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 2020

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Abbreviations

ALARA	As Low As Reasonably Achievable
BIDSF	Bohunice International Decommissioning Support Fund
BSC	Bohunice RAW Treatment Center
BUC	Burnup credit
CAF	Common Assessment Framework
CCS	Central Crisis Staff
CMRS	Central Monitoring and Control Centre
EC	European Commission
EIA	Environmental Impact Assessment
ETR	Emergeny transport rules
EU	European Union
FCC	Fibre-concrete container
FS KRAO	Facility for Final Treatment and Conditioning of Liquid Radioactive Waste
HRK	Emergency, control *and compensation* assembly
HÚ	Deep repository
HVB	Main Generation Unit
IAEA	Inter**r**national Atomic Energy Agency
IED	Individual *dose* equivalent
INES	International Nuclear Event Scale
IRAW	Institutional Radioactive Waste
IRRS	Integrated Regulatory Review Service
ISFS	Interim Spent Fuel Storage
ISNFSF	Interim Spent Nuclear Fuel Storage Facility
IS RAO	Integral Radioactive Waste Storage Facility
IS RAW	Integral Storage Facility for Radioactive Waste
IMS	Integrated Management System
JAVYS, a. s.	Jadrová a vyraďovacia spoločnosť / Nuclear Decommissioning Company
KED	Collective dose equivalent
KRAO	Liquid radioactive waste

L&C	Limits and Conditions for operation
LLW	Low level radioactive waste
MDV SR	Ministry of Transport and Construction of the Slovak Republic
MH SR	Ministry of Economy of the Slovak Republic
MO SR	Ministry of Defence of the Slovak Republic
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MPRV SR	Ministry of Agriculture and Rural Development of the Slovak Republic
MŠVVaŠ SR	Ministry of Education, Science, Research and Sport 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 Plant V1 Jaslovské Bohunice (Units 1 &2)
NPP V2	Nuclear Power Plant V2 Jaslovské Bohunice (Units 3 & 4)
NPP Mochovce	Nuclear Power Plants Mochovce
OIL	Values of directly measurable quantities
PHARE	EU Initiative for economic integration of CEE countries
PoSAR	Pre-operational Safety Report
PRAO	Solid radioactive waste
PS	Operational set
PSA	Probabilistic safety assessment
PSR	Periodic Safety Review
RAW	Radioactive waste
RF	Russian Federation
RFSS	*Representative full scale simulator*
RMUO	*Radioactive materials of unknown origin*
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.
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
ŤK	Heavy metal
$t_{ŤK}$	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
US NRC	United States Nuclear Regulatory Commission
ÚRMS	*Radiation Monitoring Network Headquarters*
ÚVZ SR	Public Health Authority of SR
VBK	Fibre-concrete container
VLLW	Very low level radioactive waste
VUJE, a. s.	VUJE, a. s. Trnava – Engineering, design and research organization
WWER	Water-water power reactor
WANO	World Association of Nuclear Operators
ZRAM	Captured radioactive materials
USSR	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 referred to as “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/Rev. 3). ***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 WWER-440/230 type (NPP V1) are in the decommissioning process. Spent nuclear fuel (hereinafter referred to as “SNF”) from these units was transported to the Interim Spent Fuel Storage (hereinafter referred to as “ISFS”).

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 currently decommissioned. The spent nuclear fuel from this NPP was repatriated to the Russian Federation (hereinafter referred to as “RF”). 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 - hereinafter referred to as “TSÚ RAO”), and at Mochovce site (called Facility for Final Treatment and Conditioning of Liquid Radioactive Waste – hereinafter referred to as “FS KRAO”).

National repository of low active radioactive waste (hereinafter referred to as “RÚ RAO”) has been in operation since 1999 at the Mochovce site.

Interim Spent Fuel Storage Facility 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 Radioactive Waste (hereinafter referred to as “RAW”) management can be found in the following chapters of this report. The licensees for operation and decommissioning of nuclear installations are Slovenské elektrárne, joint stock company (hereinafter referred to as “SE, a. s.”) and Nuclear and Decommissioning Company (hereinafter referred to as JAVYS, a. s).

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 *2020 – 2024*,
- Energy Security Strategy of SR (2008),
- National Policy and National Program for the Management of Spent Nuclear Fuel and Radioactive Waste in the Slovak Republic (2015).

State regulation over nuclear safety over management of radioactive waste and spent nuclear fuel is performed by the Nuclear Regulatory Authority of SR (hereinafter referred to as "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 supervision over radiation protection *in nuclear installations* is provided by the Public Health Authority of the Slovak Republic (hereinafter referred to as "ÚVZ SR") in accordance with the provisions of Act No. *87/2018 Coll. on Radiation Protection.*

State supervision in the field of radiation protection during the shipments of radioactive and nuclear materials is, in accordance with Act No. 87/2018 Coll. provided by the Ministry of Transport and Construction of SR (hereinafter referred to as "MDV SR").

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 (hereinafter referred to as "EIA") of NI is the competence of the Ministry of Environment of SR (hereinafter referred to as "MŽP 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 list of nuclear installations within the meaning of the Joint Convention is set out in Annexes L I. and III.

The previous National Reports from y. 2003, 2005, 2008, 2011, 2014, *2017* are available on the website of ÚJD SR: www.ujd.gov.sk.

Implementation of findings resulting from the 6*th* Review Meeting (as contained in the Rapporteur´s report for Slovakia)

Finding No. 1.

Engage in a more detailed process for the development of a deep disposal facility (set more detailed milestones on the process including strategies for public communication, regulatory decisions, and related requirements).
Measure completed.

By the Government Resolution No. 402/2018, section B.3, dated 5 September 2018, the Minister of Economy of SR was instructed to draw up a phased schedule for the preparation of the deep geological repository.

The Chairperson of ÚJD SR, by letter No. 2992/2020 dated 30 April 2020, requested the Minister of Economy of SR to report on the given task. This report was submitted by the Ministry of Economy (hereinafter referred to as "MH SR") in May 2020.

The report in question will also serve as a basis for the planned update of the National Policy and National Program for the Management of Spent Nuclear Fuel and Radioactive Waste in the Slovak Republic in 2021.

Based on the recommendations from the 6th Review Meeting of the Parties to the Joint Convention, the report proposed more specific milestones in the process of preparation of the deep geological repository in the Slovak Republic, including the strategy for communication with the public.

As part of the strategy for communication with the public, a time frame was proposed for the creation of a detailed action plan for the involvement of the public concerned, the start of the information campaign in electronic and print media, and the organization of meetings with municipalities in the affected localities. An important element in the process will be the creation of an inter-ministerial working group for the development of the deep geological repository and the cooperation of the relevant stakeholders and state authorities (JAVYS, a. s., National Nuclear Fund, SE, a. s., ÚJD SR, ÚVZ SR, MH SR, MŽP SR, Main Mining Authority, MF SR, MDV SR).

Phased schedule for the development of the deep geological repository in the Slovak Republic

The presented schedule for the development of the deep geological repository in the SR is proposed in accordance with the legislation currently in force, and assumes that a detailed geological survey will confirm the suitability of one of the five promising sites.
*Some **activities**, such as public relations and research, development, survey and design work for the period after the implementation of the project "Development of the deep geological repository, stage 2 – Part 2" (2020 - 2030) cannot be specified in more detail today. Their scope will depend on the results of activities in previous periods, and will be regularly updated at the end of each stage.*
Schedule dates are based on the current state of knowledge and may change in the future, e.g. with regard to the duration of operation of existing nuclear power plants ("NPP"), the operation of new NPPs or with regard to other circumstances and knowledge.

Key project milestones for the development of the deep geological repository

1. Site selection (2020 – 2030)

- *Communication with public in selected localities* *2020 - 2030*
- *Indicative Geological Survey of the Environment Tríbeč, Rimava basin, including the assessment of the impact of making deep drills on the environment* *2020 - 2025*
- *Indicative Geological Survey of the Environment – Veporské vrchy (Vepor hills), Stolické vrchy (S. hills), Cerová vrchovina (C. highlands),*

including the assessment of the impact of making Deep drills on the environment *2025 - 2030*

- *Research, development, design and other work needed for the decision on siting the deep geological repository and to obtain a zoning decision* *2020 - 2030*
- ***Selection of the final and backup site*** ***2030***

2. Characterization – confirmation of the site (2030 – 2038)

- *Continued communication with the public in the selected site* *2030 - 2038*
- *Research, development, design and other work needed for the permit for siting the deep geological repository and for obtaining zoning decision* *2030 - 2038*
- *Detailed geological survey in selected location* *2030 - 2034*
- *Assessment of the impact of construction and operation of the deep geological repository on the environment* *2034 - 2038*
- ***Obtaining zoning decision*** ***2038***

3. Construction of the deep geological repository (2038 – 2064)

- *Continued communication with the public in the selected site* *2038 - 2043*
- *Research, development, design and other work needed for the permit for construction and operation of the deep geological repository, development of the project for the building permit and safety documentation* *2038 - 2064*
- ***Obtaining a permit for the construction of the repository*** ***2045***
- *Construction of an underground laboratory on the horizon – 300 m* *2045 - 2047*
- *Construction of the repository* *2047 - 2065*
- ***Obtaining permit for the operation of the deep geological repository*** ***2064***

4. Operation of the deep geological repository

- ***Commissioning of the deep geological repository*** ***2065***
- *Continuation of work for the construction of additional modules and confirmation of the safety of the repository* *2065 - 2100*

5. Closure of the deep geological repository

- ***Termination of operation of the deep geological repository and its closure*** ***2115***

Finding No. 2.

Complete construction and commissioning of second module for very low level radioactive waste (hereinafter referred to as "VLLW") disposal (necessary for the management of waste from decommissioning).
Measure completed.

The construction of the second module of disposal facility for VLLW was completed in September 2017 and put into operation in December 2017.

Finding No. 3.

Complete revision of the National Emergency Plan (in consistency with IRRS mission recommendations).
The implementation is ongoing.

In accordance with the recommendations of the IRRS mission in the Slovak Republic in 2012 and 2015, the Act No. 42/1994 Coll. on Civil Protection of the Population was amended. This Act defines the content of the protection plan (National Emergency Plan according to the IAEA terminology), covering in particular:

a) Plan for the area in terms of possible emergencies:
   1. *Evacuation,*
   2. *Shelter,*
   3. *Material and technical support of civil protection units,*
   4. *Preparations for civil protection,*

b) Documentation necessary for:
   1. *Rescue work management for individual emergencies and coordination of forces and resources usable during emergency, indicating the first name, family name and position of the authorized person for rescue work management,*
   2. *Measures for warning the population and notification of persons,*
   3. *Radiation protection measures,*
   4. *Manage possible scenarios of a major industrial accident specified in the Safety Report and with regard to possible domino effect, as well as emergency preparedness measures,*
   5. *Emergency supply and emergency accommodation, etc.*

Pursuant to this Act, the Ministry of Interior of SR (hereinafter referred to as "MV SR") elaborates and updates the protection plan (the National Emergency Plan). The amendment to the Civil Protection Act entered into force on 1 August 2015.
The recommendation to carry out INEX 5 exercise, which was held at national level and practiced all components of emergency preparedness at the national, regional and local levels, was also fulfilled. A report was prepared from the exercise, based on which recommendations were adopted. This report and recommendations were approved by the Slovak Government and the tasks were imposed by Government Resolution No. 536/2016.
Task No. B.1 of Government Resolution No. 536/2016 requested the MV SR in cooperation with ÚJD SR and ÚVZ SR, to elaborate updated documentation of radiation protection measures in accordance with Act No. 42/1994 Coll. ÚJD SR and ÚVZ SR provided supporting documentation for drafting this documentation in accordance with the IAEA safety standard (GSR Part 7).

Finding No. 4.

Complete design and construction dispositions in view of ISFS extension commissioning.
Measure completed.

Design and construction layout in connection with the enlargement of the ISNFSF were completed in December 2019 by elaborating design documentation. Following the comments of the authorities concerned, the application for a building permit will be submitted by the end of 2020. The European Commission will deliver an opinion on the submitted documentation under Article 37 of the Euratom Treaty before the building permit is issued.

Finding No. 5.

Complete construction of a facility for centralized collection, sorting and storage of institutional Radioactive waste management and captured radioactive materials in Mochovce.
Measure completed.

The construction of the facility for centralized collection, sorting and storage of institutional radioactive material and seized radioactive materials in Mochovce was completed in 2015 and the facility was put into operation in February 2016.

Finding No. 6.

Prepare construction of dry interim Spent Nuclear Fuel storage facility.
Measure completed.

As part of preparation for the construction of a dry ISNFSF, documentation was prepared in accordance with legislative requirements of the Slovak Republic and the European Commission, including a public assessment of impacts of this activity on the environment. After obtaining a positive Final Opinion of the MŽP SR on the proposed activity No.1064/2016-3.4/hp, the implementation of the dry ISNFSF is provided within the framework of a contract in accordance with the Public Procurement Act (see par. d) above).

Finding No. 7.

Prepare construction of a facility for melting metal radioactive waste management in Jaslovské Bohunice.
Measure completed.

As part of the preparation for the construction of a facility for melting metal radioactive waste, documentation was prepared and the construction of the facility is provided for within the framework of a contract. Final construction activities are currently underway. Commissioning planned for September 2020.

Finding No. 8.

Prepare stage 3 of decommissioning of NPP A1.
Measure completed.

Preparation of stage 3 and at the same time of stage 4 of decommissioning of NPP A1 by JAVYS, a. s. took place between 2014 and 2016. As part of the preparatory activities for the implementation of stage 3 and 4 of decommissioning of NPP A1, documentation was prepared. After obtaining positive opinions from the European Commission, MŽP SR, ÚJD SR and ÚVZ SR, the implementation of stage 3 and 4 of NPP A1 started from 1 October 2016.

Finding No. 9.

Prepare stage II of decommissioning of NPP V1.
Measure completed.

Preparation for stage 2 of decommissioning of NPP V1 took place between 2011 and 2014. As part of the preparatory activities for the implementation of stage 2 a set of safety and technical documentation was prepared. After obtaining positive opinions from the European Commission, MŽP SR, ÚVZ SR and ÚJD SR, the implementation of stage 2 of NPP V1 started from 1 January 2015.

Finding No. 10.

Change in the system of treatment liquid radioactive concentrates in NPP Mochovce.
Measure completed.

See chapter K.

The Contracting Parties further agreed that the National Reports for the forthcoming 7th Review Meeting should include the following information:

a) Implementation of national strategies for spent fuel and radioactive waste management.
See chap. B.1, B.2.

b) Safety implications of long term management of spent fuel.
See chap. D.2.1, D.2.5.

c) Linking long term management and disposal of disused sealed radioactive sources.
See chap. J.

d) Remediation of legacy sites and facilities.
Not applicable.

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 after its removal from the reactor) is *at the reactors* in *spent fuel storage pool*, which are located at each reactor unit.
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 – ISFS.
5. The long-term goal in the concept of SNF management is to increase the capacity of the current ISFS for the needs of nuclear power plants in operation using dry storage technology.
6. *At present, in the field of final management of SNF and RAW, the priority option* is the development of a national deep geological repository for direct disposal of SNF and RAW that cannot be disposed at the National RAW Repository in Mochovce, and *at the same time, as a back-up option, Slovakia monitors activities* that could lead to international deep geological repository, i.e. repository jointly owned and operated by several States under relevant international agreements.
7. 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.

ISFS 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.

The whole production of SNF from the NPP A1 (HWGCR reactor type, in operation from 1973 till 1977) was exported to the former Union of Soviet Socialist Republics (hereinafter referred to as "USSR") and then to the Russian Federation until 1999. Small portion of SNF from WWER-440 reactors (697 fuel assemblies) was exported to the former USSR prior to 1987.

B.2 Concept for Radioactive Waste Management (RAW)

Characteristics of the current management of radioactive waste in SR:

1. 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.
2. 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 and solidification in a matrix SIAL (geopolymer) and incineration. *Bituminisation technology is used very little due to the reduced production of liquid concentrates from the WWER units in operation.*
3. The volume of solid RAW *(hereinafter referred to as "PRAO")* is minimized *in particular by their high pressure* compacting, incineration and *various* preventive measures *taken during the operation and decommissioning of NI*.
4. 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.
5. 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.
6. *VLLW 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 VLLW from NPP A1 was put into operation in 06/2016. *The second module of the repository for very low-level waste for VLLW from the decommissioning of NPP V1 was put into operation in 12/2017.*
7. Available technology (high pressure compacting, cementation, etc.) is used for treatment and conditioning of metal RAW. Low level metal waste is treated by fragmentation and decontamination, followed by release of decontaminated material into the environment. With regard to an increased production of metal RAW, which cannot be released into the environment, construction of a *facility for melting metal radioactive waste* is currently underway, *which is expected to be put into active operation in 2020.*

8. 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.
9. Institutional *radioactive waste (hereinafter referred to as "IRAW"),* disused sealed sources *and radioactive materials of unknown origin (hereinafter referred to as "RMUO")* will be stored at the Facility, which was built and put into operation in 02/2016 at Mochovce site. IRAW and *RMUO* are conditioned into a form acceptable for permanent disposal using standard technology for RAW from nuclear installations.
10. Long-term storage of *treated* RAW *(e.g. Chrompik vitrificate)* is *provided for in* specially adapted premises at the Jaslovské Bohunice site.
11. 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.
12. RAW that does not meet the criteria for disposal in RÚ RAO, is stored long-term at the site of nuclear power plants *and in the Integral RAW storage facility* at the Jaslovské Bohunice site, *which was put into operation in February 2018.* RAW that *does not meet the criteria for disposal in RÚ RAO*, will be *finally* disposed in a deep geological repository.
13. The RAW transports are realized exclusively using approved transport facilities.
14. The costs of transport and management of RAW from the decommissioning of nuclear installations are covered mainly from the resources of the National Nuclear Fund. V1 - *Bohunice International Decommissioning Support Fund* (hereinafter referred to as "BIDSF") *partly covers performance of RAW management of some NPP V1 decommissioning projects*. The costs of transport and RAW and SNF management from NPP operation are covered from the operating costs of RAW and SNF producers.

The National Policy and the National Program for the SNF and RAW management are currently being updated (December 2021), taking into account its current needs and current trend, as well as the obligations arising from international agreements and the principle of not burdening future generations.

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.

Matrix (according to INFCIRC/604/Rev.3)

Type of Liability	Long term Management Policy	Funding of Liabilities	Current Practice / Facilities	Planned Facilities
Spent Nuclear Fuel	Two options: Geological repository or multinat. solution	*From the resources of the National Nuclear Fund - see chap. F.2.2*	Long-term storage in ISFS (Interim Spent Fuel Storage)	Dry storage facility, Geological repository
Nuclear Fuel Cycle Waste	*Geological / Surface repository*	*From the resources of the National Nuclear Fund - see chap. F.2.2*	*Disposal of low level RAW (National Repository for low-level RAW)*	*Geological repository 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

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 1.

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

The scope of this Report includes information on the safe management of SNF from nuclear power plants, including transport and inventory of SNF *and on the safe management of RAW*.

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

Currently in Slovakia there are no 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 chapter 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 USSR / 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 storage pool,
- 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 hermeticity test of fuel cladding 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 hermeticity test of fuel cladding 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 31December 2019	13 980 fuel assemblies
Number of pools	3 operational + 1 backup
Ground-plan of the building	45 m x 70 m

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 m x 8,4 m x 7,2 m
Number of baskets per pool	98 of KZ-48 type

Table 2 Basic technical data for ISFS

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. 1 Pool hall in ISFS

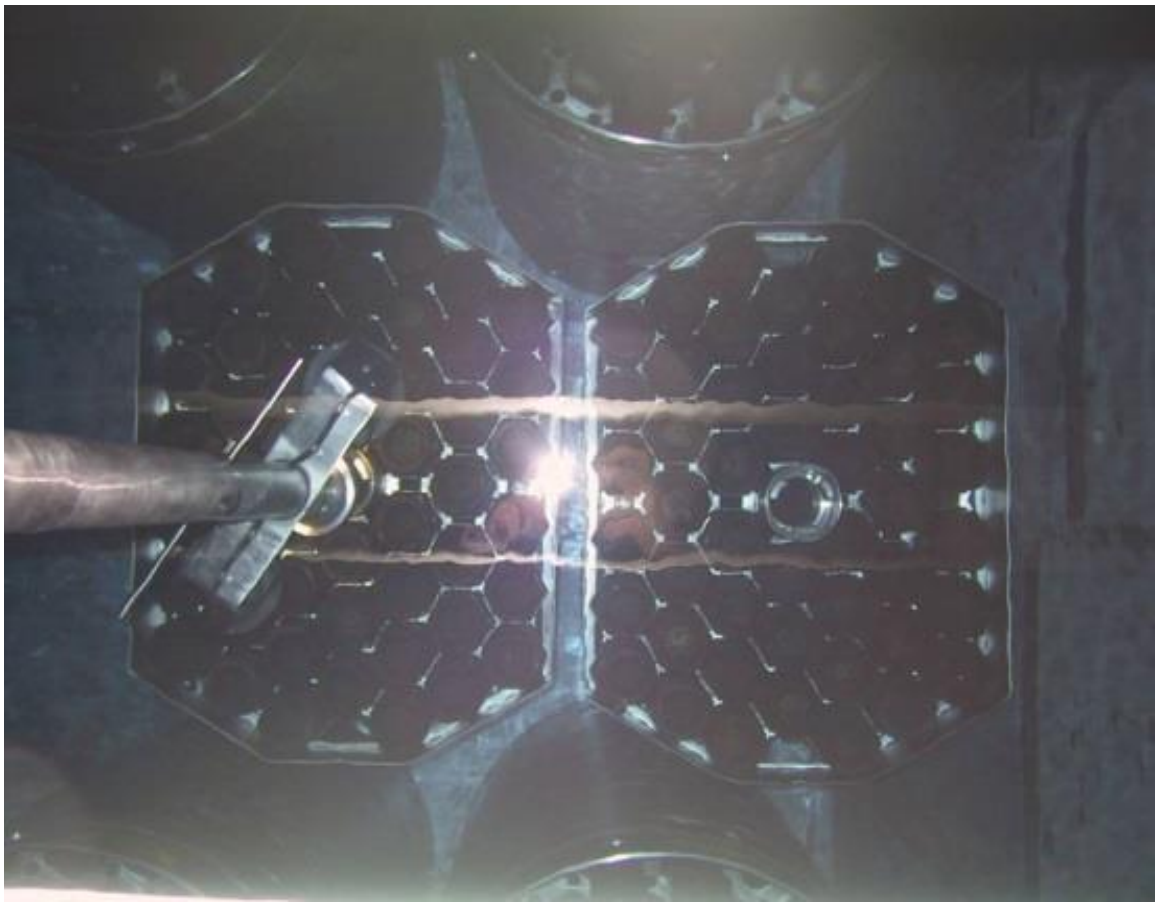

Fig. 2 Spent fuel cask

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,
- 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 Safety Review of ISFS (ISFS PSR)

The second Periodic Safety Review (hereinafter referred to as "PSR") was carried out in accordance with the legislation valid as of *30 November 2018*. The emphasis was placed on meeting the requirements of the ÚJD SR Decree No. *33/2012 Coll.*, and the ÚJD SR safety guide.
As a result of PSR, 9 integrated corrective actions *with low safety significance* were identified*.*

Stress Tests for the ISNFSF

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

1. Earthquake stronger than envisaged in the design,
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, a. s. realized “Program evaluation – review ISNFSF response to the Fukushima event type.” Chapter "Seismic event" has been added to an operating document "Addressing failure conditions in ISNFSF ". *The details were provided in the National Report of 2017.*

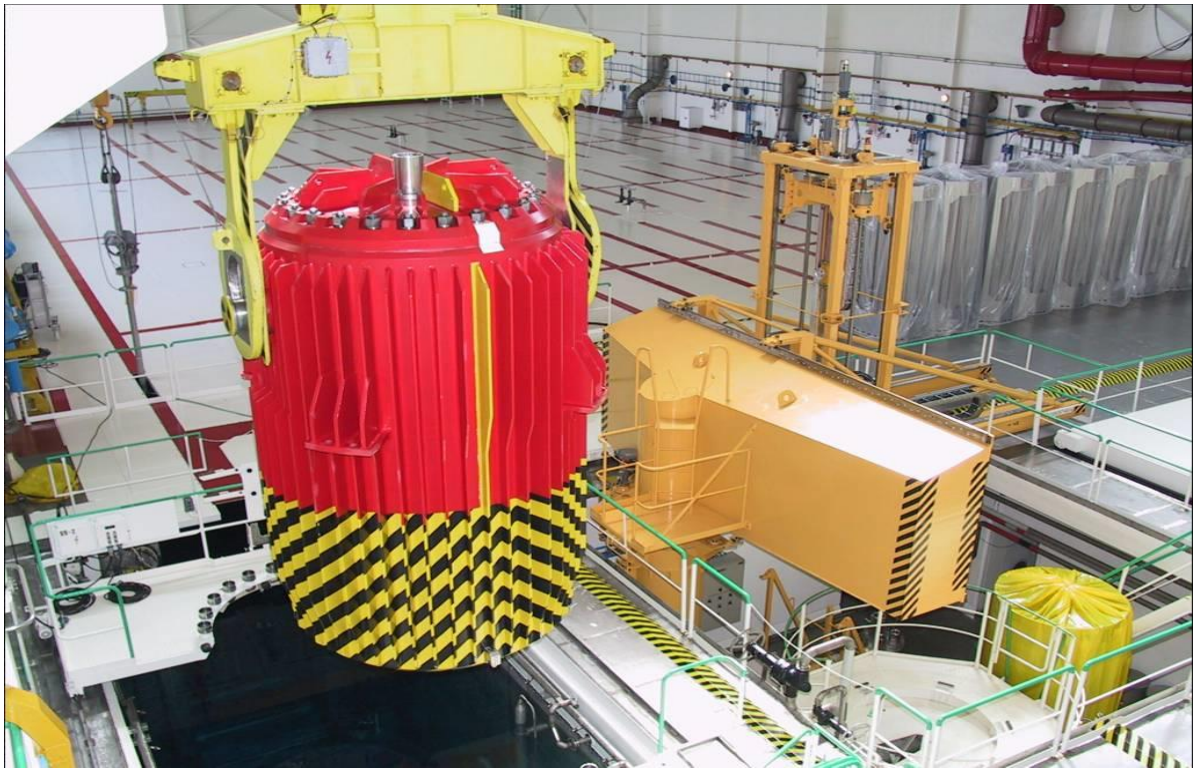

Fig. 3 Transport of TK C-30 by special transport hitch

Impact of decommissioning of NI V1 on the operation of ISFS

Due to the fact that ISFS is closely connected with the NPP V1 under decommissioning, *it was* necessary to *change* selected technological systems of the ISFS specified in the project “Power plant modification and installation of new systems“, which *is currently being implemented, e.g.:*

- 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,
- *pipelines for collection of regeneration and decontamination solutions in ISFS*, etc.

Increasing storage capacity of ISFS

As of 31 December 2019, 12,712 SNFs were stored in ISFS representing *90,08 %* 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 *2023*, in 2013 an investment project "Increasing storage capacity for SNF at Jaslovské Bohunice site" was approved.

Increasing the current storage 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. Final Opinion of the MŽP SR on "Increasing storage capacity of the ISFS at Jaslovské Bohunice site" was issued under No. 1604/2016-3.4/hp on 11 February 2016. At present, the project is in the stage of *design activities. The planned commissioning of the storage capacity for SNF (within the first stage) is in 2022.*

Transport container TK C-30 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 facility 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, e. g.:

- 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);
- Air-conditioning filters in metal packages placed in storage shafts;
- Oversized solid RAW is freely stored in designated storage shafts;
- *and other.*

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 m^3.

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.

RAW from NPP operation is handed over for further treatment to JAVYS, a. s., responsible for RAW management in Slovakia until its disposal.

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

Technology for treatment and conditions of RAW operated by *JAVYS, a. s. at Jaslovské Bohunice* site, include:

- Bohunice RAW Treatment Centre *(hereinafter referred to as "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 limits and conditions (hereinafter referred to as "L&Cs") for storage, transport and final disposal in National Radioactive Waste Repository;
- Bituminous lines designed for treatment of concentrates and *saturated* sorbents,

- Discontinuous bituminization line designated for treatment of saturated sorbents,
- Wastewater treatment facility for treatment of liquid radwaste from NPP A1,
- Fragmentation facility and large capacity decontamination facility for metal RAW *serve* for *decontamination and* treatment of metal RAW,
- Workplace for processing air filters,
- Workplace for crushing used power cables,
- *Facility for melting metal radioactive waste,*
- *Fixed RAW pre-treatment line.*

One of the technological equipment put into operation in 2019 is the ***Line for pre-treatment of fixed RAW****, which includes technologies for decomposition, crushing, grinding and subsequent sorting of solid fixed low-activity RAW in barrels. At the same time, the line separates any metal materials stored in barrels from flammable materials, dries flammable materials, cuts them into pieces, grinds them into a fine combustible fraction and then homogenizes this ground material to achieve the final maximum permitted activity for further management using the existing TSÚ RAO lines. In addition to pre-treatment of the content of barrels, the line also allows to crush also emptied barrels.*

Since 2019 the second PSR was conducted with reference date as at January 2019. As a result of the PSR, two corrective actions were identified to be implemented by the end of 2020.

Fig. 4 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,
- Bituminisation of concentrates,
- Bituminisation of *saturated* ion exchange resins (*RA*-sludge),
- Cementation of liquid radwaste and solid radwaste,
- Preparation of fibre-concrete container for transport.

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.

The first PSR of this facility was conducted in 2015. The PSR identified some corrective actions which were completed in 2019.

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

At the Jaslovské Bohunice site, a new facility for RAW storage was built and operated by JAVYS, a. s. The Integral Storage Facility for RAW (hereinafter referred to as “IS RAW”) is *used* exclusively for storage of:

- Solid or solidified RAW prior to their further treatment at facilities within JAVYS, a. s. (storage of liquid RAW and SNF is *not permitted* in the 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 final disposal,
- Solid RAW for a period, during which their activity is decreasing to a level allowing their release to the environment.

Fig. 5 Integral Storage Facility for RAW

D.2.5 Facility for Institutional Radioactive Waste Management (IRAW) and radioactive material of unknown origin (RMUO)

The Government of the Slovak Republic by its Resolution No. 610 of 2 September 2009 approved the draft procedure for the management of IRAW and radioactive material of unknown origin *(hereinafter referred to as "RMUO")* in Slovakia, and authorized JAVYS, a. s., to build a comprehensive facility serving for:

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

A centralised facility for safe storage of IRAW, *RMUO* originating from the whole territory 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 *RMUO* management.

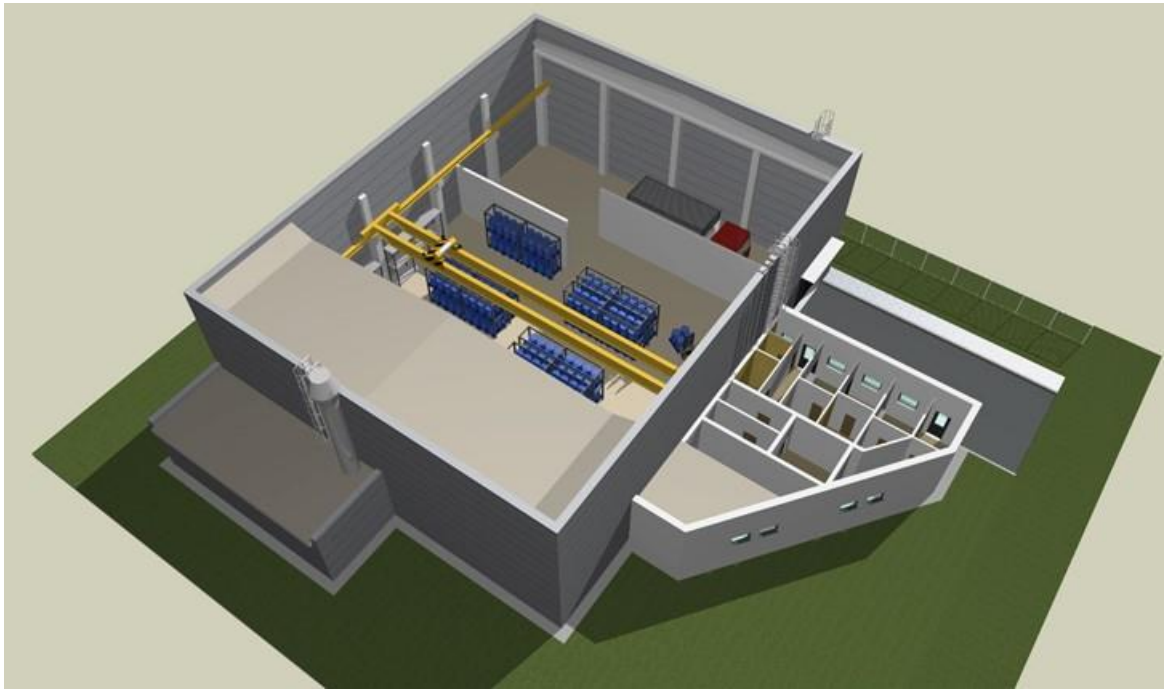

Fig. 6 Facility for Institutional Radioactive Waste Management (IRAW) and radioactive material of unknown origin (RMUO)

D.2.6 Radioactive Waste (RAW) Shipment

To ensure the handling of RAW, IRAW and *RMUO*, a transport system was developed enabling the transport of:

1. Solid and liquid RAW within Jaslovské Bohunice premises,
2. Solid RAW between Jaslovské Bohunice – Mochovce sites,
3. Institutional RAW and *RMUO* 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. 7 Transport of fibre concrete containers to the National Repository of RAW

Fig. 8 Transport of solid RAW at Jaslovské Bohunice site and between Jaslovské Bohunice and Mochovce site

Fig. 9 Transport of KRAO at Jaslovské Bohunice site

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

The National RAW Repository (put into operation in 2001) is a surface-type repository designed for the disposal of solid and solidified low *and very-low* activity RAW from the operation and decommissioning of nuclear installations in Slovakia. 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 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. 10 Third double row of boxes

The repository for the disposal of low-level RAW currently consists of a system of boxes arranged in three double rows, each with 40 boxes. One box can take 90 fiber concrete containers (hereinafter referred to as („FCCs"). The total current capacity of the repository is 10,800 fiber concrete container (hereinafter referred to as "FCC") with a total volume of 32,400 m3. The repository area allows expansion to 7.5 double-rows, i.e. to dispose approx. 27 thousand FCCs with RAW. The FCC has an internal volume of 3.1 m^3. Appropriately conditioned RAW is fixed in FCC by active or inactive cement grout.

In connection with the decommissioning of NI and the assumptions of the amount of low-level RAW the 3rd double-row was built by the end of 2018.
Since 2019 the second PSR was conducted with a reference date for review as at September 2019.
The 1st, 2nd and 3rd double-rows are protected against weather influences by halls, which ensure that the area is covered during the entire operation until it is replaced by a final cover.
For the disposal of VLLW, i.e. waste with activity only slightly exceeding the limits for their release into the environment (contaminated soils, crushed concrete from decommissioning) *a location was selected* in the southern part of the RÚ RAO Mochovce site for this category of RAW as a separate structures. The 1st part stage of this repository with a capacity of 20,000 m^3 VLLW from the decommissioning of NPP A1 is in operation since 2016. *From 2017, the 2nd part of VLLW repository is also available. The total capacity within the 1st and 2nd stage of VLLW repository is currently 29,000 m^3.*

Fig. 11 Disposal of VLLW in the first stage of VLLW repository

Fig. 12 The 2nd stage of VLLW repository built next to the overlay hall of the operated 1st stage of the VLLW repository after its relocation in 2019

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 equipment 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 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.

Decommissioning of NPP V1 is implemented through partial projects. Out of the total number of 74 projects, 61 BIDSF projects are currently completed and 8 projects are being implemented. Other projects are in the preparatory stage. JAVYS, a. s., after obtaining a permit for decommissioning implements activities that represent activities, such as, for example, dismantling of large-scale components of the primary circle and dismantling of the most contaminated equipment (reactor pressure vessels of both units, steam generators, main circulating pumps, primary circuit piping and other technological components), as well as the implementation of other related projects. Parallel with the

dismantling activities, a continuous process of management of the RAW, their shipment and release of materials meeting the criteria for release into the environment takes place (see also Chapter K).

Fig. 13 Transporting steam generator PG 11 to SO 490 V1

D.3.2 NPP A1 Jaslovské 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 water (D_2O) as moderator and carbon dioxide (CO_2) as coolant - HWGCR.

The NPP A1 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 USSR / 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 diphenyl-oxide – 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 to 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 a higher level of contamination is gradually dismantled in the next stages of decommissioning, while stage 2 was completed as of 30 September 2016.
Following stage 2 of decommissioning of NPP A1, the implementation of stage 3 and 4 decommissioning of NPP A1 continued from October 2016. In the main production unit these stages are focused mainly on decommissioning of technological equipment of the primary circuit, oil management and accessories of turbo-compressors, CO_2 cooling systems, heavy water management, fuel cladding inspection system, steam generators including their accessories, treatment of sludge phases from long-term storage for NPP A1, treatment of Chrompik, which was used as a cooling medium for SNF and treatment of cases

for SNF storage from NPP A1. During these stages, the decommissioning activities continue also on external objects of NPP A1.
Planned completion date of stage 3 and 4 of decommissioning of NPP A1 is 2024.

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 facility 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 Facility of Chrompik (VICHR)

The vitrification facility *was built and is used* for the fixation of radioactive *medium Chrompik with the radioactivity of* 10^{11}*Bq/*dm^3 *and which was originally used as coolant for storage of SNF from A1. This high temperature process of treatment liquid radioactive medium* into glass matrix of borosilicate type *is* to achieve a significant volume reduction of *RAW, while achieving the required quality parameters for leachability and stability of the matrix to achieve maximum safety during storage and later disposal of* this specific radioactive liquid waste.

Handling box for handling moderately active radioactive materials was *originally used as a hot chamber for inspections and handling of SNF from A1. After the reconstruction of the hot chamber into a handling box it is possible to remotely control equipment from the operator´s workplace:*

- 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.

Workplace of fragmentation of cases from the long-term storage *was built in order to dispose of cases for the long-term storage of SNF from A1, which remained in this NI after the SNF was shipped back to the Russian Federation. These cases for long-term storage are considerably contaminated from the inside and outside by radioactive substances and the dose rate of these cases reaches the order of 100 mSv/h. The fragmentation workplace for cases of long-term storage* 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.

Sludge fixation facility SUZA II

The facility is located in the reactor hall of NPP A1 and is used for fixation of sludge phases coming from the long-term storage pool for SNF of NPP A1. A cement matrix is used to fix the sludge, and the output product is a 200 dm^3 drum with fixed liquid radioactive waste (hereinafter referred to as "KRAO"). The facility, after certain adjustments, allows modification in the use of matrices, as well as the output product to 200 dm^3 and 60 dm^3 drums.

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

Facility for fixation of sludge. 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,
- Monitoring and sorting of soils,
- Shipment of soils after monitoring and sorting from the workplace.

For decontamination of some equipment, such as tanks, pipes and others, **decontamination circuit mobile facilities.** These facilities consist of several modules, which are mutually interconnected and enable to perform pre-disassembly decontamination of equipment and pipe lines in closed hydrodynamic circuit. Decontamination is performed with the help of decontamination solutions.

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 14.

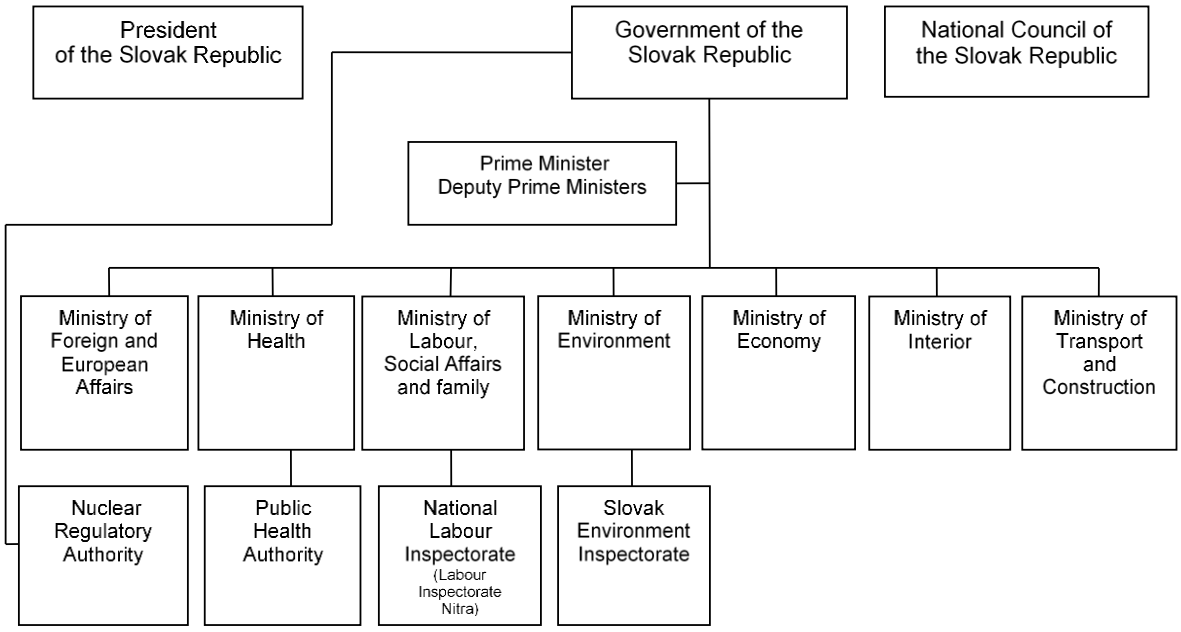

Fig. 14 Structure of regulatory bodies

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 (hereinafter referred to as "MZ SR") 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 public 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 is responsible for setting limits and values of permissible load by these factors, *determines fundamental directions and priorities in the field of radiation protection and monitors their compliance* in accordance with current scientific knowledge on the impact of physical, chemical and biological factors on public health.

The ÚVZ SR is the contact point for communication with the competent authorities of other Member States in the field of radiation protection, it participates in addressing national and international programs important for radiation protection. ÚVZ SR performs state supervision over activities leading to exposure, including SNF and RAW management and release of radioactive substances and radioactively contaminated facilities from administrative control. It determines the conditions and

authorized limits in nuclear facilities and at workplaces, where it has issued a permit for operation. ÚVZ SR has the function of headquarters of the radiation monitoring network and manages its activity, monitors the radiation situation, gathers and processes data on monitoring results in the Slovak Republic for exposure assessments and assessments of the impact of radiation on the health of the population. ÚVZ SR determines reference levels for optimization of exposure in an emergency situation or in case of persistent exposure in an existing exposure situation and determines the conditions for the transition from an emergency to an existing exposure situation.

Ministry of Environment of the Slovak Republic (MŽP SR)

Ministry of Environment of the Slovak Republic 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 MŽP SR:

- 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, competent body of the European Commission (ECURIE) in Luxembourg, *contact point of the Emergency Response Coordination Centre of the European Union and of neighbouring States.*

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 (hereinafter referred to as "MPSVR SR") 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)

Ministry of Transport and Construction of the Slovak Republic is a central administration body for railway, road, water and air transport, electronic communications, postal services, tourism and construction. In terms of shipments of fresh and spent nuclear fuel *and RAW,* MDV SR is one of the authorities that participate in the permitting process. According to Section 28 par. 13 (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.

MDV SR is *also* an authority of *radiation protection according to Act No. 87/2018 Coll. on Radiation Protection. It exercises its competencies in the field of radiation protection in railway, road, waterway and air transport in accordance with Act No. 87/2018 Coll. The Department of the Chief Hygienist of the Ministry (ÚVHR) enforces the requirements of the law on radiation protection as it relates to the competencies of the MDV SR and performs state administration and state supervision over radiation protection with priority in shipments of nuclear and radioactive materials in Slovakia.*

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 (hereinafter referred to as "STN"), European Technical Standards (hereinafter referred to as "STN EN") and International Technical Standards (hereinafter referred to as "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 its validity, the Atomic Act has been amended twenty-two 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 stage 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.

The amendments to Act No. 541/2004 Coll. introduced by Acts No. 18/2018 Coll., No.87/2018 Coll., No.177/2018 Coll., No. 308/2018 Coll. and No. 279/2019 Coll., focused mainly on reflecting partial adjustments in relation to radiation protection, personal data protection, measures against bureaucracy, economy in proceedings, handling of information, to which the law grants protection, and uniform regulation of the method of delivery in the licensing process to nuclear installations.

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.

To ensure a high level of environmental protection, the **Act No. 24/2006 Coll. on environmental impacts assessment (hereinafter referred to as "Act No. 24/2006 Coll.")** provides for a procedure of professional and public assessment of expected environmental impacts, namely:

1. strategic documents *during their preparation and* prior to their approval (e.g. concept of radioactive waste and spent nuclear fuel management, the national program for radioactive waste and spent nuclear fuel management); and
2. proposed activities before the decision on their siting or before permitting them according to special regulations (construction of nuclear installations and related activities).

The Act defines activities that are subject to mandatory international assessment in terms of their impact on the environment:

1. nuclear power plants and other nuclear reactors (excluding research installations for the production and conversion of fissile and enriched materials, the maximal thermal output of which does not exceed 1 kW of continuous thermal load),
2. facilities intended exclusively for the production or enrichment of nuclear fuel, for reprocessing of spent nuclear fuel or its storage, as well as for the disposal and treatment of RAW.

Since 2006, the Act has had 19 amendments. In 2009, Act No. 24/2006 Coll. was amended by *Act No. 287/2009 Coll. of 19 June 2009* in order to:

- specify procedure for changes to the proposed activities,
- specify procedure for decision-making on which of the activities not listed in the Annex to the Act are subject to assessment,
- regulation on transboundary impact assessment,
- informing the public after the decision on permitting proposed activity,
- the position of the public in the environmental decision-making process.

Act No. 145/2010 Coll. effective from 1 May 2010 amended also other laws, in particular Act No. 50/1976 Coll. on spatial planning and building regulations (Building Act) and Act No. 541/2004 Coll. on peaceful uses of nuclear energy (Atomic Act), in public access to environmental information and in decision-making on permitting proposed activities. After the amendment to Act No. 24/2006 Coll. *in 2010,* the public concerned was expanded to include natural and legal persons interested in environmental decision-making procedures. A natural person must be a person over 18 years of age, who submits a written opinion stating his or her interest in the decision, and having a status of a party to the proceedings in the authorization procedure. This amendment further regulates the concept of citizens´ initiative, as well as the manner of acting, participating in the process and electing a representative of this group of people. A civic initiative, as well as civic association and an NGO, has the status of a party to the proceedings pursuant to special regulation if the conditions stipulated by the law are met. *Act No. 24/2006 Coll. has been amended five times since 2017, while the last amendment was introduced by Act No. 74/2020 Coll. and entered into force as of 9 April 2020.*

The competent authority for the assessment of transboundary environmental impacts is the MŽP SR.

With effect from 1 *January* 2019, **Act No. 308/2018 Coll. on the National Nuclear Fund** entered into force *replacing* the previous Act No. 238/2006 Coll. "Nuclear Fund" is an independent legal entity managed by the MH SR. The Fund has its own bodies (Board of Trustees, Supervisory Board, Director, Chief Controller). The sources of the Nuclear Fund are various – *mandatory* contributions from licensees *for nuclear installations for power generation, mandatory payments from licensees for non-reactor nuclear facilities*, levies collected by transmission and distribution system operators in the prices of supplied electricity directly from the end customers (to be used to pay for the "historical debt"), fines imposed by ÚJD SR, interest on deposits, subsidies and contributions from EU funds, from the state budget and other. *The amount of annual levy intended for covering the historical debt from the supplied electricity to the end customers and details on the method of its collection, its use and on the method and deadlines for its payment, are set by Government Ordinance No. 21/2019. The amount of the mandatory contribution and mandatory payment and details on the method of collection and payment of the mandatory contribution and mandatory payment are set by the Government Ordinance No. 22/2019.*

Act No. 87/2018 Coll. on radiation protection *regulates the performance of state administration in the field of radiation protection, conditions for performing activities leading to exposure and activities in the environment with natural sources of radiation, requirements for management of radioactive substances, institutional radioactive waste and radioactive waste of unknown origin, protection of workers and residents from exposure to radon inside the buildings, external irradiation from building materials and persistent exposure resulting from an emergency or as a result of human activity in the past, ensuring the safety of radioactive source, preparedness for radiation emergency, monitoring of radiation situation and radiation monitoring network, limitation of exposure from drinking water, natural mineral water and spring water, obligations of natural persons and legal entities in ensuring radiation protection, offences, administrative offences and sanctions in the field of radiation protection.*

The performance of activities and provision of services important from the point of radiation protection with regard to the extent of possible radiation hazard are divided into:

- *activities that are excluded from the scope of law,*
- *activities subject to notification obligation,*
- *activities and services subject to registration; and*
- *activities and services performed on the basis of a permit.*

The Act also defines the requirements for ensuring physical protection when using radioactive sources, which are to prevent misuse of radioactive sources for illegal manipulation, including the possibility of their misuse for terrorist purposes. Details on the requirements for ensuring radiation protection for the implementation of the law are set out in the implementing decrees of MZ SR 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. *The Act was several times amended the last time in 2019.*

E.1.2.3 Draft Legislation

In 2013, preparatory work were launched for the new Atomic Act. ÚJD SR set up a working group. 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 received, 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 *were* 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 at NI the change of operator´s ownership structure, *enhanced* access *of the interested public to* environmental information, *access to justice and practical experience with the implementation of the Atomic Act*, practical experience of law enforcement, implementation of new WENRA requirements, implementation of the new form of exercising public authority by electronic means (E-Government), *cyber security,* or more stringent personal data protection *(General Data Protection Regulation).*

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). 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 jurisdiction 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 enshrined in Section 4 *of Act No. 541/2004 Coll.,* which is very extensive (https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2004/541/20160701#paragraf-4).

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 siting and the authorization procedure for construction operation decommissioning are shown in figures No. 15., 16.

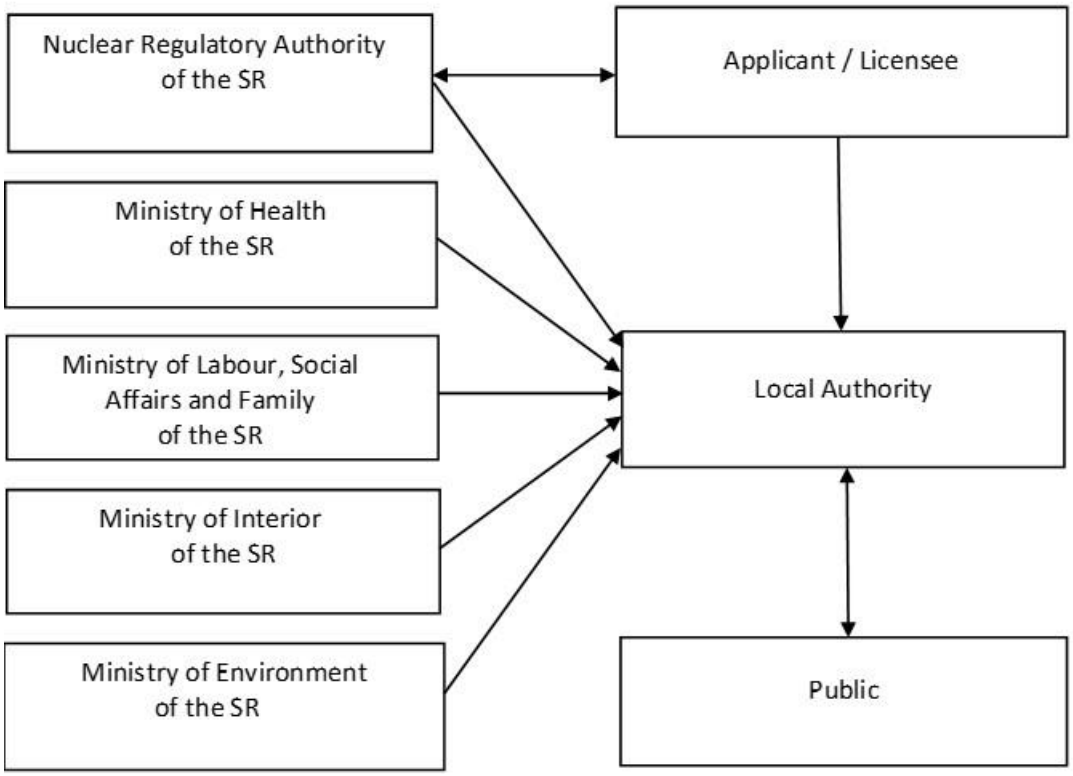

Fig. 15 Authorization procedure for siting

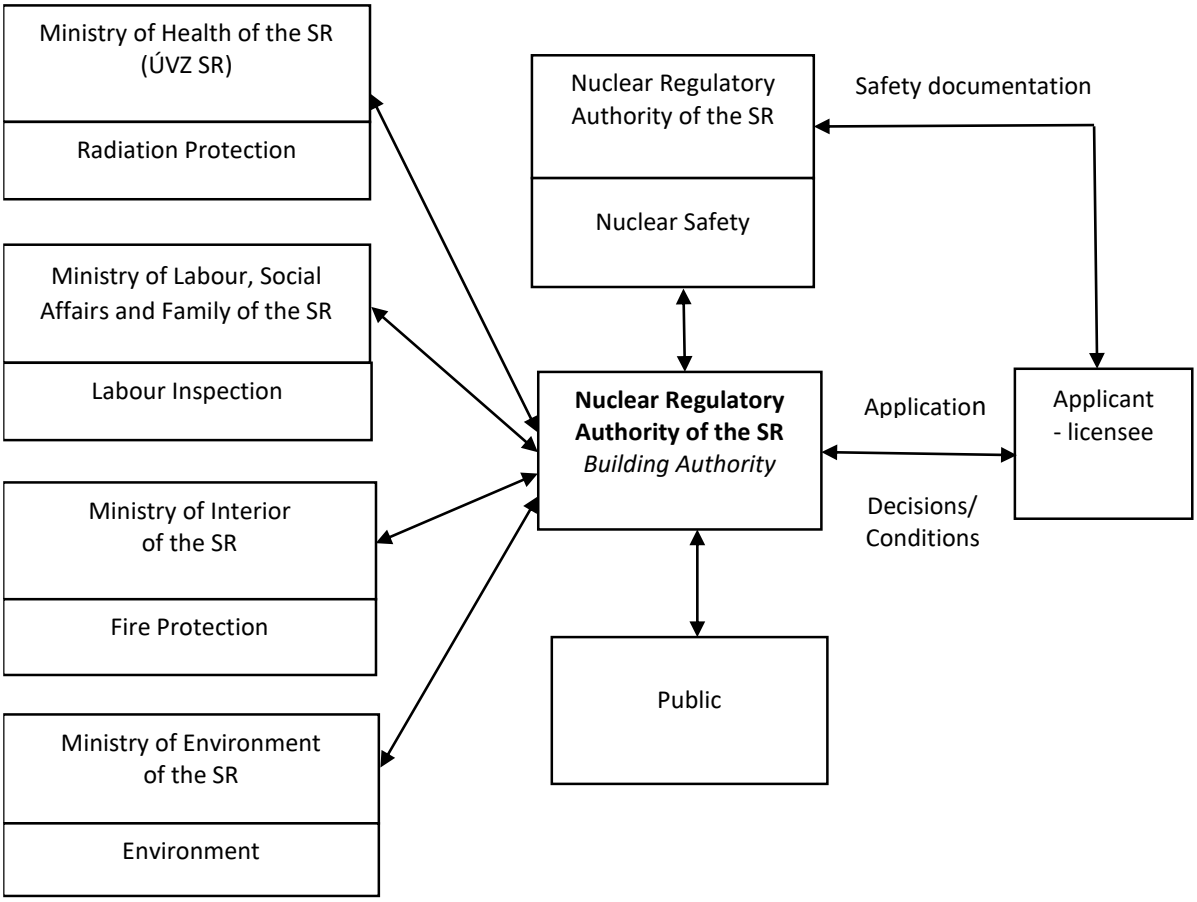

Fig. 16 Authorization procedure for construction, operation and decommissioning

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.

The individual phases of licensing of nuclear installations are procedurally subject to Act No. 71/1967 Coll. on administrative procedure (the Administrative Procedure Code). The Act ensures that the public is informed from the beginning of the decision-making process in accordance with Act No. 24/2006 Coll. on EIA in a timely and effective manner. Publication of EIA is assured through the website of the MŽP SR and on the websites of district authorities and municipalities.

When constructing nuclear installations, the decision on siting of nuclear installation is issued by the *District Office in the seat of the region* concerned according to the location of planned construction of NI, which decides based on the approval issued by ÚJD SR and opinions of other supervisory authorities (ÚVZ SR, 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 ÚVZ 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 Coll. (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. by ÚJD SR Decree No. 31/2012 Coll.

All initiated, ongoing and closed administrative proceedings, including ÚJD SR Decisions, are immediately published on the ÚJD SR website, as well as on the Central Official Electronic Notice Board, which is available to the public 24 hours a day at the offices of ÚJD SR. It is also possible to follow the permitting procedures, during which the party to the proceeding and the public concerned are provided with opportunity to submit comments, suggestions to supplement or raise objections in issuing decisions at all stages of licensing of a nuclear installation. During the proceedings the party may participate in the decision-making process by consulting the file, submitting procedural motions and comments, and before issuing a decision, each party has the right to comment the draft decision. Following the decision, any party to the proceedings may appeal against the first-instance decision of the administrative authority (ÚJD SR). In the second instance proceedings, the provisions of the first-instance proceedings with all the rights and obligations of the party to the proceedings shall be followed accordingly. If a party considers that his rights in the administrative procedure have been infringed, such a party may, within the relevant period, bring a claim before the court to review the legality of the administrative decision.

E.2.1.3 Regulatory Authority – ÚJD SR

Organization structure is illustrated in Fig. 17.

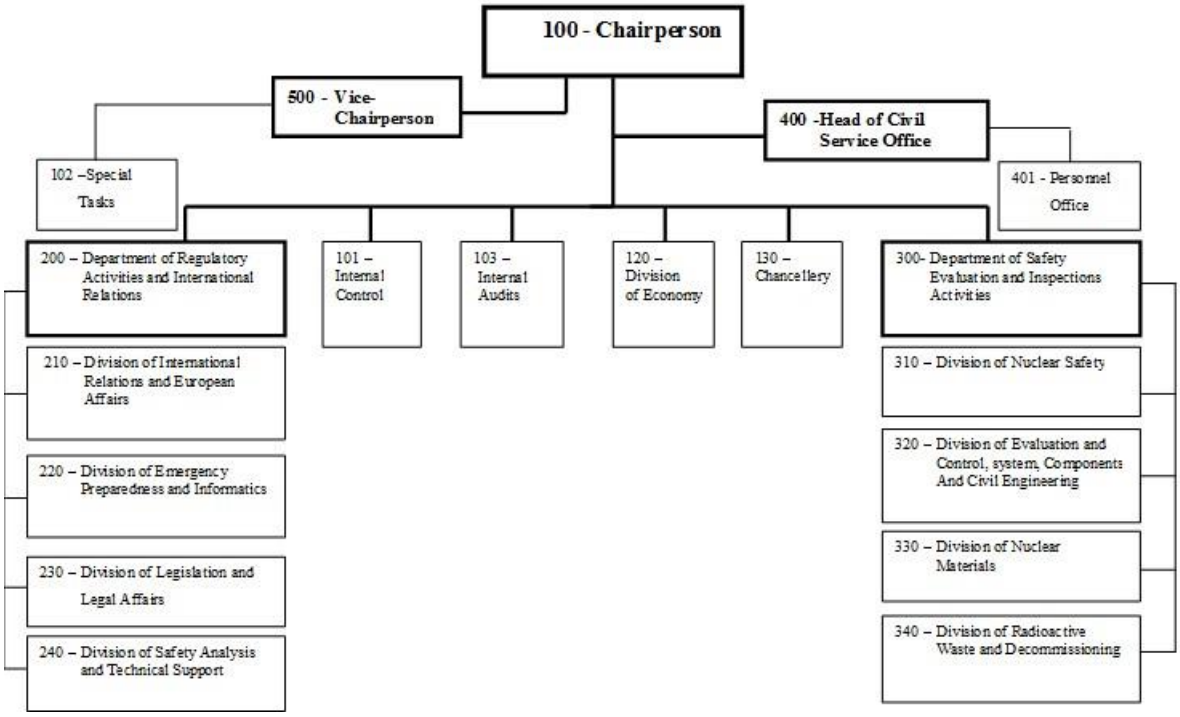

Fig. 17 Organizational structure of ÚJD SR

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. The following are accepted as the basis for ensuring the quality of the Authority´s activities: the *Slovak technical* standard STN EN ISO 9001:2009 and the IAEA GS-R-3 documents. The requirements of the *Slovak technical standard* STN EN ISO 9004:2001 and other *Slovak technical standards from the set of STN standards for management systems* STN EN ISO are also applied if relevant. 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 Act. No. 541/2004 Coll. 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 Act No. 541/2004 Coll., 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 stages) 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 require 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 licensee.

Implementation of compliance with the regulator´s requirements through inspections (year 2019)

As of 29 February 2020, a preliminary analysis of the inspection activities of ÚJD SR for 2019 was performed. 166 inspections were included in the inspection plan for 2019. During the year, 48 unscheduled inspections were added. 10 inspections were later cancelled. A detailed breakdown of inspections is shown in Table 3.

Nuclear installation	***Planned***			***Unscheduled***	***Total***	***Of which protocol***	****Not completed***
	Routine	*Special*	*Team*				
JAVYS (V1)	*4*	*8*	*2*	*2*	***16***	*0*	*3*
SE – EBO (V2)	*4*	*16*	*13*	*5*	***38***	*6*	*8*
SE – EMO 1&2	*5*	*18*	*13*	*2*	***38***	*4*	*10*
SE – MO3&4	*4*	*6*	*2*	*15*	***27***	*4*	*8*
JAVYS – VYZ	*5*	*15*	*3*	*0*	***23***	*0*	*3*
VUJE	*0*	*2*	*0*	*0*	***2***	*0*	*1*
NM and RAW shipments	*0*	*5*	*0*	*8*	***13***	*0*	*0*
Control and registration of NM	*0*	*27*	*0*	*15*	***42***	*0*	*0*
Other inspections	*0*	*4*	*0*	*1*	***5***	*0*	*0*
Total	***22***	***101***	***33***	***48***	***204***	***14***	***33***

Table 3 Preliminary statistics of inspections at NI in SR in 2019 (* at the time when the NR was prepared)

Topics of inspections (examples):

- *Decommissioning, RAW management;*
- *Permits for special air operations (within the scope of physical protection) – airspace zone LZ P1, test of compliance with the directive on drones operation;*
- *Training and qualification of employees;*
- *Physical protection;*
- *Coordination of emergency response in the entire site for emergency drills;*
- *Operation and fire safety;*
- *Safety systems monitoring test;*
- *Storage of fresh fuel/spent fuel;*
- *Checking for changes to the documentation;*
- *Emergency planning – inspection of the performance of monitoring systems;*
- *Technical specification/Limits & Conditions for operation: record;*
- *Inspection after refuelling; etc.*

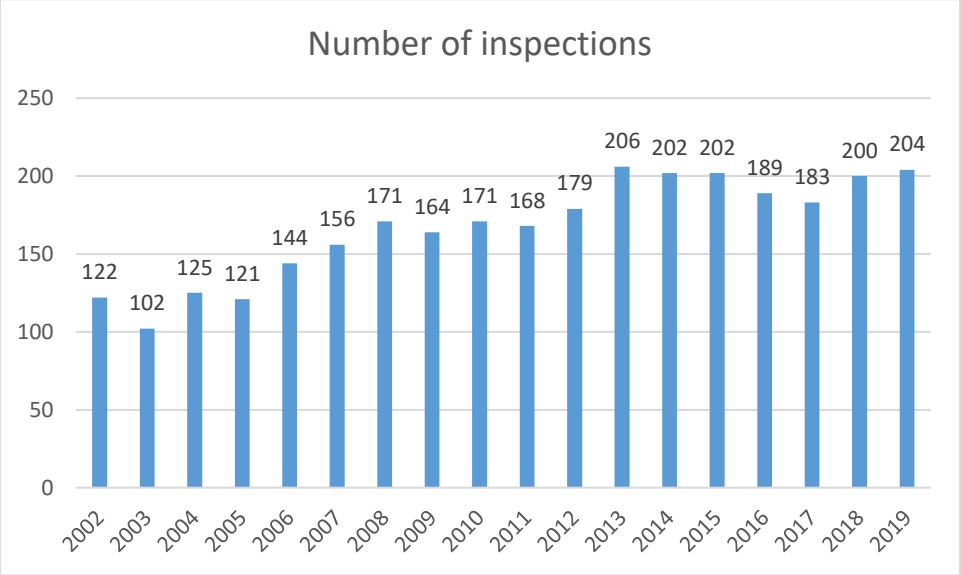

Fig. 18 Number of ÚJD SR inspections in the period 2003 - 2019

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 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 legitimate 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.

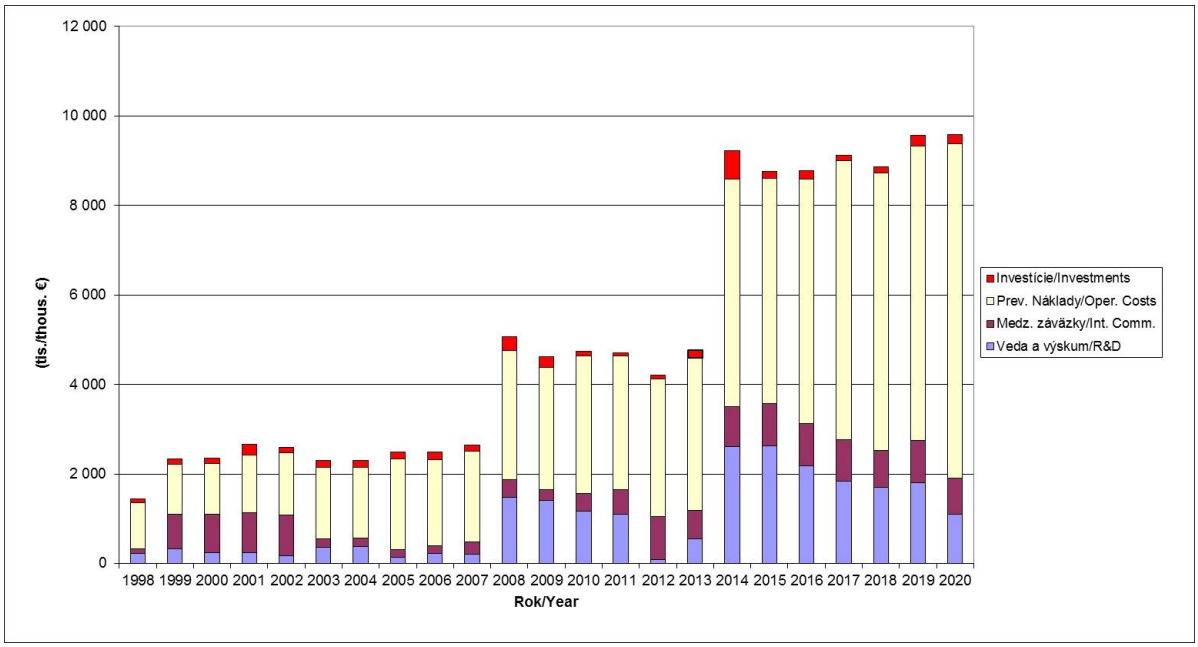

Fig. 19 Structure of the budget chapter

The *2020* budget breakdown for ÚJD SR stipulated a determined total number of employees *128* of which *111* are civil servants and *17* employees working in public interest.

Every year, ÚJD SR approves and evaluates the annual plan of continuous education of all its employees. Continuous education is considered by ÚJD SR to be a systematic process of providing and acquiring knowledge, maintaining, improving and supplementing the skills, abilities, habits and experience that the employee needs to perform work activities. This process distinguishes between adaptation training and competence training. Adaptation training is intended to ensure that a new employee is quickly integrated into the current job position. Competence training includes expert training, language training, management training, training focused on personal development, as well as training in the field of information technology. Special attention is paid to the competence training of ÚJD SR inspectors, in the form of modules focused on professional areas related to the operation of nuclear istallations.

ÚJD SR is currently running a project "Implementation of knowledge management", which is to ensure not only the transfer of knowledge between more experienced and less experienced staff, but also the preservation of critical knowledge.

ÚJD SR uses also other forms of education and training, such as self-study or e-learning.

ÚJD SR approves and evaluates the annual training program for its employees. In addition, ÚJD SR has a training software (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 – ÚVZ SR

Pursuant to Act No. 575/2001 Coll., the MZ SR is the central state administration authority for health care, health protection and other activities in the field of health care.

The state administration in the field of radiation protection, according Act No.87/2018 Coll. on radiation protection, is performed by radiation protection authorities, namely:

- *Ministry of Health of SR - MZ SR,*
- *Public Health Authority of SR - ÚVZ SR,*
- *Regional public health authorities; and*
- *other bodies of radiation protection having competence at the relevant ministry (MDV SR, Ministry of Defence of the SR, MV SR and the Slovak Information Service).*

The competence of the MZ SR includes, inter alia, the establishment of exposure limits and conditions for the management of RAW in terms of their possible impact on public health.

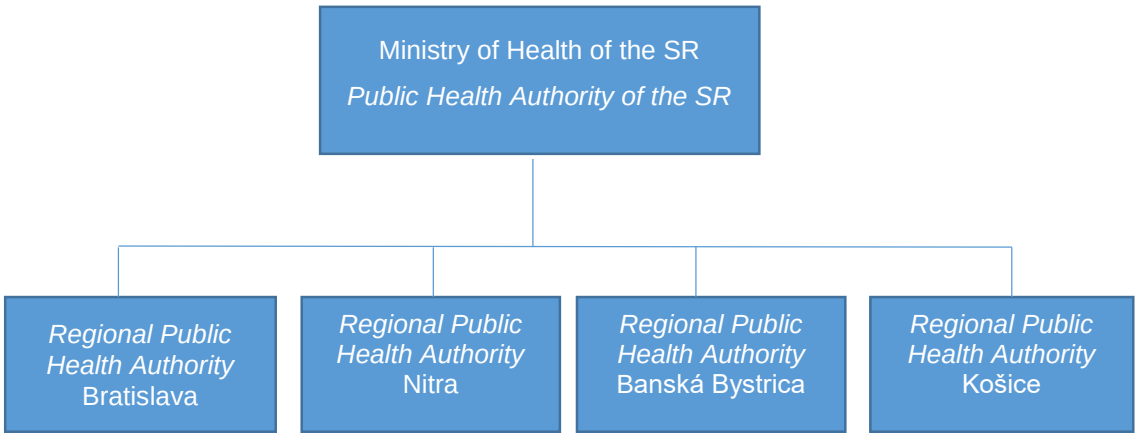

Fig. 20 Structure of state regulation in the field of health protection against radiation

ÚVZ SR issues various types of decisions, binding opinions, and directions to eliminate identified deficiencies, and directives, recommendations, manuals and guidelines in the field of radiation protection.

In the field of radiation protection, the competence of ÚVZ SR is defined by Act No. 87/2018 Coll. on radiation protection (https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2018/87/20180401).

Every year, ÚVZ SR issues reports on the activity of ÚVZ SR, available at: http://www.uvzsr.sk/index.php?option=com_content&view=category&layout=blog&id=25&Itemid=34.

In the field of radiation protection, ÚVZ SR performs *supervision* over radiation protection at nuclear facilities and workplaces where activities, for which it has issued a permit are performed, determines conditions for performing activities leading to exposure, *services* important in terms of radiation protection and for release of radioactive substances and radioactively contaminated objects and materials from administrative control, *in nuclear facilities and workplaces where it has issued*

a permit for operation, it determined conditions and authorized limits. ÚVZ SR determines reference levels for optimizing radiation protection *in an exposure emergency or in persistent exposure under an existing exposure, conditions for the transition from an exposure emergency into an existing exposure, and proposes a strategy for managing the existing exposure situation.* It monitors and directs radiation load of workers by controlling compliance with exposure limits and checking justification of activities leading to exposure, controls compliance with the *limit dose of a representative person for design, construction and operation of a nuclear installation* for radioactive discharges into the atmosphere and hydrosphere, assesses *radioactive contamination* of individual components of the environment, assesses the health condition of the population in the immediate and wider vicinity of workplaces with sources of ionizing radiation.

In the field of radiation protection, among others, ÚVZ SR:

- orders measures to prevent the development of diseases and other health disorders as a result of ionizing radiation;
- monitors the radiation situation and collects data on the territory of the Slovak Republic for the purposes of radiation assessment and assessment of the impact of radiation on public health and creates, ensures and manages activities of radiation monitoring network;
- maintains a register of activities leading to exposure, for which it has issued permit and activities leading to exposure, which it has registered based on notification;
- maintains a central registry of sources of ionizing radiation and a central registry of doses and issues personal radiation cards to external workers;
- provides professional guidance and information to persons, who have come into contact with or been exposed to a radioactive source;
- provides information to the public on radiation situation, emergencies and possible exposure, on the risks caused by exposure and on measures and interventions to reduce exposure in the event of radiation accidents;
- searches for workplaces and facilities where orphan radioactive sources may occur;
- *establishes an examination board for examination and recognition of professional competence;*
- *establishes a commission that assesses the fulfilment of requirements for the recognition of the competence of a natural person and a legal entity to act as an expert on radiation protection;*
- cooperates with the European Commission and the competent authorities and institutions of the Member States, and represents the Slovak Republic in international organizations in matters of radiation protection.

E.2.2.2 Authorization Procedure

When permitting activities leading to exposure *or permitting a service important in terms of radiation protection, ÚVZ SR* proceeds in accordance with Act No. 71/1967 Coll. on administrative proceedings. *The basic precondition for the issuance of a permit is the submission of the required documentation and compliance with the requirements set out in Act No. 87/2018 Coll.*

The permit of ÚVZ SR for activities leading to exposure in relation to nuclear facilities is not the final granting of a licence, but it is a condition for the issuance of a licence.

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

The state health supervision is carried out by staff of the ÚVZ SR.

The person performing state health supervision is entitled, inter alia, to enter plots, buildings, facilities and operations and other premises of controlled entities, request the necessary accompaniment, take samples in the amount and to the extent necessary for *analysis and perform their professional assessment,* request the necessary information, documents, data and explanations, accompanying documents, technical and other documentation, impose measures to eliminate identified deficiencies *and sanctions.* A person performing state health supervision may, for example: prohibit the use of devices and equipment that pose an immediate threat to health, order the closure of an establishment or part thereof, if it finds a risk of damage to health, order measures to limit exposure of *workers* and residents, order safe removal of disused or damaged sources of ionizing radiation, RAW or radioactive substances, order the elaboration of special operating rules, working procedures and methodologies for performing activities leading to exposure, prohibit activities or operations, order special measurements, analyses or investigations to assess harmful factors and their impact on health. Supervision over the provision of radiation protection in activities leading to exposure *and services important in terms of radiation protection* is performed, a priori, by assessing the proposal to perform activities leading to exposure *or provision of service important in terms of radiation protection* at the stage of its licensing and then continuously according to the nature of risk.

ÚVZ SR performs state supervision based on a pre-prepared inspection plan, which is updated once a year. In preparing and updating it, a graded approach shall be applied, taking into account the extent and nature of the risk associated with the performance of activities that are subject of supervision. Inspections can also be performed as unscheduled.

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 on-site inspection, the following is checked 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.

On-site inspections are connected with control measurements of the radiation situation and the taking of control samples by the supervisory staff.

Inspections are mostly focused on a special area important in terms of radiation protection:

- Control of ensuring *radiation protection* during power operation of reactors,
- Control of ensuring *radiation protection* during general outage,
- 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*,*
- 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 the fulfilment of the monitoring plan in the vicinity of the *nuclear installation* and assessment of the impact of the *NI´s* operation on the radioactivity of components of the environment,
- Control of radiation situation in the premises of the *nuclear installation,*
- 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.

Other *inspections* are performed as needed:

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

Each inspection performed must be documented in the form of minutes. Binding measures to remedy the deficiencies identified shall be part of the minutes. They must be clearly worded in such a way as to require the removal of deficiencies found, and be comprehensible with clearly defined deadlines.

Financial and human resources of the regulator – ÚVZ SR

ÚVZ SR is a budgetary organization of the State, which through financial relations is connected to the budget of MZ SR. In the exercise of its powers, ÚVZ SR, as a body of radiation protection, uses the human resources and financial resources necessary to fulfil its obligations under this Act in accordance with the resources available from the state budget; Radiation protection authorities may use external scientific knowledge and technical resources and expertise to support their regulatory functions. In 2019, the radiation protection authorities in the health sector (ÚVZ SR and regional public health authorities) had a total of 40 employees who perform state supervision in the field of radiation protection according to Act No. 55/2017 Coll. on civil service.

E.2.3 Regulation in the Field of Occupational 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 occupational accidents causing death or serious injury, *the imminent threat of a* major industrial accident, safety, technical and organizational causes of occupational diseases and threat of an occupational disease, keeps records on them and if necessary, investigates the causes of other occupational accidents,
- By means of binding opinion imposes requirements for ensuring safety and protection of occupational 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 Act No. 125/2006 Coll. on labour inspection *and Act No. 82/2005 Coll. on illegal work and illegal employment and on amendments to certain laws,* the Labour Inspectorate Nitra supervises all workplaces of nuclear facilities throughout the territory of 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 MPSVR SR 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 equipment are divided into group A, group B or group C. “Group A” contains technical equipment with high degree of threat, “Group B” are technical equipment with higher degree of threat and “Group C” are technical equipment with lower degree of threat. Technical equipment of Group A and technical equipment of Group B are considered as classified technical equipment.

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:

a) Propose technical, organizational and other measures necessary to remedy the situation,
b) Order removal of identified deficiencies within the time limits specified,
c) Order measurements, inspections, tests and other necessary measures,
d) 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 licensee 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 licensee is obliged to ensure nuclear safety, physical protection, emergency preparedness, including their verification, to comply with the documentation reviewed or approved by the ÚJD SR, to adhere to the limits and conditions of safe operation or limits and conditions of safe decommissioning. Further the licensee is obliged to comply with the technical and organizational requirements provided by the generally binding legal regulations.

The licensee may entrust the performance of work activities only to persons fulfilling the conditions specified by Act No. 541/2004 Coll., and in accordance with ÚJD SR Decree No*. 52/2006 Coll*.

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 licensee shall be liable for nuclear safety.

Radiation protection, in the meaning of Act No*. 87/2018 Coll., is* defined as a *system of technical measures or organizational measures to limit the exposure of natural persons against the effects of ionizing radiation*.

The licensee 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.

When using nuclear energy, the level of *radiation protection* or is according to the available knowledge and the exposite follows the principle of as low as reasonably achievable, without exceeding the

exposure limits. 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 16l), Section 21 par. 13 *of the Act No. 541/2004 Coll.*).

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 *(hereinafter referred to as "IMS")* is built in accordance with legal requirements, IAEA safety standards and in accordance with *Slovak technical* standards STN EN ISO 9001:2016, STN EN ISO 14001:2016, STN *ISO 45001:2018* and STN ISO/IEC 20000-1:2014.
- 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 Licensee towards Regulator

The licensee 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 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 licensee 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 licensee 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 licensee 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 licensee 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 licensee 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 licensee, necessary to perform work activities by the employee of a licensee. 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 licensee. The licensee authorizes his personnel to perform working activities. An “Authorization to Perform Working Activities“ as part of the IMS for quality assurance of a nuclear installation – a licensee. 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 licensee, 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 licensee 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 lecensee 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 documents;
- the IAEA standards and guides;
- *Slovak technical standards* STN EN ISO 9001:*2016*, STN EN ISO 14001:*2016, STN ISO 45001:2018* and STN ISO/IEC20000-1*:2014*,
- Management documentation in the Quality System.

Diagram of the system of staff training:

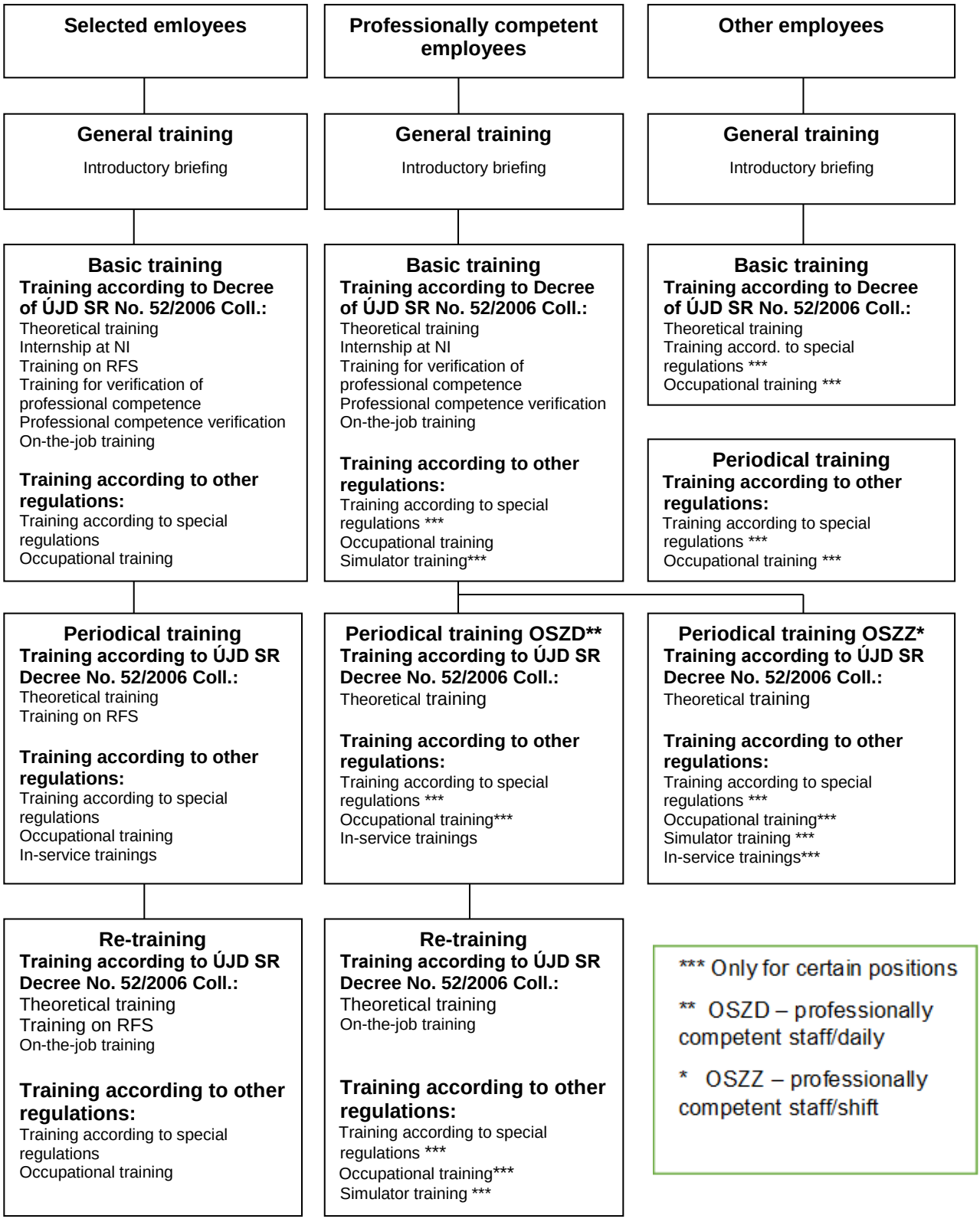

Fig. 21 Chart of Profesional training system for employees

In terms of their impact on nuclear safety, the employees are classified into the appropriate type and phase of training and divided accorded to their activities into *ten* categories, which are further divided into professional groups, *according to their professional focus. (Fig. 22):*

Category I: Selected employees performing work activities with direct impact on nuclear safety:

- *Secondary circuit operator*
- *Primary circuit operator*
- *Head of reactor unit*
- *Shift supervisor*
- *and professionally competent staff performing work activities with impact on nuclear safety, such as:*
- *Lecturer for RP simulator training*
- *Specialist for nuclear safety analyses*

Category I-: Professionally competent staff performing work activities with impact on nuclear safety:

- *Safety management engineer – nuclear safety*
- *Equipment reliability specialist*
- *System engineer*
- *Project engineer*
- *Basic design configuration specialist*

Category II+: Professionally competent staff performing work activities with impact on nuclear safety:

- *Safety management engineer*
- *Component engineer*
- *Equipment/simulator administration technician*

Category II: All other professionally competent staff – management employees, specialists, engineers, technicians, technologists, foremen, or others, performing managerial, technical, engineering, control, maintenance activities with impact on nuclear safety.

Category III: – professionally competent staff – field operator, locksmiths, electricians, mechanics, radiation control technicians and other, performing operator, maintenance and control activities with impact on nuclear safety.

Category F – selected employees performing work activities with direct impact on nuclear safety:

- *Control physicist*

Category S – selected employees performing work activities with direct impact on nuclear safety:

- *Scientific head for start-up without the right of handling*

Category M – professionally competent staff – managerial staff performing work activities with impact on nuclear safety:

- *Section and Plant Directors*
- *Managers of centralized units*
- *Senior staff of Procurement Section 30000*

Category T – Foreign professionally competent staff performing work activities with impact on nuclear safety in non-managerial positions (technicians, technologists, specialists, etc.).

Category VI – other employees performing activities without impact on nuclear safety.

Com.: Category IV was terminated and incorporated into other categories.

Fig. 22 Categories of employees of the licensee, SE, a. s.

For the licensee, JAVYS, a. s. (responsible for decommissioning RAW and SF management), employees are divided according to their impact on nuclear safety as follows:

***Work activities with an impact on nuclear safety** of NI are performed by professionally competent staff included in category V training, working in the following job positions (Fig. 23):*

Category V: – Selected employees performing work activities with an impact on nuclear safety:

- *Division directors,*
- *Heads of units,*
- *Heads of sections,*
- *Heads of departments,*
- *Technical-administrative staff (technicians, technologists, specialists, clerks),*
- *Foremen,*
- *Operators and maintenance staff.*

Fig. 23 Category of employees of the licensee, JAVYS, a. s.

Category V (a-e) includes professionally competent staff who perform activities related to operation of nuclear installations TSÚ RAO, ISFS, RÚ RAO, IS RAO and FS KRAO and decommissioning of NPP A1 and NPP V1.

Employees performing activities related to the operation of TSÚ RAO, ISFS, IS RAO, RÚ RAO, FS KRAO and decommissioning of NPP A1, stage 3 and 4.

Operator of a specialized facility

Training of employees of the licensee, *and if necessary, also employees of contractors,* is carried out by the operator of a specialized facility (training centre), which is a holder of a licence for training of *employees of the relevant licensee*, issued by ÚJD SR based on a written request after assessment of the technical equipment used for training and professional competence of the applicant´s staff. The training is carried out in accordance with the *ÚJD SR Decree No. 52/2006 Coll. on professional competence and with the approved system of training of licensee staff and in accordance with the relevant training programs of professionally competent staff or selected staff, drawn up by the operator of the specialized facility. The special technical equipment of the specialized facilities is a representative full scale simulator (hereinafter referred to as "RFSS") of the referential unit of operated NI.There are three RFSS NI in Slovakia:*

- *RFSS EBO at VUJE, a. s., ŠVS – in operation and Unit 3 EBO is a referential unit,*
- *RFSS EMO in the premises of EMO – in operation and Unit 1 of EMO is a referential unit,*
- *RFSS MO 3&4 in the premises of EMO – under construction and Unit 3 of EMO is a referential unit.*

The main upgrade on RFSS (representative full scale simulator) in EMO was in 2013, during which the control computer and the core model were replaced. A similar upgrade was successfully implemented in 2013 and 2014 also at the RFSS EBO at VUJE, a. s. In the period 2019 – 2020, RFSS MO3&4 was upgraded for the needs of commissioning of Unit 3 of EMO.

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 method of financing the management of RAW, SNF and decommissioning of nuclear installations is regulated by Act No. 308/2018 Coll. on the National Nuclear Fund. Government Ordinance No. 21/2019, stipulating the amount of annual levy intended for covering the historical debt from the supplied electricity to the end customers, and details of the method of its collection for the National Nuclear Fund, its use and on the method and deadlines for the payment. Government Ordinance No.22/2019 stipulates the amount of mandatory contribution and mandatory payment, and details on the method and payment of mandatory contribution and mandatory payment to the account of the National Nuclear Fund. The purpose of the Nuclear Fund is to provide financing of activities related to the national program for the management of SNF and RAW (hereinafter referred to as "National Program"), to concentrate and manage funds intended for the back-end of the peaceful use of nuclear energy cycle, to secure funds from the state budget for the management of nuclear materials of unknown origin, and to administer financial security for high-activity sources in accordance with a special regulation.

Fund resources are funds paid as:

a) Mandatory contributions,
b) *mandatory payments,*
c) *a transfer from the expenditure budget account of the MH SR, as a levy collected by the transmission system operator and a distribution system operator (hereinafter referred to as "System Operator"), to cover historical debt (hereinafter referred to as "levy"); The levy is a part of the price of electricity supplied to end customers,*
d) fines *and sanctions* imposed by ÚJD SR according to a special regulation,
e) *income from deposits on the Nuclear Fund accounts,*
f) voluntary contributions from natural *persons* and legal entities,
g) subsidies and contributions from European Union funds and from other international organizations, financial institutions and funds provided to cover the cost of the back-end of the *peaceful use of* nuclear *energy*,
h) *subsidies from the state budget intended to cover the necessary costs incurred for the management of nuclear materials of unknown origin and for the management of radioactive materials of unknown origin, these subsidies being provided in full; If the originator of these materials and wastes is subsequently identified, a special regulation shall be followed*,
i) *subsidies from the state budget provided for reasons other than under par. h) on the basis of a Government Decision,*
j) proceeds from financial operations,
k) *other resources, if so provided by a special regulation or an international treaty, by which the Slovak Republic is bound,*

l) *fees from legal entities or natural persons – entrepreneurs applying for a permit or holders of permit for activity leading to exposure, who will handle a high-activity source in accordance with a special regulation, representing a financial security in the amount determined by an authorized organization, holder of a permit from the ÚVZ SR according to a special regulation.*

At present, the basic (majority) resources of the Fund are the mandatory contributions *and payments* of licensee and a transfer from the expenditure budget account of the MH SR, as well as levies collected by the collected by transmission and distribution system operators.

The Fund creates special-purpose sub-accounts *and analytical accounts* in the following structure:

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:
   1. Nuclear Power Plant A1,
   2. Nuclear Power Plant V1,
   3. Nuclear Power Plant V2,

b) Sub-account for the decommissioning of nuclear installations, including management of RAW from this commissioning, operated at Mochovce site in the structure of the following analytical accounts:
   1. NPP Mochovce 1&2,
   2. NPP Mochovce 3&4,

c) Sub-account for decommissioning of *other* nuclear installations, including management of RAW from this decommissioning, which *are* commissioned after *1 January 2019.*

d) *Sub-account* for management of nuclear materials of *unknown origin* and radioactive *materials of unknown origin.*

e) Sub-account for site search, geological survey, preparation, design, construction, commissioning, operation and closure of repositories for RAW or SNF, including site monitoring after closure of these repositories and related research and development, public involvement into decision-making processes, communication with the public, economic incentives for the sites concerned and the alleviation of the burdens caused by these activities in the structure of the following analytical accounts:
   1. RÚ RAO at Mochovce site,
   2. Deep geological repository,

f) sub-account for institutional inspection of repositories,

g) sub-account for *long-term* storage of spent nuclear fuel in separate nuclear installations,

h) sub-account for reimbursement of expenses intended for the administration of the *Nuclear Fund* and expenses related to the management of the *Nuclear Fund*,

i) sub-account for security to cover the costs of handling disused high-activity sources,

j) sub-account for decommissioning nuclear installations other than nuclear installations for power generation and closure of RÚ RAO in the structure of the following analytical accounts:

1. *Technologies for treatment and conditioning of radioactive waste including objects and facilities transferred here from NPP A1,*
2. *Interim spent fuel storage facility operated at the Jaslovské Bohunice site,*
3. *Final treatment of liquid radioactive waste operated at the Mochovce site,*
4. *Integral radioactive waste storage facility operated at the Jaslovské Bohunice site,*
5. *National RAW Repository operated at the Mochovce site,*

k) *Sub-account for collecting funds from fines and sanctions.*

The resources of the Nuclear Fund arising from mandatory contributions or mandatory payments shall be held in relevant sub-accounts or analytical accounts, for which the mandatory contributions or mandatory payments are intended, together with income from the deposits of these funds in the accounts and yields from financial operation.

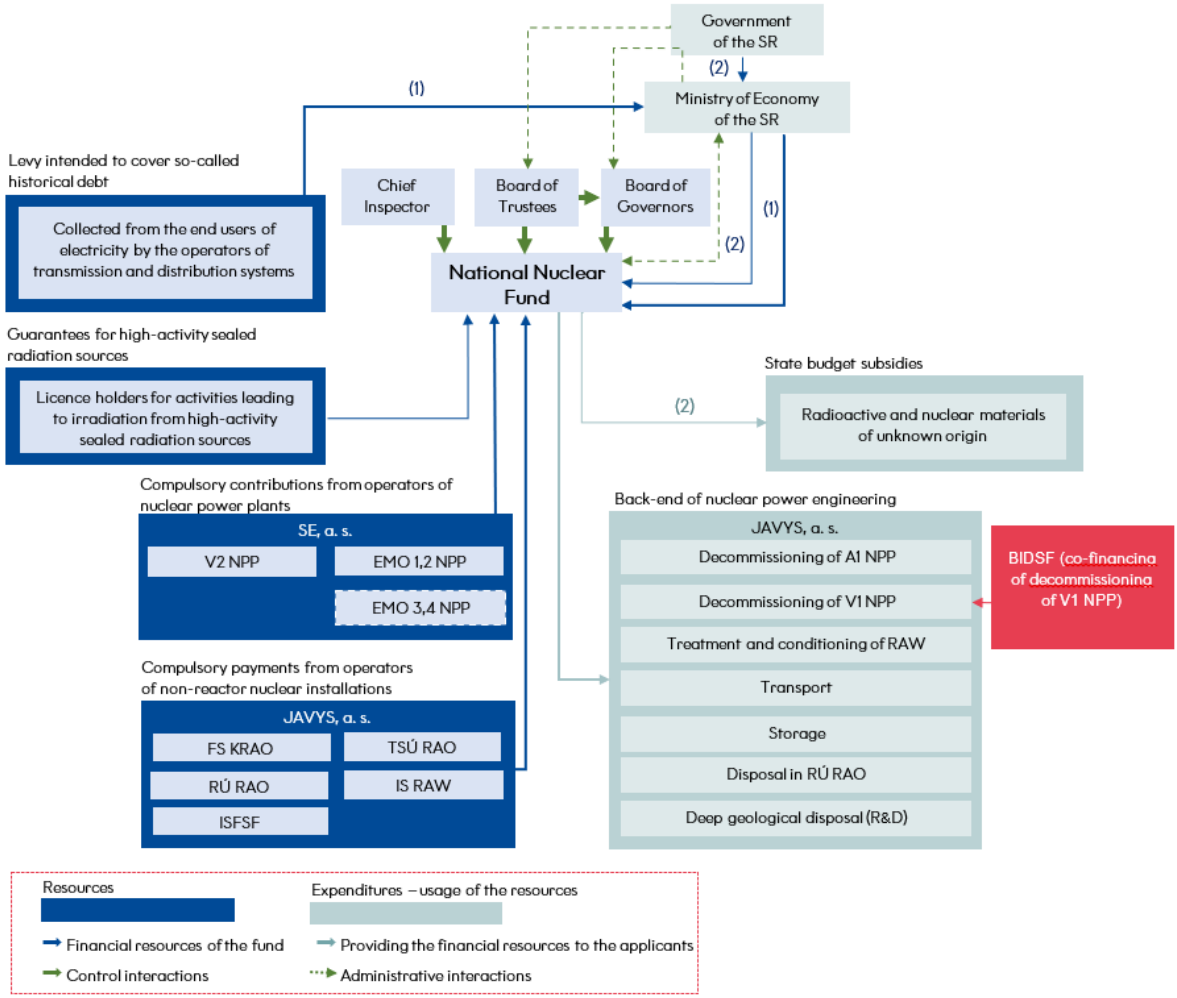

Fig. 24 Financing scheme for the back-end of the nuclear energy cycle

Funding from the Fund is provided based on applications. The applicant may be a licensee for:

1. *A stage of decommissioning of a nuclear installation,*
2. *Operation of a nuclear installation for RAW or SNF disposal,*

3. *Closure of RAW repository or repositories, and SNF and its institutional control,*
4. *RAW or SNF management,*
5. *Handling of nuclear materials inside or outside the nuclear installation, or*
6. *Export of nuclear materials or shipments of radioactive materials, including their international transport.*

The Nuclear Fund is obliged to use funds in accordance with the National Program to cover eligible costs incurred for activities of the back-end of the peaceful use of nuclear energy cycle, and activities related to management of nuclear materials of unknown origin, radioactive materials of unknown origin and disused high-activity sources, up to the amount of accumulated funds, in particular for:

a) elaboration of documentation submitted to ÚJD SR for the purpose of issuing permit for decommissioning of nuclear installation,

b) decommissioning of a nuclear installation, including RAW management from this decommissioning,

c) spent nuclear fuel management after the start of decommissioning of a nuclear installation,

d) handling of nuclear materials of an unknown origin and handling of radioactive materials of unknown origin, where the originator or the current owner, according to the statement of the Police Investigator or the statement of the MZ SR, is not known; if the originator of nuclear material of an unknown origin or radioactive material of unknown origin is subsequently identified, is obliged to reimburse to the Nuclear Fund for the costs incurred in the handling of nuclear material or radioactive material,

e) the purchase of land for the location of RAW or SNF repository from the decommissioning of nuclear installations,

f) site search, geological survey, preparation, design, construction, commissioning, operation and closure of RAW or SNF repositories, including their monitoring after the closure, institutional control of repositories and related research and development, reasonable costs for public involvement in related decision-making processes, reasonable costs of communication with the public, reasonable costs of economic stimulation of affected localities, and reasonable costs of alleviating the burdens caused by activities under this point,

g) management and activities related to the management of Nuclear Fund up to 1% of the annual income of the Nuclear Fund,

h) payment of insurance premiums for liability insurance of the operator of nuclear installation, which is in decommissioning, for damages caused by nuclear event,

i) the management of disused high-activity sources and related activities from the signing of the proof of receipt of disused high-activity source by the authorized organization up to the amount of the contribution to the financial security,

j) reasonable and purposefully spent costs to support training, qualification and expertise for the preservation and dissemination of knowledge, and support for research and development intended to deal with the back-end of the peaceful uses of nuclear energy cycle, the management of nuclear

materials of unknown origin or radioactive materials of unknown origin, RAW produced during activities leading to exposure and the area of disused high-activity sources.

In the context of the accession of the Slovak Republic to the EU, both Units of NPP V1 were shut-down in 2006 and 2008 based on the decision of the Government of SR. Completion of the decommissioning of NPP V1 is planned by 31 December 2025.

The costs of decommissioning of NPP V1 are financed from the following sources:

- *from Slovak resources (from levies paid to the National Nuclear Fund and from own resources of JAVYS, a. s.),*
- *from EU funds and other donors.*

The purpose of providing financial assistance by the EU was to mitigate the economic and social impacts of the early shutdown of NPP V1. EU funds were provided through PHARE program and subsequently managed by the EBRD, which established the International Fund for the Decommissioning of NPP V1 (BIDSF), to which EU funds from the budget period 2007 - 2013 and partly also from 2014 – 2020 were allocated. From 2016, a National Agency was established, which manages new EU funds alongside the EBRD funds.

Initially, projects indirectly related to decommissioning were also supported, to mitigate the consequences of shutdown, especially in the areas of transmission system and energy efficiency. Since 2014, it is possible to allocate financial support exclusively for NPP V1 decommissioning projects.

From the resources of the National Nuclear Fund, the national funds are provided for the relevant year on the basis of approved applications for NPP V1 decommissioning, for co-financing of selected projects co-funded from the EU sources, to finance consideration for suppliers, to finance induced support costs of NPP V1 decommissioning, and other activities according to the possibilities specified in Act No. 308/2018 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

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 9001:2016 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 equipment are determined in quality plans for these equipment.

Quality system of operator is built and implemented in through the 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.

In addition to legislative requirements, which are binding, technical standards are considered to be the minimum recommended technical solution and their observance ensures that the user meets the legal requirements. Pursuant to Act No. 60/2018 Coll. on Technical Standardization compliance with a Slovak technical standard or technical standardization information is voluntary (e.g. Slovak Technical Standards - STN), European standards (ES), international technical standards (ISO, IEC), manuals, internal standards (such as for example, directives and orders).

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 **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, *STN ISO 45001* 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 Coll., as well as Decree No. 430/2011 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 regime. When verifying professional competence also the physical condition – technical equipment of legal entities and natural persons is verified.

During the inspection of professional competence by the Labour Inspectorate, the following is checked in particular:

- Organizational support for the activity,
- Staffing of the activity,

- Material and technical support of the activity,
- Other (according to the requirements of labour inspection authorities, e.g. certificates for activities of the staff, document on risk assessment of activities, designated safe working procedures, demonstrable familiarization and equipment for employees to ensure safety and protection of health at work, designated protective measures and protective equipment, internal regulations – rules on safety and protection of health at work, accompanying technical documentation of work equipment and technical equipment, keeping of documentation, records and record-keeping related to safety and protection of health at work).

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, *in accordance with* Act No*. 87/2018 Coll.* is defined as a *system of technical or organizational measures to limit the exposure of individuals to the effect of ionizing radiation.*

This Act transposed Council Directive 2013/59/Euratom, which lays down basic safety standards for protection against hazards arising from ionizing radiation into the legislation of the Slovak Republic.

Act No. 87/2018 Coll. *regulates the performance of state administration in the field of radiation protection (details in chapter 4.1.2.2). The Act also defines requirements for ensuring physical protection in the use of radioactive sources. Details on the requirements for ensuring radiation protection for the implementation of the Act are set out in the implementing decrees of the MZ SR SR listed in Annex VI.*

F.4.2 Monitoring of Radioactivity by Licensee

Pursuant to Act No. 355/2007 Coll. on the protection of health, the promotion and development of public health, every natural person and every legal entity carrying out activities, in which harmful factors occur or arise, is obliged to ensure their qualitative and quantitative detection at the workplace and its vicinity.

The licensee or holder of registration issued by ÚVZ SR is obliged, to the extent corresponding to the severity of the performed activity, to ensure monitoring of ionizing radiation and radionuclides generated or released as a result of activity leading to exposure in the work environment and environment in the vicinity of the workplace in accordance with the monitoring plan, and inform the staff about the results of monitoring. Details of the requirements for monitoring ionizing radiation are set out in *Act No. 87/2018 Coll., Decree of the MZ SR No. 99/2018 Coll. on the provision of radiation protection and Decree of the MZ SR No. 96/2018 Coll., laying down details on the activities of the radiation monitoring network.*

The licensee is obliged to develop a monitoring *plan* and ensure that it is observed. Monitoring must be performed continuously, periodically or operatively *during a certain activity leading to exposure in order to evaluate and ensure the acceptability of this activity leading to exposure in terms of radiation protection*. The monitoring plan, according to the type of activity performed must include monitoring during normal operation, in case of foreseeable deviations from normal operation, during radiation incidents or radiation accidents.

It is structured into parts governing the monitoring of:

a) Work areas of the workplace and areas adjacent to the work areas,
b) The surroundings of the workplace,
c) Personal monitoring of staff,
d) Discharges of radioactive materials from the workplace into the environment.

The monitoring plan shall contain:

a) quantities relevant in terms of radiation protection to be monitored, method, scope 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.

Meters that are used to monitor the workplace must be regularly maintained, their functionality verified, they must be calibrated and metrologically verified.

The monitoring plan must allow control of compliance with exposure limits and *reference annual levels of discharges* into the environment, and early detection of deviations from normal operation and demonstrate that 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 ÚVZ SR, 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. 25 Monitoring of the spatial dose equivalent on the surface of FCC

F.4.3 Liquid and Gaseous Discharges

The annual reference levels for discharges are listed in Annex II.

Pursuant to Act No. *87/2018 Coll. on radiation protection,* the licensee is obliged to submit for approval to the state regulator the principles for the discharge of radioactive materials into the environment within the radiation protection quality assurance program. 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.

Act No. 87/2018 Coll. furthermore requires:
Radioactive materials may be discharged into the air and surface waters from the workplace, where the activity leading to exposure is performed, if the discharge was permitted by ÚVZ SR or the relevant regional authority, and if it is ensured that the average effective dose of a representative person caused by the release into the environment in any calendar year does not exceed 0.05 mSv, even if the released radioactive material accumulates as a result of the activity.
With regard to the discharge of radioactive materials from a nuclear installation into the environment, the dose limit of a representative person for the design, construction and operation of a nuclear installation for one operator of a nuclear installation is 0.25 mSv per calendar year. In the case of discharges into the air and surface waters, the value of the limit dose of a representative person shall be determined separately for individual discharges as follows:
a) an effective dose of 0.2 mSv pre calendar year for releases into the air, and
b) an effective dose of 0.05 mSv per calendar year for discharges into surface waters.
If there are several nuclear installations on one site or region (that affect the dose of a representative person), this value applies to the total exposure from all nuclear installations in the locality or the region.
It is possible to discharge radioactive material into the environment from a workplace, where activity leading to exposure is performed, without the permission from the ÚVZ SR or the relevant regional authority, if in any calendar year the average effective dose caused by their introduction into the environment does not exceed 0.01 mSv in a representative person, and at the same time the collective effective dose shall not exceed 1 manSv; the conditions for meeting the criteria under this paragraph are set out in Annex 5 of Act No. 87/2018 Coll. on radiation protection.
ÚVZ SR may require the applicant for a permit for the release of radioactive materials from the workplace to prepare an optimization study.
This means that the dose limit is the basic criterion for checking the current *annual reference levels* of discharged activities of radioactive materials listed in Annex II. (checking that the above-criterion is not exceeded – not exceeding the effective dose – was performed by a software through the appropriate geographical model and conversion factors).

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 radioactive materials into the air are continuously monitored in the ventilation stacks of nuclear installations in order to check that the daily *reference levels* are not exceeded. At the same time, samples are taken in samplers to determine radionuclide composition and balance. Requirements for balancing of individual radionuclides are defined in the relevant decisions of *ÚVZ SR* for individual nuclear installations.

The basic balance annual *reference levels* of discharges of radioactive materials are supplemented by reference levels, the aim of which is to continuously monitor the operational status of the nuclear installation:

- 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 radioactive discharges from four stacks (the main production unit of NPP A1 + bituminisation line, BSC, the ISNFSF, NPP V1). Of these, until 21 October 2011, only NPP V1 and ISFS stacks had their own reference values set for gaseous discharges and others were intended for "ventilation stacks in the NPP A1 site". From 21 October 2011, the ÚVZ SR decision (department of health protection against radiation) OOZPŽ/7119/2011 has been in force, which assesses TSÚ RAO and NPP A1 (ventilation stacks in the NPP A1 site) – consisting of a bituminisation line, BSC, main production unit of NPP A1, not as a whole, but as 3 separate facilities with discharge points. The ISFS facility is further assessed separately.

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}.**

ISFS	Mixture of radionuclides (alfa/beta/gamma)	
Year	Discharge [kBq]	% *of annual reference level*
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*
2017	*92,559*	*0,03*
2018	*100,400*	*0,03*
2019	*98,897*	*0,03*

Table 4 Gaseous discharges from 2012 for ISFS

Gaseous discharges from ISFS are shown in Table 4.

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

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 the result of the analysis and comparison with *values of the reference levels,* the water from the tanks is either returned

to the technological processes or for purification to the water treatment station or discharged through the waste water control station to the environment (the Váh river).

Liquid discharges from the National RAW Repository are only drainage and runoff (rainwater) water, which falls on the roof of buildings and then collected in retention tanks. After filling and analysis of radionuclides (the list of radionuclides and their reference values are given in the Table of Annex II.) it is discharged into the Telinsky stream.

Values of radioactive material discharges into atmosphere and hydrosphere from NPP A1 and technologies of RAW treatment and conditioning between 1994 - 2019 are shown in the following tables (*Table 4 and Tables 5, 6, 7, 8 or Table 9*). It can be stated that in the whole monitored period, the *annual reference levels* of discharges of radioactive materials were not exceeded, while the discharges of corrosive and fission products and discharges into the atmosphere were well below the authorized *annual reference levels.*

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.

VK 46/A	Radionuclides (beta/gamma)		Strontium(^{90}Sr-beta)		Transuranium (alpha/gamma)	
Year	Discharge [kBq]	*% of annual reference level*	Discharge [kBq]	*% of annual reference level*	Discharge[kBq]	*% of annual reference level*
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
2017	*2 175,581*	*0,331*	*27,610*	*0,141*	*7,803*	*0,127*
2018	*3 406,446*	*0,518*	*97,170*	*0,496*	*24,681*	*0,401*
2019	*4 125,023*	*0,627*	*105,700*	*0,539*	*58,927*	*0,957*

Table 5 Gaseous discharges from VK 46/A

VK 46/B	Radionuclides (beta/gamma)		Strontium(^{90}Sr-beta)		Transuranium (alpha /gamma)	
Year	Discharge [kBq]	% *of annual reference level*	Discharge [kBq]	% *of annual reference level*	Discharge [kBq]	% *of annual reference level*
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*
2017	*169,110*	*0,120*	*9,240*	*0,220*	*0,380*	*0,029*
2018	*62,807*	*0,045*	*7,079*	*0,169*	*0,338*	*0,026*
2019	*75,103*	*0,053*	*6,001*	*0,143*	*0,452*	*0,034*

Table 6 Gaseous discharges form VK 46/B

VK 808	Radionuclides (beta/gamma)		Strontium (^{90}Sr-beta)		Transuranium (alfa/gamma)	
Year	Discharge [kBq]	% *of annual reference level*	Discharge [kBq]	% *of annual reference level*	Discharge [kBq]	% *of annual reference level*
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*
2017	*54,993*	*0,039*	*11,400*	*0,271*	*0,283*	*0,021*
2018	*157,965*	*0,112*	*8,524*	*0,203*	*0,352*	*0,027*
2019	*121,945*	*0,086*	*6,502*	*0,155*	*0,328*	*0,025*

Table 7 Gaseous discharges from VK 808

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

The Váh river	Tritium		Corrosion and fission products *(alpha/beta/gamma)*	
Year	Discharge [GBq]	% *of annual reference level*	Discharge [MBq]	% *of annual reference level*
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
2017	*117,822*	*1,178*	*15,835*	*0,132*
2018	*460,381*	*4,604*	*17,791*	*0,148*
2019	*92,823*	*0,928*	*15,433*	*0,129*

Dudváh	*Tritium (^{3}H)*		*Corrosion and fission products (alfa/beta/gamma)*	
Year	Discharge	% *of annual reference level*	Discharge [MBq]	% *of annual reference level*
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
2017	*0*	*0*	*0*	*0*
2018	*0*	*0*	*0*	*0*
2019	*0*	*0*	*0*	*0*

Table 8 Liquid discharges from NPP A1 and the conditioning technology of TSÚ RAO

Gaseous and liquid discharges from facilities for RAW and SNF management form a smaller part of the total discharges. *In all years of operation, these reference values from the relevant decisions of the ÚVZ SR were not exceeded.*

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 - *2019* is shown in Table 9.

Year	Volume of discharged water - m^3	Yearly discharged activity kBq (drawdown of L&C -%)			
		^{3}H	^{137}Cs	^{60}Co	^{90}Sr
2004	4140	3870 (0.02)	301 (1,31)	275 (1,22)	186 (0,07)
2005	6774	6430 (0,03)	142 (0,62)	135 (0,60)	149 (0,06)
2006	5821	5610 (0,03)	931(0,41)	105 (0,47)	64 (0,03)
2007	3272	3300 (0,02)	589 (0,26)	7,85 (0,03)	7,8 (0,003)
2008	6098	6120 (0,03)	128 (0,56)	189 (0,84)	792 (0,32)
2009	969	8687 (0,046)	111 (0,48)	154 (0,69)	179 (0,07)
2010	11126	20845 (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)
2017	*1 816*	*4 544 (0,024)*	*36 (0,158)*	*19 (0,085)*	*339 (0,139)*
2018	*1 927*	*4 820 (0,026)*	*41 (0,180)*	*25 (0,112)*	*409 (0,168)*
2019	*2 270*	*5 680 (0,030)*	*66 (0,289)*	*64 (0,286)*	*425 (0,174)*

Table 9 Yearly liquid discharges – water from the runoff RÚ RAO

F.4.4 Dose and Exposure Limits of Personnel

Limits of doses and exposure of *workers* and individual groups of *workers* are set by Act No*. 87/2018 Coll. on radiation protection, and* in accordance with the recommendations of the ALARA Commission for an annual period, while the intervention limits, where they evaluate the cause of their exceeding and reasoning for their justification, are lower than the values set by legislation.

In all works, the basic principles of radiation protection are taken into account, the principle of justification of the activity, the principle of *optimization of radiation protection* (ALARA) and the principle of dose limitation.

A graphical representation of the average collective effective dose of NPP A1 and technology for RAW treatment and conditioning for the period *2010* to *2019* is shown in Fig. 26.

The collective equivalent dose is consistently at a low average level, which indicates a very good level of its management by applying the ALARA system, optimizing the planned individual and collective doses. No employee of JAVYS, a. s. (NPP A1, TSÚ RAO) or contractors´ staff exceeded exposure limits, nor the *target* ALARA *indicators* during the given period.

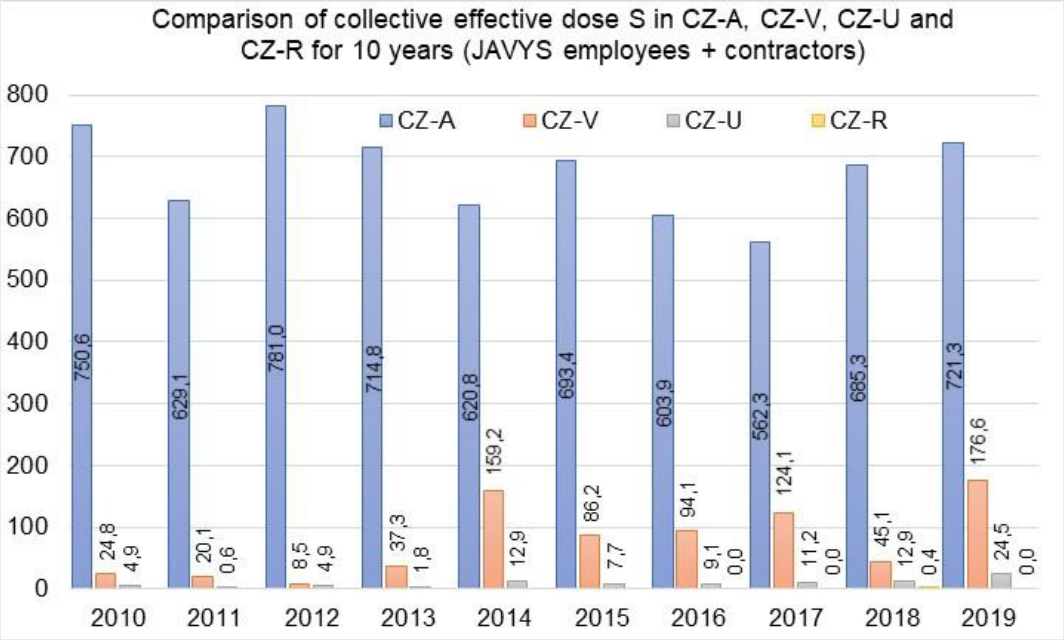

Fig. 26 Collective effective dose NPP A1 and TSÚ RAO, ISFS NPP V1 and RÚ RAO and FS KRAO (employees of JAVYS, a. s. + contractors)

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:
    1. the volume activity of aerosols in continuous abstractions of air;
    2. *surface activity of* atmospheric fallout,
    3. volume activity of milk;
    4. volume activity of drinking surface waters;
    5. volume activity of ground waters;
    6. *mass activity of* agricultural products (clover, barley, wheat, ...),
    7. *mass activity/area activity of* soil,
    8. continuous measurement of *power input spatial dose equivalent* and gamma spectrometric measurement in the field.
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 – *2019* the radiological impact of the NI to its surroundings is negligible.**

The annual individual dose equivalent (hereinafter referred to as “IED”) for three most loaded groups of population calculated from the monitoring data are depicted in the Table 10. These IEDs are significantly lower than IEDs that residents receive from *the natural radiation* background. The individual dose equivalent from the *natural radiation* background in the vicinity of NPP Bohunice and NPP Mochovce is 100 – 10,000 times higher than the IED values given in the Table. At the same time, IED calculations are characterized by considerable conservativism.

Fig. 27 Monitoring equipment at the National Repository of RAW

Year	IED [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
2017	*2,09 E-7*	*3,34 E-7*	*3,22 E-7*

Year	IED [Sv]			
	Foetus	0-5 years	6-15 years	Adults
2018	4,91 E-8	1,56 E-7	1,9 E-7	1,95 E-7
2019	4,53 E-8	1,32 E-7	1,56 E-7	1,58 E-7

Table 10 Calculated annual IED for the groups of population in the vicinity of NPP Bohunice. Since 2018, the age structure of the population has been adapted to the new legislation.

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, 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

A national emergency preparedness organization has been set up to provide the necessary measures to cope with events at nuclear installations and measures to protect the population, environment and

property in case of an accident having impact on the environment, divided into three levels Fig. 28.

***The first level** consists of an Emergency Response Organization (hereinafter referred to as "ERO") of operators of nuclear installations, whose main functions are: management of works and measures on the territory of nuclear installations so as to enable establishing the state of the technological equipment and to manage actions to deal with the emergency and limit the consequences for personnel, equipment and the environment. Another function of this level is the information function for the activities of public administration authorities at the level of local government, the relevant public administration authorities at the national level (MV SR, ÚJD SR, PHA SR), which will provide information on the state of facilities and possible impacts on the environment.*

***The second level** is organized at the regional level and is made up of crisis staff of the local government and self-government, whose territory falls into the emergency planning zone, where life, health or property may be threatened, and where measures to protect the population are planned. The second level is initiated in case when the licensee is unable to prevent the impact on the population and the environment by its own forces and means.*

***The third level** is the national level formed by the Slovak Government as the supreme body of crisis management pursuant to Act No. 387/2002 Coll. on state management in crisis situations other than wartime or state of war. The Government has established the Central Crisis Staff (hereinafter referred to as "CCS") of the Government of the Slovak Republic as its executive body, which coordinates the activities of public administration and self-government bodies in dealing with the consequences of nuclear accident, cooperates with the Security Council of SR in the preparation of measures to deal with such accident and controls the fulfilment of tasks and measures imposed by the Government in dealing with the nuclear accident. The chairman of the CCS is the Minister of Interior of SR. The CCS cooperates in dealing with the consequences of nuclear accident with its specialized support units, which are: the ÚJD SR Emergency Response Centre (hereinafter referred to as "ERC"), the Centre of Radiation Monitoring Network of SR at ÚVZ SR, Central Monitoring and Control Center of the MV SR. The third level initiates its activity in the event if the nuclear accident affects more than one territorial region or the district office at the seat of the region in the emergency planning zone is unable to protect the population and the environment with its own means and forces.*

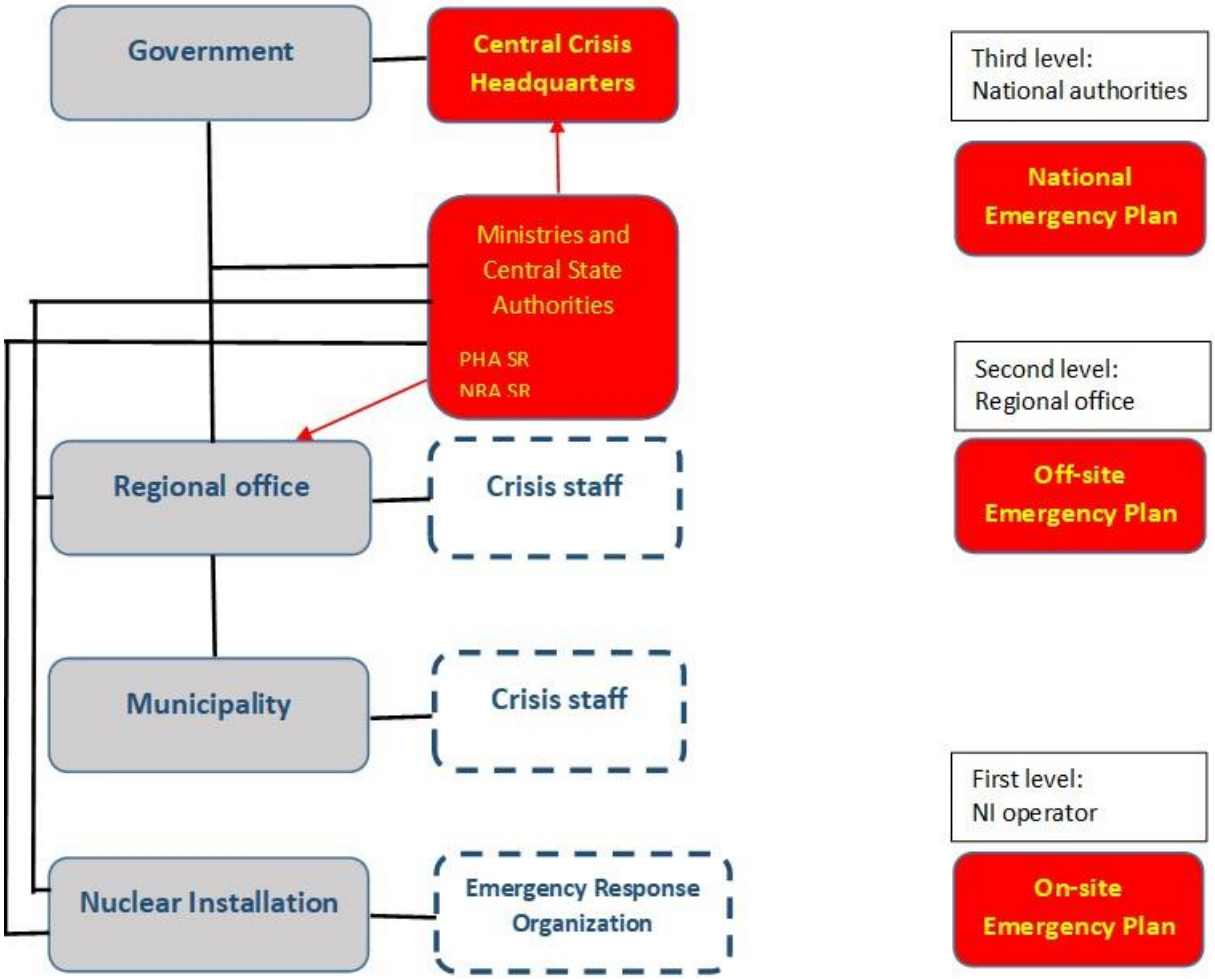

Fig. 28 Scheme of vertical division of the national response organization to an emergency following a radiation accident

Pursuant to Annex 14 to Act No. 87/2018 Coll. the emergency response shall be implemented through timely implementation of measures that include, inter alia:

a) Introduction of protective measures of the population,

b) Assessment of the effectiveness strategies and measures put in place and their adaptation to the specific situation,

c) Comparison of benefits with the applicable reference level, focusing on groups of the population, whose benefits exceed the reference level,

d) Implementation of further protection strategies based on specific conditions and available information, if necessary.

Pursuant to Act No. 87/2018 Coll., protective measures must be adapted to the situation and implemented in relation to the source of ionizing radiation in order to reduce direct exposure, prevent leakage of radionuclides, limit leakage of radionuclides or stop leakage of radionuclides or ionizing radiation; in relation to the environment, in order to reduce the transfer of radioactive materials to a person from the population and thus to reduce his exposure caused by radioactive materials by important routes of exposure and in relation to a person from the population to reduce his exposure, and

if necessary, to also provide for his treatment.

In an emergency situation, which is an accident according to Act No. 541/2004 Coll., the representative of ÚVZ SR together with members of the Emergency Staff of ÚJD SR in the ERC of ÚJD SR, submits to the competent crisis management authorities proposals for the implementation of protective measures pursuant to Section 144 par. 3 of Act No. 87/2018 Coll. on radiation protection.

In an emergency situation, which is an extraordinary situation pursuant to Act No. 42/1994 Coll. on Civil Protection of the Population, ÚVZ SR submits to the competent authorities of civil protection proposals for the implementation of protective measures pursuant to Act No. 87/2018 Coll.

Furthermore the competent radiation protection authority shall order appropriate protective measures. When deciding on the adoption of protective measures, the competent state administration authority shall proceed in accordance with the general criteria for the adoption of protective measures set out in Annex 12 to Act No. 87/2018 Coll.

The facts that indicate the suspicion of the occurrence or indicate the occurrence of radiation emergency outside the premises of a nuclear installation or workplace with sources of ionizing radiation, are:

a) Result values of monitoring measurements of the radiation situation in the territory of the Slovak Republic, which are higher than the values of intervention levels defined in the monitoring plan, or values of intervention levels defined in the discharges monitoring program or in the monitoring program for the vicinity of the workplace,

b) information on the occurrence of radiation emergency outside the territory of the Slovak Republic notified by the European Commission, the IAEA or the neighbouring state by ÚJD SR pursuant to a special regulation (Section 4 of Act No. 541/2004 Coll.).

In order to limit emergency exposure under emergency situation, in addition to the general criteria for the adoption of protective measures according to Act No. 87/2018 Coll., the values of directly measurable quantities have been set (hereinafter referred to as "OIL") according to Annex 4 to the Decree No. 99/2018 Coll. on ensuring radiation protection.

OILs are values of directly measurable quantities, these are pre- calculated values that correspond to the relevant general criterion for the implementation of protective measure. They reflect the parameter of a specific source of ionizing radiation, the nature of the event and the weather condition.

If specific field measurement results are to be the decisive criterion for the implementation or correction of urgent protective measures, appropriately verified and regularly calibrated meters must be used for measurements, and suitable pre-defined measurement conditions, evaluation of measured data and measurement uncertainty must not be neglected.

OILs, which are part of the Decree No. 99/2018 Coll. the following IAEA documents were transposed into the Slovak legislation: General Safety Guide No. GSG-2 Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency (2011) and Emergency Preparedness and Response: Actions to Protect the Public in an Emergency Due to Severe Conditions at Light Water Reactor (2013).

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

1. *Central Monitoring and Control Centre (hereinafter referred to as "CMRS")*
2. *ERC of ÚJD SR is a technical support tool of ÚJD SR for monitoring the operation of NIs and for evaluating the technical condition and radiation situation in the event of a nuclear or radiation accident and forecasting the development of the accident and its consequences in accordance with the Atomic Act. At the same time, it serves as a technical support tool for Central Emergency Staff.*
3. *Radiation Monitoring Network Headquarters (hereinafter referred to as "ÚRMS"), whose function is fulfilled by a group of ÚVZ SR staff, is a technical support body that provides an effective monitoring system combining the monitoring systems of individual ministries. Central Emergency Staff may invite ÚRMS representatives in case of a crisis situation.*

Central Monitoring and Control Centre (CMRS)

A Central Monitoring and Control Center (CMRS) to monitor, manage, evaluate and support of activities within the state administration. The CMRS of MV SR consists of office, personnel, documentation and technological resources with information, communication and other technologies.

The CMRS provides for continuous operation of the national contact point for the receipt and transmission of alerts, information messages and requests for assistance from the coordination centres of the Integrated Rescue System, National Contact Points of Countries with bilateral agreements with Slovakia, the United Nations – Office for the Coordination of Humanitarian Affairs in Geneva (UN OCHA), the United Nations – Economic Commission for Europe (UN-ECE), the Euro-Atlantic Centre for Disaster Relief Coordination at NATO (EADRCC), The European Union Emergency Response Coordination Centre, the European Atomic Energy Community (Euratom), and the competent public authorities of the Slovak Republic. Based on bilateral and multilateral agreements, it provides the necessary information about emergencies at NIs, which may have an impact on the territory of another state.

General tasks for the CMRS are:

- To collect information on the extent and nature of the crisis phenomenon. This includes information about the event, emergency, 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.

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 emergency preparedness system and *prepares recommendations for protective measures at an early stage. It is also responsible for carrying out of tasks of a contact point based on international conventions and EU requirements, and for sending and receiving requests for assistance addressed to the International Atomic Energy Agency.* ERC 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. 28.

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 the activities *of the NI operator* during an 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 *four* 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)

Radiation Monitoring Network is a system of technically, professionally and personally equipped workplaces, which are organizationally connected for the needs of monitoring of radiation situation and radiation data collection.

The Radiation Monitoring Network is created by ÚVZ SR and relevant regional authorities in cooperation with central state administration authorities.

The Radiation Monitoring Network provides:

a) Measurement of determined quantities in selected components of environment in the system of site monitoring according to the time schedule,

b) Assessment of the exposure of the population and the contribution to the exposure of the population caused by activities leading to exposure in a normal radiation situation,

c) Documents for systematic guidance of exposure of the population,

d) data on radioactive contamination of the environment, which are necessary for the decision-making on the implementation or termination of interventions, and measures to limit exposure in an emergency,

e) data on the level of exposure for informing the population and for the international exchange of information on the radiation situation in the Slovak Republic.

The Radiation Monitoring Network consists of the Radiation Monitoring Network Headquarters, the permanent units and emergency units; Permanent units and emergency units monitor the radiation situation and immediately or within specified deadlines provide the measured data in the agreed manner and specified form to the Radiation Monitoring Network Headquarters.

In a normal radiation situation, monitoring is performed by permanent units of the Radiation Monitoring Network. In an emergency, monitoring is performed by permanent units of the Radiation Monitoring Network and by emergency units of the Radiation Monitoring Network. The emergency units are activated according to the civil protection plans or according to the instructions of the Radiation Monitoring Network Headquarters.

Permanent units include:

a) In organizations designated by the MZ SR

1. *an early warning network, consisting of a system of monitoring points for continuous measurement of the dose equivalent intake in the Slovak Republic for immediate information on its increase above the level of natural radiation background,*
2. *a network of thermoluminescent dosimeters for measuring of the dose equivalent input in the territory of the Slovak Republic,*
3. *monitoring points for monitoring radioactive contamination of the air,*
4. *monitoring points for monitoring radioactive contamination of the environmental components,*
5. *monitoring points for monitoring radioactive contamination of food chain components,*
6. *mobile groups performing measurements of the dose equivalent input, in-situ measurements of radionuclides in the field, monitoring on route, sampling of environmental components and the food chain,*
7. *laboratory groups performing analyses of environmental and food chain samples,*

b) meteorological service providing data on the current meteorological situation.

Emergency units include:

a) An early warning network, consisting of a system of monitoring points for continuous measurements of the dose equivalent intake in the Slovak Republic for immediate information on its increase above

the level of natural radiation background, in organizations designated by the MV SR, Ministry of Defence of the Slovak Republic (hereinafter referred to as "MO SR") and MŽP SR,

b) Teledosimetric system of the operator of the nuclear installation performing continuous measurement of the dose equivalent intake and determination of radionuclides in the air around the nuclear installation in organizations designated by the MH SR,

c) monitoring points for monitoring of radioactive contamination of the air in organizations designated by MŽP SR,

d) monitoring points for monitoring radioactive contamination of environmental components in organizations designated by the Ministry of Agriculture and Rural Development of the Slovak Republic (hereinafter referred to as "MPRV SR"), MV SR, MH SR and MŽP SR,

e) monitoring points for monitoring radioactive contamination of food chain components in organizations designated by the MV SR, MH SR and MPRV SR,

f) mobile groups in organizations designated by the MV SR, MO SR and MDV SR performing measurements of dose equivalent intake, in-situ measurements of radionuclides in the field, monitoring on route, sampling of environmental components and food chain components,

g) laboratory groups created in organizations designated by the MPRV SR, MV SR, MH SR, MŽP SR and MO SR, performing analyses of environmental samples and food chain samples,

h) monitoring points for monitoring radioactive contamination of environmental components, monitoring points for monitoring radioactive contamination of food chain components and laboratory groups in laboratories of universities performing monitoring of radioactive contamination of environmental components and food chain components proposed by the Ministry of Education, Science, Research and Sports of the Slovak Republic (hereinafter referred to as "MŠVVaŠ SR"),

i) aviation groups established in organizations designated by the MV SR and the MO SR.

Monitoring data *(continuous measurement of dose equivalent intake in the Slovak Republic)* are provided in real time by the Slovak Hydrometeorological Institute to the EURDEP network managed by the European Commission, whose data is available to all Member States through a protected website.

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 operator of nuclear facilities has developed internal emergency plans, which specify the organization of emergency response and its implementation regarding the management of emergency situation and the protection of personnel including protection of health of employees in the plan of medical measures.

In addition, it has developed operating procedures, following the internal emergency plan, which allow the recognition and classification of an emergency according to international recommendations, already

based on a forecast by monitoring the specified symptoms, and which will 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.

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 of the Population. The amendment adjusted the competence of the MV SR so that it corresponded to its position as the central state administration authority in the field of civil protection. *Among other changes, the amendment concerned the elaboration of a* population protection plan at the national level, according to which tasks and measures will be fulfilled in the event of an emergency with effects exceeding the territory of the region.

Furthermore, an information obligation towards other states in the event of an emergency, the effects of which extend beyond the territory of the Slovak Republic, was added.

The amendment to the law also clarified the cooperation in the field of civil protection at the international level, with priority given to the institutions of the European Union and its Member States.

F.5.2.3.1 On-site Emergency Plans

On-site emergency plans and related documents are elaborated in such a way as to ensure the protection and training of staff in the event of a significant release of radioactive materials into the work environment or vicinity, and measures must be taken to protect the health of persons at the nuclear installation level or the population in its vicinity*,* whereas a system is in place t*o ensure* that effective measures are put in place still before the actual release of radioactive materials.

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 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.
For licensees, ERO consists of units that provide, 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 follow up the on-site emergency plan of the *operator*.

The Public Protection Plans developed for the territory of a region are subject to review process by the ÚJD SR and approval by the MV SR. 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 order to avoid the risk of delays in the performance of tasks related to the public protection, the relevant crisis staffs are included in the organization of emergency response of the Slovak Republic.

In the event of an incident or accident at a nuclear facility with a release of radioactive materials, in accordance with the Act of NC SR No. 42/1994 Coll. on Civil Protection of the Population, competent authority designated for crisis management, which manages rescue work within its territory, provides for the requirements of lower levels for material and technical supplies and prepares proposals for measures for crisis management and supporting documentation for decision-making on effective solution of the situation in the endangered area:

- 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 licensee for transport develops, according to Act No. 541/2004 Coll. and the ÚJD SR Decree No. 55/2006 Coll., an emergency transport rules (hereinafter referred to 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 MDV SR.

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 population and Decree of the MV SR No. 388/2006 Coll. on the details of providing technical and operational conditions for the information system of civil protection.

The warning and notification system is provided by the licensee through a network of electronic sirens, early warning and notification to all employees and persons in the premises of nuclear installations and in the case of *operators* of nuclear power plants also all inhabitants within 21 km area of the emergency planning zone of NPP Bohunice 3&4 and 20 km area of emergency planning zone of 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, use 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

In both locations of both *operators* (SE, a. s. and JAVYS, a. s.), shift exercises are performed twice a year and site emergency exercise once a year, attended by all employees of nuclear installations at the site, and interoperability emergency exercise, which is carried out in cooperation with local state administration bodies and self-government bodies, ERC ÚJD SR, or other ERO units (fire brigades, health care, armed forces, etc.) once every 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 by the plant management and inspected by UJD SR.

F.5.2.6 Facilities and Means of Emergency Preparedness

They are designed to provide for the operation of ERO with available devices for rapid detection and continuous evaluation of events. The following means of emergency response are available for ERO:

- 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 used as primary shelter for shift staff and intervening staff, and are *also* used for distributing the means of individual protection and specialized equipment for intervening units.
- Civil protection assembly points serve for gathering staff (not included in ERC) 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 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 In-house Medical Centre 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 MV 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.

Slovakia has not yet registered its capacities in the RANET system, which is a tool for coordinating the provision of assistance in accordance with the Convention on Assistance in the Case of a Nuclear Accident or Radiation Accident. Nevertheless, Slovakia is ready to provide its available means to assist the members of the international community based on the requirements raised on the basis of this Convention.

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 Cooperation between EU Member States in the field of civil protection

Decision 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (hereinafter "Decision 1313/2013/EU on a Union Civil Protection Mechanism")

The Council Decision establishes a Community mechanism to facilitate enhanced cooperation between the Community and the Member States in civil protection assistance interventions in the event of major emergencies or their imminent threat, including accidents at NI (hereinafter referred to as "Mechanism")

The Union Civil Protection Mechanism shall aim to strengthen the cooperation between the Union and the Member States and to facilitate coordination in the field of civil protection in order to improve the effectiveness of systems for preventing, preparing for and responding to natural and man-made disasters. Civil protection cooperation shall include prevention and preparedness actions and actions to

assist in responding to the immediate adverse consequences of a disaster and inside or outside the Union.

The protection to be ensured by the mechanism covers primarily people, but also the environment and property, including cultural heritage, against all kinds of natural and man-made disasters, including cultural heritage, against all kinds of natural and man-made disasters, including environmental disasters, marine pollution and acute health emergencies, occurring inside or outside the Union.

Decision of the European Parliament and of the Council 1313/2013/EU lays down rules for the provision of financial assistance for:

a) Actions under the Community Mechanism to support the strengthening of cooperation in civil protection assistance interventions;
b) Measures aimed at preventing or limiting the consequences of an emergency; and
c) Actions designed to improve the Community´s preparedness for emergency response, including actions to raise awareness of EU citizens.

F.5.3.5 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 MV 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 licensee 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 stage 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. Since 1995, the licensee for NI is obliged to (currently as amended by Atomic Act No. 541/2004 Coll. and Act on the National Nuclear Fund No. *308/2018* Coll.) provide earmarked funds during operation to cover costs associated with decommissioning. These funds form part of the revenues of the National Nuclear Fund for the decommissioning of NI and for the SNF and RAW management (hereinafter referred to as “Fund”). Additions to and use of the resources of the Fund are described in detail in section E.1.2.

Application of radiation protection measures is ensured according to the Act No. *87/2018* Coll. on radiation protection. Continuity of radiation protection procedures and requirements applied during operation (see chapter 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

percentage 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 percentage of annual limit.

Application of emergency measures is currently ensured in compliance with the requirements of Act No. 541/2004 Coll. (see chapter 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 equipment;
- 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;

i) 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 Act *No. 87/2018 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. 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 Act No. 541/2004 Coll. 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.

To assess the impact of nuclear installation on the environment, as well as the potential impact of the surrounding environment of a nuclear installation, ÚJD SR issues an opinion pursuant to Act No. 24/2006 Coll. as a building authority for construction at a nuclear installations.

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, defining the investment projects to be communicated to the European Commission in accordance with Article 41 of the Treaty establishing the European Atomic Energy Community;
- Commission Regulation (EC) No. 1209/2000 of 8 June 2000 on the communications prescribed in Article 41 of the Treaty establishing the European Atomic Energy Community as amended by Commission Regulation (Euratom) No. 1352/2003 of 23 July 2003.

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 NPP A1. 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. Properties that **exclude** siting of a nuclear installation in this area are listed in Annex 2 to the Decree No. 430/2011 Coll., *as amended by Decree No. 103/2016 Coll.*:

a) Under conditions of operation, abnormal operation or in the event of emergency, the following cannot be ensured:
   1. Compliance with the prescribed doses to the population and the prescribed level of noise and vibrations affecting humans including neighbouring land plots and buildings,
   2. Protection of life, health and property from the consequences of emergencies,
   3. Protection against the harmful effects of extreme weather conditions and floods on nuclear installation,

b) There is a risk of landslide or sinking of terrain, mining water overflows or strong shocks due to mining activity, gas or oil extraction or with groundwater reserves,

c) Geodynamic and karst phenomena occur in the area endangering the stability of the rock mass, such as landslides, movement and seismically active faults, soil liquefaction, tectonic activities or other phenomena that may change the inclination of the surrounding surface beyond the specified technological requirements,

d) There are protection zones of natural curative resources and natural mineral resources, areas with climatic conditions for treatment, spas and spa areas, groundwater and surface sources of drinking water,

e) There are declared mining areas with the extraction of raw materials in the territory,

f) The area encroaches on the protection zone of industrial or other economic objects, with which undesirable operational collisions could arise,

g) The density and distribution of the population in the territory prevent the effective application of emergency preparedness measures,

h) It is not possible to ensure a sufficiently safe and reliable feeding of the output of the planned installed capacity,

i) In the case of a repository, the existing high or difficult to predict risk arising from external and man-made events or if the evolution of these events cannot be reliably predicted over the design life cycle.

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.

Seismic load of the Jaslovské Bohunice site was re-assessed and measures for improve seismic resistance of NPP V1 (when in operation) and ISFS were implemented.

For the *NPP* Mochovce site, *the original design value of* PGA = 0.06 g was increased (based on the IAEA recommendations) *to PGA* = 0.1 g, which *was later, based on a new calculation from 2003, and the following ÚJD SR Decision, increased to PGA = 0.15 g. This value is binding* for the completion of MO 3&4, as well as for the *seismic reinforcement of* EMO 1&2. *Overall, the seismic* resistance of power plants in *SR has increased several times compared to the original design,* and is *in line with* current *international standards and* requirements. There are plans for *advanced analyses to quantify the safety margins of key systems, structures and components for the beyond-design-basis earthquake and development of seismic PSA*.

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 chapter 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.

Act No. 50/1976 Coll. on spatial planning and building regulations (Building Act), and Act No. 541/2004 Coll. (Atomic Act) apply for building procedure for the construction of nuclear installations. The construction of a nuclear installation may only be carried out by the holder of a valid building licence. *Also Decree of the MŽP SR No. 532/2002 Coll. which defines, inter alia, general technical requirements for construction, e. g. requirements for the territorial technical solutions of the construction, requirements for the technical design of the building and requirements for the purposeful solution of the construction, shall also apply for the building procedure.* ÚJD SR decides on issuance of

a building permit for the construction of a nuclear installation in accordance with Section 66 of Act No. 50/1976 Coll. on spatial planning and building regulations (Building Act).

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).

Requirements for the design and construction of spent nuclear fuel storage:

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 equipment (equipment 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, equipment, 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.).

During the operation or during decommissioning of a nuclear installation the licensee 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 licensee is obliged to perform periodical safety assessment since 2004 based on the requirements of the Atomic Act No. 541/2004 Coll. within the intervals and the extent laid down by a binding legal regulation issued by ÚJD SR Decree No. 33/2012 Coll.
Based on ÚJD SR decision, in 2011 the licensee prepared a program for monitoring the condition of the ISFS and stored spent nuclear fuel and periodically submits reports evaluating the program.

In connection with the decision of the European Commission to perform stress tests on nuclear facilities as a result of events at the Fukushima NPP, Japan, ÚJD SR asked the licensee to reconsider the response to similar potential events (details see chapter D.1.2).

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 licensee 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 the completion of *pre-complex testing, complex testing* of each system of the transport technological part, the “Evaluation of pre-complex testing, complex testing“ was prepared, which documented the course and fulfilment of the goals set.

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 applied (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.), 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 the spent fuel pools at the reactor:

- 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.

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

Management of SNF at NPP units of WWER type is part of the nuclear fuel cycle, for which the relevant *quality assurance* management documentation and its subordinate operational documentation have been prepared:

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

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

Reviews, revisions, maintenance, tests, and complex care of equipment 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.

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 (hereinafter referred to as “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.

A methodology for using of BUC was developed, taking into account only actinides, and validated the scale system 6.0 (or 6.1) as a tool for WWER-440 fuel. The second part of the project included fission products.

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.

The BUC will be needed to permit a new type of fuel with an enrichment of 4.87% ^{235}U in the pool next to the reactor and in the KZ-48 cask.

Another R&D project focuses on determining the relationship between the generation of residual heat in spent fuel and the surface temperature of the C-30 shipping container. The generation of residual heat is calculated by special software. During the transport of spent nuclear fuel, the surface temperature of the transport container is limited. The results of this project will allow better prediction of surface temperature and residual heat release.

The project simulates real conditions during transport of spent nuclear fuel in a C-30 transport container with KZ-48 cask inside. Dummy fuel assembly in each position inside the KZ-48 cask was placed to achieve the same volume of water inside the shipping container C-30. Every second dummy assembly has an electrically heated coil. The temperature is measured inside the shipping container, as well as at selected points on the surface. The results were processed and the mathematical dependence between the known residual heat temperature and the surface temperature was calculated.

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 World Association of Nuclear Operators (hereinafter referred to as "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 managerial staff 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 (hereinafter referred to as “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 to 2001, *the first two parts of the initial stage* of development of deep geological repository were completed, within which the following tasks were addressed:

- 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 repository 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 management 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.

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).

At the turn of 2012/2013, activities were initiated to continue the national program for the development of the deep geological repository. The first stage of activities related to the “new“ development of deep geological repository in the Slovak Republic was completed in 2016. Within this stage, the following tasks were addressed:

- Comprehensive evaluation of the work performed so far in the project of development of deep geological repository, including summary of the results achieved within the framework of international activities in the subject area and evaluation of the results in the form of a comprehensive summary document.
- Update of a document "Criteria for site selection and evaluation".
- Analysis of the possibilities of economic and non-economic instruments to support the implementation of the deep geological repository.

- Development of a strategy for public relations in the area of development of the deep repository in SR.
- Information and promotional materials on the development of the deep geological repository.
- Updated feasibility study of a deep geological repository in SR.
- Draft legislation to stimulate the affected municipalities during the implementation of survey work and after the siting of the deep geological repository.
- Detailed work plan for the period 2017 - 2023 and proposal for further development of the deep geological repository for RAW and SNF in Slovakia.
- *In 2016, the project "Deep geological repository – site selection, stage 1" was completed, which also included a proposal for further development of the deep geological repository in SR.*
- *In the years 2017 and 2018, the deep geological repository development program continued with the project "Deep geological repository – site selection, stage 2 – Part I"*
- *The geological task project – pursuant to Act No. 569/2007 Coll. on geological works (the Geological Act) and Decree No. 51/2008 Coll., which implements the Geological Act, deals with the proposal for the design of relevant geological and technical works for two selected promising sites for the disposal of spent nuclear fuel and high-level radioactive waste in the SR: "Tribeč" and "Western part of Rimava basin". The project of geological repository includes the definition of the projected geological works and methods, with an indication of the scope and method of their application. Part of the project preparation of drilling works is the analysis of possibilities and selection of potentially suitable locations for the implementation of drilling works.*
- The deep geological repository is expected to be commissioned around 2065 (see also chapter A).

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 *licensee* is responsible for ensuring safe management of RAW in accordance with the national program up to the point of their taking over to the repository.

Radioactive waste shall be managed so as to:

a) maintain sub-criticality,
b) secure residual heat removal,
c) minimize the effects of ionizing radiation on *workers*, the population and the 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

Every licensee shall spend all efforts to minimize RAW generation. The requirement for minimization of RAW generation is laid down in the Atomic Act (No. 541/2004 Coll.). Act No. *87/2018* Coll. *on radiation protection* imposes an obligation on the licensee to limit the production of RAW 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.

For radioactive materials containing radioactive nuclides below the *release level*, a "Draft procedure for measuring low contaminated materials from the operation of NPP V1, V2 and their release into the environment" and "Methodology for releasing low contaminated waste from operation of NPP V1, V2 into the environment" were developed. Authorization for release of RA-materials into environment was issued in 2003 by the ÚVZ SR for the locality of Jaslovské Bohunice and in 2004 for Mochovce site.

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

In 2003, the "Type catalogue of radioactive waste and their treatment and conditioning" was issued for NIs in SR. *This document is regularly updated, usually at two-year intervals, or according to current requirements. The last update of this operating regulation entitled "Type catalogue of radioactive waste" was in 2019.* This document provides basic information for the correct identification and categorization of RAW during their packaging and transfer or acceptance for treatment and conditioning in the relevant technological facilities. 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 risks

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 Assessment

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.

Existing facilities and procedure in the past

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 Czechoslovak Atomic Energy Commission (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. At present, ÚJD SR Decree No. 30/2012 Coll. applies for the field 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

The selection procedure to select a site suitable for the construction of the RÚ RAO took place in the years 1975 – 1978. The criteria for the site selection were specified based on applicable legislation in force and the IAEA safety standards.

Attention was paid mainly to the requirements for suitable geological and hydrogeological conditions at the selected site, because safety analyses of repositories operated in the world clearly show that the critical path for exposure of the population is the transport of radioactive materials by groundwater. In Slovakia, 34 sites were selected, of which 12 were selected for further monitoring. Of these, based on selection criteria, the Mochovce site was selected.

For the disposal of VLLW, i.e. waste with activity only slightly exceeding the limits for their release into the environment (contaminated soils, crushed concrete from decommissioning) *a location was selected* in the southern part of the RÚ RAO Mochovce site for this category of RAW as a separate storage structures.

The project for disposal of VLLW (*for 20,000 m^3 of VLLW* from NPP A1 in decommissioning) in RÚ RAO began in August 2014, and the *operation of the stage 1 of the VLLW repository was licensed by ÚJD SR Decision No. 338/2016* in *06*/2016. Work on stage 2 of the VLLW repository (*9,000 m^3 of* VLLW from

NPP V1 in decommissioning) started in September 2016. *The operation of stage 2 of the VLLW repository was licensed by the ÚJD SR Decision No. 435/2017 in 12/2017*.

The construction of the third double row for the disposal of low-level RAW in RÚ RAO Mochovce, was provided within the BIDSF project "Design and construction of new disposal facilities for low level radioactive waste (hereinafter referred to as "LLW") and VLLW from decommissioning of NPP V1 in RÚ RAO Mochovce", the implementation of which started at the beginning of 2016 and was completed in 11/2018. By the Decision No. 117/2019, the Authority permitted operation of the third double row of disposal boxes for LLW.

For the Integral Storage Facility – storage facility for RAW from decommissioning (see Annex VII., Table 1), the "EIA" documentation and safety documentation was elaborated and reviewed. In the years 2011 – 2012, an EIA *was carried out* in accordance with Act No. 24/2006 Coll. On 10 September 2012, the MŽP SR issued its final opinion on the assessment of impacts of the proposed activity on the environment in accordance with Act No. 24/2006 Coll., and from January 2014, activities related to the construction of an integral storage facility began *in accordance with the approved documentation for the building permit. The construction of the integral storage facility was completed in August 2017, and in October 2017, the integral storage facility was put into operation. The permit for permanent operation was issued by ÚJD SR in December 2017. The integral storage facility for RAW was put into active operation in February 2018. At present, RAW from the decommissioning of NPP A1 and NPP V1 is stored at the integral storage facility.*

At the same time, within the TSÚ RAO, modifications on this NI were implemented and continued. In 2018, an Intent was submitted to the MŽP SR on the proposed modifications at TSÚ RAO in accordance with Act No. 24/2006 Coll. for "Optimization of treatment capacities of technologies for treatment and conditioning of radioactive waste of JAVYS, a. s. at Jaslovské Bohunice site". In 2019, the report on assessment of activities was prepared and the whole process of EIA is currently being evaluated.

At the same time, from 2017 a modification has been implemented at ISFS within IPR "Completion of SNF storage capacities.

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 facilities for RAW management are defined in Decrees No. 430/2011 Coll. and No. 30/2012 Coll. The requirements for the issuance of a building permit is as described in Section E.2 are contained 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 Decree No. *430/2011 Coll.* the design of a nuclear facility must respect and follow the principles and requirements for ensuring radiation protection of workers, the population and the environment, and their continuous monitoring. Equipment coming into contact with radioactive materials are to be designed, sited, shielded *and operated* in such a way that the risk of exposure of persons in a nuclear installation under all operating conditions is as low as reasonably achievable, taking into account technical, economic and social factors, and the exposure is lower that the limits set by *Act No. 87/2018 Coll. on radiation protection*. The design must include technical 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.

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 *is that the Inception Safety Report Contains plans for the decommissioning of the given nuclear facilities* individual decisions, This inception report 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. The design of a 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.

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. Manufacturers and suppliers of safety related equipment, their materials and equipment are obliged to state in the documentation on the quality of the delivery, the results of selected quality checks at the manufacturer and tests of properties of elements, equipment, base material, welded joints and weld-on, properties and material composition and the findings and eliminated defects identified by inspection. In cases where special technological procedures may affect the resulting properties of the materials and products used, further testing must be ensured in advance (e. g. keeping of test specimens). 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.

In the monitored period, a project was implemented at NPP A1 focused on the construction of local fragmentation workplaces intended for the management of waste from decommissioning of components of the primary circuit of NPP A1. The project also took into account construction modifications in the building of the main production unit, which were aimed at preventing the possible spread of contamination in accordance with the criteria and conditions of radiation protection and the ALARA principle.

Within TSÚ RAO, investment projects "Optimization of RAW incineration capacities" and "Facility for melting of metal RAW" are currently implemented at the Jaslovské Bohunice site.

The special requirements for the repository project are added to the general requirements for nuclear safety of nuclear facilities during their design, and specifically for this type of nuclear facility, *inter alia, require the elaboration of a preliminary design for its final covering and the manner of closure of the repository*.

The project takes into account the inventory and properties of disposed RAW and include a technical solution for *adequate* isolation of RAW from the environment not only during operation, but also after closure during the institutional control of the repository within the specified duration of its active and passive part. It must be ensured that the project provides enhanced barrier protection system, a suitable combination of engineering elements and natural characteristics of the area in order to *achieve* long-term safety after the repository is closed. It is required that safety of the repository during its lifetime is preferably achieved by passive elements, including gravitational drainage system and that the need for active elements after the closure of the repository is minimized.

Pursuant to the Authority´s Decree No. 30/2012 Coll., *as amended by ÚJD SR Decree No. 101/2016 Coll.,* the *characteristic* properties of the *repository, in particular* the ingress of water into the repository *and the* release of radioactive materials into the environment, *are monitored throughout the commissioning, operation, as well* as in the period of institutional control after *its* closure. *However, it must be ensured that the monitoring system does not reduce the tightness of the repository.*

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).

EIA is considered to be one of the main tools of international environmental policy for the implementation of sustainable development. In general, the environmental impact assessment process (EIA process) pursuant to Act No. 24/2006 Coll. precedes the permitting procedure. The outcome of the EIA process – the final opinion – is binding for further permitting proceeding of the activity. RAW management facilities, *pursuant to* Act No. 24/2006 Coll., are subject to mandatory *assessment*, while due to the nature of the activity, the construction of RAW and SF management facilities is also assessed in a cross-border context. Final opinion of the MŽP SR recommending the implementation of the proposed activity, i.e. construction of RAWand SF management facilities, forms part of the documentation required for the issuance of a building permit. *In its decision the permitting authority (ÚJD SR) must take into account the outputs from the EIA process set out in the final opinion.*

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.

Fig. 29 Safety documentation for individual steps of basis according the Atomic Act

The construction of a repository, like any other nuclear facility, is subject to the issuance of a permit and the submission of relevant documentation under the Atomic Act. This package also includes a Preliminary safety report containing a systematic safety assessment.

Pursuant to the Authority´s Decree No. 30/2012 Coll., *as amended by ÚJD SR Decree No. 101/2016 Coll.,* safety analyses of a repository represent a comprehensive assessment of risks related to RAW management and demonstration of functionality and safety of the entire disposal system in terms of its possible effects on humans and the environment. Safety analyses also include analyses of *uncertainties and sensitivity analyses of the results to individual parameters.* The period of institutional control after the closure of the repository is taken into account when preparing safety analyses. The safety assessment shall be based on the dose limit values set by ÚVZ SR.

A pre-operational safety report specifying the preliminary safety report must be prepared as part of the documentation for the commissioning and operation of the nuclear installation.
The Pre-operational Safety Report (hereinafter referred to as "PoSAR") focuses on the introduction of modifications to the design-basis demonstrating the maintenance of its safety and on additional calculations and measurements resulting from the requirements of the Preliminary safety report. In addition to the description of RAW and SF management process, the PoSAR also includes a detailed

description of safety functions of all safety systems, structures, systems and components with an impact on nuclear safety, and safety analyses verified by an independent entity. The report sets out the limits and conditions for safe operation and the procedure for commissioning of a nuclear installation.
A description of the operation of facilities and technologies for RAW and SF management in a nuclear facility, together with their safety analyses, is also included in the plan for RAW and SNF management, which is also part of the documentation for commissioning of a nuclear installation.

Envelop safety analyses are included in the decommissioning plan for the decommissioning of NPP V1. Due to the fact that the power plant is decommissioned step by step, the ÚJD SR requires specific safety analysis for each decommissioning project, as the projects are implemented by public procurement.

As part of the safety analyses for stage 3 and 4 of decommissioning of NPP A1, the activities of historical RAW management carried out in parallel to the decommissioning were also assessed. The scope of the safety analyses has been determined with regard to the purpose and level of permitting documentation prepared to such an extent as to illustrate that the activities performed are manageable in a safe manner with have impact on workers, as well as the population, and do not exceed statutory limits. Before carrying out the decommissioning activities of stage 3 and 4, detailed work programs or operating procedures have been developed for the RAW treatment lines, which already include specific safety analyses, including the proposal of preventive or elimination measures.
To help the preparation of safety analyses, the ÚJD SR issued a safety guide "Requirements of safety analyses of activities performed during decommissioning of nuclear installations."
The independent assessment of safety analyses by a third party that is not directly involved in the development of safety analyses significantly contributes to building confidence.
In the safety analyses, in addition to radiation risks (e.g. external exposure, internal exposure by inhalation or ingestion or internal exposure caused by injury and subsequent wound contamination), other risks associated with chemical and toxic materials, should be considered in safety assessment. In addition, other significant risks in the process of decommissioning of nuclear facilities are considered e. g. risks in places where dismantling and demolition activities are carried out or where transport of heavy loads takes place, heavy equipment is used, etc. The stated non-radiation risks are mentioned directly in the safety guide only if they lead or may affect the occurrence of radiation risk.
The results of safety analyses serve as a basis for demonstrating compliance with safety requirements or to define safety measures needed to comply with these requirements, as well as to demonstrate the application of the ALARA principle. Uncertainties and assumptions associated with the developed safety analyses need to be identified, documented and updated as necessary.
Safety analyses for decommissioning must clearly demonstrate that the safety measures implemented are robust enough to ensure the required level of safety during the planned decommissioning activities, as well as during operational events.
Safety analyses for decommissioning need to be updated, or more extensive revisions must be performed in the event of any significant change that affect safety or related arguments regarding the level of safety. These changes include, e.g. major modifications to the equipment, modifications to procedures, new information obtained during decommissioning activities (e.g. finding that assumptions

or data relevant to safety assessment were inaccurate or incorrect or demonstrating the presence of hazardous substances not considered in the original analysis).

In accordance with the Atomic Act, it is necessary to increase nuclear safety to the highest practically achievable level during operation *and during decommissioning* and to perform periodic, comprehensive and systematic nuclear safety review *at least every 10 years and at the end of the decommissioning stage,* taking into account the current state of knowledge in the field of nuclear safety review, and to adopt measures to eliminate the identified deficiencies and to prevent their recurrence in the future.

The safety review of nuclear installations during operation is carried out in accordance with the Authority´s Decree No. 33/2012 Coll. Periodic review during decommissioning is focused mainly on the comparison of achieved status of decommissioning with the defined final state of the facility in the given stage of decommissioning, and the requirements of the Authority´s Decree No. 33/2012 Coll. apply accordingly (details see chapter D).

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.

According to 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 licensee.

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 licensee 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 of 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 L&Cs, the format and content of which follows the IAEA guides SSG-40, WS-G-6.1 and United States Nuclear Regulatory Commission (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 equipment.

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 RAW management is elaborated in detail in the process and operational documentation so as to ensure compliance with the requirements of Decree No. 30/2012 Coll.

Procedures, principles and instructions for operational documentation processing is described in detail in relevant directives and guidelines of the quality assurance 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

The “Type catalogue of radioactive waste“ provides basic information for the labelling and categorization of RAW for their packaging and hand-over or take-over for treatment in the treatment facilities (*see chapter* 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 chapter 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 chapters G.3, H.4). 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. defines the closure of a repository as administrative and technical steps after disposal of RAW *or spent fuel* to the repository has been terminated, *including the final construction or other work necessary to bring the repository into a long-term safe condition*. The permit for the closure of the repository and institutional control is issued by ÚJD SR upon submission of a *written* application by the holder of permit for operation of a repository, supported by the required documentation. The permit holder shall take measures to ensure that records are kept after the closure of a repository, institutional control is carried out and corrective intervention is taken, if necessary, in the event of an

unplanned release of radioactive material (Section 22 of the Act). *The specific scope of these records and the extent of institutional control shall be determined by the Authority in the conditions of the permit. The* documentation required for the application for a permit to close the repository, according to Annex 1 to the Act, shall include, inter alia:

- 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.

Preliminary *proposal of the method of repository closure*, in particular its stabilization, overlay and building of a drainage system of the covering is part of the PoSAR for National RAW Repository located in Mochovce.

This *repository closure and institutional control plan is based on safety analyses, and contains:*

a) Materials, technologies and procedures used to fill the interspaces of disposal boxes, to stabilize disposed packaged forms of RAW, and to ensure the final configuration of the disposal system, including the composition of the cover and the design of the drainage system in order to maintain long-term life of the repository,
b) a program for the decontamination and dismantling of unnecessary buildings and above-ground spaces, including the removal or sealing of redundant components, equipment, monitoring tunnels, shafts and boreholes or other engineering elements that could form a pathway for radionuclide leakage in the future,
c) a description and method of ensuring management of RAW generated during activities pursuant to par. b),
d) a plan for the maintenance and repairs of individual components of the repository during the period of active part of the institutional control,
e) The scope of activities performed within the passive part of the institutional control of the repository,
f) The method of long-term storage and transmission of information specifying the media used, as well as data important for the implementation of corrective actions or for reassessing the safety of the repository in the future,
g) Detailed safety analyses of the long-term safety of the repository in the post-operation stage in connection with current data and verified by an independent organization.

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. The solution under consideration is conditioned by current knowledge, technological possibilities, as well as the design of the repository itself, and geological conditions.

The actual final overlay of the disposed waste will be divided into two stages. The first is characterized by the construction of a water-proof concrete monolithic slab above the double-rows. After the completion of disposal in the premises and full implementation of stage 1 of the covering, operational facilities, unnecessary utility networks, fencing of the premises, unnecessary roads will be gradually removed, and stage 2 of the final covering will be implemented, but it will be necessary to ensure access road to the new part of the repository for inspections, development of warning and information system and possibly to make maintenance. In the period after the end of inspections, the fencing will be removed, the inspection shafts and sampling points will be made inaccessible. The access road will be no longer purposeful and it will be possible to liquidate it, if it is not liquidated earlier due to the development of means of transport. Given the development of technology and the new requirements that will arise during the period of institutional control, it is currently difficult to estimate the needs and how to address them.

Regardless of the development, however, the following issues need to be addressed in the final overlay of the repository:

1. Development of a multi-barrier system,
2. Gravity drainage of drainage systems,
3. Creation of conditions for capture and drainage of surface water from the surrounding sloping surfaces or prevention of water inflow into the repository area and drainage of the repository,
4. Ensuring access and fencing during institutional control, allowing sampling, including the location of any damage to the barriers,
5. Prevention of unauthorized access to the drainage system or tunnels,
6. Long-term designation of the repository area,
7. Integration of the final landscaping of the repository into the surrounding landscape,
8. Ensuring the maximum possible service life and minimizing maintenance,
9. Optimization or minimization of the scope of work in designing the final overcover,
10. Urbanistic design.

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 PoSAR for the RÚ RAO Mochovce. These measures will be elaborated in detail well before the completion of operation.

H.7.1 Keeping of documentation

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. *After its completion, the entity included licensing authorities will keep the documentation until the expiration of periods for keeping documents and then prepare disposal procedure. Registry records with permanent documentary value (archival documents) will be put in the Slovak 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 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 *the overlay (final cover) will prevent the access 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 licensee 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. 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, *establishing a standard document for the supervision and control of shipments of RAW and SNF, referred to in Council Directive 2006/117/Euratom.*

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 equipment, 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 21x30 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*

Pursuant to Act No. 87/2018 Coll. on radiation protection, the permit from the MDV SR in terms of radiation protection is required for the transport of radioactive material with an activity higher than the activity of classified consignments. This obligation shall also apply to shipments by entities, whose registered office or place of business is another Member State, and are holders of permit in that State.

The applicant for a shipment permit shall state in his application: the business name, legal form, registered office and identification number, if the applicant is a legal entity, place of business, name, family name and address of persons, who are statutory bodies, name, family name and address of a professional representative.

The applicant for permit shall attach to the application:

- *Characteristics of the planned activity leading to exposure and a description of the technical equipment, and*
- *Documentation according to Annex 6 to the Act on radiation protection*
  - *justification for the shipment,*
  - *transport regulations,*
  - *a description of the technical equipment to ensure transport including loading and unloading,*
  - *assessment of risks arising from the nature of transported radioactive material, mode of transport and transport routes,*
  - *emergency plan for the shipment,*

- *documents on packaging set,*
- *proof of technical competence of the means of transport,*
- *proof of the competence to operate the means of transport.*

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 2018, ÚJD SR issued a permit for the import of RAW from Italy for the purpose of its treatment by incineration, while the secondary waste generated from treatment will be exported back to Italy after completed treatment of the entire intended amount of RAW. In 2018, there were 4 shipments of RAW in 2020. Further shipments are planned for 2020 to 2023.

Based on the permit of ÚJD SR for shipment of compactable RAW from the Czech Republic, 1 shipment of this RAW in 2019 and the products of treatment (mouldings) were subsequently shipped back to the Czech Republic. Repeated shipments will be carried out in the years to come.

In both cases of licensing of RAW shipments originating from the Czech Republic and Italy, and return of products from the treatment, the process of communication with the authorities of the country concerned, as well as the transit countries, took place in accordance with Act No. 408/2008 Coll., and the relevant standard documents were used.

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 holder of a permit for the shipment of radioactive materials* with a total activity exceeding the activity of *qualified* consignments, no later than 24 hours before the start of the shipment must, *based on Section 105 of Act No. 87/2018 Coll. on radiation protection,* notify the MDV SR of the following:

a) name and address of the carrier, consignor and consignee, telephone, fax number or E-mail,

b) telephone or fax number of the carrier,

c) date, time, method and route of the shipment,

d) the type of means of transport, in case of motor vehicle, also its registration number,

e) UN number and shipment index of each shipment,

f) Type, activity and physical form of transported radioactive materials,

g) For transboundary shipments, the date and time of each crossing of state border.

In 2019, ÚJD SR issued 2 permits for import of IRAO from Germany and Italy for treatment by incineration. Under these permits, 2 shipments of IRAO from Germany and 2 shipments of IRAO from Italy were realized, while the secondary waste from the treatment in both cases will be shipped back to the country of origin. As it is IRAO, the competent authority for the authorization of international shipment under EU Council Directive 2006/117/Euratom is the MDV SR.

During performance of state supervision by *MDV SR* during shipments of radioactive materials, no deficiencies have been *identified* so far in terms of radiation protection.

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 *radioactive* sources themselves:

- It is necessary to ensure that the exposure of *workers* and the general public is as low as reasonably achievable,
- It is necessary to ensure that there is no *u*nauthorized handling of *radioactive* sources or *radioactive waste*.

There are currently around *200* 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 (military). Workplaces using radioactive sources are within the competence of various state departments – the MH SR, the MZ SR, the MPRV SR, the MŠVVaŠ SR, the MDV SR, the MV SR, as well as the MO SR.

EU Council Directive 2003/122/Euratom on the control of high-activity sealed radioactive sources and orphan sources requires the Members States to ensure, inter alia, “adequate management of *disused* sources, including agreements concerning the transfer of *disused* sources from suppliers, other authorized organization or facility,“

According to Act No. 87/2018 Coll., a disused source is a radioactive source that is no longer used in the activity leading to exposure, its further use is not envisaged, but its safe handling is still required.

The original centralized system of collection of RAW and *disused* radioactive sources in Slovakia was terminated 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.

An applicant for a permit for an activity leading to exposure that will handle high activity source, must deposit a security in the amount of full costs associated with the collection, sorting, storage, treatment, conditioning for disposal of disused high activity source as RAW, to the account according to a special regulation, except for the applicant who submitted:

j) A contract for the take-back of a high activity source by the manufacturer or supplier,

k) A contract for commercial insurance of the costs of disposal of high activity source against insolvency at the time when the source becomes disused source or orphan source; or

l) A contract for the disposal of high activity source with a licensee of a permit for collection, sorting, storage, treatment, conditioning for disposal and disposal of IRAO at the time, when the source becomes a disused source.

The licensee of a permit to perform activity leading to exposure is obliged immediately, no later than 12 months from the date when the sealed source became disused source, hand over the sealed source to the supplier, manufacturer or organization authorized by ÚVZ SR for collection, accumulation, storage and conditioning of radioactive sources, including ionization fire detectors for the disposal, operation of a workplace intended for collection or storage of radioactive sources, including transport within the workplace or for spent fuel and RAW management, including collection, sorting, storage, treatment, conditioning for disposal and disposal of RAW, unless otherwise specified by the competent radiation protection authority, and notify the competent radiation protection authority and the central register of sources; Attach to the notification a copy of the acknowledgement of receipt of the sealed source.

Currently the central registry of sources of ionizing radiation, which is maintained at ÚVZ SR, there are *1,439* 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. Seized radioactive sources and *radioactive materials of unknown origin* are stored in JAVYS, a. s. storage facilities, permitted by the authorized authorities for this purpose.

The basic legislative requirements for the use of sealed radioactive sources are set out in Act No. *87/2018* Coll. *on radiation protection, and in the MZ SR Decree No. 99/2018 Coll. on ensuring radiation protection. This Act applies graded approach also to the categorization of sources of ionizing radiation.*

For the service important in terms of radiation protection and for the performance of activity leading to exposure, which is not exempt from the notification obligation, taking into account the nature, the associated level of possible exposure of workers or the general public and the possible risk arising from foreseeable disturbance and deviations from normal operation, it is required:

a) notification,

b) registration; or

c) authorization.

In order to direct the movement of radioactive sources and ensure their safety, radioactive sources are classified into categories 1 to 5 according to their activity; the criteria for the inclusion of radioactive sources into category of ensuring its safety, are set out in Annex 3 to the Act No. 87/2018 Coll. on radiation protection.

Act No. 87/2018 Coll. on radiation protection lays down the basic conditions and requirements for the *management of sources of ionizing radiation*, defines the basic obligations of *operators of sources of ionizing radiation* and establishes a central register of sources of ionizing radiation.

Act No. 87/2018 Coll. *on radiation protection and Decree of the MZ SR No. 99/2018 Coll. on ensuring radiation protection* in accordance with EU legislation specifies the *conditions for performing activity leading to exposure, and the conditions for provision of a service important in terms of radiation protection, requirements for protection of workers and general public from ionizing radiation, ensuring safety of radioactive source and radioactive material, monitoring of radiation situation and the obligations of natural persons and legal entities in ensuring radiation protection. This Act defines the basic principles of radiation protection, methods of protection against the adverse effects of ionizing radiation, sets requirements for ensuring* radiation protection in *handling sources of ionizing radiation,* sets exposure limits for workers and the general public, sets requirements for storage, transport and use of *sources of ionizing radiation*, sets requirements and procedures for performing acceptance tests, tests of long-term stability and operational stability of *sources of ionizing radiation*, issuance of certificates of sealed sources, as well as conditions for the release of radioactive materials into the environment.

The Government, by its Resolution No. 610 of 2 September 2009, approved the draft procedure for the management of IRAO and *RMUO* in Slovakia, and authorized JAVYS, a. s., to build a complex facility for taking, 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 IRAO and captured radioactive materials (hereinafter referred to as “ZRAM”) at the Mochovce site, thus providing for the last element in the comprehensive and optimal management of IRAO and *RMUO (ZRAM)* originating from the entire territory of Slovakia (see details D.2.5). *In addition, on the basis of contracts, various types of IRAO were collected (used sealed sources, used liquid scintillators, liquid and solid radioactivity measurements, common laboratory waste - gloves, glass, chemicals, also materials containing natural radionuclides).*

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 (radioactive material of unknown origin - RMUO)

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. However, there are still reserves in the coordination of the activities of the ministries and institutions involved.

There are dozens of *seizures* in Slovakia *representing sealed radioactive sources, radioactive contaminated objects,* especially spare parts for agricultural machinery, metal objects contaminated by evaporator and parts of military equipment (on-board aircraft instruments containing radioactive phosphorescent paints with ^{226}Ra).

Recently, the number cases to be solved has been declining.
The following Table shows an overview of the number of RMUO in the period 2009 - 2019.

Number of RMUO in the period 2009 – 2019 accepted by JAVYS, a. s. for further handling	
Year	**Number of RMUO**
2009	20
2010	9
2011	12
2012	33
2013	31
2014	12
2015	14
2016	8
2017	17
2018	14
2019	8

Table 11 Number of RMUO in the period of 2009 – 2019

Due to limited capacities, the active search for orphan radioactive sources and radioactive contaminated objects is no longer performed. Recently, all radioactively contaminated objects have been captured by

business entities mainly engaged in collection and processing of scrap metal, and performing their own monitoring of radioactivity. Seizure of radioactively contaminated objects is notified to the ÚVZ SR or the relevant Regional Public Health Authorities. In 2019, 8 seized sources of ionizing radiation were reported. These were mainly parts of agricultural machinery contaminated with radionuclide ^{60}Co, parts of military equipment contaminated with ^{238}U-rad, safe deposit box ^{238}U-rad, ^{40}K and daughter products of the decay series ^{238}U, fire detectors ^{241}Am, uranyl acetate ^{238}U, ^{235}U, ^{234}U.

To reduce the risk of illicit handling of radioactive materials and their potential misuse for terrorist purposes, in December 2011, the Government of the Slovak Republic and the US Government signed a joint "Action Plan to Combat Illegal Disposal of Nuclear and Radioactive Materials" in Brussels, aimed at prevention, early detection and a rapid response to cases of illicit handling of radioactive materials and their subsequent safeguarding so as not to endanger the health of the population or misuse them for terrorist purposes. An authorized organization for the handling of radioactively contaminated objects, as well as sources of unknown origin is JAVYS, a. s.

K General Efforts to Improve Safety

K.1 Implemented Planned Measures from 2017

- ***Putting into operation the Integral RAW Storage Facility in Jaslovske Bohunice***
  Measure completed.
  After the completion of the construction in 2017, and the issuance of final approval decision, the Integral RAW Storage Facility in Jaslovske Bohunice was put into operation in February 2018.

- ***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***
  Measure completed.
  The construction of the third double row at RÚ RAO for low-level radioactive waste was completed in November 2018, and was put into operation in April 2019.
  The construction of the second module of disposal spaces at RÚ RAO for very low-level radioactive waste from decommissioning of NPP V1 was completed in September 2017 and it was put into operation in December 2017.

- ***Building the dry interim Spent Nuclear Fuel storage facility by extending the capacity of the current ISFS***
  Measure being implemented.
  As part of preparation for the construction of a dry ISNFSF, documentation was prepared in accordance with the legislative requirements and in accordance with the Act No. 24/2006 Coll. After obtaining a positive Final Opinion of the MŽP SR on the proposed activity, the construction of a dry ISNFSF is provided for under a contract between JAVYS, a. s. and external contractor, concluded in accordance with the Public Procurement Act. Design and construction layout in connection with the expansion of the ISNFSF were completed in December 2019. ÚJD SR, IAEA and WENRA. After obtaining the opinions of the authorities concerned and the opinion of the EC according to Article 37 of Euratom Treaty, the application for a building permit will be submitted to ÚJD SR by end of 2020. The expected date of operation of the dry ISNFSF is in 2022.

- ***Building the workplace for melting metal RAW in Jaslovske Bohunice***
  Measure completed.
  After the preparations for the construction of the facility for melting metal radioactive waste, within which documentation was prepared in accordance with the legislative requirements, a public assessment of impacts of this activity on the environment according to the Act No. 24/2006 Coll. was performed. After obtaining a positive Final Opinion of the MŽP SR on the proposed activity, No. 1775/2015-3.4/hp, and a building permit, based on a contract concluded in accordance with the Public Procurement Act between JAVYS, a. s. and an external contractor, the construction of a facility for melting metal radioactive waste was implemented, within which all construction works and

installation of technological equipment were carried out. Preparations are currently underway for inactive testing of the facility for melting metal radioactive waste. Commissioning is planned for in 2020.

- ***Continue in stage 3 and 4 of decommissioning of NPP A1***

  Measure continuous according to schedule.

  After obtaining positive opinions from the EC, MŽP SR, ÚJD SR and ÚVZ SR, from 1 October 2016 stage 3 and 4 decommissioning NPP A1 started, within which safety valves and emergency valves of steam generators were decommissioned in full, decommissioning of gantry crane used at the time of construction of A1 for the installation of steam generators, decommissioning of oil management – turbo-compressors and all technological equipment in the gas management building. Furthermore, decommissioning of technological equipment of the heavy water management CO_2 cooling systems, pumping station for the coolant for the spent nuclear fuel (SNF) from NPP A1 Chrompik and Dowtherm, steam generators including their accessories treatment of sludge phases from long-term storage for NPP A1, treatment of Chrompik, which was used as a cooling medium for SNF and treatment of cases for SNF storage from NPP A1, remediation of contaminated soils and contaminated water, and other decontamination activities, dismantling, fragmentation of related technological equipment, and management of radioactive waste produced. All activities are carried out in accordance with the schedule of Decommissioning Plan for stage 3 and 4 of NPP A1, and preconditions are created for the fulfilment of all objectives and the completion of these stages of NPP A1 decommissioning by the end of 2024. (See also chapter D.3.2)

- ***Continue in the implementation of stage II of decommissioning of NPP V1***

  Measure continues according to schedule.

  Activities of stage 2 of decommissioning of NPP V1 (2015 – 2025) focus on dismantling of equipment and primary circuit structures of NPP that are in the controlled zone, i.e. decommissioning of the nuclear island. Other unnecessary external objects of NPP V1, tanks, underground pipelines and cable lines will be dismantled as well. After the site has been restored to its original condition (or after clearance) and its final inspection, the site will be released from the scope of the Atomic Act. Decommissioning of NPP V1 is implemented through partial projects. Out of the total number of 74 projects, 61 BIDSF projects currently completed and 8 projects are being implemented. Other projects are in the preparatory stage. JAVYS, a. s., after obtaining a permit for decommissioning implements activities that represent activities, such as for example, dismantling of large-scale components of the primary circle and dismantling of the most contaminated equipment (reactor pressure vessels of both units, steam generators, main circulating pumps, primary circuit piping and other technological components), as well as the implementation of other related projects. Parallel with the dismantling activities, a continuious process of management of the RAW, their shipment and release of materials meeting the criteria for release into the environment takes place.

- **Change in the system of treatment of liquid radioactive concentrates in NPP Mochovce.**

  Measure completed.

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 final 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).

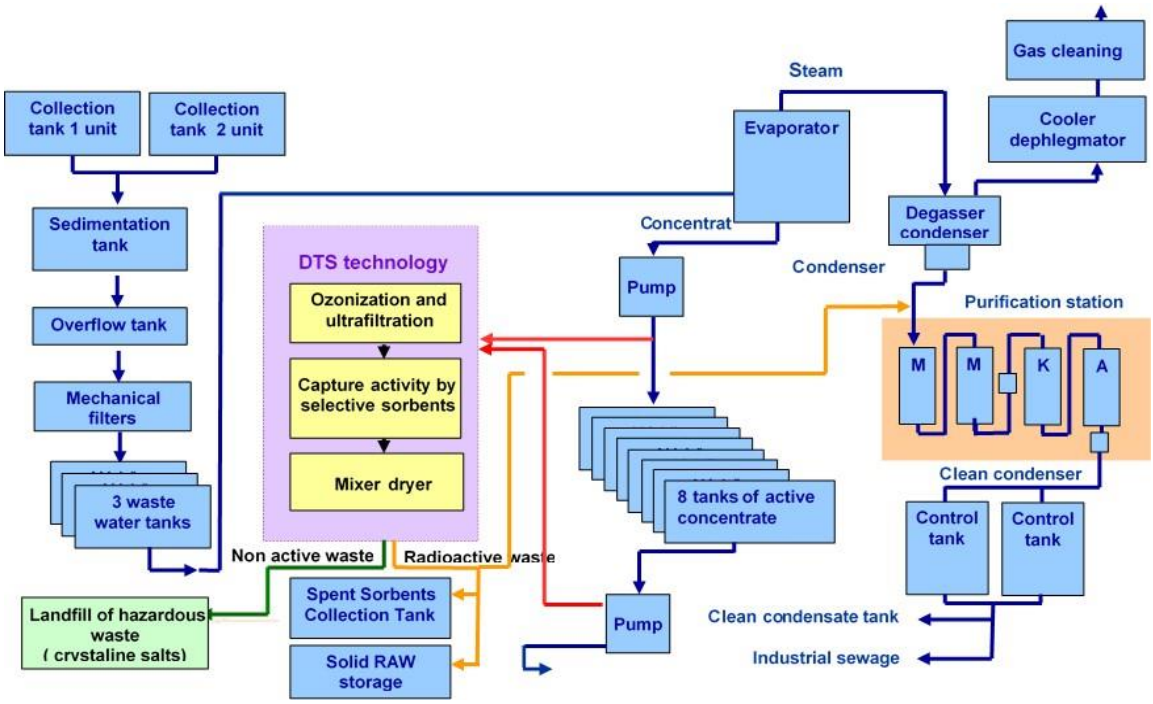

Fig. 30 Scheme of treatment of radioactive liquid concentrates at NPP Mochovce

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 150 m^3/year.

Expected completion of design change implementation is *09/2020.*

The overall scheme of the proposed system of liquid RAW treatment is shown in Fig. 31.

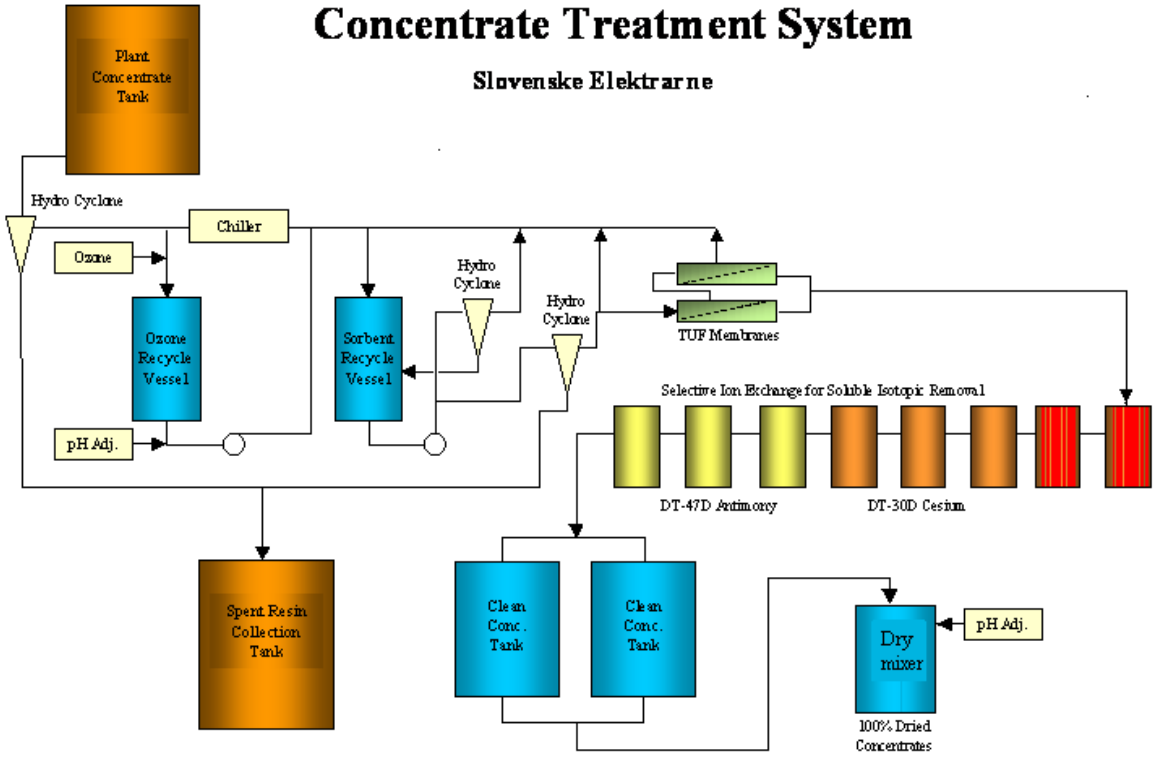

Fig. 31 Scheme of liquid RAW treatment at SE, a. s.

K.2 Planned Measures to Improve Safety

In the coming period, JAVYS, a. s. plans to implement the following measures:

- *Expand the storage capacity for SNF of the current ISFS by building and putting into operation of a dry interim Spent Nuclear Fuel storage facility;*
- *Build technologies of RAW management within the planned optimization of treatment capacities, including the completion of the EIA process for this project.*

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) 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) form the legislative framework for communication with the public in the field of nuclear energy.

All initiated, ongoing and closed administrative proceedings, including ÚJD SR Decisions, are published on the ÚJD SR website, as well as on the Central Official Electronic Notice Board, which is available to the public 24 hours a day at the offices of ÚJD SR (see chapter E.2.1.2). 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. 5 of the law, he must also inform the public. Among the obligations of the licensee, 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 licensee. Act No. 24/2006 Coll. 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 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:

- *JAVYS Information Centres at the Mochovce and Jaslovské Bohunice sites, average annual visit, approx. 5 thousand visitors + tours of facilities for selected groups;*
- *SE Information Centres Bohunice (annually 2 – 4 thousand visitors) and Energoland Mochovce (annually 12 – 15 thousand visitors) + tours of the construction site of EMO 3&4 for students of Slovak technical universities, for the representatives of local self-government, for members of the Economic Committee of the Parliament, for Austrian experts, etc.*;
- *Periodical "JAVYS in our country", published by JAVYS, a. s. – distributed free of charge also in the regions of Jaslovské Bohunice and Mochovce + online version;*
- *Bi-monthly "Energy for the country", published by SE, a. s. – distributed free of charge in the regions of Mochovce and Jaslovské Bohunice + online version, other printed matter (information brochures and leaflets) information presented in an accessible and comprehensible form;*

- Websites of license holders – www.seas.sk, www.javys.sk and the regulatory *authority* ÚJD SR – www.ujd.gov.sk *and the National Nuclear Fund – www.njf.sk*,
- *Social networks Facebook, Linkedln, You Tube, Instagram, Twitter;*
- www.slovensko.sk Portal - *Central Official Electronic Notice Board (CÚET), on which ÚJD SR publishes the prescribed information and which works as a nationwide communication point for all public administration authorities in relation to the public;*
- *Touch information kiosk of ÚJD SR, fulfilling the function of the Official Notice Board of ÚJD SR – allows easy viewing of administrative proceedings and decisions issued by ÚJD SR, accessible to the public 24 hours a day, installed in 2016;*
- 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 regulators and thus they are getting qualified first-hand 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 regulators,
- 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),
- *Occasional events for the staff and the general public organized by SE, a. s. and JAVYS, a. s., such as for example: Night at Energoland, Family Safety Day, Open Door Day, Sports games, etc.*
- External lectures at schools *and other events, for example the Ekotopfilm festival, through which the licensee reach out to more than 15 thousand pupils and students of primary and secondary schools,*
- 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, *festivals*, 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 ÚJD SR *(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 www.slovensko.sk *portal through CÚET*. ÚJD SR has a touch information kiosk, *having the function of the Official Notice Board of ÚJD SR,* where it is possible to view the administrative proceedings of the ÚJD SR (closed and pending), and also Decisions issued by the ÚJD SR. The website of the ÚJD SR 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. *The Annual Report is also published in the Slovak-English version, it is in electronic form and it is accessible to the public on the ÚJD SR website. Information on the publication of the current annual report is distributed to the ministries, other central state administration authorities, state organizations, to the embassies of foreign states in the Slovak Republic, and the Slovak embassies abroad, foreign regulatory bodies, international and other organizations and schools.*

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 articles about its domestic and foreign activities to the press agencies of SR, to dailies and electronic media*, publishes press releases and the Chairperson of ÚJD SR provides extensive interviews on current topics, such as the completion of NPP Mochovce 3&4, and the method of performing supervisory activities. For many years, ÚJD SR together with the* State Authority for Nuclear Safety of the Czech Republic (SÚJB), has been the publisher of the professional magazine "Nuclear Safety", which focuses on presenting the latest knowledge in the field of nuclear safety in SR and CR. *After changes made by SÚJB, the magazine was taken over – as a publisher - by the Research*

Centre Řež in the second half of 2019, and in cooperation with ÚJD SR continues to publish the magazine under the original name "Nuclear Energy".

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 website 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 MV SR 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. 32 Energoland at Mochovce

L Annexes

I. List of Nuclear Facilities for Spent Fuel and RAW Management

II. *Reference levels of annual releases of radioactive materials into the environment*

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 Plant Jaslovské Bohunice, NPP V2 - Units 3 & 4;
- Nuclear Power Plant Mochovce, Units 1 & 2.

Jadrová a vyraďovacia spoločnosť, a. s. (JAVYS, a. s.) operates:

- Interim Spent Nuclear Fuel Storage at Jaslovské Bohunice;
- Technologies for RAW Treatment and Conditioning at Jaslovské Bohunice;
- *Integral Radioactive Waste Storage Facility (IS RAO) at Jaslovske Bohunice;*
- Final Treatment of Liquid RAW Mochovce;
- National RAW Repository Mochovce.

Other nuclear installations are listed in Annex III.

Annex II. Reference levels of annual radioactive releases into the environment

Radionuclides activity values in gaseous and liquid discharges are part of L&C approved by ÚVZ authorities.

The basic radiological limit for limiting the exposure of the general public in the vicinity of a nuclear facility caused by release of radioactive materials into the atmosphere and into surface water us the effective dose of a representative person, is 250 μSv per calendar year.

A representative person, pursuant to Act No. 87/2018 Coll. on radiation protection means an individual from a general public representing a group of natural persons, who are most exposed to the source and the route, except for natural persons with extreme or unusual habits.

The creation of two entities at the Jaslovské Bohunice site in 2006 (JAVYS, a. s. and SE, a. s.) gave rise to division of *reference levels of annual discharges* almost equally between SE, a. s. (i.e. NPP V2) and JAVYS, a. s. (i. e. NPP V1, NPP A1, TSÚ RAO and ISFS). In this, permanent shutdown of Unit 3 of NPP V1 in 2006 and 2008 and the fact that discharges from facilities for RAW and SNF management are significantly lower than discharges from NPP in operation, were taken into account. New *reference levels of annual* discharges *were established in 2011*.

Gaseous discharges				
Reference levels of annual discharges for the group of NI	Noble gases (any mixture)	Iodines (gaseous and aerosol phase)	Aerosols – mixture of long-lived radionuclides	$^{89, 90}$Sr
	Bq/year	Bq/year	Bq/year	Bq/year
Jaslovské Bohunice site after 2007				
All NIs	4.10^{15}	$1{,}3.10^{11}$	$1{,}6.10^{11}$	3.10^{8}
Jaslovské Bohunice site from 2007 till 2011				
JAVYS, a. s. (incl. NPP V1)	2.10^{15}	$6{,}5.10^{10}$	$8{,}1.10^{10}$	$1{,}6.10^{8}$
SE, a. s. NPP V2	2.10^{15}	$6{,}5.10^{10}$	8.10^{10}	$1{,}4.10^{8}$
Jaslovské Bohunice site from 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				
NPP Mochovce 1&2	$4{,}1.10^{15}$	$6{,}7.10^{10}$	$1{,}7.10^{11}$	Not limited
Liquid discharges				
Reference levels of annual discharges for the group of	Tritium Bq/year		Other corrosive and fission products Bq/year	

NIs	recipient Váh	recipient Dudváh	recipient Váh	recipient Dudváh
Jaslovské Bohunice site before 2007				
All NIs	$4{,}37.10^{13}$	$4{,}37.10^{11}$	$3{,}8.10^{10}$	$3{,}8.10^{8}$
Jaslovské Bohunice site from 2007				
JAVYS, a. s. (incl. NPP V1)	*3.*10^{13}	$2{,}3.10^{11}$	$2{,}5.10^{10}$	$2{,}5.10^{8}$
SE, a. s. NPP V2	2.10^{13}	2.10^{11}	$1{,}3.10^{10}$	$1{,}3.10^{8}$
Jaslovské Bohunice site from 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. JE V2	2.10^{13}	2.10^{11}	$1{,}3.10^{10}$	$1{,}3.10^{8}$
Mochovce site				
Mochovce NPP 1&2	$1{,}2.10^{13}$		$1{,}1.10^{9}$	

Reference levels of annual liquid discharges from RÚ RAO

Nuclide	*Reference level of annual discharges* [Bq]/year
^{3}H	$1{,}88.10^{10}$
^{137}Cs	$2{,}28.10^{7}$
^{90}Sr	$2{,}44.10^{8}$
^{60}Co	$2{,}24.10^{7}$
^{239}Pu	$5{,}56.10^{5}$

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 ŤK) (*as at 31 December 2019*)

The interim Spent Nuclear Fuel storage facility of JAVYS, a. s. as at 31 December *2019* stored *12,712* SNF from the production of NI V1, V2 and NPP Mochovce, in the following breakdown:

As of 31 December 2019, a total of 1,243 SNF assemblies were stored in the SNF storage pools at the NPP V2 and NPP Mochovce.

Note: By using advanced design of nuclear fuel, SNF production is gradually going down.

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 solid RAW

Storage of solid RAW

Storage	Total capacity [m³]	Filled capacity [m³]	Available [m³]
Total	2507	664,4	1842,6

Storage of RA-concentrate

Storage	Capacity [m³]	Filled capacity [m³]	Available space [m³]
Total	4215	157,19	4057,81

Storage of low level active and medium level active sorbents

Tank	Capacity [m³]	Filled capacity [m³]	Volume converted to total salinity 190g/l [m³]	Available volume [m³]
Total	1584	0	Not measured	1584

Storage of solid radwaste with higher activity (Mogilnik)

Tank	Capacity [m³]	Filled capacity [m³]	Available volume [m³]
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 *2019*)

Storage of solid RAW on pallets

Storage	Total capacity /pallets/	Utilization /pallets/	Available /pallets/	Note
Total	1 920	55	1 865	

Storage of solid RAW at storage facilities without internal structure

Storage	Total capacity /drums/	Utilization /drums/	Available /drums/	Note
Total	11 490	406	11 084	

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: *289 cells*

Empty: *240 cells*

Storage of RA-concentrate

Pond	*Capacity [m³]*	*Utilization [m³]*	*Available volume [m³]*
Total	4 310	*1 445*	*2 865*

Storage of ion exchange resins

Pond	Capacity [m³]	Utilization [m³]	Available volume [m³]
Total	*920*	*103,5*	*816,5*

V.3 Inventory of Stored Radioactive Waste (RAW) at NPP Mochovce (at as 31 December *2019*)

Storage of solid RAW on pallets

Storage	**Capacity /pallets/**	**Utilization /pallets/**	**Available volume /pallets/**
Total	*970*	*84*	*886*

* Volume of one pallet is 0,5 m³

Storage of air filters

Storage 108/8	**Capacity (pcs drums)**	**Utilization (pcs drums)**	**Available volume (pcs drums)**
Total	*660*	*424*	*236*

Storage of PRAO in drums without built-in

Storage	**Capacity *(pcs drums)***	**Utilization *(pcs drums)***	**Available volume *(m³)***
Total	*1 296*	*9*	*1 287*

Storage of solid RAW with higher activity (Mogilnik)

Total capacity of storage facility: *529 channels*

Utilized: *134 channels*

Empty: *395 channels*

Storage of RA-concentrate

	Capacity (m^3)	**Real utilization (m^3)**	**Available volume (m^3)**
Total	2 110	*1 178*	*932*

Storage of ion exchange resins

Pond	**Capacity**	**Utilization**	**Available volume**
Total	460	*0*	*460*

V. 3 Inventory of stored RAW as at 31 December 2019 in JAVYS, a. s.

Criteria used to define and categorize waste

In the Slovak Republic (Act No. 541/2004 Coll.) any unusable materials in gaseous, liquid or solid form are defined as radioactive waste, which due to the content of radionuclides in them or due to the level of their contamination with radionuclides cannot be released into the environment.

The division of radioactive waste into classes is based on their disposability and it is defined in Section 5 of ÚJD SR Decree No. 30/2012 Coll., as amended by ÚJD SR Decree No. 101/2016 Coll., laying down the details of requirements for the management of nuclear materials, radioactive waste and spent nuclear fuel. According to this Decree, RAW is divided according to their activity into the following classes (according to the IAEA Safety Guide GSG-1 Classification of Radioactive Waste):

Release levels enabling release into the environment for individual radionuclides are given in Annex 5 to the Act No. 87/2018 Coll. on radiation protection.

Inventory of stored RAW as at 31 December 2019		
ÚJD SR Decree No. 30/2012 Coll. *as amended by ÚJD SR Decree No. 101/2016 Coll.*	**IAEA Safety Guide GSG-1**	**RAW stored in JAVYS, a. s.**
	Exempt waste (EW): Waste that meets the criteria for clearance, exemption or exclusion from regulatory control for radiation protection purposes as described in Ref. [6].	
Transient radioactive waste, *the activity of which during storage due to a very short half-lives will fall below the limit value for their release into the environment,*	*Very short lived waste (VSLW): Waste that can be stored for decay over a limited period of up to a few years and subsequently cleared from regulatory control according to arrangements approved by the regulatory body, for uncontrolled disposal, use or discharge. This class includes waste containing primarily radionuclides with very short half-lives often used for research and medical purposes.*	*130,101 kg solid RAW* *(cca 166 m^3)*

Very low level radioactive waste, *the activity of which is slightly higher than the limit value for their release into the environment, preferably contain radionuclides with short half-life or also radionuclides with long half-life in low concentration, which require lower degree of isolation from the environment with a system of engineered barriers or do not require the use of engineered barriers, and the time of institutional control of the repository is shorter than in the case of surface type of RAW repository,*	*Very low level waste (VLLW): Waste that does not necessarily meet the criteria of EW, but that does not need a high level of containment and isolation and, therefore, is suitable for disposal in near surface landfill type facilities with limited regulatory control. Such landfill type facilities may also contain other hazardous waste. Typical waste in this class includes soil and rubble with low levels of activity concentration. Concentrations of longer lived radionuclides in VLLW are generally very limited.*	*17,430,472 kg solid RAW* *(cca 14,525 m^3)*
Low level waste, *the average mass activity of long-lived radionuclides, especially alpha-emitting radionuclides, is lower than 400 Bq/g, the maximum mass activity of long-lived radionuclides, especially alpha-emitting radionuclides, is locally lower than 4,000 Bq/g, do not produce residual heat and after conditioning, meet the limits and conditions of safe operation for the surface type of RAW repository,*	*Low level waste (LLW): Waste that is above clearance levels, but with limited amounts of long lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years and is suitable for disposal in engineered near surface facilities. This class covers a very broad range of waste. LLW may include short lived radionuclides at higher levels of activity concentration, and also long lived radionuclides, but only at relatively low levels of activity concentration.*	*3,402,086 kg solid RAW* *(cca 4,377 m^3)* *+* *517.6 m^3 liquid RAW*
Intermediate level waste, *the average mass activity of long-lived radionuclides, especially alpha-emitting radionuclides, equals to 400 Bq/g or is higher, may produce residual heat and measures for its removal are lower than in the*	*Intermediate level waste (ILW): Waste that, because of its content, particularly of long lived radionuclides, requires a greater degree of containment and isolation than that provided by near surface disposal. However, ILW needs no provision, or only limited provision, for heat dissipation during its storage*	*33,210 kg solid RAW* *(cca 12 m^3)* *+*

case of high-level waste and after conditioning do not meet the limits and conditions of safe operation for surface type of RAW repository,	*and disposal. ILW may contain long lived radionuclides, in particular, alpha emitting radionuclides that will not decay to a level of activity concentration acceptable for near surface disposal during the time for which institutional controls can be relied upon. Therefore, waste in this class requires disposal at greater depths, of the order of tens of metres to a few hundred metres.*	*7,4 m^3 liquid RAW*
***High level waste,** the average mass activity of short and long-lived radionuclides, especially alpha-emitting radionuclides, exceeding values set for low-level and intermediate-level waste, can be disposed only in the deep type of RAW repository, while measures to remove residual heat represent significant factor in the design of these repositories.*	*High level waste (HLW): Waste with levels of activity concentration high enough to generate significant quantities of heat by the radioactive decay process or waste with large amounts of long lived radionuclides that need to be considered in the design of a disposal facility for such waste. Disposal in deep, stable geological formations usually several hundred metres or more below the surface is the generally recognized option for disposal of HLW.*	

Spent nuclear fuel is currently not considered as high-level radioactive waste.

V. 4 Inventory of Stored Radioactive Waste (RAW) at JAVYS, a. s. (as at *31 December 2019)*

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, *NPP V1*).

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 has 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. At the end of *2019,* the total inventory of *such* liquid RAW (including non-concentrated) was *275.719* m^3.

Aggregate amounts of solid RAW at NPP A1 in *2019* reached *2 343,583* tons of metal RAW*, 389,708* tons of other RAW*, 17 430,472* tons of contaminated soil and debris*.*

Storage	Total capacity [m^3]	Utilization [m^3]	Available capacity [m^3]
Total	***17 589***	***3 774,602***	***13 814,398***

Storage spaces for storage of PRAO are filled with 200 l drums, 220 l drums, 440 l drums, 2EM-01 containers, ISO containers and fence pallets.

As of *31 December 2019,* certified storage facilities of JAVYS, a. s., *stored*:

- *In the storage facilities of TSÚ RAO (obj. 32,34): 8,958 pcs of 200 l drums;*
- *In the storage facilities of TSÚ RAO (obj. 723): 634 pcs of 200 l drums and 25 pcs of 220 l drums;*
- *In the storage facilities of TSÚ RAO (obj. 641): 3,218 pcs of 200 l drums, 20 pcs of 220 l drums, 4 pcs of 440 l drums, 237 pcs 2EM-01 containers and 720 fence pallets;*
- *In IS RAW: 1,242 of 200 l drums and 12 ISO containers with RAW.*

Inventory of solid RAW placed in objects of JAVYS, a. s.:

No.	RAW type	Volume [cca m^3]	Weight [t]
	Total	***19 080,68***	***20 999,163***

Inventory of liquid RAW JAVYS, a. s. in total: 525 m^3

V. 5 Amounts of Radioactive Waste (RAW) treated or conditioned at TSÚ RAO at Jaslovské Bohunice and FS KRAO at Mochovce in *2019*

TSÚ RAO + FS KRAO	Conditioned (treated)	*year 2019*	
Filled FCC		*352 ks*	
Transported to RÚ RAO		*338 ks*	

TSÚ RAO	***Type of waste***	***Amount***	
Operational set (PS) - BSC RAW *PS 04 – Cementation*	*KRAO (concentrate,* washing liquid, sludge, ion exchanges) *PRAO* (bituminous product, mouldings, ashes, other matrix)	*313,713 m³* *379,985 m³*	
PS 06 - Incinerator	Solid RAW (total) NPP A1 NPP V1 NPP V2 NPP Mochovce 1&2 Other producers Liquid RAW (total) NPP A1 - Dowtherm, oil NPP V1 – oil NPP V1 – sorbents NPP V2- sorbents Others producers	***86,888 t*** *21,812 t* *14,632 t* *8,396 t* *2,886 t* *39,162t* *21,113 m³* *1,35 m³* *0 m³* *0 m³* *5,949 m³* *13,814 m³*	
PS 08 - Compactor	Total NPP A1 NPP V1 NPP V2 NPP Mochovce 1&2 Other producers IRAW	***440,042 t*** *231,999 t* *135,114 t* *29,415 t* *15,17 t* *28,337 t* *0,007 t*	
PS 03 – Concentration	Total Concentrate NPP V1 Concentrate NPP V2	*0 m³* *0 m³* *0 m³*	
PS 05 – Sorting	Solid RAW	*0 t*	
Operating set - 809 Concentration KCV at PS 44, PS 100	KCV NPP A1 NPP V1 NPP V2	 *0 m³* *0 m³* *0 m³*	
DBL	Sorbents	*0 m³*	
Operating set - obj.41	RA – water	*1208,5 m³*	
Operating set – Facility for treatment of metal RAW	Metal RAW (total) NPP A1 NPP V1 NPP V2 Other producers	*245,584 t* *168,458 t* *65,078 t* *12,048 t* *0*	

Operating set – Treatment of air filters - PS 009	Air management - filters (total) NPP A1 NPP V1 Others producers	*14,653 t* *11,623 t* *3,03 t* *0*	
FS KRAO	**Type of waste**	**Amount**	
Concentration KCV	Concentrate NPP Mochovce 1&2	*0 m^3*	
Cementation of RAW	Cementation Solid RAW Liquid RAW	 *99,507 m3* *71,527 m3*	
DBL – FS KRAO	Sorbents	*22,356 m3*	

RAW disposed at the national repository at Mochovce

By the end of *2019,* there were *8,812* FCCs disposed in total, representing cca *18,017.2* m^3 solidified RAW from NPP A1, NPP V1 and NPP V2 and NPP Mochovce 1&2. A substantial part of these wastes consisted of concentrates in the form of cement grout of FCCs*, liquid waste solidified to 200 l drums* and solid waste treated before pouring into FCCs by high pressure compacting.

Annex VI. List of Selected National Laws, Decrees and Guidelines

- Act of NC SR No. 71/1967 Coll. on Administrative Procedure *(Administrative Procedure Code)* – latest amendment as Act *No. 177/2018 Coll.*
- Act of NC SR No. 50/1976 Coll. on Land-use Planning and Building Regulations (Building Act) – the latest amendment as Act No*. 90/2020 Coll.*
- Act of the NC SR No. 42/1994 Coll. on Civil Protection of the Population – as last amended by Act No*. 177/2018 Coll.*
- *Act No. 56/2018 Coll. on product conformity assessment, making a specified product available on the market, and on amendments to certain laws – the latest amendment as Act No. 307/2018 Coll.*
- Act No. 575/2001 Coll. on Organization of Government Activities and of Central State Administration Organisations – the latest amendment as Act No*. 134/2020 Coll*.
- Act No. 215/2004 Coll. on Protection of Cclassified Information and on amendments to certain laws – the latest amendment as Act No. *221/2019 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. 177/2018 Coll.*
- Act No. 541/2004 Coll. on the Peaceful Uses of Nuclear Energy (the Atomic Act) and on amendment and alternations of several acts as amended – the latest amendment as Act No*. 279/2019 Coll*.
- Act No. 251/2012 Coll. on Energy Sector and on amendments and complements to certain laws – the latest amendment as Act No*. 309/2018 Coll*.
- Act No. 24/2006 Coll. on Environmental Impact Assessment and on amendments to certain laws *as amended* – the latest amendment as Act No*. 74/2020 Coll*.
- Act No. 124/2006 Coll. on Occupational Health and Safety and on amendments to certain laws – the latest amendment as Act No*. 66/2020 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*. 54/2019 Coll.*
- *Act No. 87/2018 Coll. on Radiation Protection and on amendments to certain laws – the latest amendment as Act No. 69/2020 Coll.*
- Act No. *308/2018* Coll. on the National Nuclear Fund, *and on amendments to Act No. 541/2004 Coll. on peaceful uses of nuclear energy (the Atomic Act), and on amendments to certain laws as amended* – the latest amendment as Act No*. 221/2019 Coll.*

- Act No. 309/2009 Coll. on Support of Renewable Sources of Energy and High Efficiency Cogeneration and on amendments to certain laws – last amendment Act No. *309/2018 Coll., 362/2019 Coll.*
- Act No. 254/2011 Coll. on Transportable Pressure Equipment and on amendments to certain laws as amended by Act No. *56/2018 Coll.*
- Act No. 250/2012 Coll. on Regulation in Network Industries – the last amendment of Act *No. 309/2018 Coll.*
- Act No. 133/2013 Coll. on Building Products and on amendments to certain laws as amended by Act *No. 177/2018 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. *117/2018 Coll., repealing Government Ordinance No. 35/2008 Coll.,* laying down the details on 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 – *the last amendment of Act No. 333/2019 Coll.*
- 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 – *the last amendment of Act No. 325/2019 Coll.*
- 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. 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. 21/2019 Coll., laying down the amount of the annual levy intended for the payment of historical debt from the supplied electricity to end customers, and details on the method of its collection for the National Nuclear Fund, its use and on the method and due dates for tis payment.*
- *Government Ordinance No. 22/2019 Coll., laying down the amount of the mandatory contribution and mandatory payment and details on the method of collection and payment of mandatory contribution and mandatory payment to the account of the National Nuclear Fund*.
- *MH SR Decree No. 31/2019 Coll., laying down details on the structure and scope of eligible costs, rules for price setting and price updates for own deliveries of the beneficiary of funds from the National Nuclear Fund and the structure and scope of price calculation of own deliveries.*
- *MZ SR Decree No. 96/2018 Coll., laying down details on the activity of the radiation monitoring network.*
- *MZ SR Decree No. 98/2018 Coll., laying down details on the limitation of exposure of workers and the general public to natural sources of ionizing radiation.*
- *MZ SR Decree No. 99/2018 Coll. on ensuring radiation protection.*
- *MZ SR Decree No. 100/2018 Coll. on limitation of exposure of the general public from drinking water, natural mineral water and from spring water.*
- *MZ SR Decree No. 101/2018 Coll., laying down details on ensuring radiation protection during medical exposure as amended by MZ SR Decree No. 340/2019 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 MPSVR 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 MPSVR 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.
- *MŽP SR Decree No. 532/2002 Coll. of 8 July 2002, laying down details of the general technical requirements for construction works and the general technical requirements for works used by persons with reduced mobility and orientation.*
- 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*. 112/2020 Coll., establishing special materials and equipment that fall under the supervision of ÚJD SR*.
- 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. *410/2019 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 – the latest amendment by ÚJD SR Decree No. 9/2018 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. 71/2019 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. 2016/52 of 15 January 2016, laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency, and repealing Council Regulation (Euratom) No. 3954/87 and Commission Regulations (Euratom) No. 944/89 and (Euratom) No. 770/90.*
- 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 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 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 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.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.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.
BNS I.4.2/2017	*Requirements for the preparation of PSA (3rd Edition – revised and supplemented)*
BNS I.9.5/2017	*Requirements for safety analyses of activities performed during decommissioning of nuclear installations*
BNS I.4.5/2018	*Requirements for the safety of nuclear installations in relation to natural hazards*
BN 1/2019	*Requirements for the software quality assurance for safety analyses (4th Edition - revised and supplemented)*
BN 2/2019	*Single failure criterion (3rd Edition – revised and supplemented)*
BN 3/2019	*Requirements for the description of the reactor and its design basis in the Safety Report (4th Edition – revised and supplemented)*

BN 4/2019	*Requirements for self-assessment and evaluation of the results of self-assessment nuclear physical safety culture*
BN 5/2019	*Requirements for deterministic safety analysis of NPP with WWER-440/V213 (6th Edition – revised and supplemented)*
BN 1/2020	*Comprehensive periodic safety review (3rd Edition – revised and supplemented)*
BN 2/2020	*Requirements for ensuring fire protection and fire safety of nuclear installations in terms of nuclear safety (4th Edition – revised and supplemented)*
Glossary	Nuclear safety glossary of the Nuclear Regulatory Authority of SR.

Annex VII. List of International Experts Reports and Safety Reports

Tab. 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 stage 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 stage of decommissioning - 2008 Plan for 3rd and 4th stages 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	Plan for the 1st stage of decommissioning - 06/2011 Plan for the 2nd stage of decommissioning - 2015	07/2009 *06/2014*	
ISFS Bohunice	Preliminary Safety Report (reconstr. 1997) EIA 02/2016	1987, 09/1998 04/2010 03/2014	11/2008	
TSÚ RAO *Bohunice*	*BSC Bohunice* Reference Safety Report, EIA (pre BSC), EIA TSÚ RAO 11/2014	1987, 9/1998	2000 (after reconstruction)	
TSÚ RAO *Bohunice*	Preliminary Safety Report, EIA (pre BSC) EIA TSÚ RAO 11/2014	1998 (pre BL 1994, 2002) 08/2010 *10/2017* *07/2018*	05/2009 *01/2019*	
FS KRAO *Mochovce*	Preliminary Safety Report 2004 EIA FS KRAO Mochovce 07/2014	07/2006 *12/2017*	10/2015	
Integral Storage *Bohunice*	Intent 2011 EIA IS Bohunice 09/2012 *Preliminary Safety Report 2015*			
RÚ RAO	Reference and	4/1999	4/2011	WATRP 1995

Mochovce	Preliminary Safety Report EIA RÚ RAO 05/2013	10/2014 10/2015 01/2017 *07/2018*		

Safety Reports and evaluation documents from missions *at NI for the SNF and RAW management in the Slovak Republic:*

1.	NPP V1 Safety Report after gradual reconstruction	05/2001
2.	Pre-operational Safety Report for the National RAW Repository	04/1999
3.	Pre-operational Safety Report – shipments of solid RAW in ISO containers	01/2000
4.	Pre-operational Safety Report – re-qualified fragmentation facility for treatment of metal RAW with surface contamination do 3000 Bq/cm2	04/2001
5.	Pre-operational Safety Report for the ISFS	09/1998
6.	WENRA: Nuclear Safety in EU Candidate Countries	10/2000
7.	IAEA: Review of Results of the Gradual Upgrading at Bohunice WWER-440/230 NPP Units 1 and 2	11/2000
8.	Licensing Related Assessment of Design and Operational Safety for VVER 213 (PHARE/SK/TSO/VVER03)	12/1999
9.	Report on Nuclear Safety in the Context of Enlargement (9181/01)	05/2001
10.	International Conference on the Strengthening of Nuclear Safety in Eastern Europe – IAEA Report	06/1999
11.	Final Report of the IAEA EBP and other Related IAEA Activities on the Safety of WWER and RBMK NPPs	1998
12.	5-BSP-001 Safety Report of NPP V1 after gradual reconstruction	11/2000
13.	A-01/A1 Safety Report of NPP A1 - current status	11/2005
14.	*Pre-operational Safety Report of FS KRAO Mochovce*	*07/2006*
15.	Technical Report – Periodic Safety Review of NPP A1 after stage 1 of decommissioning	10/2007
16.	*Technical Report - Periodic Safety Review of ISFS*	*12/2009*
17.	*Technical Report – Periodic Safety Review of NPP V1 – Report No JAVYS/PHJB - V1/ZS/2009*	*12/2009*
18.	*JAVYS/PHJB-V1/ZS/2009 Technical Report – Periodic Safety Review NPP V1*	*12/2009*

19.	*5-BSP-001 Pre-operational Safety Report for NPP V1*	*03/2010*
20.	A-01/MSVP Pre-operational Safety Report for ISFS	04/2010
21.	A-01/TSÚ RAO Pre-operational Safety Report for TSÚ RAO at Jaslovske Bohunice	08/2010
22.	Technical Report – Periodic Safety Review of RÚ RAO	04/2011
23.	A-01/RÚ RAO Pre-operational Safety Report of RÚ RAO Mochovce	09/2011
24.	13-BSP-001 Pre-operational Safety Report for ISFS at Jaslovske Bohunice	03/2014
25.	*B6.5-D12-6 Report on periodic safety review of NPP V1 after stage 1 of decommissioning*	*06/2014*
26.	12-BSP-001: Pre-operational Safety Report for RÚ RAO Mochovce	10/2014
27.	12-BSP-001: Pre-operational Safety Report for RÚ RAO Mochovce	10/2015
28.	*Technical Report - Periodic Safety Review of FS KRAO*	*10/2015*
29.	12-BSP-001: Pre-operational Safety Report for RÚ RAO Mochovce	01/2017
30.	*10-BSP-001 Pre-operational Safety Report for TSÚ RAO Bohunice*	*10/2017*
31.	*11-BSP-001 Pre-operational Safety Report for FS KRAO*	*12/2017*
32.	*16-BSP-001 Pre-operational Safety Report for IS RAO at the Bohunice site*	*12/2017*
33.	*10-BSP-001 Pre-operational Safety Report for TSÚ RAO Bohunice*	*07/2018*
34.	*12-BSP-001: Pre-operational Safety Report for RÚ RAO Mochovce*	*07/2018*
35.	*Technical Report – Final Report on Periodic Safety Review of ISFS*	*11/2019*
36.	*Technical Report - Final Report on Periodic Safety Review of TSÚ RAO*	*01/2020*

Documentation submitted by the Slovak Republic to fulfil Article 37 of the Euratom Treaty as interpreted by the COMMISSION RECOMMENDATION of 6 December 1999 on the application of Article 37 of the Euratom Treaty (notified under document number C (1999) 3932) (1999/829/Euratom), published on 16 December 1999 in the Official Journal of the European Communities, No. L 324:

- Technologies for RAW treatment and conditioning at the Jaslovské Bohunice site;
- Integral RAW storage facility at Jaslovské Bohunice site;
- Decommissioning of nuclear power plant A1 (stage 1);
- Decommissioning of nuclear power plant A1 (stage 2);
- Decommissioning of nuclear power plant V1 (stage 1);

- Completion of the second double row and construction of the third double row of the National RAW Repository in Mochovce;
- Construction of a Repository for very low-activity RAW at the National Repository in Mochovce;
- Decommissioning of nuclear power plant A1 (stage 3 and 4).

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