will be responsible for preventing access to the premises. It is not possible to determine now, when this activity will be completed, but at the end of the activity the documentation will be handed over to the department designated for long-term keeping of documents. From today´s point of view it is the National Archive.

A plan of repository closure and institutional control as one of the basic documents required for the issuance of ÚJD SR authorization for repository closure contains besides others also a method of long-term keeping and transmission of information with identification of used media, as well as data important for implementation of corrective actions or for reassessment of safety of repository in the future and a method of keeping records about results of inspections, measurements and monitoring during institutional control.

H.7.2 Institutional Control

Institutional control means all activities that are performed after the end of disposal of RAW and final closure of a repository. Necessary maintenance of the repository structures will be ensured, and the system of physical protection of repository will be in operation during active period of institutional control. Monitoring systems will be in operation, providing information about possible water penetration into disposal vaults and its further migration.

The exact scope of institutional control shall be determined based on safety analyses conducted before repository closure.

On the basis of results of safety analysis and in accordance with recommendation of international mission WATRP *(Waste Management Assessment and Technical Review Programme)*, the 300 years duration of institutional control is assumed for the Mochovce repository and for intruder scenarios is considered, that system of final repository cover will prevent the access close to disposed RAW for a period of 500 years.

Also part of the repository closure and institutional control plan is the plan for maintenance and repair of the respective components of the repository over the period of active part of institutional control as well as establishing the scope of activities to be carried out within passive part of institutional control of the repository.

The current safety report documents that during operation as well as during the period of institutional control individuals, society and the environment are protected from radiation events. PoSAR guarantees that the criteria set out for the repository by MoH will not be exceeded as long as the limits set forth therein are complied with:

1. Effective dose to a member of the public due to the evolution scenario shall not exceed 0.1 mSv/y in any year following the completion of institutional control of the repository;
2. Effective dose to a member of the public due to a intrusion activity (scenarios where a probability will substantially be less than 1) shall not exceed 1 mSv/y in any year following the completion of institutional control of the repository.

The documentation contains the following sections dealing with safety assessment for periods subsequent to the repository closure:

a) Repository closure and institutional control plan (at the level of design study)
   - Stabilisation of the site,
   - Completion of repository operation,
   - Post-operation monitoring;

b) Safety analyses
   - Characteristics of disposed waste,
   - Safety aspects of repository operation,
   - Long-term stability,
   - Long-term repository safety analyses,
   - Waste acceptance criteria for disposal resulting safety analyses.

The Mochovce NRR´s long-term safety analyses envisaged two groups of scenarios - evolution and intrusion.

H.7.3 Intervention Measures

It is assumed that intervention measures will be performed in the case of detection of unplanned release of radioactive materials in drainage system of the repository or in some part of the environment in the vicinity of the repository, if any. Pursuant to the Atomic Act, the holder of the authorization for repository closure and institutional control will provide the performance of such corrective intervention. The scope of corrective action is not established precisely as yet, depending on the results of controls and measurements carried out during the institutional control, on the results of the program for monitoring the state of repository barriers and the radiological monitoring plan. Afore-mentioned controls, measurements, monitoring programs are designed so as to cover all potential pathways for leakage and spread of radionuclides from the repository into the environment.

I Transboundary Movement of Spent Nuclear Fuel and Radioactive Waste

Article 27 of the Joint Convention

Transboundary Movements

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 international binding 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 licence 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, or 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.*

I.1 General Requirements for Safety at Borders

In SR the transboundary movement of spent fuel and RAW, imports, exports are governed by Act No. 541/2004 Coll. as amended and by the ÚJD SR Decree No. 57/2006 Coll., transposing the Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent nuclear fuel, which is based on the IAEA recommendations formulated in the documents of TS-R-1 series. Approval of the type of transportation equipment is issued at the most for five years. Authorization for SNF shipment can be issued for up to one year and in case of RAW shipment for up to three years.

The Act No. 541/2004 Coll. allows for import of RAW, which resulted from treatment and conditioning of RAW exported for this purpose and their re-entry was approved in advance by ÚJD SR and also allows import of RAW for the purpose of its treatment and conditioning on the territory of SR if export of RAW with proportional activity was contractually agreed and approved by ÚJD SR. Any other import of RAW

to SR is prohibited. The Atomic Act specifies exactly, in § 3 par. 8, which are those states to which it is prohibited to transport RAW.

By Act No. 408/2008 Coll., which amended and supplemented Atomic Act (No. 541/2004 Coll.), has been transposed the Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent nuclear fuel and at the same time through a reference to the Commission Decision 2008/312/Euratom model standard documents for the supervision and control of shipments of RAW and spent fuel were transposed into the national legal framework.

I.1.1 Basic Requirements for Safety Documentation

The safety documentation shall contain a set of measures for efficient protection of persons, property and environment against the consequences of irradiation during shipment of radioactive materials. This protection is assured by separation of radioactive contents and environment, by control of dose rates during shipment, by prevention of criticality achievement and by prevention of shipment damage due to released and absorbed heat.

These measures must apply to all activities and conditions associated with the movement of radioactive materials; they include design, maintenance and repair of transportation equipments, preparation, expedition, loading, transfer including storage during transport, unloading and acceptance of consignment at the point of shipment destination.

I.1.2 Issuance of Shipment Authorization

Shipment of Radioactive Materials

Radioactive materials (nuclear material, radioactive waste and spent nuclear fuel) may only be transported based on shipment authorization issued by the ÚJD SR to consignor and by means of transportation equipment, which was approved by the ÚJD SR.

Authorization for shipment of radioactive materials shall not be required for shipment of:

a) products from non-irradiated natural and depleted uranium and non-irradiated thorium,
b) nuclear materials which total amount transported within period of 12 consecutive calendar months not exceed:
    1. 500 kg of natural non-irradiated uranium or
    2. 1000 kg of non-irradiated depleted uranium and non-irradiated thorium.

Application for the authorization for shipment of radioactive waste to the EU Member States or other countries shall be submitted by the applicant using a standard document. The document contains statement confirming that the radioactive waste will be taken back and if it is not possible to assure its shipment to the consignee or should the shipment become impossible under conditions imposed by the competent authorities of other countries.

Authorization for shipment is issued for each shipment separately. Where the same type of radioactive materials is concerned, with the same type of shipment by the same consignor, ÚJD SR may issue the authorization for shipment of radioactive materials or spent nuclear fuel for a repeated shipment for a period of one year, and in case of radioactive waste for a three years period at maximum.

The Authority issues the authorization for shipment of radioactive waste and approval of transportation equipment type in a form a decision.

The Authority shall specify the following (besides the regular terms) in the decision, in which it issues the authorization for shipment of radioactive materials:

a) the type of the authorization,
b) the identification label assigned by the Authority,
c) the date of issue and validity period,
d) the list of relevant Slovak and international legal provisions, including the International Atomic Energy Agency's Regulations for the Safe Shipment of Radioactive Materials, under which the shipment is authorized,
e) any restrictions on the shipment mode, the type of the transportation equipment, the shipping container, and eventual possible instructions on the transport route,
f) the following statement:"This permit shall not relieve the consignor from the obligation to comply with the requirements under legal rules of the states to or through which the shipment is to be effected.",
g) a detailed list of additional operational inspections necessary during preparation, loading, transport, disposal, unloading and handling of the consignment, including eventual special provisions concerning disposal in terms of safe heat dispersion and sub-criticality assurance,
h) the reference to information provided by the applicant related to any special activities to be carried out prior to the shipment,
i) the reference to the relevant approval of the transportation equipment type or the consignment project,
j) the specification of the real radioactive content which may not be obvious from the nature of the package file; this shall include the physical and chemical form, the relevant total activity (or activities of various radioisotopes), the amount of possible fission material in grams, and the statement as to whether the material to be transported is not a low dispersed radioactive material,
k) the specification of the relevant quality assurance program.

The Regulatory Authority may bind the authorization by conditions, which it considers necessary.

The Authority may issue authorization for transportation of radioactive materials also under special conditions, which shall contain besides the essentials mentioned above also:

- scope of temperatures of surrounding environment, for which the approval for transport under special conditions was issued,

- detailed list of additional operational controls required during shipment, loading, transport, stowage, unloading and handling with the consignment, including possible special provisions on stowage with respect to safe heat dispersion,
- reasons for transport under special conditions (if appropriate/necessary),
- description of compensation measures to be used, if the transport is taking place under special conditions,
- reference to information provided by the applicant relating to used consignments or specific acts to be performed prior to shipment.

I.1.3 Approval of Transportation Equipment Type

The Authority shall state the following (besides the regular terms) in the decision, in which it approves the type of transportation equipment:

a) The type of approval license (certificate),
b) The identification label assigned by the Authority,
c) The date of issue and validity period,
d) Possible restrictions on the shipment mode,
e) The list of relevant Slovak and international legal provisions, including the International Atomic Energy Agency's Regulations for the Safe Shipment of Radioactive Materials, based on which the type of transportation equipment/consignment project was approved,
f) The following statement: "This permit shall not relieve the consignor from the obligation to comply with the requirements under legal rules of the states to or through which the shipment is to be made".
g) The reference to approval of alternative radioactive content, to validate approvals of other relevant bodies or additional technical data and information according to the requirements of the Authority,
h) The declaration of transportation authorization, if the decision combines approval of consignment project with shipment authorization,
i) Identification of package set,
j) The description of package set in the form of reference to drawings or project specification. If appropriate, also reproducible illustration not larger than 21 x 30 cm, illustrating the consignment together with a brief description, including the used material, total weight, total outside parameters and the appearance,
k) Specification of consignment project with reference to drawings,
l) Specification of authorized radioactive content, including possible restrictions of radioactive content, which may not be obvious from the nature of package set; this shall include the physical and the chemical form, the relevant activity level (or activities of various radioisotopes), the amount of possible fission material in grams, and a statement as to whether the material to be transported is not a low dispersion radioactive material,
m) Additional for consignments of fission material:
    1. Detailed description of authorized radioactive content,
    2. Sub-criticality (CSI) index value,

3. Reference to documentation, which proves the sub-criticality content,
4. Other special circumstances, from which absence of water is assumed in certain free areas when assessing sub-criticality,
5. Any assumptions, based on which decrease of neutron multiplication is expected, as a result of real course of irradiation when assessing sub-criticality,
6. Temperature range of the surrounding environment, for which the type of transportation equipment was approved,

n) For consignments of B(M) type explanatory information, which may be useful for other relevant authorities,
o) Detailed list of additional operational controls required in preparation, loading, stowage, unloading and handling with the consignment, including potential special provisions on stowage with respect to safe heat dispersion,
p) Reference to information provided by the applicant relating to used consignments or specific actions to be performed prior to shipment,
q) Declaration concerning surrounding conditions used in the consignment project,
r) Specification of a relevant quality assurance program,
s) Reference to consignor identity, if necessary.

I.1.4 *Permit for Shipment of Radioactive Sources*

Shipment of radioactive sources, radioactive waste, spent nuclear fuel and radioactive contaminated substances that due to their activity cannot be released from the administrative control, requires permit from the public health authority. This obligation also applies to shipments performed by persons from abroad, having their seat or permanent residence in another Member State (Section 45 par. 9 of Act No. 355/2007 Coll.). The applicant, for the shipment authorisation application, is obliged to provide documentation according to Annex 4 to the Act No. 355/2007 Coll. Section X:

a) Justification for shipment,
b) Transport rules including specification of the type of transport and the arrangements to ensure radiation protection during transport, including the route of transport, if known,
c) Description of technical equipment including loading and unloading of the consignment,
d) Assessment of risk arising from the nature of transported radioactive substances, the mode of transport and the transport route,
e) Emergency plan for transport,
f) Documents on the packaging set,
g) Document on the technical capacity of the means of transport,
h) Document on the ability to operate the means of transport.

The permit for shipment includes:

a) Business name, legal form, seat and identification number,
b) Specification of the authorized activity,
c) The place of performance of authorized activity,

d) Conditions for carrying out activities,

e) The name, surname and address of the professional representative, if any.

I.2 Experience with Transboundary Shipment of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW)

The process of transboundary shipment of RAW is governed by section 16 of Act No. 541/2004 Coll., which implements the Council Directive 2006/117/Euratom of 20 November 2006 on supervision and control during shipment of radioactive waste and spent nuclear fuel.

ÚJD SR issued authorization for shipment of spent nuclear fuel from a research reactor in the Czech Republic to the Russian Federation within the US initiative - Global Threat Reduction Initiative. All transboundary shipments of spent nuclear fuel were made on the basis of consents and authorizations from the relevant regulatory and administrative authorities of the State of Origin after notification to the State of destination and with its consent.

In 2012 ÚJD SR issued authorization for transport of solid RAW from the Czech Republic to the territory of Slovakia, for the purpose of its treatment (compacting) and subsequent shipment of mouldings as products of treatment back to the Czech Republic.

Based on the application from the carrier of RAW, in 2013 ÚJD SR issued authorization (in compliance with the requirements of the Atomic Act - No. 541/2004 Coll.) for shipment of solid RAW. In the period 2012 – 2014 there were 4 shipments of RAW from the Czech Republic for the purpose of treatment in Slovakia and subsequent shipments of products of treatment back to the Czech Republic. *In 2015 another 6 RAW shipments were organized from the Czech Republic for the purpose of their treatment in Slovakia and subsequent shipments of products of treatment back to the Czech Republic.*

In 2015, after the expiry of the permit issued in 2012 ÚJD SR issued a new permit for shipment of solid RAW from the Czech Republic to Slovakia for the period 2015 - 2017, for the purpose of RAW treatment by compacting and incineration, and subsequent transport of products of treatment (moldings and ashes) back to the Czech Republic. When licensing shipment of RAW originating from the Czech Republic and return shipment of products, the process of communication with the authorities of the country concerned took place in accordance with the Act No. 541/2004 Coll. (Atomic Act), and the relevant standard documents were used. In the period of 2015 and 2016, there were 8 RAW shipments from the Czech Republic for the purpose of their treatment in Slovakia and subsequent shipment of products of treatment back to the Czech Republic.

I.3 *Experience with the Transboundary Shipment of Radioactive Sources*

Transboundary shipments of radioactive sources, in terms of radiation protection, are assessed in the same way as national shipments. The consignor, when transporting shipments with a total activity exceeding the activity of exempted shipments or shipments of high level sources, not later than 24 hours prior to the commencement of shipment, shall notify the competent workplace of the national health supervision:

a) The name and address of the consignor and the consignee, their phone numbers or facsimile numbers,

b) Telephone number or facsimile number of the consignor,

c) Date and time of shipment, the mode of transport and the route of shipment,

d) Type of means of transport and in case of motor vehicle also its registration number,

e) Type and physical form of transported radioactive sources and radioactive substances,

f) The time of each border crossing.

J Disused Sealed Sources

Article 28 of the Joint Convention

Disused Sealed Sources

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 re-entry 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.*

For the safety of institutional radioactive waste management, including disused sealed sources, in principle the same, principles apply as for management of sources themselves:

- It is necessary to ensure that the exposure of staff and the public is as low as reasonably achievable,
- It is necessary to ensure that unauthorized handling of sources or waste is prevented.

There are currently around *160* legal and natural persons in Slovakia, who hold an authorization for *collection, storage and* use of sealed and open radioactive sources. These are entities operating in various sectors of the economy, in health care, schools, *in science and research or in other sectors (millitary)*. Workplaces using radioactive sources are within the competence of various state departments – the Ministry of Economy of SR, the Ministry of Health of SR, the Ministry of Agriculture and Rural Development of SR, the Ministry of Education, Science, Research and Sports of SR, the Ministry of Transport and Construction of SR, the Ministry of Interior of SR, as well as the Ministry of Defense of SR.

The Council Directive 2003/122/Euratom on the control of high activity sealed radioactive sources and orphan sources requires from the Member States, inter alia, to ensure “adequate handling of sealed sources, including agreements regarding the transfer of disused sources from suppliers, from other authorized organization or facility“.

The original centralized system for collection of radioactive waste and disused radioactive sources ended due to the split of the Czecho-Slovak Republic. The basis for the new national system was laid by the Government Resolution No. 537/1997, designating responsibility for storage of contaminated radioactive materials in SR to Slovenské elektrárne, a. s. – Decommissioning of nuclear energy installations, radioactive waste and spent nuclear fuel management (SE, a. s. – VYZ), while from 1 April 2008 the obligations were transferred to the current shareholding company, JAVYS, a. s.

There are no sealed sources produced in Slovakia. All sealed radioactive sources are imported mainly from the EU member states and the Russian Federation. After the split of the Czecho-Slovak Republic all entities having authorization for import and distribution of radioactive sources in SR have the obligation imposed on them through a decision of ÚVZ SR, to contractually secure taking back of disused radioactive sources and their return to the foreign producer or supplier. Thus all sealed radioactive sources, after expiration of the recommended period of use, must be returned back to the foreign producer or supplier.

Pursuant to the Government Ordinance No. 348/2006 Coll. on the requirements for ensuring control of high activity sources and abandoned sources, the applicant for an authorization for activities leading to exposure by a high-activity source, is obliged to deposit a financial security at the full cost of collection, sorting, storage, treatment by conditioning for disposal, and disposal of disused radioactive high-activity source as radioactive waste, to an account. Such security is then returned, if the high-activity source was handed over to another user or if the disused source is returned to the supplier or manufacturer.

Currently the *central registry of sources of ionizing radiation, which is maintained at ÚVZ SR,* there are *930* sealed radioactive sources registered. This number does not include radioactive sources, for the use of which it is not necessary to have an authorization from the relevant public health authority: calibration radioactive sources, low activity radioactive sources used as part of various laboratory measuring and analytical instruments, sources used in fire detectors, etc. The number of sealed radioactive sources, which are currently not being used and are stored by individual users, is minimal. Disused sources were gradually disposed of in the past years. In case of high activity radioactive sources the operator is obliged to secure their disposal not later than 12 months after the end of their use. Captured radioactive sources and radioactively contaminated materials of unknown origin are stored at the storage facility of JAVYS, a. s., authorized by the regulatory bodies for this purpose.

The basic legislative requirements for use of sealed radioactive sources are set by the Act No. 355/2007 Coll., setting the basic conditions and requirements for their use (notification and authorization of activities, for which radioactive sources are used), defines the basic duties of the users of radioactive sources and establishes the central register of sources of ionizing radiation.

On Ordinance of the Government No. 348/2006 Coll. concerning requirements for securing control of high activity sources and orphan sources governs the conditions for management of these sources in compliance with the EU legislation.

The Government ordinance No. 345/2006 Coll. in accordance with legislation of EU specifies the requirements for optimizing radiation protection, ensuring radiation protection in use of sealed radioactive sources, sets the exposure limits for the workers and for the public, establishes requirements for storage, transport and use of sealed sources, sets the requirements and procedures for carrying out acceptance tests, leakage tests, long-term stability test and operational stability of sealed sources, certification of sealed sources and also conditions for releasing radioactive materials into the environment.

More detailed requirements for institutional radioactive waste management are established by Decree No. 545/2007 Coll., stipulating the details of requirements for securing radiation protection in activities leading to exposure and activities important with respect to radiation protection.

At present a new radiation protection law is under preparation and its implementing regulations, transposing the requirements of the Council Directive 2013/59/Euratom.

The Government of the Slovak Republic by its Resolution No. 610 of 2 September 2009 approved the draft procedure for institutional radioactive waste management and captured radioactive materials

and charged JAVYS, a. s., to build a complex facility for grading, sorting and long-term safe storage of such materials.

On 25 February 2016, JAVYS, a. s., put into operation the „Facility for the management of IRAW and ZRAM at Mochovce site originating from the whole of SR.
After this facility was put into operation, all IRAW and ZRAM for long-term storage in this facility were transferred from certified storage facilities TSÚ TAO in Bohunice. In addition, on the basis of contracts, IRAW with a total weight of 3,026 kg was collected from NEXIS FIBERS, a. s., Humenné, as well as from Oncological Institute of St. Elizabeth, Bratislava.
As regards the possibility to dispose IRAW, including disused sealed sources at RÚ RAO, all previous studies analyzing this issue arrived at a consistent conclusion that:

- Practically all IRAW originating from use of open sources can be disposed in a suitable manner at RÚ RAO,
- Practically all used sealed sources can be disposed at RÚ RAO provided *that the activity of used sealed sources in the container does not exceed the following values:*

Radionuclide	Limit A [Bq]
^{90}Sr	$3{,}6.10^{9}$
^{137}Cs	$3{,}5.10^{8}$
^{241}Am	$5{,}6.10^{6}$

- Practically all disused sealed sources can be disposed, with the exception of:
  - Sources ^{137}Cs with higher activity (2 pcs),
  - Disused sealed sources, which are alpha-sources, specifically ^{226}Ra (about 180 pcs of radiophores with a total activity of just over 10^{12} Bq), ^{238}Pu itself, or as Pu/Be neutron source, ^{239}Pu, ^{241}Am (approx. 430 pcs) itself or as Am/Be neutron sources.

The sources that cannot be disposed at the RÚ RAO after centralized collection shall be stored at the existing facility in Mochovce for the period until a suitable way of their disposal is found together with other waste from nuclear installations that cannot be disposed at RÚ RAO, and with spent nuclear fuel in a deep repository.

Management of captured nuclear and radioactive materials (orphan)

After the development in recent years basically a routine practice has been established in capturing nuclear and/or radioactive materials, which is based on international practice. *A Joint Guideline has been developed to provide for the activity in case of detecting illegal handling of radioactive or nuclear material*. *An electronic* information system ILTRAM was developed *(*operated by HUMA-LAB APEKO in Košice), *recording the dates and times of events, the notification, notes on events, results of search, material measurements, etc. A*nother information system is under preparation, which will be managed by the Ministry of Interior of the Slovak republic.

In the last approx. 15 years there have been dozens of events in Slovakia of capturing sealed radioactive sources and hundreds of cases, when radioactive contaminated objects/materials have been captured, in particular spare parts for agricultural machinery and spring steel that had been contaminated by ^{60}Co and originated from the Czech Republic. In active search of radioactive contaminated objects, in the period 2002 - 2004 more than 1,600 radioactively contaminated metal parts were discovered, which were contaminated with ^{60}Co mass activity 4.0 to 4.5 MBq/kg. Given the fact that it has been clearly proven that these parts were produced and originate from the Czech Republic, after discussions with the State Authority for Nuclear Safety of the Czech Republic contamined metals were exported back for disposal in the Czech Republic. Except these contaminated parts also sealed radioactive sources, ^{60}Co, ^{90}Sr, ^{137}Cs metal objects/materials contaminated with evaporated-crust from the natural thermal waters and parts of military equipment (instrument of flight deck containing radioactive phosphorescent paint with ^{226}Ra). Recently the number of cases has a decreasing trend and there are less than 20 seizures per calendar year.

Due to limited resources the active search of orphan radioactive sources and radioactively contaminated objects has ceased. Recently all radioactively contaminated objects were captured by companies dealing in particular with collection and treatment of metal waste and perform their own monitoring of radioactivity. The capture of radioactive contaminated substances is notified to ÚVZ SR o*r to the relevant regional public health authorities. In 2016, 9 captured sources of ionizing radiation were reported. These were primarily components of agricultural technologies contaminated with ^{60}Co radionuclide, part of military equipment contaminated by ^{238}U-series, and steel pulp contaminated by ^{238}U-series.*

To reduce the risk of illegal handling of radioactive materials and their possible misuse for terrorist purposes, in December 2011 the Government of the Slovak Republic and the US Government signed a common "Action Plan to combat illegal handling of nuclear and radioactive materials", aimed at prevention, early detection and rapid response to the illegal handling of radioactive materials and their subsequent securing them to avoid threat to the public health or their misuse for terrorist purposes. Qualified organization for handling such substances as well as orphan sources, is JAVYS, a. s. and HUMA-LAB APEKO company.

K General Efforts to Improve Safety

K.1 Implementation of Planned Measures from 2014

- ***Start construction of a facility for centralized collection, sorting and storage of institutional RAW and captured radioactive materials in Mochovce.***

The storage facility for long-term storage of IRAW and ZRAM originating from the whole teritory of Slovakia was built in the immediate vicinity of RÚ RAO in Mochovce. Facility for the IRAW and ZRAM handling, after successful approval, was put into operation in 02/2016, after which all IRAW until then stored at NPP A1 in Jaslovské Bohunice was transferred into this facility (see Section A).

- ***Implement the construction of IS RAW that is under preparation.***

See Section D.2.4.

- ***Prepare construction of dry interim storage facility for SNF.***

ISFS at Jaslovske Bohunice (in operation since 1987) is used for storage of fuel assemblies in a wet pool. After its reconstruction based on the change in the geometry of the layout of stored assemblies, the ISFS has a higher final storage capacity (of 14,112 spent fuel assemblies). Reconstruction also provided for higher seismic resistance and extension of lifetime of the NI ISFS to 50 years.

For the needs of operation of nuclear power plants in SR, it is envisaged to complete the capacity of the current ISFS – by construction of a dry storage facility for SNF, representing enhanced storage capacity at the Jaslovské Bohunice site with additional 18,600 spent fuel assemblies. The construction of a new storage capacity for SNF, as a necessary condition for a safe operation of nuclear units in SR, was assesed within the process under the Act 24/2006 Coll. on environmental impacts assessment as amended, based on which in 02/2016 MŽP SR issued its Final Opinion on the proposed activity under No. 1064/2016-3.4/hp, which recommeds the implementation of the proposed activity. The process of selecting the contractor for the design documentation and construction of new storage capacity for SNF at Jaslovské Bohunice site started in 01/2017 so that the implementation of the investment project was completed with suficient time reserve by the end of 2020 in accordance with the current requirements for storage capacity for SNF originating from nuclar units in SR. For details see Section D.1.2.

- ***Prepare construction of a plant for melting metal RAW in Jaslovske Bohunice.***

Available technology (*high pressure* compacting, cementation, etc.) is *used* for treatment and conditioning of metal RAW. Low level metal waste i*s treated by* fragmentation and decontamination, followed by release of decontaminated material into the environment. *Due to the increase in metal RAW that cannot be released into the environment, facility for melting of metal RAW is currently under way for its treatment and further recycling.*
Completion of the documentation for the building permit is in progress, with the expected date of submission of the application to ÚJD SR in September 2017.

- ***Prepare stage III of decommissioning of NPP A1.***

In accordance with the National Program for Spent Fuel and Radioactive Waste Management the process of decommmissioning of NPP A1 continues after completing stage II.

In order to ensure continuous process of decommissioning of NPP A1, the licensing documentation was developed needed for the review by the state administration authorities. At the same time, for the decommissioning of NPP A1 stage III and IV, and management of RAW from decommissioning, documentation was drafted according to Article 37 of the Euratom Treaty, based on which the European Commission issued positive opinion of the European Commission No. 2015/C 362/1, published in the Official Journal of the European Union on 31 October 2015. In 2016, ÚVZ SR issued an authorization, by which the Authority authorizes the activities „Stage III and IV of decommissioning of the nuclear installation of NPP A1" and ÚJD SR Decision No. 369/2016 of 11 August 2016, by which the Authority authorizes stages III and IV of decommissioning of the nuclear installation NPP A1. For details see Section D.3.2.

- ***Prepare stage II of decommissioning of NPP V1.***

The stage II of decommissioning of NPP V1 started on 01 January 2015 and was in compliance with the approved licensing documentation (ÚJD SR Decision No. 900/2014 of 23 December 2014) with the expected deadline for completion 31 December 2025. The decommissioning of NPP V1 is implemented through partial projects. The individual projects cover all activities necessary for the removal of the nuclear installation from the operation of the Atomic Act (dismantling of equipment, demolition of buildings, waste management from NPP V1, decommissioning, including treatment and safe disposal of radioactive waste in the National Repository for RAW in Mochovce, or safe storage of radioactive waste in the Integral Storage Facility in Jaslovske Bohunice). Following the completion of decommissioning of NPP V1 the site will be released for any further industrial use. The current state of decommissioning of NPP V1 has been continuously monitored, and is in line with the plan for stage II of the decommissioning of NPP V1 as of 31 December 2016. For details see Section D.3.1.

- ***Change in the system of treatment liquid radioactive concentrates in NPP Mochovce – good performance.***

Every operator of a nuclear power plant is obliged to minimize production of radioactive waste. One of the measures taken in 2017 to increase safety is to improve the system for RAW treatment at NPP Mochovce, which will allow significant reduction in the volume of liquid RAW produced so far. The previous method of managing the ra-concentrate in NPP Mochovce was based on their transfer from the storage tanks at NPP Mochovce to the facility – Final treatment of KRAO, where ra-concentrate is fixed into a cement or bitumen matrix. The balance of the existing process of ra-concentrate treatment shows that the activity of the final product intended for permanent disposal reaches a level up to 1 % of the permitted concentration limit, indicating a large reserve in the use of the space in the RÚ RAO at Mochovce.

New devices will be added to the existing system to capture radionuclides from the concentrate by sorbents and then to reduce the volume of inactive concentrate by drying to form crystalline salt. Inactive salts will be released into the environment as hazardous waste (not as RAW).

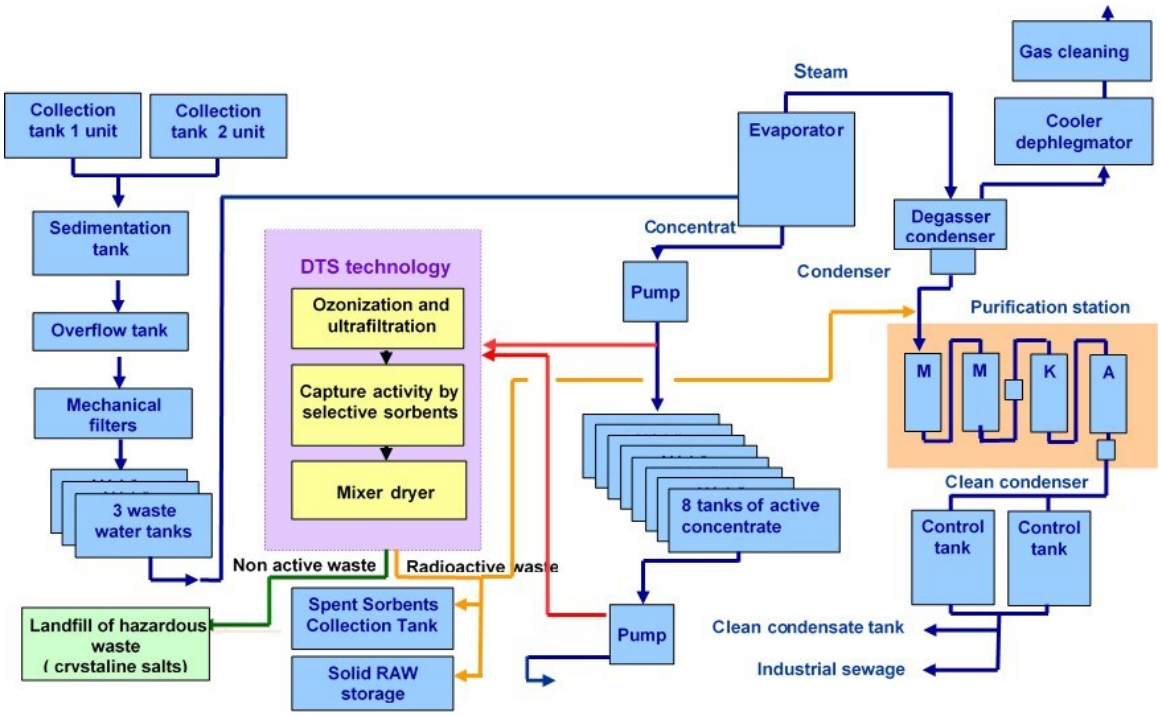


Fig. K.1a) Scheme of treatment of radioactive liquid concentrates

Treatment of radioactive liquid concentrates by DTS/Avantech technology achieves separation of dissolved salts from radioactive nuclides, their crystallization and then released into the environment as „hazardous waste" (in accordance with the Waste Act No. 223/2001 Coll.) with the sum mass activity less than 300 Bq/kg. Radioactive nuclides concentrated into sludge or captured on selective sorbents in the process and thus the resulting volume of radioactive waste is significantly reduced to cca 8 % of the original volume. The new equipment was tested for the existing ra-concentrates under laboratory conditions on a reduced model system.

The facility for treatment of ra-concentrates consists of the following sub-systems:

- *Pre-treatment system – ozone oxidation, powder sorbent cleaning and ultrafiltration,*
- *System of additional cleaning with selective sorbents,*
- *Drying mixer system.*

The system is designed for batch treatment of concentrate with a capacity of about 150m^3/year. Expected completion of design change implementation is 11/2017. The overall scheme of the proposed system of liquid RAW treatment is shown in figures K.1b. This measure is considered as a good performance.

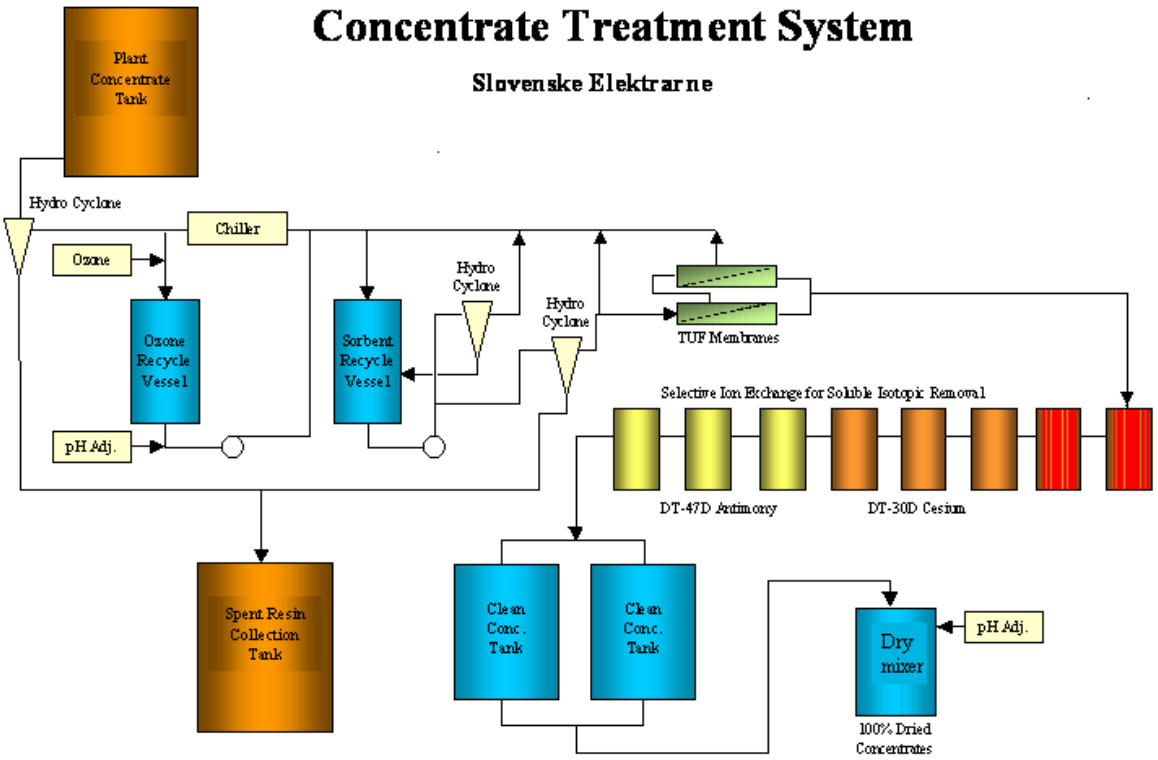


Fig. K.1b) Scheme of liquid RAW treatment

K.2 Planned Measures to Improve Safety

In the coming period, *JAVYS, a. s.* plans to implement the following measures:

- *Putting into operation the Integral RAW Storage Facility in Jaslovske Bohunice;*
- *Complete the construction and put into operation the third double row for low level radioactive waste and the second module of the repository for very low level radioactive waste from the decommissioning of NPP V1 in RÚ RAO,*
- *Building the dry storage for SNF by extending the capacity of the current ISFS,*
- *Building the workplace for melting metal RAW in Jaslovske Bohunice;*
- *Continue in stage III and IV of decommissioning of NPP A1;*
- *Continue in the implementation of stage II of decommissioning of NPP V1;*
- Continue in the implementation of design change in the water purification systems at Units of NPP Mochovce 1&2, which will allow sampling of sorbents to optimize their removal;
- Change in the system of treatment of *liquid* radioactive concentrates in NPP Mochovce.

K.3 International Missions

See Section E.2.1.5.

K.4 Transparency and Public Relations

In the Slovak Republic the right to information is guaranteed by the Constitution and by other documents on human rights since the beginning of 90-ties. The Act No. 211/2000 Coll. (Act on Free Access to Information, as amended) provides to the public a legal way to obtain the necessary information. This Act together with the Act No. 541/2004 Coll. (the Atomic Act) and Act No. 24/2006 Coll. (Act on Environmental Impact Assessment and on amendments and complements to certain laws as amended) form the legislative framework for communication with the public in the field of nuclear energy. Pursuant to the Act No. 541/2004 Coll. (section 27, par. 4) the operator is obliged to inform ÚJD SR on events in the operated nuclear installations and in case of incident or accident in accordance with section 28 par. 3 of the law, he must also inform the public. Among the obligations of the holder of authorization, according to the Atomic Act (Section 10, par 1, letter m), is to inform the public also about assessment of nuclear safety at the nuclear installations operated by the holder of authorization. Act No. 24/2006 Coll. on environmental impacts assessment transposes the EU Directive in the given field (Council Directive 85/337/EC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment as amended), as well as the Aarhus Convention not only in the field of public information, but also public participation on the decision-making processes concerning environmental issues.

The operation, safety improvements at NIs at Bohunice V2 and Mochovce, as well as construction of Units 3&4 in Mochovce, influenced the life in those regions significantly, which has required necessary intensification in the communication with the regions in the vicinity of NIs, as well as on a national level. Transparent information on all aspects of construction, operation and decommissioning and disclosure of publicly available information channels has become an integral part of an open policy of operator and regulators. Among the most significant communication channels are:

Information Centres at Mochovce and Bohunice + field trips directly in the nuclear installations. Every year Bohunice and Mochovce plants are visited by 12 to 15 thousand visitors from across the SR and from abroad + external lectures for schools,

Monthly magazine “atóm.sk” distributed free of charge in the regions of Mochovce and Bohunice and other printed materials (information brochures and leaflets at the Info-centres and on the web sites of operators), where information is made accessible in a comprehensible form,

Web sites of the operators – www.seas.sk, www.javys.sk, and the regulatory authority ÚJD SR – www.ujd.gov.sk.

- *Portal www.slovensko.sk, where the official notice board of ÚJD SR is placed and which acts as the national communication point for all public administration authorities in relation to the public,*
- Civil Information Commissions (hereafter only as CIC) Mochovce and Bohunice, consisting of elected and other representatives of the regional public. Members of CIC hold regular meetings with the management of operators, *as well as with the representatives of the regulator* and thus they are getting qualified firsthand information,

- Regional associations of towns and municipalities, which also communicate and solve their problems in conjunction with the NI operators in the given region *and with the regulator*,
- Programs of local sponsorship of operators assisting in areas, which need it the most and which bring win-win benefits (education, medical services and charity, culture, sports, environment),
- Open Plant for the staff and the public organized every year in each NIs,
- Other: seminars for journalists, mayors and representatives of self-government; press conferences and briefings at significant events, press releases for the media, active participation at national and foreign exhibitions, conferences, etc.

ÚJD SR provides information upon request and at the same time is active in disclosing information on the condition of nuclear installations in SR and on its activity as a regulatory body, by which it allows to the public and the mass-media to check the data and information on nuclear installations, as well as on ÚJD SR. The web site of the authority *(www.ujd.gov.sk)* besides the above mentioned information discloses also the initiated, ongoing and completed administrative proceedings according to the Act No. 71/1967 Coll. on administrative proceedings, as well as decisions issued by ÚJD SR in full together with the rationale. *In addition, ÚJD SR publishes important information on the portal www.slovensko.sk. ÚJD SR has established a touch screen information kiosk, where it is possible to view the administrative proceedings of the Authority (completed and currently ongoing), and also decisions issued by the Authority. The website of the Authority is available there to the public. The touch screen information kiosk is located at the seat of ÚJD SR in Bratislava – in front of the building and is accessible to the public 24 hours a day.*

ÚJD SR has competencies in the field of public information regarding nuclear safety and monitors other media sources with the aim to obtain the necessary overview on the information policy of the given entity. ÚJD SR is a regulatory body, which independently from operators of nuclear installations provides information on nuclear safety of nuclear installations including information on the safety of radioactive waste, spent nuclear fuel management, nuclear materials, their control and record keeping, as well as information on other stages of fuel cycle.

Every year, in accordance with the Atomic Act, ÚJD SR prepares an Activity Report on the results of activities of ÚJD SR and on safety of nuclear installations for the past year, which is submitted to the Government and to the National Council. In addition an Annual Report is published in Slovak-English version, which is distributed to libraries, to the ministries, to other bodies of state administration, to state organizations, to the embassies of foreign countries in Slovakia, the embassies of SR abroad, foreign regulatory bodies, international and other organizations and schools. *The Annual Report is published on the ÚJD SR website.*

ÚJD SR places extraordinary emphasis on communication with the public in the region with nuclear installations, striving for continuous improvements in a form of cooperation with Civic Information Commission, the representatives of municipalities, as well as by distribution of information materials, such as annual reports, leaflets and by making contributions to the regional press and TV.

In cooperation with Civic Information Commission or with the municipalities discussions are being organized with the public both on nuclear safety, as well as radioactive waste management.

Every year ÚJD SR sends contributions on its domestic and foreign activities to the press agencies of SR, to the daily papers and to electronic media and organizes press conferences for the journalists. ÚJD SR together with the State Authority for Nuclear Safety of the Czech Republic (SÚJB) is a publisher of a “Safety of Nuclear Energy Sector“ journal focusing on presenting the latest knowledge in the field of nuclear safety in SR and in Czech Republic.

With regard to emergency preparedness the district offices and the municipalities according to the Act No. 42/1004 Coll. on civil protection of the public publish information for the public on the web site or on a public information board, while there is a 30 days period, during which the affected public may file comments. Justified comments are adequately taken into account when developing a public protection plan. Information are reviewed and updated as needed; they are published in the updated form at least once in three years. Information for the public include in particular information on the source of threat, information on the possible extent of an extraordinary event and consequences on the affected area and on the environment, hazardous properties and identification of substances and preparations that may cause an incident, information about the method of warning the public and on rescue works, tasks and measures after an extraordinary event, details on where to obtain further information relating to the public protection plan. Bodies of state administration and of self-government publish manuals for the public containing advice for the public, the aim of which is to provide as much information as possible on how to proceed and how to behave in case of natural disasters, accidents or disasters. Since 1999 the Ministry of Interior of the Slovak Republic has been publishing a non – fiction periodical, Civil protection, a review for the civil protection of the public. It is addressed to all those, who are actively involved in fulfilment of tasks resulting from Act No. 42/1994 Coll., but also to all readers, who are interested in the issues of civil protection. In the individual categories the review brings up-to-date information, publishes methodological inserts dedicated to practical fulfilment of tasks of civil protection, etc. Separate room is given also to the self-government.

Fig. K.3 Open Doors Day at Mochovce NPP

L Annexes

I. List of Nuclear Facilities for Spent Fuel and RAW Management

II. Indicative values of Radioactive Material Discharges into Atmosphere and Hydrosphere

III. List of Nuclear Installations in Decommissioning

IV. Inventory of Stored Spent Nuclear Fuel (t_{TK})

V. Inventory of Stored RAW

VI. List of National Laws, Decrees and Guidelines

VII. List of International Expert Reports (including Safety Reports)

VIII. List of Authors

Annex I. List of Nuclear Facilities for Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) Management

Slovenské elektrárne, a. s. (SE, a. s.) operates:

- Nuclear Power Plants Jaslovské Bohunice, NPP V2 - Units 3 & 4
- Nuclear Power Plants Mochovce, Units 1 & 2

Jadrová a vyraďovacia spoločnosť, a. s. (JAVYS, a. s.) operates:

- Interim Spent Fuel Storage at Jaslovské Bohunice
- Technologies for RAW Treatment and Conditioning at Jaslovské Bohunice;
- National RAW Repository Mochovce;
- Final Treatment of Liquid RAW Mochovce.

Other nuclear installations are listed in Annex III.

Annex II. Indicative Values of Radioactive Material Discharges into Atmosphere and Hydrosphere

Prior to commissioning of NIs at both sites in SR common *indicative values* of discharges were set for each site.

After establishment of two entities at Jaslovské Bohunice site in 2006 (JAVYS, a. s. and SE, a. s.) initiated the division of *indicative values* for discharges sharing it almost equally between SE, a. s. (i. e. NPP V2) and JAVYS, a. s. (i. e. NPP V1, NPP A1, technology for RAW treatment and conditioning – TSÚ RAO and ISFS). The permanent shutdown of of NPP V1 and the fact that discharges from the facilities for RAW and spent fuel treatment are significantly lower than the discharges from the NPP operation, new *indicative values* were approved for discharges in 2011.

Gaseous discharges				
Annual discharge *indicative values* for group of NIs	Noble gases (any mixture)	Iodines (gaseous and aerosol phase)	Aerosols – mixture of long-lived radionuclides	Sr $^{89, 90}$
	Bq/year	Bq/ year	Bq/ year	Bq/ year
Jaslovské Bohunice site after 2011				
JAVYS, a. s. (incl. NPP V1)	-	-	$8{,}1.10^{10}$	$1{,}7.10^{8}$
SE, a. s. NPP V2	2.10^{15}	$6{,}5.10^{10}$	8.10^{10}	$1{,}4.10^{8}$
Mochovce site after 2011				
NPP Mochovce 1 & 2	$4{,}1.10^{15}$	$6{,}7.10^{10}$	$1{,}7.10^{11}$	unlimited
Liquid discharges				
Annual discharges *indicative values* for group of NIs	Tritium Bq/rok		Other corrosive and fission products Bq/rok	
	recipient Váh	recipient Dudváh	recipient Váh	recipient Dudváh
Jaslovské Bohunice site after 2011				
JAVYS, a. s. (incl. NPP V1)	$1{,}2.10^{13}$	$5{,}7.10^{10}$	$2{,}5.10^{10}$	$2{,}5.10^{8}$
SE, a. s. NPP V2	2.10^{13}	2.10^{11}	$1{,}3.10^{10}$	$1{,}3.10^{8}$
Mochovce site after 2011				
NPP Mochovce 1 & 2	$1{,}2.10^{13}$		$1{,}1.10^{9}$	

Annual indicative values of liquid discharges from the National Repository for Radioactive Waste (RÚ RAO)

Nuclide	Annual activity *indicative value* [Bq]/year
H^{3}	$1{,}88.10^{10}$
Cs^{137}	$2{,}28.10^{7}$
Sr^{90}	$2{,}44.10^{8}$
Co^{60}	$2{,}24.10^{7}$
Pu^{239}	$5{,}56.10^{5}$

Annex III. List of Nuclear Installations in Decommissioning

Jadrová a vyraďovacia spoločnosť, a. s. (JAVYS, a. s.):

- Nuclear Power Plant Jaslovské Bohunice - NPP A1 (incl. Technology for RAW management from this NPP installed within its premises),
- Nuclear Power Plant Jaslovské Bohunice - NPP V1 (Units 1and 2).

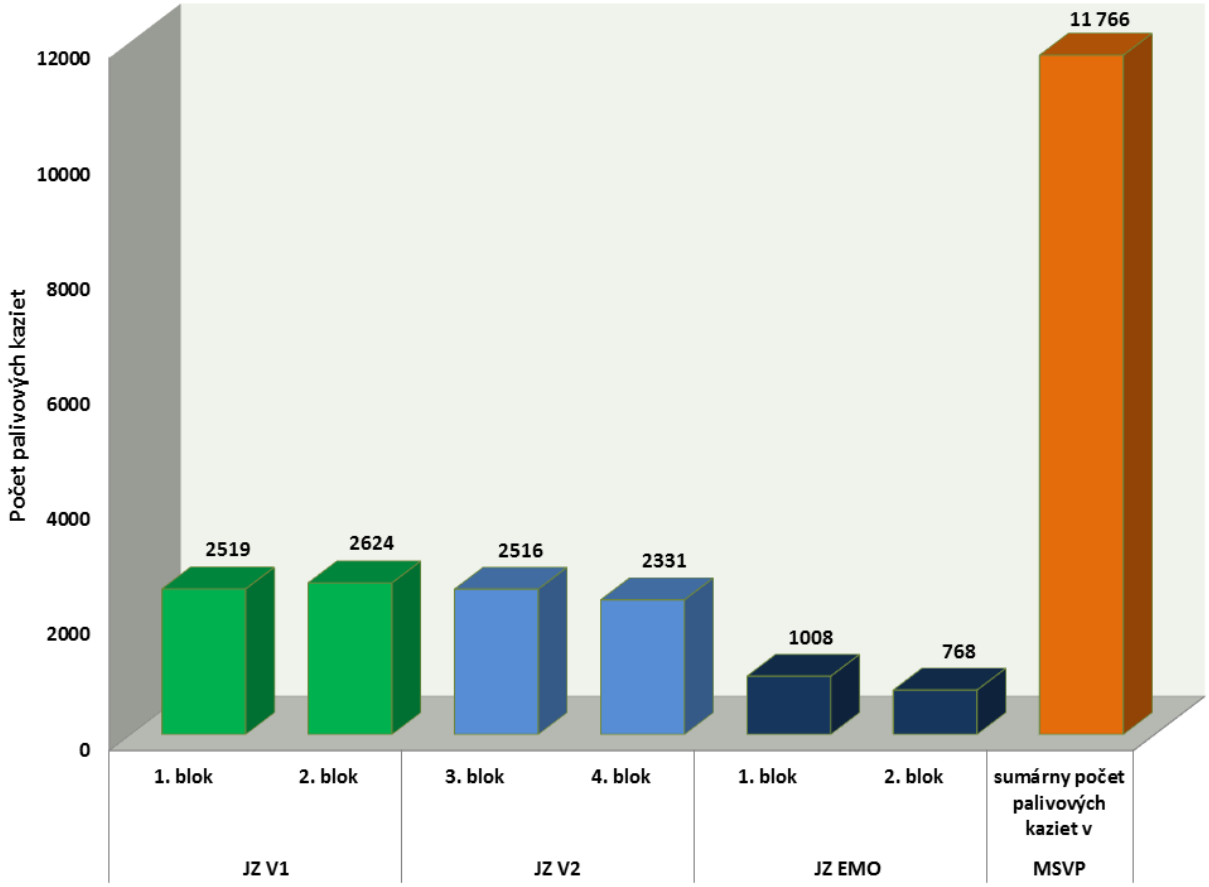
Annex IV. Inventory of Stored Spent Nuclear Fuel (t_{TK}) (as at 31 December 2016)

The Interim Storage Facility for spent nuclear fuel of JAVYS, a. s. as at 31 December *2016* stored *11,766* SNF from the production of NI V1, V2 and NPP Mochovce, in the following breakdown:

- 5 143 fuel assemblies produced by reactor Units of NI V1,
- *4 847* fuel assemblies produced by reactor Units of NI V2,
- *1 776* fuel assemblies produced by reactor Units of NI Mochovce.

The maximal design storage capacity of ISFS 14 112 of SNF has been used up to *83.38* %.

Quantity of SNF disposed in ISFS structured by individual NIs and Units



The SNF storage pools in NPP V2 and NPP Mochovce, as at 31 December 2016 there were 1,336 SNF assemblies stored, in the following breakdown:

- *600 fuel assemblies from the production of reactor Units of NPP V2;*
- *736 fuel assemblies from the production of reactor Units of NPP Mochovce.*

Annex V. Inventory of Stored RAW

V.1 Inventory of Stored Radioactive Waste (RAW) at NPP V1 (as at 31 December 2016)

Filling of storage capacities for storage of solid RAW

Storage of solid RAW

Storage	Total capacity [m^3]	Filled capacity [m^3]	Available [m^3]
Total	2507	664,4	1842,6

Storage of RA-concentrate

Tank	Capacity [m3]	Filled capacity [m3]	Available space [m3]
Total	4 215	157,19	4 057,81

Storage of low level active and medium level active sorbents

Tank	Capacity [m^3]	Filled capacity [m^3]	Volume converted to total salinity 190g/l [m^3]	Available volume [m^3]
Total	1584	0	nemerané	1584

Storage of solid radwaste with higher activity (Mogilnik)

Tank	Capacity [m^3]	Filled capacity [m^3]	Available volume [m^3]
Total:	83	11,7	71,3

Total capacity of storage: 399 cells

Stored: 32 tons, *11,7 m^3*

Storage for intermediate activity RAW is filled to about 90 % of the total design capacity

V.2 Inventory of Stored Radioactive Waste (RAW) at NPP V2 (as at 31 December 2016)

Storage of solid RAW on pallets

Storage	Total capacity /pallets/	Utilization /pallets/	Available /pallets/	Note
Total	1 920	793	1 127	

Storage of solid RAW at storage facilities without internal structure

Storage	Total capacity /drums/	Utilization /drums/	Availablei /drums/	Note
Total	11 490	720	10 770	

Storage of air filters at the storage 108/12

Cell No.	*Capacity [pcs]*	*Utilization [pcs]*	*Available area [pcs]*
Total	*912*	*464*	*448*

Storage of solid RAW with higher activity (Mogilnik)

Total capacity of storage facility: 529 cells

Utilized: *225* cells

Empty: *304* cells

Storage of RA-concentrate

Pond	*Capacity [m³]*	*Utilization [m³]*	*Available volume [m³]*
Total	*4 310*	*1 505,7*	*2 804,3*

Storage of ion exchange resins

Pond	*Capacity [m³]*	*Utilization [m³]*	*Available volume [m³]*
Total	*920*	*150,8*	*769,2*

V.3 Inventory of Stored Radioactive Waste (RAW) at NPP Mochovce (as at 31 December 2016)

Storage of solid RAW in bags on pallets

Storage	***Capacity /pallets/***	***Utilization /pallets/***	***Available volume /pallets/***
Total	*672*	*7*	*665*

** Volume of one pallet is 0,5 m³*

Storage of solid RAW in drums on pallets

Storage	***Capacity (pallets/pcs drums)***	***Utilization (pallets/pcs drums)***	***Available volume (pallets/pcs drums)***
Total	*456/1 824*	*59/236*	*397/1 588*

** Volume of drum is 0,2 m³*

Storage of solid RAW in storage without internal structure

Storage	***Capacity (m3)***	***Utilization (m3)***	***Available volume (m3)***
Total	*1 782*	*1,2*	*1 780,8*

Storage of RA-concentrate

	Capacity (m3)	***Real utilization (m3)***	***Summary beta activity (kBq/l)***	***Available volume (m3)***
Total	*2 110*	*1 040,6*	*617*	*1 069,4*

** Analysis of concentrate samples from 12/2016*

Storage of ion exchange resins

Pond	***Capacity***	***Utilization***	***Available volume***
Total	*460*	*79,12*	*380,88*

V.4 Inventory of Stored Radioactive Waste (RAW) at JAVYS, a. s., (as at 31 December 2016)

RAW stored at the facilities of JAVYS, a. s.

Secondary RAW occurs in the current time in connection with decontamination, disassembly and demolition works in nuclear installations, which are in decommissioning (NPP A1).

Due to historical reasons, RAW from NPP A1 Bohunice represents a special problem, since it was not either consistently sorted nor registered during operation of this installation. A large amount of liquid operational RAW was already been treated and conditioned for disposal, or the activity of these waste was decreased. Continuously occurring concentrates (approx. 35 m^3 per year) are every year treated by cementation. By the end of year *2016* the summary inventory of liquid (including not concentrated) RAW represented *345,235* m^3.

Aggregate amounts of solid RAW at NPP A1 in *2016* reached *1 435,881 tons of* metal RAW*, 389,708 tons of other RAW, 4 987,486 tons of* contaminated soil and debris *and 14 087,4 tons of VNAO.*

Storage	Total capacity [m^3]	Utilization [m^3]	Available capacity [m^3]
Total	***2 022,8***	***1 810,6***	***212,2***

Storage areas for storage of solid radwaste are filled with 200 l drums of MEVA type (max.10 114 drums).

(1 m^3 = 5 drums)

As at *31 December 2016* the certified storage facilities of JAVYS, a. s., contained *9,053* drums with solid RAW in total – of which:

- *188* drums with solid burnable RAW,
- *666* drums with compactible RAW (of which 91 drums with HVAC filters),
- *175* drums with RAW intended for sorting.
- *5,941* drums with metal RAW,
- 40 drums with solid RAW determined for VBK without treatment (drums with bitumen and cement product),
- *2017* drums - clay, concrete, gravel and non-fixed RAW,
- *26 drums with ash.*

Inventory of solid RAW placed in objects of JAVYS, a. s.:

No.	RAW type	Volume [m3]	Weight [t]
	Total	***18 248***	***21 365,23***

Inventory of liquid RAW JAVYS, a. s. in total: 596,785 m^3

V.5 Amounts of Radioactive Waste (RAW) treated or conditioned at TSÚ RAO at Jaslovské Bohunice and FS KRAO at Mochovciach during 2014 - 2016

NI TSÚ RAO + NI FS KRAO	***Conditioned (treated)***	***In 2014***	***In 2015***	***In 2016***
Filled VBK		*410 pcs*	*515 pcs*	*400 pcs*
Transported to RÚ RAO		*393 pcs*	*546 pcs*	*420 pcs*
NI TSÚ RAO	***Type of waste***	***Amount***	***Amount***	***Amount***
Operational set (PS) - BSC RAW	*- washing liquid, sludge, ion*	*13,663 m3*	*15,44 m3*	*24,189 m3*
PS 04 – Cementation	*exchange resins*	*0 m3*	*0 m3*	*10,387 m3*
	- bitumen product			
	- mouldings, ashes	*75,977 m3*	*174,032 m3*	*159,904 m3*
	- other matrix	*85,308 m3*	*354,789 m3*	*352,537 m3*
PS 06 - Incinerator	*Solid RAW (total)*	***74,281 t***	***103,077 t***	***115,02 t***
	NPP A1	*41,647 t*	*16,062 t*	*32,239 t*
	NPP V1	*5,39 t*	*5,765 t*	*2,223 t*
	NPP V2	*8,985 t*	*19,167 t*	*19,917 t*
	E Mochovce 1,2	*10,814 t*	*14,921 t*	*12,520 t*
	Other producers	*7,445*	*47,163*	*48,121 t*
	Liquid RAW (total)	*7,794 m^3*	*18,666 m^3*	*10,318 m^3*
	NPP A1- dowtherm, oil	*7,794 m^3*	*2,662 m^3*	*0,251 m^3*
	NPP V1 – oil	*0 m^3*	*0,0 m^3*	*0 m^3*
	NPP V1 – sorbents	*0 m^3*	*0 m^3*	*0 m^3*
	NPP V2- sorbents	*0 m^3*	*0*	*8,1108 m^3*
	Other producers	*0 m^3*	*16,004*	*1,9562 m^3*
PS 08 - Compactor	*Total*	***290,1744 t***	***290,487 t***	***277,314 t***
	NPP A1	*219,0769 t*	*232,173 t*	*198,314 t*
	NPP V1	*7,65 t*	*7,848 t*	*25,981 t*
	NPP V2	*27,9655 t*	*11,275 t*	*4,366 t*
	NPP Mochovce 1,2	*9,938 t*	*10,566 t*	*6,924 t*
	Other producers	*25,544*	*28,584*	*41,729 t*
	IRAW	*0*	*0,041*	*0*
PS 03 –	*Total*	*0 m^3*	*0 m^3*	*0 m^3*
Concentration	*Concentrate NPP V1*	*0 m^3*	*0 m^3*	*0 m^3*
	Concentrate NPP V2	*0 m^3*	*0 m^3*	*0 m^3*
PS 05 - Sorting	*Solid RAW*	*19,611 t*	*4,313 t*	*5,88 t*
Operating set - 809	*KCV*			
Concentration KCV at PS 44, PS 100	*NPP A1*	*0 m^3*	*0 m^3*	*0 m^3*
	NPP V1	*0 m^3*	*0 m^3*	*0 m^3*
	NPP V2	*0 m^3*	*0 m^3*	*0 m^3*
DBL	*Sorbents*	*0 m^3*	*0 m^3*	*0 m^3*
Operating set – obj. 41	*RA - water*	*1292,8 m3*	*976,1 m3*	*958 m3*

Operating set – Plant for treatment of metal RAW	*Metal RAW (total)* *NPP A1* *NPP V1* *NPP V2* *Other producers*	*208,057 t* *109,823 t* *59,553 t* *25,664 t* *13,017*	*240,576 t* *221,344 t* *7,744 t* *5,21 t* *6,278*	*263,817 t* *251,339 t* *7,361 t* *5,117 t* *0 t*
Operating set – *treatment of air filters – PS 009*	*VZT – filters (total)* *NPP A1* *NPP V1* *Other producers*	*14,787 t* *11,782 t* *2,592 t* *0,413*	*16,5 t* *13,595 t* *1,945 t* *0,96 t*	*17,067 t* *9,993 t* *0,468 t* *6,606 t*
NI FS KRAO	***Type of waste***	***Amount***	***Amount***	***Amount***
Concentration KCV	*Concentrate* *NPP Mochovce 1,2*	*0 m^3*	*0 m^3*	*0 m^3*
Cementation of RAW	*Cementation* *bit. prod. from KCV* *bit. prod. rom DBL* *other matrix*	*0 m^3* *22,542 m^3* *37,791 m^3*	*0 m^3* *4,199 m^3* *201,552 m^3*	*0 m^3* *54,587 m^3* *92,378 m^3*
DBL – FS KRAO	*sorbents*	*26,0 m^3*	*26,211 m^3*	*17,186 m^3*

RAW disposed at the national repository at Mochovce

By the end of *2016* there were *4 804* of VBK disposed in total, representing cca *14 892,4* m^3 solidified RAW from NPP A1, NPP V1 and NPP V2 and NPP Mochovce *1,2.* Substantial part of this waste was formed by concentrates in a form of bituminisation product or cement mix for VBK and solid waste treated before pouring into VBK by high pressure compacting.

Annex VI. List of Selected National Laws, Decrees and Guidelines

- Act No. 71/1967 Coll. on Administrative Procedure *(správny poriadok)* – the latest amendment as Act *No. 149/2017 Coll.*
- Act No. 50/1976 Coll. on land use planning and the building code (the Building Act) – the latest amendment as Act No*. 247/2015 Coll.*
- Act No. 42/1994 Coll. on civil protection of the population – the latest amendment as Act No*. 125/2016 Coll.*
- Act No. 264/1999 Coll. on technical requirements for products and on conformity assessment and on amendments and complements to certain laws – the latest amendment as Act No*. 51/2017 Coll.*
- Act No. 575/2001 Coll. on organization of government activities and on organization of the central state administration – the latest amendment as Act No*. 138/2017 Coll.*
- Act No. 215/2004 Coll. on protection of classified information and on amendments to certain laws – the latest amendment as Act No. 51*/2017 Coll.*
- Act No. 220/2004 Coll. on protection and utilization of agricultural land and on amendment to Act No. 245/2003 Coll. on integrated prevention and on environmental pollution control and on amendments to certain laws as amended – last amendment, Act No. *254/2015 Coll.*
- Act No. 541/2004 Coll. on the Peaceful use of nuclear energy (the Atomic Act) and on amendment and alternations of several acts as amended – the latest amendment as Act No*. 96/2017 Coll.*
- Act No. 251/2012 Coll. on energy sector and on amendments and complements to certain laws – the latest amendment as Act No*. 315/2016 Coll.*
- Act No. 24/2006 Coll. on environmental impact assessment and on amendments to certain laws *as amended* – the latest amendment as Act No*. 142/2017 Coll.*
- Act No. 124/2006 Coll. on occupational health and safety and on amendments to certain laws – the latest amendment as Act No*. 378/2015 Coll.*
- Act No. 125/2006 Coll. on labour inspection and on amendment to Act No. 82/2005 Coll. on undeclared work and illegal employment and on amendments to certain laws – *the* latest amendment as Act No*. 82/2017 Coll.*
- Act No. 355/2007 Coll. on protection, support and development of public health and on amendments and complements to certain laws – the latest amendment as Act No. *150/2017 Coll.*
- Act No. 238/2006 Coll. on the National Nuclear Fund for decommissioning of nuclear installations and on spent nuclear fuel and radioactive waste management (Act on Nuclear Fund) and on amendments to certain laws – the latest amendment as Act No. 143/2013 Coll.
- Act No. 309/2009 Coll. on promotion of renewable sources of energy and high efficiency cogeneration and on amendments to certain laws – last amendment Act No. *173/2015 Coll.*
- *Act No. 254/2011 Coll. on transportable pressure equipment and on amendments to certain laws as amended by Act No. 51/2017 Coll.*
- *Act No*. *250/2012* Coll. on regulation in network industries – *the last amendment of Act No. 164/2017 Coll.*

- Act No. *133/2013* Coll. on building products *and on amendments to certain laws as amended by Act No. 91/2016 Coll*.
- *Act No. 54/2015 Coll. on civil liability for nuclear damage and on its financial coverage and on amendments to certain laws.*
- Government Ordinance No. 35/2008 Coll. laying down the details of technical requirements and conformity assessment procedures for personal protective equipment.
- *Government Ordinance No. 149/2016 Coll. on equipment and protective systems intended for use in potentially explosive atmospheres.*
- *Government Ordinance No. 234/2015 Coll. on making available simple pressure vessels on the market.*
- *Government Ordinance No. 1/2016 Coll. on making available pressure equipment on the market.*
- *Government Ordinance No. 148/2016 Coll. on making available electrical equipment intended for use within certain voltage limits on the market.*
- Government Ordinance No. 436/2008 Coll. laying down the details of technical requirements and conformity assessment procedures for machinery – as amended by *Government ordinance* No. 140/2011 Coll.
- Government Ordinance No. 194/2005 Coll. on electromagnetic compatibility as amended by Government Ordinance No. 318/2007 Coll.
- Government Ordinance No. 276/2006 Coll. on minimal safety and health requirements for work with display units.
- Government Ordinance No. 340/2006 Coll. on requirements for health protection of individuals against the dangers of ionizing radiation in relation to medical exposure – as amended by Government Ordinance No. 85/2007 Coll.
- Government Ordinance No. 345/2006 Coll. on the basic safety standards for the protection of health of workers and the general public against the dangers arising from ionizing radiation (transposing the Council Directive 96/29/Euratom of 13 May 1996).
- Government Ordinance No. 346/2006 Coll. on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled area (transposing the Council Directive 1990/641/Euratom of 4 December 1990).
- Government Ordinance No. 348/2006 Coll. on requirements for the control of high activity sealed sources and orphan sources - as amended by Government Ordinance No. 497/2011 Coll. (transposing Council Directive 2003/122/Euratom of 22 December 2003).
- Government Ordinance No. 387/2006 Coll. on requirements for ensuring safety and health signs at work *as amended by Government Ordinance No. 104/2015 Coll.*
- Government Ordinance No. 391/2006 Coll. on minimal safety and health requirements for a workplace.
- Government Ordinance No. 392/2006 Coll. on minimal safety and health requirements when using work equipment.

- Government Ordinance No. 393/2006 Coll. on minimal requirements for safety and health at work in potentially explosive environment.
- Government Ordinance No. 395/2006 Coll. on minimal requirements for provision and use of personal protective equipment.
- Government Ordinance No. 396/2006 Coll. on minimal safety and health requirements for a construction site.
- Government Ordinance No. 312/2007 Coll. laying down the details on the method of collection and payments of mandatory contribution to the National Nuclear Fund for decommissioning of nuclear installations and for spent nuclear fuel and radioactive waste management as amended by Government Ordinance No. 145/2012 Coll.
- SÚBP Decree No. 59/1982 Coll., setting out the basic requirements to ensure safety at work and safety of technical equipment as amended by SÚBP Decree No. 484/1990 Coll.
- SÚBP Decree No. 25/1984 Coll. to ensure safety at work in low pressure boiler houses as amended by the Decree No. 75/1996 Coll.
- Regulation of MPSVaR SR No. 147/2013 Coll., establishing details for ensuring safety and protection of health at construction works and related works, and details on professional competence for performance of certain work activities – *the latest amendment MPSVaR SR Decree No. 100/2015 Coll.*
- SÚBP Decree No. 208/1991 Coll. on safety at work and safety of technical equipment in operation, maintenance and repair of vehicles.
- MŽP SR Decree No. 453/2000 Coll. implementing certain provisions of the Building Act.
- MŽP SR Decree No. 55/2001 Coll., on land use planning supporting documents and land use planning documentation.
- MPSVR SR Decree No. 508/2009 Coll. laying down the details for ensuring occupational health and safety for working with pressure, lifting, electric and gas technical equipment and determining technical equipment considered as classified technical equipment - as amended by *Decree of MPSVR SR No. 234/2014 Coll.*
- MZ SR Decree No. 524/2007 Coll. setting out the details on the Radiation Monitoring Network.
- MZ SR Decree No. 528/2007 Coll., setting out the details on the requirements for limitation of exposure from natural radiation – *as amended by Decree of MZ SR No. 295/2015 Coll.*
- MZ SR Decree No. 545/2007 Coll., laying down the details on requirements for ensuring radiation protection in activities leading to exposure and activities important in terms of radiation protection.
- MV SR Decree No. 533/2006 Coll. on details regarding protection of the public against effects of hazardous substances as amended by Decree of MV SR No. 160/2012 Coll.
- ÚJD SR Decree No. 46/2006 Coll. on special materials and equipment, which fall under the regulation by the Nuclear Regulatory Authority of the Slovak Republic.
- ÚJD SR Decree No. 48/2006 Coll. laying down the details on the method of notification of operational events and events during transportation and the details on investigating their causes as amended by ÚJD SR Decree No. 32/2012 Coll.

- ÚJD SR Decree No. 51/2006 Coll. laying down the details on the requirements for ensuring physical protection.
- ÚJD SR Decree No. 52/2006 Coll. on professional competence as amended by ÚJD SR Decree No. 34/2012 Coll.
- ÚJD SR Decree No. 54/2006 Coll. on registration and control of nuclear materials and on notification of selected activities.
- ÚJD SR Decree No. 55/2006 Coll. on the details in emergency planning for the case of incident or accident as amended by ÚJD SR Decree No. 35/2012 Coll.
- ÚJD SR Decree No. 57/2006 Coll. laying down the details on the requirements during transportation of radioactive materials – *the latest amendment ÚJD SR Decree No. 105/2016 Coll.*
- ÚJD SR Decree No. 58/2006 Coll. laying down the details of the scope, content and the method of preparation of documentation of nuclear installations necessary for individual decisions as amended by ÚJD SR Decree No. *102/2016* Coll.
- ÚJD SR Decree No. 430/2011 Coll. on requirements for nuclear safety – *as amended by ÚJD SR Decree No. 103/2016 Coll.*
- ÚJD SR Decree No. 431/2011 Coll. on quality management system – *as amended by ÚJD SR Decree No. 104/2016 Coll.*
- ÚJD SR Decree No. 30/2012 Coll. laying down the details on the requirements for nuclear materials, radioactive waste and spent nuclear fuel management – *as amended by ÚJD SR Decree No. 101/2016 Coll.*
- *ÚJD SR Decree No. 33/2012 Coll. on the regular, comprehensive and systematic assessment of nuclear safety of nuclear installations as amended by ÚJD SR Decree No. 106/2016 Coll.*
- *ÚJD SR Decree No. 170/2015 Coll., establishing a list of radioactive materials, their quantities and their physical and chemical parameters justifying a low risk of nuclear damage.*
- The Treaty establishing the European Atomic Energy Community (1957).
- *Consolidated version of the Treaty establishing the European Atomic Energy Community (2016/C 203/01) O.J. EU C 203, 26 October 2012.*
- Council Regulation (Euratom) No. 87/3954/Euratom of 22 December 1987 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency as amended by Council Regulation No. 89/2218/Euratom of 18 July 1989.
- Commission Regulation (Euratom) No. 90/770 of 29 March 1990 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feeding-stuffs following a nuclear accident or any other case of radiological emergency.
- Council Regulation (Euratom) No. 1493/93 of 8 June 1993 on shipments of radioactive substances between member states as amended.

- Council Regulation (Euratom) No. 2587/1999 of 2 December 1999 defining investment projects, which must be notified to the European Commission in compliance with the Article 41 of the Treaty establishing the European Atomic Energy Community.
- Commission Regulation (EC) No. 1209/2000 of 8 June 2000 determining procedures for effecting the communications prescribed under Article 41 of the Treaty establishing the European Atomic Energy Community as amended by the Commission Regulation (Euratom) No. 1352/2003 of 23 July 2003.
- Commission Regulation (Euratom) No. 302/2005 of 8 February 2005 on the application of Euratom safeguards.
- *Council Regulation (EC) 428/2009 of 5 May 2009, setting up a Community regime for the control of exports, transfer, brokering and transit of dual use items – latest amendment - Delegated Commission Regulation (EU) 2016/1969 of 12 September 2016, amending Council Regulation (EC) 428/2009, setting up a Community regime for the control of exports, transfer, brokering and transit of dual use items.*
- Commission Regulation (Euratom) No. 66/2006 of 16 January 2006 exempting the transfer of small quantities of ores, source materials and special fissile materials from the rules of the chapter on supplies.
- Directive 62/302/EC of 5 March 1962 on freedom to take skilled employment in nuclear energy.
- Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against dangers arising from ionizing radiation, repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.
- Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent nuclear fuel.
- Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations *with the effect for SR from 15 August 2017 as amended by Directive 2014/87/Euratom*.
- Council Directive 2011/70/Euratom of 19 July 2011 establishing the Community framework for the responsible and safe management of spent fuel and radioactive waste.
- Directive of the European Parliament and the Council 2012/18/EU of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC.
- *Council Directive 2013/59/Euratom of 05 December 2013, laying down basic safety standards for the protection from the dangers arising from ionizing radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.*
- *Council Directive 2014/87/Euratom of 8 July 2014, amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations.*

- Commission Recommendation *2006/40/ES* of 15 December 2005 on guidelines for the application of Regulation (Euratom) No. 302/2005 on application of Euratom safeguards.
- *Commission Recommendation 2006/851/Euratom of 24 October 2006 on the management of funds for the decommissioning of nuclear installations and the management of spent fuel and radioactive waste.*
- *Commission Recommendation 2008/956/Euratom of 4 December 2008 on the criteria for exports of radioactive waste and spent nuclear fuel to third countries.*
- Commission Recommendation *2009/120/Euratom* of 11 February 2009 on implementation of accounting and record keeping and control of nuclear materials by the operators of nuclear installations.
- Commission Recommendation *2009/527/Euratom* of 7 July 2009 for safe and effective system of sending documents and information in connection with the provisions of Council Directive 2006/117/Euratom.
- Council Decision 87/600/Euratom of 14 December 1987 on Community arrangements for the early exchange of information in the event of radiological emergency.
- *Commission Decision 2008/312/Euratom of 5 March 2008 establishing a standard document on the supervision and control of shipments of radioactive waste and spent nuclear fuel, as provided for in the Council Directive 2006/117/Euratom.*
- *Council Decision 2013/434/EU of 15 July 2013 authorizing certain Member States to ratify, in the interest of the European Union, the Protocol amending the Vienna Convention on Civil Liability for Damage caused by the nuclear event of 21 May 1963 or to accede to it and make a declaration on the application of the relevant internal rules of the Union law.*

Safety Guides of ÚJD SR:

BNS III.4.1/2000	Requirements for issuing authorization by ÚJD SR for use of fuel in WWER-440 reactors.
BNS III.4.3/2000	Requirements on assessment for fuel loading.
BNS I.8.1/2005	Specification on the scope of Preliminary plan of physical protection and Plan of physical protection in line with the Decree 186/1999 Coll. laying down the details concerning physical protection of nuclear installations, nuclear materials and radioactive waste.
BNS IV.1.3/2005	Requirements for design and operation of spent nuclear fuel storage facility.
BNS I.2.5/2005	Requirements of ÚJD SR on chap. 16 of the Pre-operational safety report “Limits and Conditions”.
BNS II.3.4/2006	Rules for the design, manufacturing and operation of monitoring systems to monitor degradation of safety important components of NI. Part 1. Corrosion Monitoring.
BNS I.4.2/2006	Requirements on elaboration of analysis and PSA studies.

BNS II.3.1/2007	Evaluation of acceptability of faults detected during in-service control of classified equipment of nuclear installations.
BNS III.4.4.2007	Requirements for realization and evaluation of test results of the physical start-up.
BNS II.1.1/2008	Registration and control of nuclear materials.
BNS I.7.4/2008	Complex periodic safety review.
BNS II.5.4/2009	Qualification of systems for non-destructive test in nuclear power engineering. Requirements and instructions.
BNS II.5.6/2009	Rules on design, manufacturing, assembly, repairs, replacements and reconstruction of mechanical and technological components of classified equipment of WWER 440 nuclear power plants.
BNS II.5.5/2009	Examining of mechanical properties, chemical composition a selected characteristics of resistance of material and welded joints against rupture under limit load conditions of mechanical and technological components of equipment of WWER 440 nuclear power plants.
BNS II.3.3/2011	Metallurgical products and spare parts for nuclear installations. Requirements.
BNS II.5.3/2011	Welding materials for welding mechanical-technology components of nuclear power plants. Technical requirements and selection rules.
BNS II.5.2/2012	Control of welding and quality of welds of components of classified equipment of nuclear power plants. Requirements.
BNS II.5.1/2012	Welding of nuclear equipment. Basic requirements and rules.
BNS II.2.1/2012	Requirements for securing protection against fire and fire safety of nuclear installations in terms of nuclear safety.
BNS I.12.1/2012	Requirements for quality assurance of software for safety analyses.
BNS I.6.2/2013	Requirements for reactor description and its design basis in the safety report.
BNS I.11.1/2013	Requirements for deterministic analyses of safety of NPPs with WWER-440/V213.
BNS I.1.2/2014	Scope and content of safety report.
BNS I.9.2/2014	Ageing management of NPPs – requirements.
BNS I.4.4/2014	Operation of a nuclear facility after reaching its design life. Requirements and instructions.
BNS I.4.1/2014	*Simple failure criterion.*
BNS I.12.3/2014	PSA quality for PSA applications.
BNS I.7.4/2016	*Comprehensive periodic safety assessment.*
BNS II.3.1/2016	*Evaluation of the permissibility of errors detected during operational inspections of selected equipment of nuclear installations.*

BNS II.9.2/2016	*Evaluation of mechanical characteristics of materials operated by selected mechanical engineering devices using SPT methodology.*
BNS II.9.1/2016	*Direct sampling of small samples from safety relevant components of Nis.*
BNS II.3.6/2016	*Rules for the design, manufacture and operation of systems monitoring degradation of safety relevant components of NI Part 3. Monitoring of radiation degradation processes of structural materials of NI.*
BNS II.3.5/2016	*Rules for the design, manufacture and operation of systems monitoring degradation of safety relevant components of NI Part 2. Monitoring of thermal aging processes of structural materials of NI.*
BNS II.3.4/2016	*Rules for the design, manufacture and operation of systems monitoring degradation of safety relevant components of NI Part 1. Corrosion monitoring.*
BNS I.9.4/2017	*Requirements for the recording of data relevant for the decommissioning of nuclear installation.*
BNS I.9.3/2017	*Requirements for the content and extent of the documentation for decommissioning, submitted as part of the application in the proceeding for approval pursuant to Section 5 par. 2 of the Atomic Act, and in the proceeding for granting authorization pursuant to Section 5 par. 3 a) to d) of the Atomic Act.*
Glossary	*Nuclear safety glossary of the Nuclear Regulatory Authority of SR.*

Annex VII. List of International Experts Reports and Safety Reports

Table 1. List of safety documentation and of international missions focusing on safety of NI for spent fuel and RAW management in SR:

NI	Preceding documentation	*Pre-operational Safety Report/Decommissioning phase Plan*	Periodical assessment	International missions
NPP A1 *Bohunice*	EIA in the framework of decommissioning *A1 12/2000* *EIA after completion of stage I 10/2003* *EIA stage III and IV of decommissioning of NPP A1 11/2015*	Plan for 2nd phase of decommissioning - 2008 *Plan for 3rd and 4th phases of decommissioning - 2016*	1980, 1992, 1995-98 *2007* *2016*	
NPP V1 *Bohunice*	EIA for the decommissioning *EIA stage II of decommissioning of NPP V1 Bohunice 06/2014*	Pllan for the 1st phase of decommissioning - 06/2011 *Plan for the 2nd phase of decommissioning - 2015*	07/2009 *2014*	
ISFS *Bohunice*	Preliminary Safety Report (reconstr. 1997) *EIA 02/2016*	1987, 09/1998 04/2010. 03/2014	11/2008	
BSC Bohunice	Reference SR, EIA (for BSC) *EIA TSÚ RAO 11/2014*	1987, 9/1998	2000 (after reconstruction)	
TSÚ RAO *Bohunice*	Preliminary Safety Report, EIA (for BSC) *EIA TSÚ RAO 11/2014*	1998 (for BL 1994, 2002) *8/2010*	*5/2009*	
FS KRAO *Mochovce*	Preliminary Safety Report 2004 *EIA FS KRAO Mochovce 07/2014*	07/2006	*10/2015*	
Integral storage *Bohunice*	Intent 2011 *EIA IS Bohunice 09/2012*			
RÚ RAO *Mochovce*	reference and Preliminary SR *EIA RÚ RAO 05/2013*	4/1999 09/2011 *10/2014* *10/2015* *01/2017*	4/2011	WATRP 1995

Annex VIII. List of Authors

ŽIAKOVÁ Marta	-	Nuclear Regulatory Authority of SR
METKE Eduard	-	Nuclear Regulatory Authority of SR
POSPÍŠIL Martin	-	Nuclear Regulatory Authority of SR
TURNER Mikuláš	-	Nuclear Regulatory Authority of SR
HOMOLA Juraj	-	Nuclear Regulatory Authority of SR
VÁCLAV Juraj	-	Nuclear Regulatory Authority of SR
BYSTRICKÁ Stanislava	-	Nuclear Regulatory Authority of SR
JURINA Vladimír	-	Ministry of Health of SR
DRÁBOVÁ Veronika	-	Ministry of Health of SR
PETRÍK Teodor	-	Ministry of Economy of SR
FILIP Aleš	-	Ministry of Interior of SR
NIŽŇANSKÝ Gabriel	-	Ministry of Environment of SR
PÁLENÍKOVÁ Darina	-	Ministry of Transport and Construction of SR
ŠOVČÍK Ján	-	National Nuclear Fund
SÜSS Jozef	-	Slovenské elektrárne, a. s.
TOMEK Jozef	-	Slovenské elektrárne, a. s.
LUKAČOVIČ Jozef	-	Slovenské elektrárne, a. s.
IVAN Jozef	-	Slovenské elektrárne, a. s.
BULLA Róbert	-	Labour Inspectorate Nitra
HORVÁTH Ján	-	JAVYS, a. s.
BETÁK Aladár	-	JAVYS, a. s.
MIHÁLY Branislav	-	JAVYS, a. s.
MIHÁLIKOVÁ Radomíra	-	JAVYS, a. s.
BOŽÍK Miroslav	-	JAVYS, a. s.
VAŠINA Daniel	-	JAVYS, a. s.
BÁRDY Milan	-	JAVYS, a. s.
KLEIN Tomáš	-	JAVYS, a. s.

And other contributors, to whom we express our thanks for the cooperation.