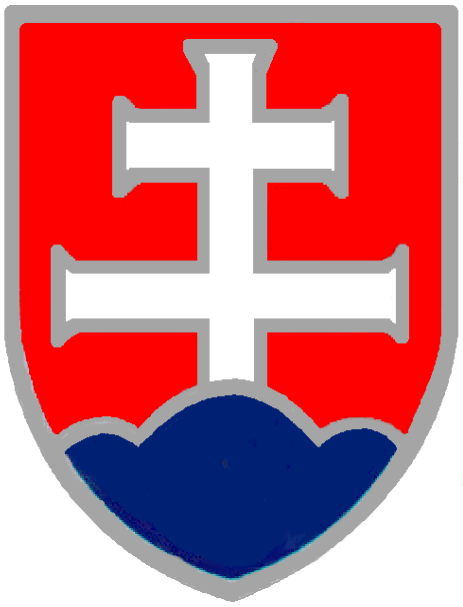
NATIONAL REPORT

OF THE SLOVAK REPUBLIC



COMPILED IN TERMS OF THE CONVENTION ON NUCLEAR SAFETY

MAY 2016

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Abbreviations

ALARA	As low as reasonable achievable
AKE	Automatic neutron flux measurement calibration system
Bq	Bequerel (unit)
BSC	Bohunice Treatment Centre
BNS	Safety guidelines
CCHV	Circulation cooling water
CDF	Core damage frequency
CMRS	*Central monitoring and control centre of the crisis management section of MoI SR*
ČSKAE	Czechoslovak Commission for Atomic Energy
DG	Diesel generator
ERC	Emergency Response Centre
ESFAS	Engineering Safety Features Actuation System
EOP	Emergency Operating Centre
MCP	Main circulation pump
HK	Main condenser
HP	High pressure
HRS	Emergency Control Centre
HVB	Main rector building
INES	International Nuclear Event Scale
INSAG	International Nuclear Safety Advisory Group
IMS	Integrated Management System
IPSART	International Probabilistic Safety Assessment Review Team
ISFS	Interim Spent Fuel Storage
JAVYS, a. s.	Joint-stock company JAVYS (Nuclear and Decommissioning Company)
KRAO	Liquid radioactive waste
LERF	Large Early Release Frequency
LP	Low pressure
IAEA	International Atomic Energy Agency
MDVRR SR	Ministry of Transport, Construction and Regional Development of the Slovak Republic
MO SR	Ministry of Defence of the Slovak Republic – Armed Forces of SR
MOD	Modernization and improvement of NPP V2
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MV SR	Ministry of Interior of the Slovak Republic
MZ SR	Ministry of Health of the Slovak Republic
MŽP SR	Ministry of Environment of the Slovak Republic

NI	Nuclear installation
NIP	National Labour Inspectorate
NOS	Nuclear oversight
NPP	Nuclear power plant
NPP A1	Nuclear power plant Bohunice A1
NPP V1	Nuclear power plants Bohunice V1 (Units 1&2)
NPP V2	Nuclear power plant Bohunice V2 (Units 3&4)
OECD / NEA	OECD / Nuclear Energy Agency
OHO	Emergency Response Organization
OSART	Operational Safety Review Team
OS SR	Armed Forces of SR
PS	Operational set
PSA	Probabilistic Safety Assessment
PSK	Steam dump to condenser
PSR	Periodic Safety Review
SG	Steam generator
QA	Quality Assurance
RAW	Radioactive waste
RČA	Quick action valve
RÚ RAO	National Repository of RAW
SAMG	Severe Accident Management Guidelines
SE, a. s.	Joint-stock company Slovenské elektrárne
SHMU	Slovak Hyrometeorology Institute
SIRM	Safety Improvement of Mochovce NPP Project Review Mission – conclusions of IAEA mission performed at Mochovce in June 1994
SPP	Separator preheater
SR	Slovak Republic
STN	Slovak technical standard
ÚVZ SR	Public Health Autority of the Slovak Republic
TG	Turbo-generator
TSÚ RAO	Technology for treatment and conditioning of radioactive waste
ÚJD SR	Nuclear Regulatory Authority of the Slovak Republic / Úrad jadrového dozoru Slovenskej republiky
CCS	Central Crisis Staff
US NRC	United States Nuclear Regulatory Commission
VUJE, a. s.	Nuclear Power Plant Research Institute
WANO	World Association of Nuclear Operators

WENRA	Western European Nuclear Regulators
ZHRS	Reserve emergency Centre
ZSB	Conventional island protection system
ZSTG	Turbine protection system

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1. Preface

1.1 Purpose of the report

The Slovak Republic ratified the Convention on Nuclear Safety (hereafter referred to as the "Convention") on February 23rd 1995 as the first state with Nuclear Installation in terms of the Convention. By this step the Slovak Republic declared the good will and preparedness to participate in fulfilment of provisions of the Convention. The presented National Report was compiled in terms of Article No. 5 of the Convention and its structure complies with the recommendations of the Guidelines regarding the National Reports. The present *seventh* National Report reports on fulfilment of provisions of the Convention for the period from *July 1st 2013 to December 31st 2015* and at the same time it contains basic information from the previous National Reports. ***Changes in comparison with the previous National Report are written in "Italics".*** These documents together with questions and answers have to be viewed as an integral one. The National Reports of the 1998, 2001, 2004, *2007, 2010, 2013 and 2016* are available on the website of the Nuclear Regulatory Authority of the Slovak Republic - www.ujd.gov.sk.

The List of Nuclear Installations in terms of the Article No. 2 of the Convention is listed in Annex 6.1.

1.2 Concept of Utilization of Nuclear Sources in the Slovak Republic

By Government Resolution No. 732 of 15 October 2008*, the Slovak Government approved the* ***Strategy for Energy Security of SR until 2030****, which aims to achieve competitive energy sector, providing secure, reliable and effective supplies of all forms of energy at affordable prices, with a view to protecting customer, environmental protection, sustainable development, security of supplies and technical security.*

By Resolution No. 548 of 5 November 2014, *the Government approved the* ***Energy Policy of SR.***

The Energy Policy of the Slovak Republic is a strategic document defining main goals and the priorities of the energy sector by 2035 with a forecast to 2050.

EP SR is part of the national economic strategy of Slovakia, since ensuring sustainable economic growth is conditional on reliable supplies of affordable energy.

The ratio of annual electricity generation and consumption is shown on Fig.1.2a).

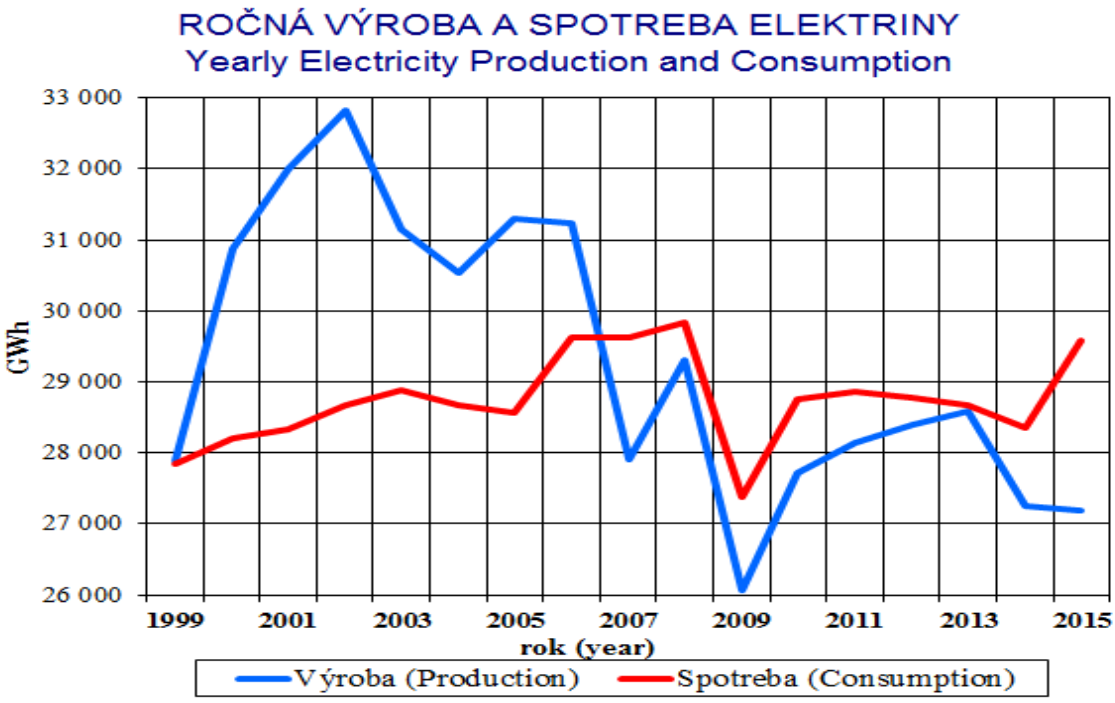


Fig.1.2a)

Share of different sources on covering annual electricity consumption in 2014 and 2015 is shown on Fig.1.2b).

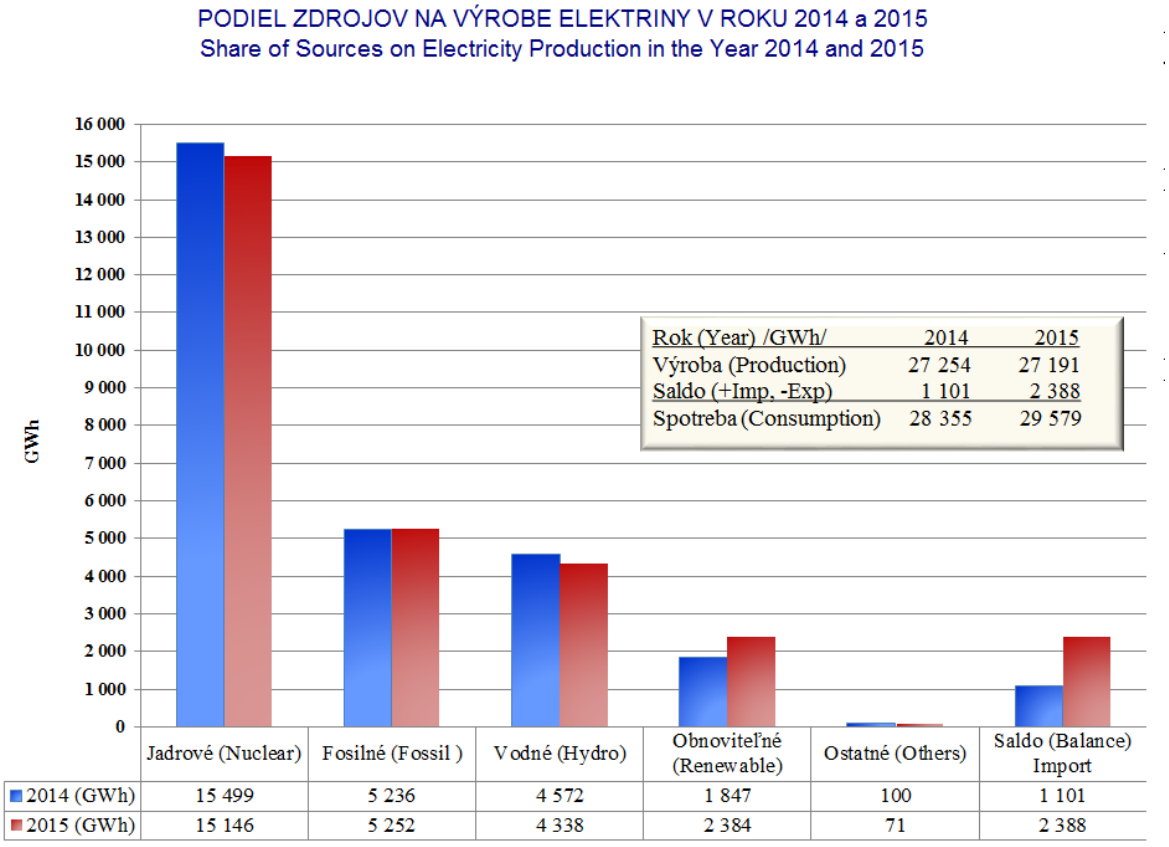


Fig.1.2b)

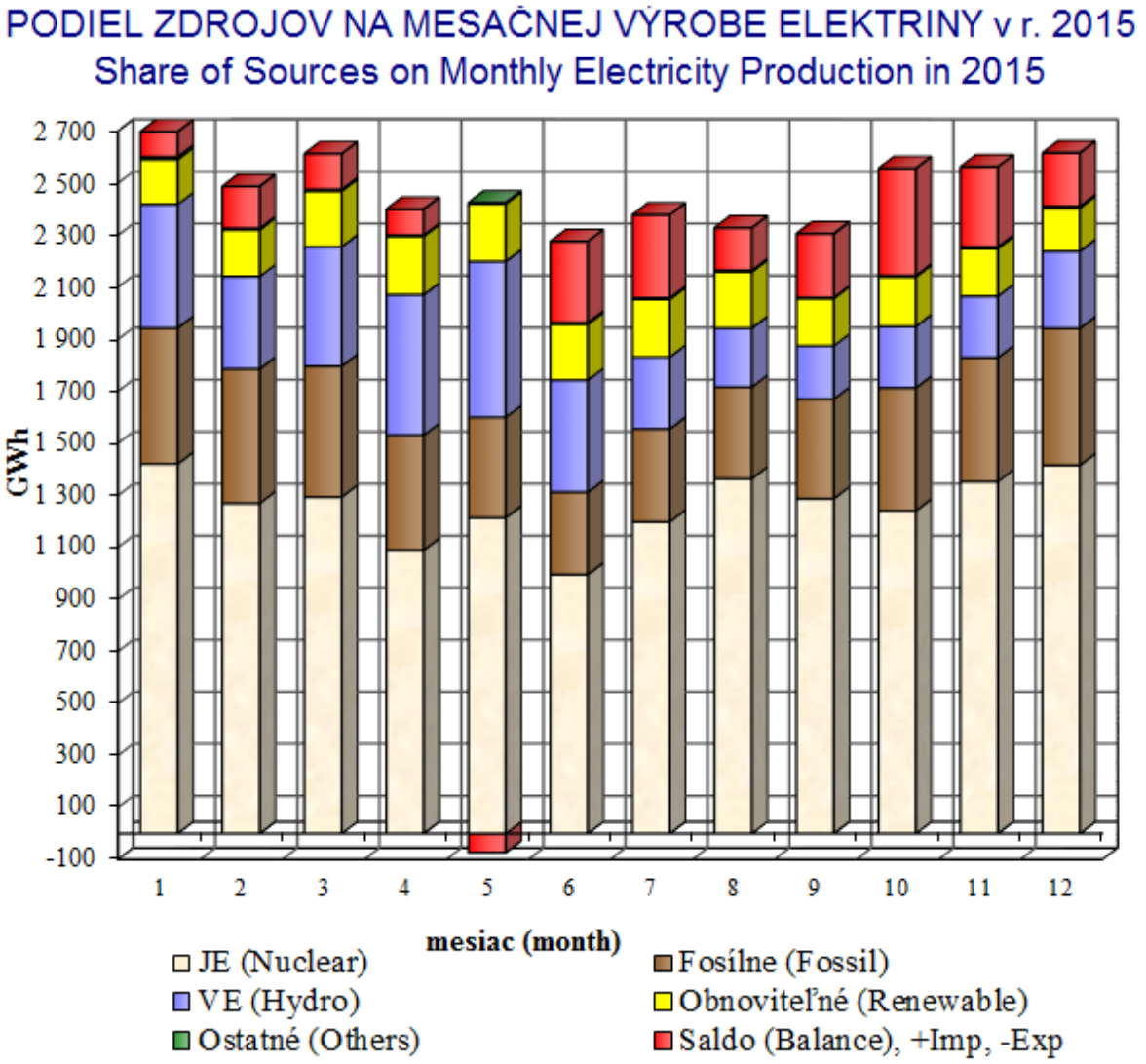

PODIEL ZDROJOV NA MESAČNEJ VÝROBE ELEKTRINY v r. 2015
Share of Sources on Monthly Electricity Production in 2015
GWh
2 700
2 500
2 300
2 100
1 900
1 700
1 500
1 300
1 100
900
700
500
300
100
-100
1
2
3
4
5
6
7
8
9
10
11
12
mesiac (month)
JE (Nuclear)
Fosílne (Fossil)
VE (Hydro)
Obnoviteľné (Renewable)
Ostatné (Others)
Saldo (Balance), +Imp, -Exp

Fig.1.2c)

INŠTALOVANÝ VÝKON ELEKTRÁRNÍ ES SR v r. 2015
Installed Capacity of Power plants in Slovakia for 2015

Rozdelenie podľa Palív Shared by Fuels		Výkon (MW) Power (MW)	Podiel (%) Share (%)	
Jadrové	Nuclear	1 940	24,0	
Vodné	Hydro	2 533	31,3	
Hnedé uhlie	Lignite	568	7,0	Fosilné palivá Fossil fuels
Čierne uhlie	Hard coal	440	5,4	
Zemný plyn	Natural gas	1 093	13,5	
Ropa	Oil	195	2,4	
Mix palív	Mixed fuels	422	5,2	
Fotovoltické	Photovoltaic	532	6,6	Obnoviteľné zdroje Renewable sources
Biomasa	Biomass	259	3,2	
Bioplyn	Biofuel	104	1,3	
Veterné	Wind	3	0,0	
Ostatné	Other	6	0,1	
Spolu	Total	8 095	100,0	

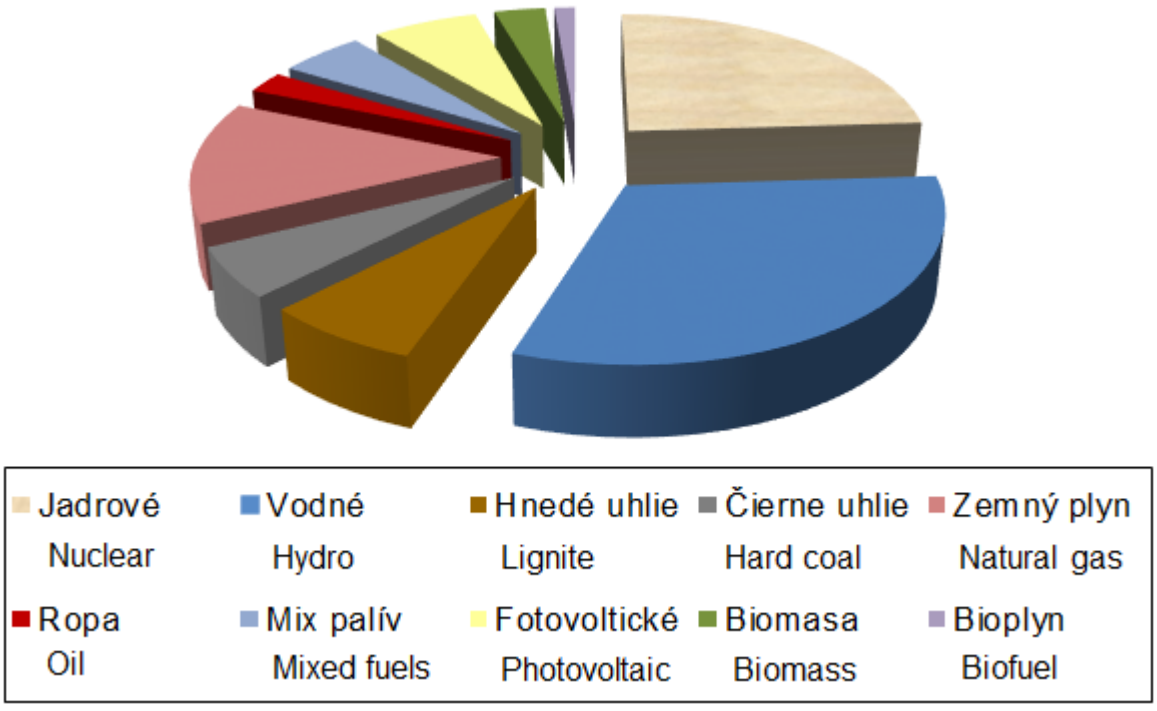


Fig.1.2d)

***Slovakia uses and plans to use nuclear energy in its energy mix**, while nuclear safety is an absolute priority. Safety of nuclear installations, in terms of external factors, seismic resistance, as well as in terms of other aspects of safety, is at a required level and permanently monitored. Level of nuclear safety is regularly, comprehensively and systematically evaluated in the context of operational*

experience and the latest knowledge of science and research, and measures are being adopted continuously to increase safety.

Prognosis of development of electricity generation by 2035

Crucial expected growth in power generation by 2020 is covered by Units 3&4 of NPP Mochovce under construction with an installed capacity of 2 x 471 MW. After commissioning of this source the power system will have surplus or pro-export balance of power after a long period of electricity imports.

Construction of a new nuclear source is also under consideration in Jaslovské Bohunice site with an expected installed capacity of 1,200 MW (or up to 1,700 MW,) with a time horizon for commissioning after 2025. Preparation and implementation of construction of a new nuclear source is time-wise, financially and in terms of approval process very demanding, and therefore a decision to implement such project should be made in good time.

Slovenské elektrárne, a. s., works on a long-term operation of NPP V2 of 60 years, i.e. until 2045, therefore the company implements a comprehensive investment program with application of the latest technology (see chap. 4.5.7, 5.3.3.4).

For long-term operation of NPP V2 it is necessary to consider also the parallel operation of both nuclear sources (NPP V2 and the new nuclear source), and to analyze and create conditions in the power system for the transmission of increased capacity for the period of parallel operation (extension of both internal transmission system of SR, as well as the cross-border tie-lines).

The balance shown in the following table gives an overview on the expected development of available power generation in case of parallel operation of NPP V2, NPP Mochovce 1- 4 and a new nuclear source (1,200 MW), as well as for the case of not extending operation of NPP V2 after 2028.

(1) Generation of NPP V2+NPP EMO 1&2 or generation only by NPP EMO 1&2 after shutdown of NPP V2.

Generation in TWh	***2012***	***2015***	***2020***	***2025***	***2030(1)***		***2035(1)***	
Current NPPs: NPP V2+EMO1&2 (1940 MW)	*15,5*	*15,5*	*15,8*	*15,8*	*15,8*	*7,9*	*15,8*	*7,9*
NPP Mochovce 3&4 (942 MW)	*0*	*0*	*7,9*	*7,9*	*7,9*	*7,9*	*7,9*	*7,9*
New nuclear source 1x 1,200 MW	*0*	*0*	*0*	*0*	*9,1*	*9,1*	*9,1*	*9,1*
Nuclear power plants total	***15,5***	***15,5***	***23,7***	***23,7***	***32,8***	***24,9***	***32,8***	***24,9***
Renewable sources, incl. hydropower	*5,8*	*6,7*	*7,7*	*8,0*	*8,5*	*8,5*	*8,9*	*8,9*
Current fossile fuel plants	*7,1*	*6,3*	*6,3*	*6*	*5,7*	*5,7*	*5*	*5*
Expected fossile fuel plants	*0*	*0,3*	*0,7*	*1,0*	*1,3*	*1,3*	*1,7*	*1,7*
Generation with paralel operation of NPP V2 and a new nuclear source	***28,4***	***28,8***	***38,4***	***38,7***	***48,3***		***48,4***	
Generation in case of not extending operation of NPP V2						***39,2***		***40,5***

Tab. 1 Expected development of power generation by plant types (Source: SEPS, a.s., MoE SR)

Back-End of Nuclear Energy Sector

Nuclear energy is the main driving force for low-carbon growth in Slovakia. In addition to safe operation, another important factor in the use of nuclear energy is managing the back-end of nuclear energy sector. The Government by its Resolution No. 328 adopted in 2008 the Strategy for the Back-end of Nuclear Energy Sector. An update of this strategy (called „Strategy for the back-end of the peaceful uses of nuclear energy in the Slovak Republic") was adopted by the Government in 2014.
After the publication of the Council Directive 2011/70/Euratom establishing the Community framework for the responsible and safe management of spent fuel and radioactive waste and its transposition to the Act No. 143/2013 Coll., amending the Act No. 541/2004 Coll. on peaceful uses of nuclear energy (hereinafter only as the „Atomic Act") and on amendments to certain laws as amended, and which amends and complements Act No. 238/2006 Coll. on the Natonal Nuclear Fund for the decommissioning of nuclear installations and for the management of spent nuclear fuel and radioactive waste (hereinafter only as the „Act on Nuclear Fund") and on amendments to certain laws as amended, the ***National Policy and the National Program for spent fuel management and radioactive management in SR*** *have been elaborated.* ***Government Resolution No. 387 of 8 July 2015*** *approved the national policy and the program, replacing the previous Strategy for the back-end of peaceful uses of nuclear energy in the Slovak Republic.*
The National Policy is based on the principles provided by the Act No. 238/2006 Coll. on the National Nuclear Fund for the decommissioning of nuclear installations and for the management of spent fuel and radioactive waste (hereinafter only as the „Act on Nuclear Fund") and on amendmets to certain laws as amended. Application of these principles sets the overall objectives:

1. Safe and reliable decommissioning of NIs
2. Waste minimization
3. Selection a suitable fuel cycle
4. Safe storage
5. Management of radioactive waste
6. Nuclear safety
7. Application of graded approach
8. The principle of „polluter pays"
9. Objective decision-making process
10. Liability

1.3 Summary Information

1.3.1 Nuclear Facilities

Currently there are 4 WWER-440/V213 nuclear units in operation in Slovakia, 2 units in Jaslovské Bohunice and another 2 in Mochovce site. In Mochovce there are also two WWER- 440/V213 units with significantly upgraded design under construction. The owner and operator (the holder of the operating license) of all operating and constructed nuclear units in Slovakia is the stock company Slovenské elektrárne, a. s. (SE, a. s.).

Basic data about all units covered by this report are in the table:

Plant	NPP Bohunice V1	NPP Bohunice V2	NPP Mochovce 1,2	NPP Mochovce 3,4
Site	Bohunice	Bohunice	Mochovce	Mochovce
Reactor type	VVER-440/230	VVER 440/V213	VVER 440/V213	VVER 440/V213
Reactor thermal power, MWt	1375	1471	1471	1375
Gross electric power, MWe	440	505	470	*440*
Plant status	In decommissioning	In operation	In operation	Under construction
Date of first criticality	1978-80	1984 - 85	1998 - 99	Under construction
Latest update of Safety Analysis Report	-	2009	2010	2008
Latest update of PSA Level 1/Level 2	-	2014	2010 - 2011	2008, update in progress
Last Periodic Safety Review	-	2008	2009	-

Upgrading of the plants since the original design

The NPPs have been significantly upgraded throughout their operational lifetime. In spite of the robustness of the original design, several modifications initiated by operational experience and by international and domestic safety assessments, have already been implemented (see Part II). Improvement of the containment tightness / integrity of existing plants is one of the major achievements.

In accordance with the legal requirements all plants are subject to Periodic Safety Reviews with 10 years periodicity. The latest periodic review in NPP Bohunice V-2 was completed in 2008, in NPP Mochovce 1&2 in 2011. Based on the results of the review ÚJD SR issued operational license for subsequent 10 years of operation. The licenses are associated with approval of safety upgrading programme of the plants aimed at to comply with the current safety standards. The programmes include also implementation of comprehensive severe accident mitigation measures.

All operating units have been subject of a number of international missions performing independent reviews of their safety level. Since 1991 there were in total about 20 IAEA missions (site review, design review, OSART, IPSART missions), 6 WANO missions, 2 RISKAUDIT missions and 1 WENRA mission.

1. Legislative and Regulatory Framework

Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR) has finalized the amendment of the Atomic Act by transposing Councíl Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste. The amendment also contains some new provisions on an increased financing of ÚJD SR. Draft amendment to the Atomic Act was adopted by NC SR on 21 May 2013 as the Act No. 143/2013 Coll., *amending the Act No. 541/2004 Coll. on peaceful uses of nuclear energy (Atomic Act) and amending and complementing Act No. 238/2006 Coll. on the National Nuclear Fund for the*

decommissioning of nuclear installations and for the management of spent fuel and radioactive waste (Act on Nuclear Fund).

International Regulatory Review Service (IRRS) mission concluded its work in June 2012. The Final Report contains 8 Good practices, 20 Suggestions and 11 Recommendations. The Report is available on the ÚJD´s web site. As a follow up, ÚJD developed an Action Plan to implement the findings. In November 2012 the government approved this Action Plan.

The Follow-up mission was held from 24 February until 2 March 2015. The purpose of the IRRS Follow-up mission was to verify implementation of recommendations and proposals for improvements, which were suggested by the IRRS mission from 2012.

The mission concluded that the Slovak Republic is fully engaged in harmonization of its regulatory framework with the safety standards of the International Atomic Energy Agency.

2. NPP Bohunice V1 (Units 1 & 2)

ÚJD SR issued Decision No. 400/2011 for the first decommissioning stage of the NPP Bohunice, V1 (Units 1&2) in July 2011. All spent fuel has been removed from the NPP. According to Article 2 of the CNS this NPP *ceases* to be a nuclear installation. More information on these units could be found in the National Report prepared under the Joint Convention.

3. NPP Bohunice V2 (Units 3&4)

The NPP Bohunice V-2 has continued to implement hardware modifications aimed at mitigating severe accidents based on the Periodic Safety Review and legal requirements (more details can be found in chap. 2.2). By the decision of ÚJD SR No.: 275/2008 the operating license was extended for the next 10 (ten) years.

4. NPP Mochovce (Units 1&2)

Realization of program for implementation of hardware modifications aimed at to mitigate severe accidents is one of the binding conditions of the new operational license based on the Periodic Safety Review after 10 years of operation. By the decision of ÚJD SR No.: 100/2011 the operating license was extended for the next 10 (ten) years. (details can be found in chap. 2.3).

5. NPP Mochovce (Units 3&4)

The European Commission issued its opinion according to Article 37 of the Euratom Treaty in June 2012, which was published in the Official Journal of the Community.

Construcion of the Units continues, however there is *significant* time delay compared to the original *assumptions* (*details see chapter 2.3.2*).

1.3.2 Actions adopted in the light of Fukushima Daichi accident

After completing the Stress Tests the Nuclear Regulatory Authority and Slovenské elektrárne, a. s. (the utility) has developed an Action Plan implementing the recommendations and findings. The vast majority of these actions are already implemented or are in the process to be implemented as a result

of previous safety improvement programs or resulted from the periodic safety reviews conducted in 2008 and 2011, that means before Fukushima. Details can be found in chapter 4.5.3.

1.3.3 Transparency

All Decisions of ÚJD SR are available on the following website: www.ujd.gov.sk. For more details on transparency and communication with the public see chapter 4.8.

1.3.4 Implementation of Recommendations from the previous Review Meeting (2014)

The Sixth Review Meeting of the Convention on Nuclear Safety in relation to SR identified the following challenges in the Report of the rapporteur:

- *Extended completion of construction of NPP Mochovce (Units 3&4) in connection with measures to increase safety post Fukushima.*

  Fulfillment: the details can be found in chapters 2.3.2 and 4.5.3.

- *Preparations for the new source at Jaslovské Bohunice site.*

  Fulfillment: Construction of a new nuclear source is under consideration at Jaslovské Bohunice site with the time horizon for commissioning after 2025 – the details can be found in chapter 1.2.

- *Ensuring regulatory activities (ÚJD SR) during implementation of the extended program of safety culture at the operators of nuclear installations.*

  Fulfillment: During 2013 and 2014 the regulator performed inspections at NPP Bohunice V2, NPP Mochovce 1&2 and at the SE, a.s. HQ, which focused on reviewing safety culture. Inspections were carried out within the so called Komfort system, which assesses 8 characteristics of safety culture (Quality of written documents, Compliance with binding regulations, Qualification and expertise, Trainings, Workload, Coping with the function of management, Cleanliness and order in the workplace – maintenance of buildings, Consultation and cooperation with the inspection body).

  The reviews focused on the following areas: safety culture system, method of evaluation and monitoring safety culture, tools for safety culture improvements, digitization of operational documentation. Results of inspections showed that the actions of managers and employees dealing with issues of maintaining and imrpoving safety culture is satisfactory. However, the reviews also showed that the managers should raise awareness and support for employees in safety culture. Regulatory activities in the field of safety culture will be monitored in 3 – 4 year cycles.

- *Coordination (national) concerning implementation of conclusions of the IRRS (Integrated Regulatory Review Service) mission findings – the details are given in chapter 3.1.3.4.*

1.4 Vienna Declaration on Nuclear Safety

At the Sixth Review Meeting of the Parties of the CNS, which was held from 24 March to 4 April 2014, the Parties decided to convene a Diplomatic Conference to consider an amendment to Article 18 of the Convention.

Parties have come to a conclusion that it would be impossible to reach a consensus on the proposed amendment. Instead, to achieve the same objective as the proposed amendment, the Parties unanimously recommended the adoption of the „Vienna Declaration on Nuclear Safety", including principles for the implementation of the Convention on the prevention of accidents and mitigation of radiological consequences.

Parties at the Diplomatic Conference adopted the Vienna Declaration by consensus (chapter 6.6).

Implementation of the Vienna Declaration

1. *The new nuclear power plants should be designed, sited and constructed so as to be consistent in order to prevent accidents during commissioning and during operation, and if there is an accident, to mitigate potential releases of radionuclides causing long-term off-site contamination and to prevent early releases of radioactive substances or releases of radioactive substances, which are large enough to require long-term protective measures and actions.*

At present a project to build a new nuclear source in Jaslovské Bohunice site (NJZ Project) is under preparation by the Nuclear Energy Company of Slovakia, a.s. (hereinafter JESS). Feasibility study was completed. Currently the last stage of the EIA process is under way.

Report on the impact assessment of proposed activity on the environment notes that: „The project will be developed in a way that ensures compliance with all relevant legislative regulations and safety standards in accordance with the regulations and requirements as set out by the Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR), IAEA and WENRA".

The following basic safety targets are as follows:

- *to prevent the uncontrolled exposure of public and release of radioactive substances to the environment during all operational states,*
- *to minimise the probability of occurrence of events, which might lead to the loss of control over the reactor core, over the fission chain reaction, radioactive source or over any other source of radiation,*
- *in case of such events, to mitigate their consequences,*
- *to ensure strict technical and administrative control of all radioactive sources.*

The first para of the Vienna Declaration will be incorporated into the national legal framework during the transposition of the Council Directive 2014/87/Euratom (see chapter 3.1.2.3). This directive article 8a contains provisions with the same safety objective.

2. *Comprehensive and systemic safety reviews are to be carried out periodically for the existing installations throughout their life cycle to determine safety improvements that are oriented to meet*

the above objective. Reasonably practicable or achievable safety improvements to be made on time.

In accordance with the Act No. 541/2004 Coll.l. (Atomic Act) and ÚJD SR Decree No. 33/2012 Coll.l. the licensee is required during operation and during decommissioning to conduct regular, comprehensive and systemic assessments of nuclear safety, taking into account the current state of knowledge in the area of nuclear safety assessment and take action to remedy the weaknesses identified, and to eliminate their occurrence in the future. Details of the practical application of this provision at existing NPPs are in chapters 2.2.1, 2.3.1, 2.3.2, 4.5.3.

3. *The national requiements and regulations for dealing with this target throughout the life of nuclear power plants must take into account relevant IAEA Satety standards and possibly other best practices, as identified, inter alia, at the Review Meetings of CNS.*

   In development of national legislation the EU legislation is transposed taking into account the IAEA standards (see chapter 6.3), resp. WENRA Reference Levels, as well as the experiences from regulatory practice, the outcomes of inspections, the results of science and research and international cooperation.

1.4.1 Implementation of the IAEA Safety Standards

In 2015, assessment of implementation of the IAEA standards (requirements) in the legislative documents was undertaken. The following IAEA documents were subject to review:

- *IAEA SSR-2/1 - Safety of Nuclear Power Plants: Design Specific Safety Requirements,*
- *IAEA SSR-2/2 - Safety of Nuclear Power Plants: Commissioning and Operation Specific Safety Requirements,*
- *IAEA SSG-25- Periodic Safety Review for Nuclear Power Plants,*
- *IAEA SSR-5 - Disposal of Radioactive Waste,*
- *NG-T-6.4 Nuclear Engineering Education: A Competence Based Approach to Curricula Development).*

The results of this assessment are used in the process of revising the Atomic Act (chapter 3.1.2.3).

Practical Application of IAEA Safety Standards are in the chapters e. g. 4.4.1, 4.4.3, 4.5.2, 4.5.6, 5.1.1.

WENRA Reference Levels (*Western European Nuclear Regulators Association)*

One of the objectives of WENRA Group, as stated in its Statute, is to create harmonized approach to issues of nuclear safety and radiation protection and their regulation in Europe. WENRA operates in three working groups:

a) Reactor Harmonisation Working Group (RHWG);
b) Working Group on Waste and Decommissioning (WGWD);
c) Inspection Working Group (WIG).

Significant contribution to achieving the objective was the publication of the report in 2006 on harmonization of reactor safety in the WENRA countries. This report dealt with nuclear power plants in

operation and established „Safety Reference Levels" (SRL). SRLs were updated twice, in 2007 and in 2008.

These SRLs were set for a greater harmonization within WENRA countries to increase the level of nuclear safety in Europe, by their implementation in the national regulatory framework. The emphasis of SRL is placed on nuclear safety (safety policy, organization of operation, management system, training a verification of professional competence, design of existing reactors and conditions of extended design of existing reactors, limits and conditions for safe operation, aging management, maintenance, inspection and testing, EOPs and SAMG, content and update of the safety report, PSA, periodic safety review, modifications on equipment, emergency preparedness, protection against internal fires and from 2014 separately natural hazards).

RHWG set the rules for quantitative assessment of fulfillment of SRL:

1. *It is reserved for regulatory part.*
2. *Status at the end of each year.*
3. *Only reference levels (SRL) transposed into published national requirement (as defined by WENRA, i.e. national legislation or publicly issued recommendation) are counted as „harmonized".*

Based on this assessment Slovakia achieved full harmonization of its national legislation with the WENRA 2008 reference levels.

Members of WENRA committed themselves to a continuous improvement of nuclear safety. In this spirit, WENRA reiterated identification of lessons learned from the Fukushima Daichi accident and safety improvement of NIs. For this purpose WENRA (Reactor Harmonization Working Group - RHWG) examined and revised SRLs for the existing reactors with the aim to integrate lessons learned from the Fukushima Daichi accident in 2011 (WENRA Reference Levels for Existing Reactors – 2014). As part of the revised reference levels of 2014, the RHWG group modified / added new, in total 101 reference levels. Altogether the revised WENRA 2014 SRL contains 342 reference levels.

During 2015 and 2016, ÚJD SR performed a self-assessment on fulfilment of WENRA 2014 SRLs. The self-assessment shows that almost 60 % of SRLs, which take into account lessons learned from the Fukushima accident, are fully implemented into the national legislation. The remaining 40.6 % will be taken into account during the next revision of the Atomic Act (chapter 3.1.2.3).

2. Nuclear installations in terms of the Convention

Article 6

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives, as well as the social, environmental and economic impact.

2.1 Nuclear power plant – units V1

2.1.1 Description of the NPP V1 units

The NPP V-1 is located in the Western Slovakia in the region of Trnava, about 3 km from the municipality of Jaslovské Bohunice.

After transfering the spent nuclear fuel from NPP V1 to ISSF, *the European Commission issued in 2011, in accordance with Article 37 of the Euratom Treaty an opinion for the decommissioning of NPP V1. Based on that opinion the Nuclear Regulatory Authority SR issued in 2011 Decision No. 400/2011, authorizing the decommissioning of NPP V1 (phase 1).* ÚJD SR conditioned the license with conditions in the field of radioactive waste treatment, modifications in the operating regulations, etc. Based on the above stated facts and in terms of the definition of a nuclear installation, NPP V1 is no longer subject to Convention on Nuclear Safety. The details about this NPP are given in the National Report of the SR compiled under the Joint Convention *(http://www.ujd.gov.sk/ujd/WebStore.nsf/viewKey/August%202014/$FILE/August%202014.pdf).*

2.2 Nuclear Power Plant Bohunice - units V2

2.2.1 Programmes of NPP Bohunice V-2 Safety Improvement – historical overview

The Programme on Modernization and Improvement of NPP Bohunice V-2 (MOD V-2) safety which started in 1994 was not focused only on solving safety issues, but includes also the decision of operational issues connected with 15-years operation of NPP Bohunice V-2 – physical wearing and moral obsolescence of devices, causing mainly at control systems and electric system problems concerning the operational reliability of devices, spare parts and service. The modernization programme included also measures focused on improvement of technical-economic parameters of NPP Bohunice V-2 units, first of all the primary and secondary unit output regulation, improvement of efficiency and nominal unit output and improvement of their life of service.

Safety concept

MOD V-2 was based on measures concerning elimination of deficiencies of WWER reactors mentioned in the IAEA report: IAEA EBP-WWER-03 and required by decision No. 4/96 of ÚJD SR. The design change has been prepared since 1998 through elaboration of the Safety concept part 1. (1998 – 2000) and the Safety concept part 2. (2000 – 2001).

For each task of modernization of NPP Bohunice V-2, design documentation in compliance with legally binding provisions and standards was made. All tasks performed within modernization were grouped according to their relevance to the problematic and their relation to various technological devices in order to rank them to several operational sets. Measures for elimination of safety problems, for innovation of equipments and for improvement of technical and economical parameters of units are implemented in these tasks.

The program of modernization of NPP Bohunice V-2 included above 50 main tasks, from which the most important were:

Following table provides a brief description and examples of some areas of the safety measures	
Issue area	**Brief description (example)**
Raising of seismic resistance of buildings, constructions and equipments with the aim:	- to secure necessary resistance, stability, integrity and functionality of buildings, constructions and equipments of seismic class 1 during seismic event on the level of maximal calculated earthquake, - to eliminate possible interactions of buildings, constructions and equipments of seismic class 2 with buildings, constructions and equipments of seismic class 1.
Fire protection – measures are aimed at:	- improvement of fire prevention – realization of fire-resistant coating of cables, - improvement of identification and fire extinguishment, - improvement of fire localization and prevention from its spread – replacement of fire-resistant flap valves and fire doors, spray fire-proofing of steel constructions.
Modification of technological systems for improvement of emergency situation course and cooling of reactor unit (i. e.):	- modification of injection into PRZ, relief valve and safety valves of PRZ, - improvement of cooling of MCP seals, - feedwater piping penetrations from MCP deck to SG box, - emergency degasing of PC, - adjustment of sealing assembly of primary SG collectors, - adjustment of emergency feeding of PC and supplement of PC equipments to secure residual heat removal,

	- transfer of feeding head pieces of SEFWS system from the floor +14,7 m, securing necessary water supply and completion of the 3rd redundancy system, - modification of ESWS system to manage cooling of NPP after seismic event and to improve the system operation.
Replacement and modification of I&C systems to improve the unit management in normal operation, transient and emergency conditions (i. e.):	- modification of functions – algorithms of automatic reactor trip system (RTS), safety system (ESFAS), technological SG protections (RLS), automatics of sequential start-up of drives, automatics of section switches, PVII (APS-ESFAS) and their integration into the system of reactor protection system (RPS), - modification of functions – algorithms of automatic power decrease, prohibition of power increase, limitations of reactor power and completion of function of RPV protection against cold pressurizing and their integration into the reactor limitation system (RLS), - replacement of the automatic reactor shutdown systems, the safety system, the technological SG protections, the automatics of sequential start-up of drives, the automatics of section switches, PVII for system RPS, and others.
Replacement and modification of electric systems to improve the power output and feeding of the unit's on-site consumption in normal operation, transient and emergency conditions (i. e.):	- replacement of sectional and subsidiary distributors 0,4 kV of I. and II. category and related cabling, respecting the requirements for separation of safety and operational functions, the requirements for nuclear safety, fire protection and electric safeguarding and selectivity, - replacement of 6 kV switches and adjustment of 6 kV distributors, - replacement and modification of PC and SO automatics panels, - replacement of cable hermetic penetrations and replacement of unsatisfactory cables, - replacement of accumulator batteries and completion of battery state monitoring system, - replacement of systems of control, exciting and on-site consumption DG, - replacement of output 400 kV switches and HP compressors, - replacement of electric unit protections and replacement of insulated wires.

Implementation of measures for improvement of operational economics (i.e.):	- implementation of secondary regulation of unit power, - creating preconditions for increase of efficiency and unit's thermal output to 107 % Nnom.

All tasks of the modernization project were designed and implemented in order to operate at increased power and with extended operation life of NPP Bohunice V2 until 2046. Modifications of MOD V2 were implemented gradually since 2002 and their completion was in 2008.

Program of Units Power Uprate

The project of power uprate of Units of NPP V2 (ZVB) was implemented in the period 2008 to 2011. The aim of ZVB was to increase the electric output of the Unit by increasing the thermal reactor output by 7 %, from 1,375 MWt/1Unit to 1,471.25 MWt/1Unit and improving the efficiency of the thermal cycle. Compared to the original design (440 MWe/1Unit) the target state was achieved (506 MWe/1Unit).

The following table briefly describes and shows examples of some areas of ZVB	
Area	**Brief desciption (example)**
Improving efficiency of thermal cycle:	- Installation of new measuring nozzles for steam flow at the steam lines from SG and to TG and condensate and replacement of moisture separators before the steam enters the TG - HK TG modification - modification of HP and LP parts of TG and change of hydraulic control of TG for electronic-hydraulic - reconstruction of SPP on TG - modification of PSK TG to absorption capacity corresponding to new power output - modification of CCHV towers.
Increasing thermal reactor power:	- Replacement of MCP impellers - installation of a new system of automatic calibration of AKE neutron flux
Feeding the output and control and management of Units:	- modification of generators - modification of feeding output from generators, including encapsulated conductors - modification of Unit transformers - ZSB exchange for ZSTG

Periodic Safety Review Bohunice NPP V2 (PSR – 2008)

Preparations for the PSR of NPP Bohunice V2 started in May 2004. The significant factor affecting the approach to the method of realization of V-2 PSR project was the fact that the PSR run at the time when the power plant was in transition (project on Modernization and improvement of NPP Bohunice V2 (MOD V2), at different levels of finishing of individual modifications).

The evaluation resulted in findings. The operator proposed corrective actions on the identified findings, based on which an integrated plan for implementation of corrective actions was compiled. Such integrated plan of corrective actions was part of the license No. 275/2008 permitting the operation of NPP Bohunice V2 for a period of the following ten (10) years.

In compliance with this decision the operator was obliged to implement corrective actions identified during the comprehensive periodic safety review in a manner, within the scope and the deadlines as follows:

a) Sixteen integrated corrective actions under the group of accidents up to "Accident management up to the level of severe accidents, emergency planning, emergency control centre".
Deadline*: 31 December 2013*

b) Five integrated corrective actions in the group "Design justification, methodology of defence-in-depth application". Deadline*: 31 December 2013*

c) Nine integrated corrective actions in the group "Physical condition of equipment and systems".
Deadline*: 31 December 2010*

d) Nineteen integrated corrective actions in the group "Demonstration and monitoring of nuclear safety, feedback from failures". Deadline*: 31 December 2010*

e) Twenty integrated corrective actions in the group "Quality, management documentation, administration and organization". Deadline*: 31 December 2010*

f) Eighteen integrated corrective actions in the group "HR management and training".
Deadline*: 31 December 2010*

g) Nine integrated corrective actions in the group "Control of modifications, documentation and change evaluation". Deadline*: 31 December 2010*

h) Five integrated corrective actions in the group "Operating procedures, documentation control".
Deadline*: 31 December 2010*

i) Three integrated corrective actions in the group "Evaluation of fire resistance and fire risk".
Deadline*: 31 December 2010*

The license holder on an annual basis *informed* ÚJD SR in writing about the course of implementation of corrective actions. *Implementation of an integrated plan for the implementation of corrective actions that were part of the license No. 275/2008, has been completed within the deadlines (end of 2013).*

Based on the 2013 revision of the Atomic Act the operating license is not limited in time, but the license holder must based on the provisions of law, every ten years demonstrate by a periodic safety review the readiness of the facility for further operation. ÚJD SR can complement the operating license with conditions. In 2016 preparations began for the second PSR – 2018.

Severe Accident Management Program

One of the tasks arising from PSR was to cope with the severe accidents including extensive damage to the reactor core. ÚJD SR with its Decision No. 86/2010 approved the submitted safety concept „Severe accident management for EBO and EMO". Based on the concept, design modifications were proposed and implemented so that the capabilities of the NPPs are enhanced to mitigate the consequences of severe accidents.

Program of implementation of severe accident management includes measures in the following areas:

Area	**Brief description (example)**
Depressurization of the primary circuit	- The system is designed to mitigate the consequences of severeaccidents, by preventing outburst of core melt under high pressure.
Hydrogen Management in HZ	- In terms of source term limits of flammable gases, hydrogen management system in HZ for EBO V2 Units was designed by means of large capacity H2 recombiners.
Vacuum breaker in HZ.	- System is to prevent creating deep vacuum in the HZ with possible damage to the lining and loss of tightness of HZ during Unit emergency conditions. System connects gas tanks of the vacuum bubbler system with the hermetic zone.
Emergency source of coolant	- Serves to minimize consequences of severe accidents due to loss of active emergency systems. It provides a source of coolant for core cooling, spraying the HZ, water supply to open reactor and supply of water into the spent fuel storage pool on the Unit affected by severe accident.
Emergency power source	- In case of severe accident, when one of the initiating events is defined also as long-term loss of internal and external sources of power, it was necessary to buid a new source of power supply for power equipment and I&C.
SAM I&C	- SAM I&C system for severe accident management at the Units of NPP EBO V2 with the aim to provide information about the conditions and functionality of different sub-systems of SAM, to provide information about monitoring Unit parameters so as to enable initiating a decision-making process when adopting strategies set by SAMG. The system provides for control of SAM when implementing SAMG strategies.
Long-term heat removal from the HZ	- The aim of the technical modifications is to allow manual operation of the sprinkler system in the late stage of severe accident management.
Siphon at the distribution of TL11 and flooding reactor cavity	- It is to ensure sufficient amount of coolant on the floor of SG boxes for the recirculation phase of design accidents with coolant leaks and locating and stabilizing the corium in the reactor pressure vessel during severe accidents with core melt.

Building new control centre for emergency response (CHO)	- Provides for creating an environment for the team managing the consequences of severe accidents.

Increasing resistance of nuclear Units of EBO V2 against extreme external events (see also chap. 4.5)

On the basis of updated new studies on meteorological conditions for the Jaslovské Bohunice site resistance of selected systems, structures and components (SSC) was assessed (floods caused by torrential rains, high and low ambient temperatures, direct wind and other relevant events for the given site), while considering events with intensity corresponding to a probability of 1 in 10,000 years or less. Based on the above assessment an Action Plan was developed to implement additional measures, which has been implemented since 2013.

List of implemented projects:

- *Increasing resistance of selected SCCs;*
- *Air conditiong for the switchgear rooms for DG QX;*
- *Protection of selected buildings against water penetration. Modification of doors to the rooms relevant for safety;*
- *Addition of water level signalling in selected rooms in the basement;*
- *Autonomous cooling for the existing DGs (independent of ESW);*
- *Refilling SFP from the storage tanks, power supply from mDG 0.4kV;*
- *Resistant shelters for mDG 0,4kV;*
- *Mobile rectifiers;*
- *Modification of existing facilities to enable connections to mDG 0.4kV;*
- *Modification of emergency lighting and connection to a new DC distributor - by systems;*
- *Building of PFB;*
- *Modifications on high pressure pumps for refill of boron;*
- *Compressor to ensure handling of RČA isolating valves on the pressure limit of the containment;*
- *Mobile measuring unit;*
- *Portable pumps, generators, breathing apparatus to cope with external events and make up of ESW;*
- *Seizmic requalification for temperature measurement and level measurement in the SFP;*
- *Increasing resistance of LRKO;*
- *Increasing reliability of ESW in case of loss of power supply and in case of extreme external events;*
- *Unification vector maps in the GISmon software;*
- *Increasing reliability of data transmission and communication needs during extreme external events;*
- *Water treatment plant of potable water for the storage tanks for potable water in the emergency control centre.*

2.3 Nuclear Power Plant Mochovce – Units 1&2

2.3.1 Programmes of NPP Mochovce 1&2 safety improvement – historical overview

The construction of the NPP Mochovce started in 1981. The political and economical changes resulted in the suspension of the construction in early 90´s. In 1996 a "Mochovce NPP Nuclear Safety Improvement Programme" was developed in the frame of unit 1 and 2 completion project.

The objective of improving safety through safety measures was to achieve safety standard according to IAEA – INSAG3.

The NPP Mochovce safety improvement program was based:

- on the document entitled "Safety Issues and their Ranking for NPP WWER-440/V213";
- outcomes of the safety review conducted by RISKAUDIT in 1994;
- conclusions at the IAEA Safety Improvement of Mochovce NPP Project Review Mission – SIRM taking place at Mochovce in June 1994.

The operator of the plant in cooperation with VUJE, a. s. developed a set of technical specifications for 87 safety measures (TSSM) to be implemented under the "NPP Mochovce Nuclear Safety Improvement Program", with taking into account specific measures as identified by the RISKAUDIT and SIRM Reports and experience with NPP Bohunice V-2 and NPP Dukovany units. This has introduced certain differences between the "NPP Mochovce Safety Improvement Program" and the IAEA document "Safety Issues and their Ranking for NPP WWER-440/V213" (certain measures have been added characterized as no-category measures).

Following table provides a brief description and examples of some areas of the safety measures	
Issue area	**Brief description (example)**
General	- question of classification and qualification of components.
Reactor core	- risk of undesirable positive reactivity as a consequence of an uncontrolled drop of boric acid concentration in the nuclear steam supply system (NSSS).
Component integrity	- tightness of NSSS components in all operating modes, including emergency modes.
Technological systems	- modification of technological systems in order to improve performance of safety functions (piping re-routing, addition of valves at piping lines, etc.).
Instrumentation & Control	- modification of instrumentation and control systems in order to improve performance of safety functions (modifications to emergency protection systems, addition of diagnostic systems, etc.).
Electrical systems	- modification of electrical systems in order to improve performance of safety functions (improvement in reliability of emergency power supply systems – diesel generators, batteries, etc.).

Containment	- comprehensive assessment of the radioactive material confining barrier in case of emergency (thermal-hydraulic calculations of containment conditions in case of accident, strength calculations of the bubble-condenser system in case of accident, etc.).
Internal risks	- minimisation of internal risks which could result in the loss of ability of safety systems to perform their safety functions (fire, internal flooding, turbine missiles, fall of heavy loads, etc.).
External risks	- minimisation of external risks which could result in the loss of ability of safety systems to perform their safety functions (earthquake, aircraft crash, other industrial activities – gas explosion, etc.).
Emergency analyses	- re-calculation of a set of emergency analyses in order to prove the NPP safety in the pre-operational safety analysis report.
Operation	- improvement of NPP safety during operation through improvement of procedures used (operating procedures, emergency procedures, performance of tests and inspections, investigation of unusual events, radiation protection of personnel, emergency planning, etc.).

By decision No.: 318/98 ÚJD SR approved the start up of the 1st unit – imposing conditions for its operation (e. g. setting deadlines for additional safety improvement measures).

Unit Power Uprate Program

From 2007 a Unit Power Uprate Program has been implemented at NPP EMO1&2 similar to NPP V2 (chapter 2.2.1). The objective of Unit Power Uprate was to increase power output by increasing the thermal reactor output by 7 %, from 1,375 MWt/1Unit to 1,471.25 MWt/1Unit and by increasing effectiveness of the thermal cycle. Compared to the basic design (440 MWe/1Unit) the target status was reached (470 MWe/1Unit).

Periodic Safety Review Mochovce (PSR – 2011)

Periodic review was conducted on the basis of ÚJD SR Decree No. 49/2006 on periodic nuclear safety review.

The result of the review were reported to ÚJD SR in a final report. The operator proposed corrective actions on the identified findings, based on which an integrated plan for implementation of corrective actions was compiled. As for the timing for implementation of integrated corrective actions in individual groups account was taken of the time required for preparation of the design documentation, the practical options for the implementation of individual design changes and of complexity of implementation for individual groups of measures. The operator is obliged to implement corrective actions identified during the comprehensive periodic safety assessment in a manner and within the scope and deadlines imposed by the ÚJD SR Decision No. 100/2011 as follows:

a) Seventeen integrated corrective actions in the group “Accident management up to the level of severe accidents, emergency planning, emergency control centre“.

Deadline: *31 December 2018*

b) Nine integrated corrective actions in the group “Design justification, methodology for defence in depth application“. Deadline: *31 December 2018*

c) Eleven integrated corrective actions in the group “Physical condition of equipment and systems“. Deadline: *31 December 2013*

d) Seventeen integrated corrective actions in the group “Demonstration and monitoring nuclear safety, feedback from failures“. Deadline: *31 December 2013*

e) Twenty integrated corrective actions in the group “Quality, management documentation, administration and organization“. Deadline: *31 December 2013*

f) Twelve integrated corrective actions in the group “Human Resource management and training“. Deadline: *31 December 2013*

g) Three integrated corrective actions in the group “Control of modifications, documenting and change evaluation“. Deadline: *31 December 2013*

h) Twenty two integrated corrective actions in the group “Operating procedures, documentation control“. Deadline: *31 December 2013*

i) Three integrated corrective actions in the group “Evaluation of fire resistance and fire risk“. Deadline: *31 December 2013*

j) To implement seismic resistance at NPP Mochovce 1&2 to a new value of seismic hazard PGA = 0.15g on the basis of review conducted in compliance with the IAEA guide NS-G-2.13 from 2009. Deadline: *31 December 2018*

k) Demonstrate the method for radioactive ion exchangers management including their final disposal. Deadline: *31 July 2011*

The license holder on an annual basis informed ÚJD SR in writing about the developments in fulfillment of corrective actions. *ÚJD SR exercises control of fulfilment of corrective actions course of implementation in a form of inspections. Inspection in 2015 found partial deficiencies in terms of compliance with the deadline set for some of the measures. This concerns measures under the group „Management of modifications, documentation and evaluation of modifications“ (the sub-process of maintaining a list of qualified equipment, seismically resistant equipment, documentation on the real situation, As-built documentation, was not properly updated) and within the group of measures „Evaluation of fire resistance and fire risk“ (the deterministic analysis of fire risk of one of the objects was not completed). The Authority set corrective actions and deadlines to remedy the deficiencies found. All other corrective actions with a deadline 31 December 2015 were met.*

Based on the 2013 revision of the Atomic Act the operating license is not limited in time, but the license holder must based on the provisions of law, every ten years demonstrate by a periodic safety review the readiness of the facility for further operation. ÚJD SR can complement the operating license with conditions.

Severe Accident Management Program

By Decision No. 86/2010 ÚJD SR approved the submitted safety concept „Management of severe accidents at EBO and EMO“. Based on the concept, design modifications were proposed and implemented, to enhance the capabilities of the power plant NPP Mochovce 1&2 to mitigate the

consequences of severe accidents. One of the tasks arising from the PSR 2008 has been to cope with severe accident management accompanied by extensive damage to the reactor core, etc. (for details see chap. 2.2).

2.3.2 Completion of the Nuclear Power Plant Mochovce, Units 3&4

2.3.2.1 *Decision on siting the project NPP Mochovce*

This power plant is in the phase of construction and the reactors are without fuel. In accordance with Article 2 of the CNS this power plant is not subject to the Convention, however for reasons of transparency, basic information about the state of construction and on the measures to improve safety are given here.

Czechoslovak Atomic Energy Commission (ČSKAE – the former federal authority for the regulation of nuclear safety, predecessor of the Nuclear Regulatory Authority of SR) issued consent on the siting in July 1980 (file. No. 4556/2.3/80). Subsequently ONV Levice, department of construction and territorial planning, the then building authority, issued its permit for siting in 1980 (No. Výst. 3865/1980), which was complemented with a decisions issued on 10 July 1981 (No. Výst. 2044/81) and in January 1982 (No. Výst. 3818/81).

2.3.2.2 *Building Permit for NPP Mochovce*

The application for the building permit of NPP Mochovce was delivered to ONV Levice, department of construction and territorial planning (the then competent building authority) on 24 September 1986. On 12 November 1986 ONV Levice, dept. of construction and territorial planning issued the building permit under No. Výst.2010/1986 including conditions, by which it permitted the construction of NPP Mochovce. One of the condition was that the project will be completed within 115 months (after the political changes – Slovakia became independent).

In 1997, the then competent building authority – the Regional Office in Nitra, environmental department – issued its decision No. 97/02276-004 dated 5 May 1997, by which it **extended the period for completion of the NPP Mochovce project until 31 December 2005**.

In 2004, in another proceeding the Regional Building Authority in Nitra, under Section 68 of the Building Act in proceeding for a change of construction before its completion, on 15 July 2004 issued its decision No. 2004/00402-07, by which it changed the original building permit so that point No. 5 of the binding conditions for implementing the project reads: "Period for project completion is determined to be by 31 December 2011", by which it **extended the period for project completion until 31 December 2011**.

By Decision No. 246/2008 ÚJD SR permitted change of the construction (based on the Building Act), determining the extent of change and determined an obligation to finish the construction by 31 December 2013. By decision No. 266/2008 dated 14 August, 2008 ÚJD SR issued the consent with realization of changes of selected equipment influencing nuclear safety in the extent of initiation project (based on the building code). By the ÚJD SR decision No. 267/2008 dated 14 August, 2008 ÚJD SR issued (based on the Atomic Act) the consent with realization of changes in the document

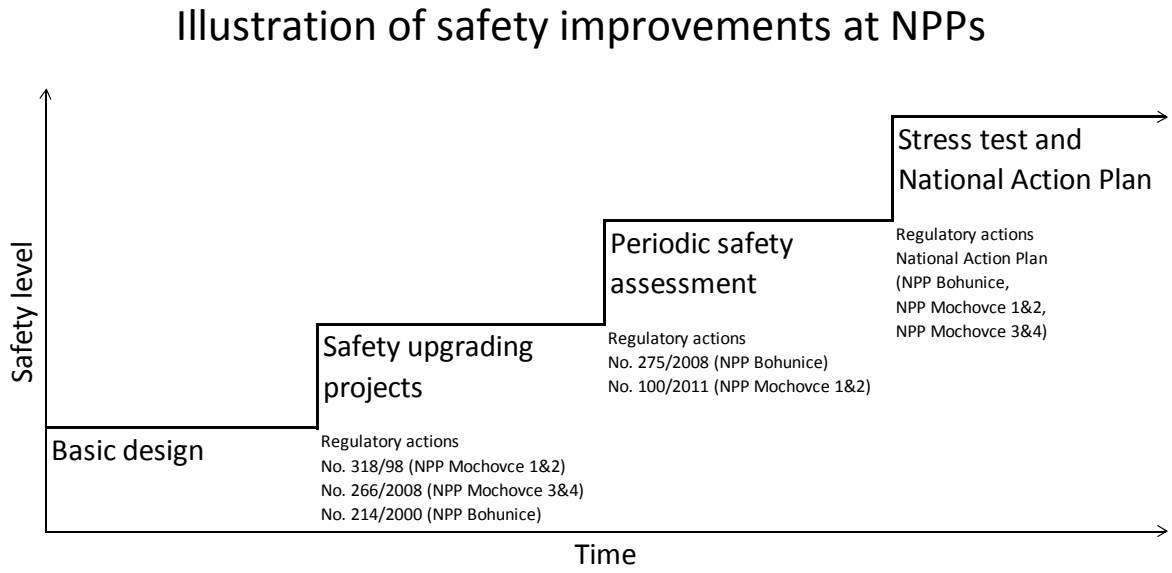
“Preliminary Safety Report of NPP Mochovce, units 3&4.

By Decision No. 1124/2013 dated 12 December 2013 ÚJD SR determined a new deadline for project completion, by 31 December 2016.

Fig. NPP Mochovce

Following table provides a brief description and examples of some areas of the safety measures	
Issue area	**Brief description (example)**
I&C Improvements	- increase of control and monitoring capacity of NPP, - implementation of predictive and supervision functions, - increased redundancies, - improved HMI (introduction of the Safety Parameters Display System), - qualification of set of PAMS signals for SA conditions and inclusion of new, dedicated signals for the SAM strategy, etc.
MCR habitability in case of a Severe Accident	- in case of severe accident with radioactive releases reaching the suction of MCR ventilation line: MCR will be isolated and provided with pressurized fresh air from dedicated reservoir tanks to provide slight overpressure in MCR and prevent the penetration of radioactivity or toxic gases from surroundings etc.
Improved design of electrical systems	- possibility of interconnecting safety bus-bars of corresponding safety divisions of adjacent units (solution for SBO),

	- creation of a 6-kV highway among 4 units that allows - long-term management of SBO scenarios, - higher flexibility for management of faults of electrical equipment (transformers, etc.), - goal: achieve additional, independent and highly-reliable source of power for each Unit, - possibility of feeding I&C safety systems from both DC and AC sources (from inverters), - provision of a SBO Common Diesel Generator for Units 3&4.
Improved Fire Protection	- measures identified to reduce the fire risk in NPP Mochovce 3&4 represent an improvement with respect to NPP Mochovce 1&2, - fire detection system has been improved, - all cables will be fire-retardant, - safety-classified cables will be fireproof, - cable channels and rooms and sensitive parts of the plant (both in nuclear and conventional part) will be equipped with a fixed fire extinguishing system.
Seismic upgrade	- upon request of ÚJD SR, the PGA for the seismic upgrade of NPP Mochovce 3&4 has been increased to 0,15 g.
Protection of Containment Function	- in-vessel retention strategy for the core debris cooling (avoidance of: containment basemat melt-through, containment over-pressurization, direct containment heating, source term reduction), - engineering passive features for hydrogen control (avoidance of: hydrogen uncontrolled burning / detonation), - prevention of high-pressure core-melt scenarios, - installation of additional power supply for station-blackout severe accident scenarios (increase the availability of containment protective active systems), - additional instrumentation for severe accident scenarios, etc.



2.4 Nuclear Power Plant Bohunice A1

2.4.1 Description of Nuclear Power Plant A1

Nuclear Power Plant A1 was designed for a power output of 150 MW^e with heterogeneous reactor based on thermal neutrons marked as KS-150. The fuel used was natural metal uranium, the moderator was heavy water (D2O) and the coolant carbon dioxide (CO2). Primary cooling circuit of the reactor (CO2) consisted of 6 loops, each loop consisted of one steam generator, turbo compressor and two parallel pipes of hot and cold branches of CO2 distribution. Cooling of the moderator was provided by 3 cooling loops, each consisting of 2 coolers, one D2O pump and associated piping. It was put into operation in 1972. In 1979 the operation of the NPP was terminated.Given that all spent fuel was exported to the country of origin and the decommissioning plan was approved by *ÚJD SR,* this nuclear installation is not covered by the Convention on nuclear safety. Details on this power plant can be found in the National Report prepared under the Joint Convention.

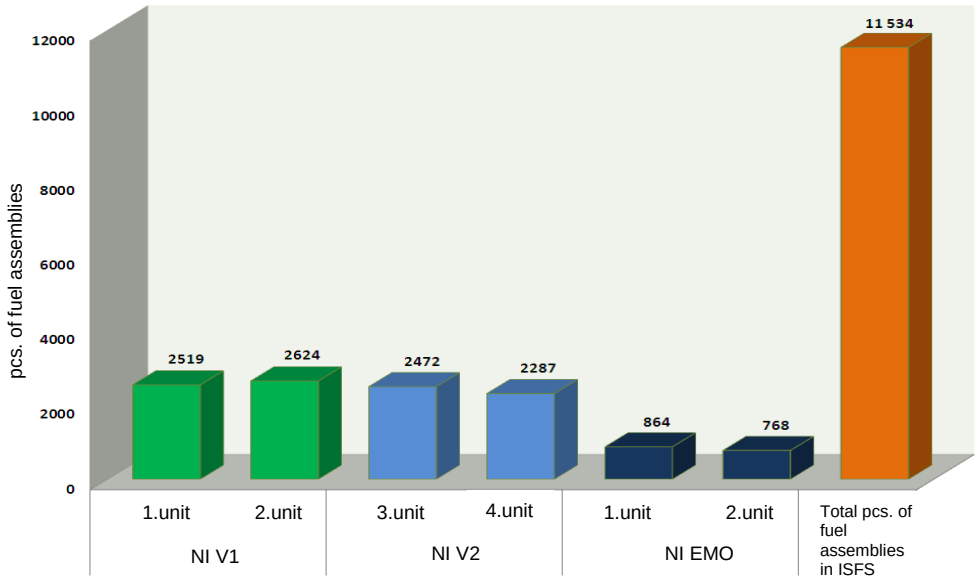
2.5 Interim Spent Fuel Storage – ISFS

2.5.1 Description of Used Technology

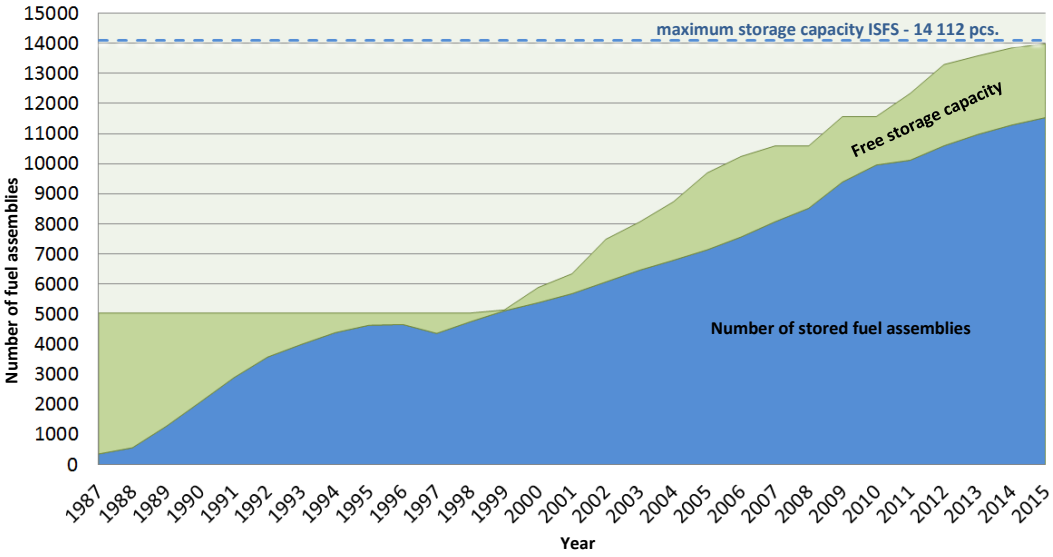
ISFS represents a nuclear installation serving for temporarily and safe storage of spent nuclear fuel from WWER reactors prior to its further processing in a re-processing plant, or prior to its final disposal in a repository. It is designed as a wet storage. It was commissioned in 1986. Its active operation began in 1987.

ISFS receives spent fuel after cooling in the storage pools in HVB NPP SE, a. s.

As at 31 December 2015 ISFS stored 11,534 SNF in the following structure:



Development in filling ISFS by spent fuel as at 31 December 2015



2.5.2 Conducted ISFS Safety Reviews

Internal safety reviews (within Slovakia) were performed during the construction and commissioning of ISFS and during its operation, by assessing and approving of safety-related documentation by regulatory authorities and SR organizations (safety reports, quality assurance programs, limits and conditions). Reports on ISFS operation, monitoring program results and overall conditions of ISFS are submitted to ÚJD SR on annual basis. No international safety reviews of ISFS have been conducted so far.

After 9 years of ISFS operation, a safety assessment report was prepared serving the purpose of decision-making with respect to extension of storage capacity.

Updated Pre-Operational Safety Report was drafted in 2000 in connection with ISFS reconstruction, which evaluated the actual safety status of the facility. The format of the safety report was based on recommendations of the US NRC Guide No. 3.44 Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Water - Basin Type), and ÚJD SR requirements resulted from Section 72 CFR Title 10 USA and the documents of the IAEA safety series No-s. 116, 117 and 118.

According to Atomic Act and ÚJD SR Decree No. 49/2006 the company JAVYS inc. performed the periodic safety review of the Interim Spent Fuel Storage to the base term Nov. 30, 2008. Based on its results, the Pre-Operational Safety Report was updated. The updated Pre-Operational Safety Report was approved by ÚJD SR Decision No.158/2010. Results of the periodic review of ISFS show that no material deficiences were found and that there are preconditions for further operation of ISFS.

After updating the Pre-Operational Safety Report of the Interim Spent Fuel Storage, ÚJD SR issued decision No. 444/2010 permitting the operation of the Interim Spent Fuel Storage.

2.5.3 ISFS Safety Improvements Programs

In course of 1997 – 1999 an extended reconstruction of ISFS was performed with the objective to increase the storage capacity, extend the lifetime and to strengthen the seismic resistance of the facility. The total ISFS storage capacity after reconstruction became almost three times higher in comparison with the original one. The increase of original storage capacity was enabled by the change of original containers of T-12 type for containers of KZ-48 type and change of storage containers geometry. The storage capacity of 14,112 SNF after the reconstruction will not be sufficient for storage of all spent nuclear fuel produced during operation of NPP V-1 Units (production of SNF completed) NPP Mochovce 1&2 and NPP Bohunice V-2.

In 2013 an investment project was initiated „Extention of ISFS storage capacity in Jaslovské Bohunice site“. The change proposes to extend the SNF storage capacity as dry storage, by a total of 18,600 SNF gradually in two stages. The first stage is an extension by 10,100 SNF, the second stage is an extension by 8,500 SNF. Currently operated ISFS with wet storage of SNF is considered to be structurally connected with the new storage capacity. The investment project „Completion of SNF storage capacity in Jaslovské Bohunice site“ is currently in the process of environmental impact assessment pursuant to the Act No. 24/2006 Coll.l. (Act on EIA).

Details about the program are mentioned in the National Report compiled in terms of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (www.ujd.gov.sk).

Based on the request of ÚJD SR the project „Response of the Interim Storage Facility (ISFS) to Events of Fukushima Type“was developed by JAVYS, a. s. with the following outcomes:

- Performance of safety functions of the ISFS were confirmed for initiating events specified by ÚJD SR.
- Chapter “Seismic event“ was elaborated and added to the operating instructions for abnormal operation.

- Employees of JAVYS, a. s. (licensee) were re-trained on corrective actions implemented during the project.

2.6 Technologies for RAW Treatment and Conditioning

For activities of RAW management there are currently two nuclear installations having permit for continuous operation:

- Nuclear Installation - Technology for treatment and conditioning of RAW at Jaslovské Bohunice site,
- Nuclear installation - Final treatment of liquid RAW at Mochovce site.

a) The nuclear installation - Technology for treatment and conditioning of RAW includes the following technologies:
   - Bohunice Treatment Center for RAW (BSC RAW)
     - Liquid RAW concentration facility,
     - RAW cementation facility,
     - Sorting of RAW,
     - Incinerator for RAW,
     - HP compacting of PRAO;
   - Bituminisation lines;
   - Active water treatment plant;
   - Sorting and fragmenting of metal RAW;
   - High capacity decontamination equipment;
   - Treatment of used electrical cables;
   - Treatment of used air conditioning filters.

b) The nuclear installation “Final treatment of liquid RAW” at the Mochovce site includes the following technologies:
   - Bituminisation line for liquid RAW;
   - Discontinuous bituminisation line of ion exchangers;
   - Facility for concentration of liquid RAW;
   - Facility for cementation of RAW.

2.6.1 Brief technology description

Description of the technologies is available in the National Report prepared pursuant to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (www.ujd.gov.sk).

2.6.2 Conducted safety reviews of Technology for treatment and conditioning of radioactive waste

To increase the safety of the technology equipment of BSC RAW and of the process of treatment and safety conditioning of RAW, based on the current operation and lessons learned, many analyses that

were conducted focus on the safety of the final product and optimal filling up of the final product, as well as the possibilites for conditioning of RAW into new package forms, several technical improvements were implemented. *In 2013 reconstruction of selected technological systems was completed in BSC RAW in order to increase their operational safety.*

In accordance with ÚJD SR Decree No. 49/2006 Coll.l. JAVYS, a.s., conducted periodic safety review of the nuclear installation, to the reference date 22 January 2009. Based on the results, the Pre-Operational Safety Report of this nuclear installation was updated. From the results confirmed that there were no material deficiencies, and there are good preconditions for its further operation.

After updating the Pre-Operational Safety Report for TSÚ RAO further operation, ÚJD SR by its Decision No. 498/2010 issued license for operation. The license for operation of TSÚ RAO ÚJD SR contained an obligation to implement corrective actions identified during the periodic safety assessment. These *corrective actions were implemented within the deadlines set by ÚJD SR.*

The technologies are regularly inspected by ÚJD SR inspectors.

2.7 RAW Repository

2.7.1 Brief technology description

National Repository for radioactive waste is a near-surface type of repository, designed for disposal of solid and solidified low and *very low activity* radioactive waste, generated from operation *and decommissioning* of nuclear installations and by other institutions, generated in Slovakia. The repository is located approx. 2 km North-West of the premises of NPP Mochovce. The repository has been in operation since 2000.

The repository comprises of a system of storage boxes arranged in two double-rows, each containing 40 boxes. A single box accommodates 90 fibre-concrete containers (FCCs).

Capacity of the two double-rows of the repository (80 disposal boxes) is sufficient for disposal of 7 200 FCCs containing RAW (from operation, decommissioning and institutional waste) until approx. year 2023. After analysing the volumes of all RAW produced from operation and from decommissioning of nuclear installations (including MO 3&4), it is expected that additional capacity would need to be built for the repository to dispose:

- 27 thous. FCCs with low-activity RAW,
- 68 thous. m^3 of very low activity RAW.

For this reason it is envisaged to extend the repository to 7,5 of double-rows of disposal boxes for low activity RAW and construction of a storage space for very low activity RAW.

As the end of *2015* the National Repository held *4 384* FCCs with RAW in total.

RAW composition stored in FCCs at the NR of RAW:

Type	
Drums (pc)	*20 095*
Compacts (pc)	*21 932*
Average weight of FCC (kg)	*8 556*

The details are in the National Report prepared in accordance with the Joint Convention (http://www.ujd.gov.sk).

The expected production of contaminated soils and concrete from the decommissioning process of NIs resulted into a need to build storage capacity for very low RAW within the National Repository. Building of storage capacity for very low activity RAW is implemented in stages, the first storage module with a storage capacity of 20,000 m^3 for very low activity RAW was put into operation in 2016.

2.7.2 Conducted Safety Reviews

Pursuant to Section 23, par.(2) of the Atomic Act and ÚJD SR Decree No.49/2006 Coll. l., JAVYS a. s., conducted periodic safety review of the nuclear installation at the reference date of 14 Sept. 2009. On the basis of its results, in accordance with the ÚJD SR Decree No. 49/2006, an update of the Pre-Operational Safety Report for this nuclear installation was elaborated. The results from the periodic safety review of the nuclear installation show that there were no shortcomings found and good prerequisites exist for ensuring nuclear safety during operation of this nuclear installation also for the following 10 years.

After the update of the Pre-Operational Safety Report for RÚ RAO ÚJD SR issued its Decision No. 490/2011 to permit further operation. The operating license ÚJD SR contained an obligation to implement corrective actions identified during the periodic review.

The corrective actions were implemented within the deadlines set by ÚJD SR.

3. Legislation and Regulation

Article 7

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.*
2. *The legislative and regulatory framework shall provide for:*

(i) The establishment of applicable national safety requirements and regulations;

(ii) A system of licensing with regard to nuclear installations and the prohibition of operation of a nuclear installation without a licence;

(iii) A system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;

(iv) The enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.

3.1 Legislative and Regulatory Framework

3.1.1 Structure of regulatory bodies

Regulation of peaceful uses of nuclear energy is discharged by the ministries and other central authorities of public administration and organizations withiin their competence specified in the relevant laws *(for example, Act No. 575/2001 Coll.l. on organization of government activities and the organization of central public administration as amended)* according to the scheme shown in Fig. 3.1.1.

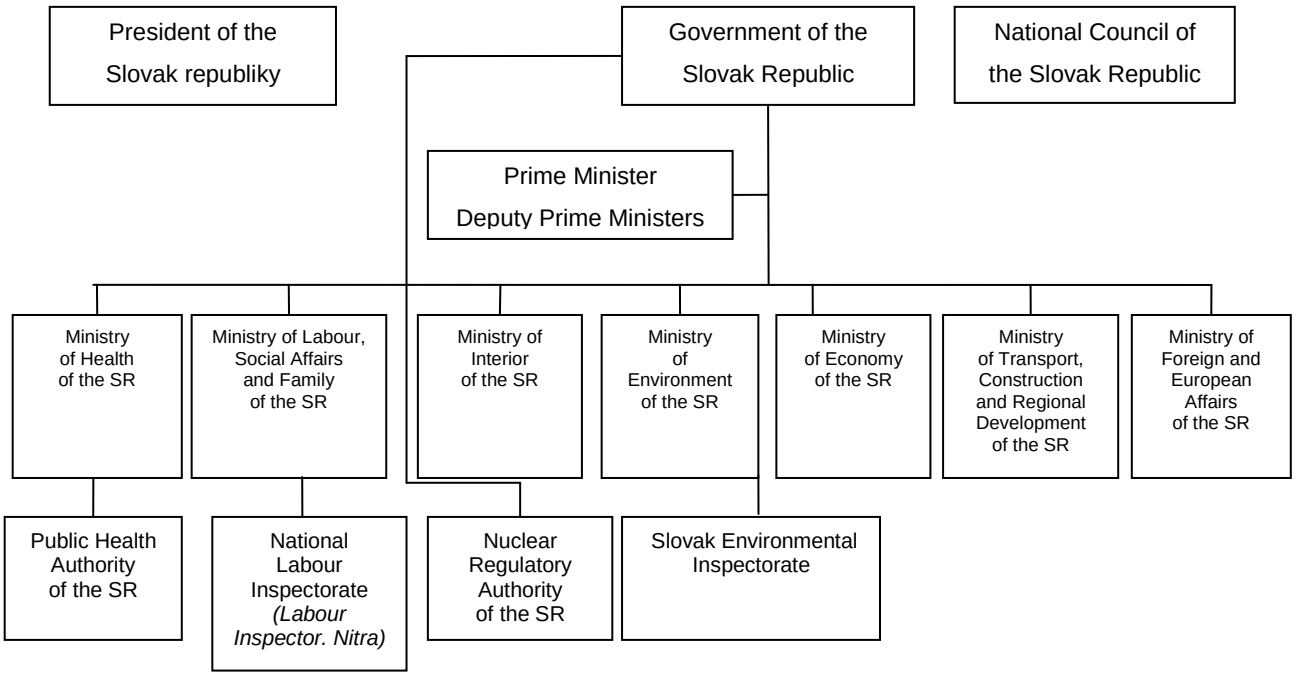


Fig. 3.1.1 Structure of regulatory bodies

Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR)

ÚJD SR is responsible for nuclear regulation. ÚJD SR provides for state regulation over nuclear safety of nuclear installations, including radioactive waste management and spent fuel management and other phases of fuel cycle, over nuclear materials including their control and record keeping, as well as over the physical protection of nuclear installations and nuclear materials ensured by the relevant licensee. It reviews the intents of the use of nuclear energy and the quality of classified facilities and equipment of nuclear technology as well as the commitments of the Slovak Republic under international agreements and treaties relating to nuclear safety of nuclear installations and nuclear materials management.

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

Ministry of Health is responsible for health care, health protection and other activities in the field of health service. In addition to the Ministry of Health of the Slovak Republic, the state administration in the field of protection of public health from effects of ionizing radiation is also discharged by the Public Health Authority, the Regional Public Health Offices and special health authorities. The competence of the Ministry includes *setting* exposure limits and conditions for the disposal and storage of radioactive waste from the view of their potential impact on health. The Public Health Authority of SR provides methodological guidance for health protection against the effects of ionizing radiation, drafts legislation, issues permits for activities leading to irradiation, carries out state health supervision in nuclear installations and is a contact point for the EU in the field of health protection against ionizing radiation (radiation protection).

Ministry of Environment of the Slovak Republic (MŽP SR)

Ministry of Environment of the Slovak Republic is responsible for development and protection of the environment including nature and landscape protection, protection of quality and quantity of waters, air protection, environmental aspects of land use planning, environmental impacts assessment, ensuring a unified information system on the environment and area monitoring.

The following bodies report to the Ministry of Environment of the Slovak Republic:

- The Slovak Environmental Inspectorate, through which the Ministry of Environment of the Slovak Republic fulfils its function of the main body of state supervision in the matters of environment;
- Slovak Hydro-Meteorological Institute and other.

Ministry of Interior of the Slovak Republic (MV SR)

Ministry of Interior of the Slovak Republic, besides others, is responsible for protection of constitutional establishment, public order, security of persons and property, the integrated rescue system, civil protection and fire protection.

Provides for – to the extent as determined by the government – crisis management, civil emergency planning, proposes humanitarian assistance to other countries.

In case of an accident at a nuclear installation it is involved in management and carrying out rescue services and evacuation plans, organizes and provides for warning and notification, development, operation and maintenance of the radiation monitoring network for civil protection. Provides for

a 24-hours service for the purpose of performing the function of a warning and notification centre and information centre of the European Union, the International Atomic Energy Agency, the European Commission (ECURIE) and for other national contact points of neighbouring countries and states.

Ministry of Economy of the Slovak Republic (MH SR)

Ministry of Economy of the Slovak Republic is responsible for the energy sector including management with nuclear fuel, storage of radioactive waste and energy efficiency, prospecting and exploration of radioactive materials and their mining, as well as for control of exports, transports, brokering and transit of dual use items.

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

The Ministry of Labour, Social Affairs and Family of the Slovak Republic is responsible (inter alia) for occupational health and safety, and the labour inspection. The state administration in the field of labour inspection is executed by the state administration bodies: the Ministry of Labour, Social Affairs and Family of SR, the National Labour Inspectorate and regional labour inspectorates.

The Ministry of Labour, Social Affairs and Family of SR manages and controls the National Labour Inspectorate (NIP) and is responsible for performance of labour inspection. The National Labour Inspectorate is the supervisor for labour inspectorates. The Labour Inspectorate in Nitra supervises the compliance with laws and other regulations to ensure occupational health and safety at the workplaces of nuclear installations in the Slovak Republic (Section 7 par. 1 of the Act No. 125/2006 Coll. l. on labour inspection and amending and complementing the Act No. 82/2005 Coll. l. on illegal work and illegal employment and on amendments to certain laws as amended).

Ministry of Transport, Construction and Regional Development of the Slovak Republic (MDVRR SR) *and Department of Health Officer for the sector*

Ministry of Transport, Construction and Regional Development of the SR is responsible for railway, road, water and air transport, *electronic communication, postal services, tourism and construction.* In terms of shipments of fresh and spent nuclear fuel, MDVRR SR is one of the bodies that participate in the authorization process. According to Section 28 par. 13 letter c) of the Atomic Act, the Ministry of Transport, Construction and Regional Development of the SR approves the emergency transport rules that contain measures during an incident or an accident in transport of radioactive material.

The Department of Chief Public Health Officer of the ministry is to assure conditions for public health, prevention of human diseases, within the competencies of the ministry.

The Department of Chief Public Health Officer exercises state health supervision over radiation protection during transport according to the Act No. 355/2007 Coll.l.

3.1.2 Legislation

3.1.2.1 *Introduction*

The legal structure of regulatory activities in nuclear safety is formed by Acts, which were adopted during the period of accession of the Slovak Republic to the European Union and shortly after its

accession. During this period the system of law of the Slovak Republic was subjected to extensive approximation with the law of the European Communities and with the law of the European Union. Some legal regulations are still valid from the period before accession (such as for example the Building Act).

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

1. The supreme and fundamental law of the state is its Constitution approved by the *National Council of the Slovak Republic by at least 3/5 majority of all members* – generally binding in nature.
2. *Constitutional laws – also adopted by the National Council by at least 3/5 majority of all members – generally binding in nature.*
3. Government ordinances are subordinated to laws and are approved by the Government – having generally binding nature.
4. Decrees and measures are rules issued by central administration authorities (for example, ministries *and other central administration authorities*), to determine details for the implementation of laws and regulations of the Slovak Government – generally binding in nature.
5. Slovak technical standards (STN), the European technical standards (STN EN) and international technical standards (STN ISO/IEC) – *having recommendatory nature.*
6. Guidelines (manuals) contain the detailed requirements and recommended steps to ensure fulfilment of requirements. These are issued by the regulatory authorities.
7. Decision can be characterized as an act of law enforcement. This means that it is application of rights and obligations set in the generally binding legal regulation for a concrete case and a concrete entity. Decisions issued by administrative authorities are also called individual administrative acts.

3.1.2.2 *Acts on state regulation*

Act No. 575/2001 Coll. l. on organization of governmental activities and on organization of the central state administration as amended (the "Competence Act") sets out tasks and responsibilities of central bodies of state administration. Provision concerning ÚJD SR is included under § 29 in the currently valid Competence Act.

The safe use of nuclear energy is governed by the **Act No. 541/2004 Coll.l.** on peaceful uses of nuclear energy (Atomic Act). It came into force on 01 December 2004 and repealed the original *Atomic Act No*. 130/1998 Coll.l. *on peaceful uses of nuclear energy.* In the meantime, the Atomic Act has been amended *fifteen* times.

The Atomic Act lays down the conditions for safe use of nuclear energy exclusively for peaceful purposes in compliance with the international treaties signed by the Slovak Republic. Generally binding legal regulations implementing the Atomic Act, issued by ÚJD SR in a form of Decrees, are listed in Annex 6.2.

Civil liability for damage caused in causal connection with a nuclear incident is governed by the ***Act No. 54/2015 Coll.l. on civil liability for nuclear damage and on its financial coverage*** *entered into force on 01 January 2016.*

This law separating private civil law relations from the public law, setting the method for distribution of damage compensation, establishing a single competent court (District Court Nitra), changing objective limitation period to 10 years and defining the responsibilities of ÚJD SR in case of nuclear damage.

Act No. *251/2012* Coll.l. on energy sector, effective from 01 September 2012 repealed the original Act No. 656/2004 Coll.l. The Energy Act, as one of the basic laws, governs *inter alia* conditions for conducting business in nuclear energy as well as the rights and obligations of natural and legal persons doing business in this field, *and exercising state regulation and control over business in the energy sector.*

Act No. *250/2012* Coll.l. on regulation in network industries *as amended,* governs the subject, scope, conditions and method of regulation in network industries. Network industries include also *power generation*. Activities performed in network industries are considered to be regulated activities, for which license is required to be issued by the Regulatory Office for Network Industries. The Act governs the terms and conditions for regulated activities and the rights and obligations of regulated entities and rules for *internal* market in electricity and in gas.

Act No. 24/2006 Coll. l. on environmental impact assessment and on changes and amendments to certain laws as amended, effective from 1 February 2006 repealed and superseded the original Act No. 127/1994 Coll. l. on environmental impact assessment as amended.
In order to ensure high environmental protection, the Act governs the procedure for environmental assessment of certain types of industrial activities.

The law also defines the activities subject to mandatory international assessment in terms of impacts on the environment, from the nuclear activities:

1. *Nuclear power plants and other nuclear reactors (except research installations for the production and conversion of fission and enriched materials, the maximal thermal power does not exceed 1 kW of continuous thermal load),*
2. *Facilities intended solely for the production or enrichment of nuclear fuel, for reprocessing of spent nuclear fuel or its storage, as well as disposal and treatment of radioactive waste.*

The competent authority for assessing the environmental impacts in a transboundary context is the Ministry of Environment of SR.

Act No. 238/2006 Coll.l. on the National Nuclear Fund for the decommissioning of nuclear installations and for the management of spent nuclear fuel and radioactive waste (Act on Nuclear Fund) and on amendments to certain laws, as amended, which repealed the original Act No. 254/1994 Coll.l. The Nuclear Fund is an independent legal entity, administrated by the Ministry of Economy of SR. The Fund has its own bodies (Board of Trustees, Supervisory Board, Director, Managers for sub-accounts, and the Chief Controller). Resources of the Nuclear Fund are varied –

contributions from licensees, levies collected by the operators of the transmission and distribution systems in the prices of supplied electricity directly from the end customers (intended for settlement of the so called “historical debt“), penalties imposed by ÚJD SR, interest on deposits, subsidies and contributions from the EU funds, from the state budget and other.

The details on the method of collection and payment of the compulsory contribution, including its calculation, to the National Nuclear Fund for Decommissioning of Nuclear Installations and for management of spent nuclear fuel and of radioactive waste, are provided for in the Government Regulation No. 312/2007 Coll. l. (amended by the Government Regulation No. 145/2012 Coll.l.).

Act No. 355/2007 Coll. l. on protection, promotion and development of public health establishes requirements for the protection of public health, public health authorities, their powers, the basic conditions for *registration and* implementation of activities leading to irradiation, the scope of the notified and permitted activities leading to irradiation, issuing permits for these activities, obligations of natural persons and legal persons, measures to protect public health, performance of state regulation in the health sector and sanctions for the breach of obligations in the field of public health protection. The details of the requirements for radiation protection are set out by implementing decrees of the Ministry of Health and in Government Regulations transposing *several* EU Directives into the legal system of SR.

Act No. 125/2006 Coll. l. on labour inspection and on amendments to Act No. 82/2005 Coll. l. on illegal work and illegal employment regulates the labour inspection, which enforces protection of employees at work and state administration in the field of labour inspection, defines the competence of state administration authorities in the field of labour inspection, the scope of supervision according to special regulation (Act No. 264/1999 Coll. l. on technical requirements for products and on conformity assessment) establishes the rights and obligations of the labour inspector and obligations of natural persons and legal entities. The relating generally binding legal regulations are listed in Annex 6.2.

Act No. 124/2006 Coll. l. on occupational health and safety establishes general principles of prevention and the basic conditions for ensuring occupational health and safety, for eliminating the risks and factors influencing the occurrence of accidents at work, occupational diseases and other health damage at work. Integral part of occupational health and safety is the safety of technical equipment. The relating generally binding legal regulations are listed in Annex 6.2.

In accordance with **Act of NR SR No. 50/1976 Coll. on spatial planning and building regulations** (the Building Act) ÚJD SR became in 2004 a building authority for the phase of building proceedings for projects of nuclear installations and projects related to nuclear installation, which are located within the premises of a nuclear installation.

3.1.2.3 *Draft legislation*

In 2013, preparations for the new Atomic Act were launched. At ÚJD SR, a working group for the preparation of the new Atomic Act was established, the members of which are employees of ÚJD SR and in 2015 this group was enlarged with the staff from the Public Health Authority of SR. As the first

step, the group elaborated a material „Principles of the new Atomic Act".

The reasons for the preparation of the new Atomic Act were in particular the transposition of the Council Directive 2014/87/Euratom dated 08 July 2014, amending the Directive 2009/71/Euratom, establishing a Community Framework for the nuclear safety of nuclear installations, transposition deadline – by 15 August 2017, fulfilment of measures from the Action Plan the IRRS mission 2012 – for example, reducing the number of decisions issued in relation to modifications to NIs and the related increase in the inspection activities of the Authority, partial transposition of the Council Directive 2013/59/Euratom, laying down basic safety standards for protection against the dangers arising from ionizing radiation (the „new BSS"), transposition deadline by 06 February 2018 and development in legislation in SR for the last ten years and its new challenges, such as for example, change in ownership of the operator, access of the public concerned to environmental information, access to justice, practical experience from the application of the law, new WENRA requirements, etc. Given the complexity and with regard to the transposition deadlines in this process the amendment to the Atomic Act will only concern the transposition of relevant EU Directives. Other issues will be resolved subsequently.

3.1.3 State regulation in the field on nuclear safety

Art. 8

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 7, provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.*
2. *Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.*

The Nuclear Regulatory Authority of SR was established on 1 Jan. 1993 and its powers result from the Act No. 575/2001 Coll. l. on the organization of activities of the government and organization of the central government. ÚJD SR is an independent state regulatory body reporting directly to the government and it is headed by the chairman appointed by the government. Independence of the Regulatory Authority from any other authority or organization dealing with development or use of nuclear energy is applied in all relevant areas (legislation, human and financial resources, technical support, international cooperation, enforcement tools).

Pursuant to Act No. 575/2001 Coll. l. ÚJD SR provides for state regulation of nuclear safety of nuclear installations including regulation of radioactive waste management, spent fuel management and of other phases of fuel cycle, as well as oversight of nuclear materials, including their control and record keeping.

The main piece of legislation in the field of nuclear safety is the *Atomic* act No. 541/2004 Coll. l. as amended. On the basis of this Act, Decrees and Decisions of ÚJD SR are prepared and issued. Besides generally binding legal regulations ÚJD SR also issues safety guidelines, which assist the

licensees to fulfil the generally binding regulations (see Annex *6.2*). In the approval process regarding a nuclear installation, standards and recommendations of the International Atomic Energy Agency are being used and applied. The same way knowledge from the OECD / NEA and the European Union is being utilized.

Regulatory decision can be characterized as an act of law enforcement. This means that it is application of rights and obligations set in the generally binding legal regulation for a concrete case and a concrete entity. Decisions issued by administrative authorities are also called individual administrative acts.

ÚJD SR issues various types of decisions: decision on the issue of authorization, decision on issue of license, on approval, on imposing sanction or measure, on designation of a new licensee, on verification of competence, on documentation review, and other.

The scope of operation of ÚJD SR is anchored in Section 4 of the Atomic Act, which is very extensive *(http://www.ujd.gov.sk/ujd/WebStore.nsf/viewKey/AZ%20novela/$FILE/AZ_novela.pdf).*

Every year ÚJD SR issues a report on the state of nuclear safety of nuclear installations and on its activity over the past year. This report is submitted to the Government by 30th April and subsequently to the National Council. The Annual Reports are available at http://www.ujd.gov.sk.

3.1.3.1 *Nuclear installation licensing procedure*

The licensing procedure for the nuclear installation consists of five main phases, that is: siting of the nuclear installation, its construction, commissioning, operation and decommissioning. Before granting an operating license the regulatory body performs inspections according to the approved schedule of program of individual phases of commissioning the nuclear installation (tests, fuel loading, physical start up, energy start up, trial operation). The main regulatory authorities and the licensing procedure in issuing operating license are illustrated in Fig. 3.1.3.1:

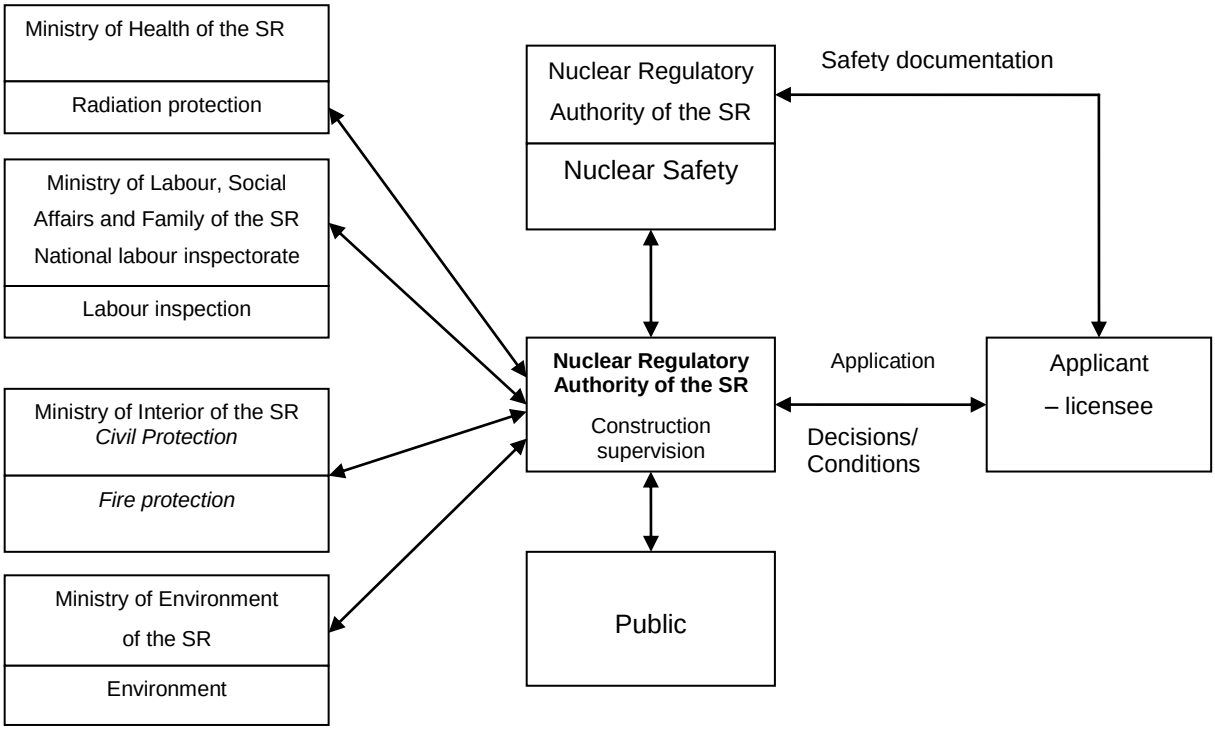


Fig. 3.1.3.1 Licensing procedure for construction, commissioning, operation and decommissioning

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

District construction authority issues decisions on siting of nuclear installation construction and its decision-making pending the approval of ÚJD SR and of other regulatory authorities (Public Health Care Office of SR, labour inspection bodies). Authorization for nuclear installation construction, permission for temporary use of the facility instruction (including authorization for trial operation) and decision on construction approval (including authorization for operation of nuclear installation) are issued by ÚJD SR already as a construction authority. ÚJD SR exercises its competency as a construction authority and state administration authority for nuclear safety. Its decisions are based on its own partial decisions (partial approval of safety documentation), as well as on the opinion of relevant regulatory authorities - Public Health Care Office of SR (radiation protection), National Labour Inspectorate, Labour Inspectorate (labour inspection and safety and health protection at work) and other bodies and organizations of state administration (fire prevention, civil defence).

The license holder is responsible for nuclear safety.

Documentation, attached to the application for issuance of certain decisions of ÚJD SR is listed in Annexes No. 1 and 2. of the Atomic Act. The details on the scope, content and method of preparation of documentation are laid down by ÚJD SR Decree No. 58/2006 Coll.l., *laying down details on the scope, content and method of preparation of documentation of nuclear installations needed for the*

*individual decisions, (*as amended by the ÚJD SR Decree No. 31/2012 Coll.l. *and ÚJD SR Decree No. 102/2016 Coll.l.).*

3.1.3.2 *Regulatory Authority – ÚJD SR*

As at *1 March 2015* ÚJD SR employed *114* employees, of whom *97* were civil servants and 17 employees are performing work in public interest.

Organization structure is illustrated in Fig. 3.1.3.2.

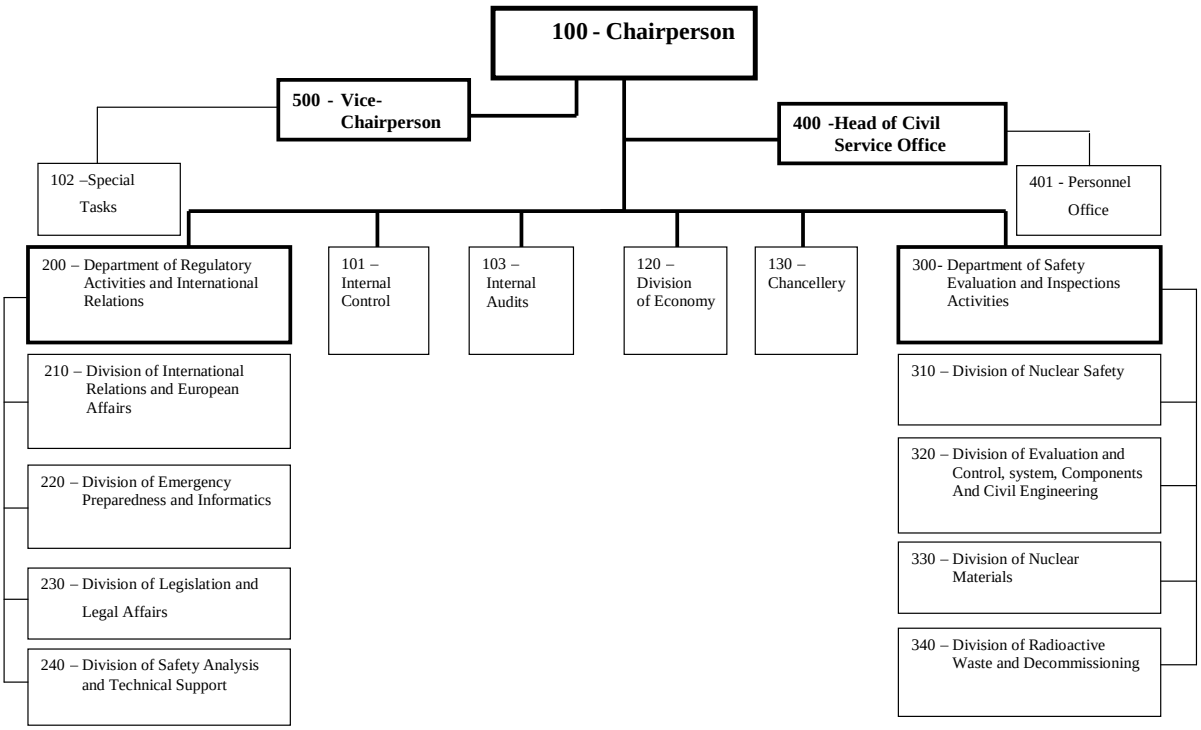


Fig. 3.1.3.2 Organizational structure of ÚJD SR

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

3.1.3.3 *Role of the Regulatory Authority*

Pursuant to the Act No. 541/2004 Coll. l., ÚJD SR discharges state regulation of nuclear safety of nuclear installations in particular:

- Performs inspections at nuclear installations controls compliance with the obligations resulting from this Act and from generally binding legal regulations issued on the basis of this Act, as well as obligations resulting from decisions, measures or regulations issued on the basis of the Atomic Act;
- Fulfilment of obligations arising from international treaties, by which the Slovak Republic is bound in the scope of this law,
- 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;
- 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;
- Checks performance of mandatory, reviews, operating controls and tests of classified equipment with respect to nuclear safety;
- Orders elimination of deficiencies having impact on nuclear safety, physical protection, emergency preparedness;
- Reviews nuclear safety, physical protection and emergency preparedness independently from the licensee;
- Checks the content, updates and exercising of emergency plans, which it approves or reviews, and organizes trainings on these;
- 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.

Methods of Regulation

Inspections

The tasks in the field of state regulation are fulfilled by the ÚJD SR inspectors. The inspections are governed by “Guideline for Inspection activity of ÚJD SR“. The guideline determines an integrated approach to inspections, in development and evaluation of the annual inspection plan, managing the

inspection program of ÚJD SR, preparation of documentation regarding the inspection activity and analysis of inspection activity of ÚJD SR.
The inspection plan is a tool for continuous and systematic evaluation of the inspection activity at nuclear installations. As a rule it is prepared for a period of one year and it covers all areas of supervision over nuclear safety in a complex way.

Inspections are carried out according to inspection procedures, which are part of the Inspection manual of ÚJD SR. For those inspection activities, for which no inspection procedures exist, there are individual procedures for inspection being developed.

Division of inspections

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

Planned inspections:

Routine inspections are used by an inspector of nuclear safety to check compliance with the requirements and conditions for nuclear safety, the condition of NI, compliance with the approved limits and conditions and selected operational procedures. Routine inspections are carried out primarily by site inspectors at the relevant nuclear installations. In case of an inspection, which by its focus exceeds the professional competencies of the site inspector, the inspection is carried out by nuclear safety inspectors from the Department of Safety Evaluation and Inspection Activities and the Department of Regulatory Activities and International Relations. Routine inspections are performed according to the procedures stated in the Inspection Manual.

Special inspections are carried out in compliance with the basic inspection plan. Special inspections focus on specific areas, in particular control of fulfilment of requirements and conditions of regulation pursuant to Section 31 Act No. 541/2004 Coll. l.

As a rule special inspections are carried out according to procedures stated in the Inspection Manual.

Team inspections focus on control of compliance with the requirements and conditions of regulation pursuant to Section 31 of Act No. 541/2004 Coll. l. and as a general rule they are performed in several areas at the same time. Team inspection is a planned inspection of areas defined on the basis of a long-term evaluation of results of the operator, resulting from the analysis of inspection activity. Under this guideline a team inspection is an inspection, where several departments are participating.

Unplanned inspections:

Unplanned inspections are carried out by nuclear safety inspectors in a form of routine, special or team inspections. These inspections are induced by the status of the NI (for example, commissioning phase of NI) or events at NI. It is a reaction of ÚJD SR to the situation that occurred at NI.

Rules valid for all types of inspections:

Inspections are basically announced in advance to the regulated entity. However, they can also be unannounced, if this is required by their focus or nature.

The relevant site inspector is advised about the inspection at NI in advance. As a general rule the site inspector takes part in the inspection.

Each inspection, which is performed by more than one inspector, has its chief of the inspection team.

Protocol from the inspection

Each inspection must be documented in a form of a protocol or a record. Binding orders to correct the established facts form part of the protocol. They must be clearly formulated so that they impose elimination of deficiencies established and clear with unambiguously set deadlines for fulfilment.

Analysis of inspection activity

Analysis of inspection activity contains statistical evaluation of findings. The purpose of the statistical evaluation is to establish distribution and frequency of findings from the inspection activity. On the basis of evaluated development of trends in findings from inspection activity it is possible to modify the inspection plan for the following period, in particular to those areas, where deficiencies of the regulated entity were detected the most.

Sanction

In accordance with the authorization for operation and management of RAW the requirements for nuclear safety and conditions of nuclear safety established or approved by the Regulatory Authority, are being monitored. In case of breach of nuclear safety the regulatory body can impose penalties to the licensee, as well as licensee's employees. In case of non-compliance with the requirements or violation of the law, the regulatory body is authorized to impose sanction to the holder of authorization, including financial penalty.

3.1.3.4 *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 are taking place focusing on nuclear safety review, in the health service, on evaluation of material degradation of primary circuit components, etc.

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

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

The mission visiting SR reviewed the following 11 areas:

- Government responsibilities and functions,
- Global nuclear safety regime,
- Responsibilities and functions of ÚJD SR,
- Management system,

- Issuing authorizations / licenses,
- Safety review and assessment,
- Conducting inspections,
- Law enforcement,
- Development of laws, decrees and guides,
- Emergency preparedness and response,
- Consequences of the accident at the nuclear power plant at Fukushima.

The IRRS mission confirmed a high level of regulation. It highlighted the work that has been done so far at ÚJD SR and ÚVZ SR, and the enthusiasm of their employees. Conclusions from the mission ÚJD SR transposed into an Action Plan.

The Action Plan to strengthen the regulatory framework was approved by the Slovak Government in November 2012.

A Follow-up mission was held from 24 February until 02 March 2015. The purpose of the IRRS Follow-up mission was to review the implementation of recommendations and suggestions for improvements suggested by the IRRS mission in 2012.

The mission completed that the Slovak Republic is fully engaged in harmonization of its regulatory framework with the safety standards of the International Atomic Energy Agency. The IRRS team further concluded that the recommendations and suggestions from the IRRS mission in 2012 have been systematically taken into account in a form of comprehensive Action Plan. In many areas significant progress has been made and many improvements have been implemented in accordance with the Action Plan.

Conclusions and findings of the Follow-up mission are implemented in cooperation with other competent national authorities (e. g. Ministry of the Health, Ministry of Interior). Report is available on the website of ÚJD SR:
http://www.ujd.gov.sk/ujd/WebStore.nsf/viewKey/IRRS_SK/$FILE/2015_IRRS_SLOVAKIA-FOLLOW-UP%20MISSION%20REPORT_FINAL%20SK.pdf.

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 are attending on a regular basis meetings of expert groups of the EU Council and the European Commission with the aim to exchange knowledge on reviews of the level of nuclear safety of nuclear installations in Europe and 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 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.

3.1.3.5 *Financial and Human Resources of the Regulator – ÚJD SR*

ÚJD SR as a Budget chapter, is linked with its revenues and expenditures to the state budget. In this context it should be noted that from 01 January 2008 *alternative funding of the regulator (ÚJD SR) was introduced in a form of annual payments* of contributions to state regulation of nuclear safety *payable by the license holders* (Act No. 94/2007 Coll.l*., amending the Act No. 541/2004 Coll.l. (Atomic Act)).* The Act e*stablished* the 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.The basic principle of the adopted law is securing 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.

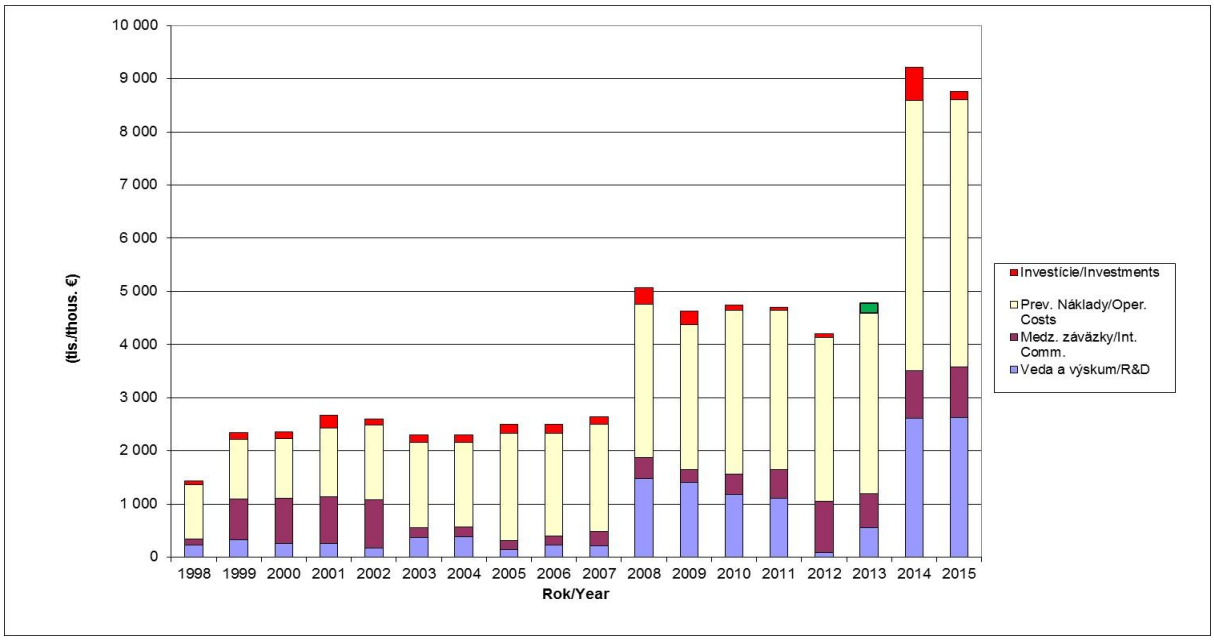


Fig. 3.1.3.5 Structure of the budget chapter

For year *2016* the budget breakdown ÚJD SR contained a determined total number of employees of *123*, of which *106* are civil servants and *17* employees working in public interest.

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

ÚJD SR ensures continuing education of employees through general education, but also specific training of inspectors through modules focused on areas of expertise related to the operation of nuclear facilities and activities in the field of nuclear energy.

3.1.4 State regulation in health protection against radiation

State regulation in the field of radiation protection in the Slovak Republic is part of the state health regulation the Public Health Authority of the Slovak Republic (ÚVZ SR).

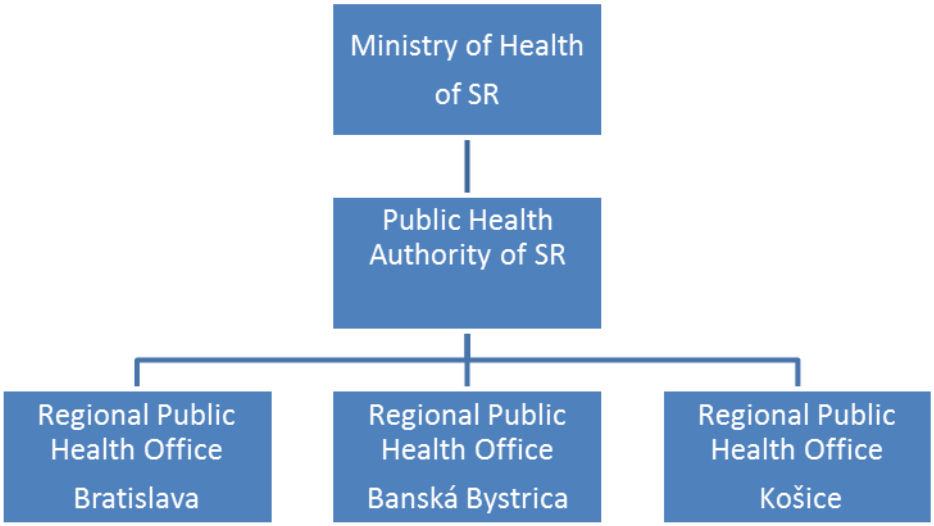


Fig. 3.1.4 Structure of state regulation in the field of health protection against radiation

3.1.4.1 *Procedure of granting a permit*

Requirements for authorization, conditions for issuing the authorization, details on the licensing procedure and duties of the holder of authorization/permit are provided by the Act No. 355/2007 Coll. l.

Permit from ÚVZ SR for activities leading to irradiation in relation to nuclear installations is not an ultimate granting of a license, however it is a condition for issuing the license by ÚJD SR.

3.1.4.2 *State regulation*

State health regulation is discharged by the staff of ÚVZ and the staff of RÚVZ. The person exercising state health regulation is, inter alia, authorized to enter lands, premises, facilities and plants and other areas of controlled entities, to request to be accompanied as necessary, to take samples in the quantity and within the scope necessary for examination, to request necessary information, documents, data and explanations, side letters / documents, technical and other documentation, to impose measures aiming at elimination of deficiencies found and block fines.

Through a measure the person exercising state health supervision may, for example:

- Prohibit the use of apparatus and equipment, having an immediate threat to health;
- To order closure of operation or part thereof, if establishing a risk of harm to health;
- To order implementing a measure to limit radiation exposure of staff and the public;
- To order safe removal of unused or damaged sources of ionizing radiation; radioactive waste or radioactive materials;
- To order development of special operational rules, work procedures and methodologies for performing an activity leading to radiation;
- To prohibit the activity or an operation;
- To order special measurement, analyses or examinations for the purpose of evaluating health damaging factors and their impact on health.

Oversight over securing radiation protection in activities leading to radiation exposure is foremost exercised by reviewing the proposal for performing the activity leading to irradiation in the phase of its licensing and then continuously depending on the nature of risk, which it represents.

Control over the activity is provided by:

- Conditions stipulated in the permit, which inter alia contains also requirements for systemic interim reporting and submission of information on the activity, on providing for radiation protection, results of monitoring, on events and changes in operating documentation;
- Inspections at the place of performance of activity, for which compliance with the requirements and conditions set by the law is being checked, the current status of radiation protection, documentation, status of equipment, adherence to regimes, monitoring systems, etc.

Inspections at the site are frequently linked with control measurements of radiation situation and sampling performed by the persons executing the oversight.

Inspections are in most cases focusing on a special area important with respect to radiation protection.

3.1.5 State regulation in the field of labour inspection

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) Labour Inspectorate Nitra executes oversight over compliance with the laws and other regulations relating to ensuring occupational health and safety at the workplaces of nuclear installations in the Slovak Republic.

Labour Inspection is:

a) Oversight over compliance with (inter alia):
   1. Labour regulations governing labour relations;
   2. Laws and other regulations to ensure occupational health and safety including regulations governing factors of working environment;
   3. Obligations resulting from collective agreements and other;
b) Drawing responsibility for breach of regulations stated under letter a);
c) Provision of free consultancy to the employers, individuals having businesses, but not being employers, and to employees within the scope of basic expert information and advice concerning the methods how to comply with the regulations stated under letter a) in the most effective way.

Obligations of an operator of nuclear installation, legal persons and natural persons vis-à-vis bodies of labour inspection result from the Act No. 124/2006 Coll. l., the Act No. 125/2006 Coll. l. and implementing regulations to these acts (see 6.2 Selected generally binding legal regulations and safety guidelines regarding nuclear, radiation and security, occupational health and safety).

3.1.5.1 *Activity of the Labour Inspectorate* Nitra

The Labour Inspectorate executes labour inspection within the scope as stipulated in the Act No. 125/2006 Coll. l. and an oversight according to special regulation, in particular it supervises whether the requirements for OH&S are satisfied with respect to, for example:

- Selection, location, layout, use, maintenance and control of the workplace, working environment, means of work;
- Work procedures, working time, organization of labour protection and system of its management;
- It investigates the causes of industrial accidents, which caused death or serious injury, imminent threat of major industrial accident, technical and organizational causes of: occupational diseases and threat of an occupational disease, maintains the records of these, and where appropriate, investigates the causes of other industrial accidents;
- Through a binding opinion it applies requirements for ensuring occupational health and safety in permitting and granting final permission for use of structures and their changes;
- Revokes license or certificate issued to a natural person or to a legal person to perform activities according to special regulations;
- Discusses offenses, takes decisions about imposing fines for offenses and on prohibiting activity according to special regulations.

The Labour Inspectorate in executing labour inspection is independent and the labour inspection is performed by labour inspectors.

Besides a standard activity the Labour Inspectorate Nitra executes also labour inspection regarding the status of occupational health and safety, including the safety condition of technical equipment (including NI): pressurized equipment, lifting equipment, electrical equipment and gas equipment pursuant to the Decree No. 508/2009 Coll. l, specifying the technical equipment considered to be classified technical equipment. It also executes labour inspection on technical equipment, which is a designated product after being introduced to the market or after their putting into operation.

Types of technical equipment are divided according to their risk level as group A, group B or group C. Group A covers technical equipment with high risk level, group B covers technical equipment with higher risk level and group C includes technical equipment with lower risk rate. Technical equipment of group A and technical equipment of group B are considered as classified technical equipment.

3.1.5.2 *Supervision methods of labour inspection body*

Labour inspector in executing labour inspection is authorized to:

- Enter the premises and the workplaces freely and at any time that are subject to labour inspection under the established rules provided by the relevant regulations for workplaces of nuclear facilities;
- Perform inspection, test, investigation and other attendance with the aim to establish compliance with the regulations for ensuring occupational health and safety;
- Request supporting documentation, information and explanations relating to application of regulations for ensuring occupational health and safety;

- Request submission of documentation, records or other documents necessary for executing labour inspection and to request copies thereof;
- To take necessary quantity of samples of materials or substances necessary for an analysis, which are in use or being handled, for the purpose of analysis;
- Request the proof of identity of an individual being at a workplace of an employer and to explain the reason of his / her presence.

Labour Inspectorate Nitra is authorized to execute labour inspection at nuclear facilities with a focus on checking the status of occupational health and safety, the safety status of technical equipment, the relevant documentation, accompanying technical documentation, periodical tests of classified technical equipment, and other.

After the inspection the labour inspector proposes measures, imposes measures and obligations to adopt measures to eliminate any breach of regulations found and their causes, and the obligation to submit to the Labour Inspectorate Nitra an information about fulfilment of measures aimed at elimination of breaches of regulations and their causes.

3.2 Operator´s Responsibility

Article 9

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license, and shall take the appropriate steps to ensure that each such licensee meets its responsibility.

3.2.1 Act No. 541/2004 Coll. I. as amended – Obligations of the Operator against the Regulator

Nuclear energy may only be used for peaceful purposes and in accordance with international commitments; the levels of nuclear safety, reliability, safety and health protection at work and safety of technological facilities, protection of health from ionizing radiation, physical protection, emergency preparedness and fire protection must be achieved upon using nuclear energy so as to keep the life, health, working an environment-related hazards as low as can be reasonably achieved according to the available state-of-art knowledge.

The licensee is responsible for nuclear safety and this responsibility cannot be delegated. The operator is liable to provide adequate funds and human resources to ensure nuclear safety, including the necessary engineering and technical support activities in all areas related to nuclear safety. The authorization holder must pay attention to the safety issues prior over any other aspects of the authorized activity (“Safety first“).

Any modifications of 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 ÚJD SR has been obtained and in special cases after

having obtained the statement of the European Commission. Other modifications must be notified to the Authority, or submitted for review.

The licensee is required to fulfil his notification obligations towards the Authority, and also to continuously meet the requirements and review periodically nuclear safety with the aim to continuously increase nuclear safety to the highest reasonably achievable level, while applying safety culture.

4. General Safety Aspects

4.1 Priority to Safety

Art. 10

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

4.1.1 Principles and definition of nuclear safety

In sense of 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.

Nuclear energy may only be used for peaceful purposes and in line with *national strategies,* international treaties *and in accordance with the national legal framework and legal acts of the European Union.*

The use of nuclear energy for other than peaceful purposes is prohibited.

The use of nuclear energy shall be justified by benefits outweighing potential risk of such activities, in particular when compared with other ways, which accomplish the same purpose.

In using nuclear energy, priority emphasis shall be given to safety over any other aspects of such activities.According to the Atomic Act § 3:

during the uses of nuclear energy such level of nuclear safety, reliability, occupational health and safety and security of technical devices, health protection against ionizing radiation, physical protection, emergency preparedness and fire protection must be achieved, in a manner that a risk of threat to life, health, working conditions or the environment was based on available knowledge as low as reasonably achievable, and must not exceed the exposure limits. When obtaining new significant information about the risks and consequences of using nuclear energy, the given level should be reconsidered and necessary measures must be taken to comply with the conditions according to this law.

4.1.2 Concept of nuclear and radiation safety

The purpose of safety policy of nuclear installation operators is to set safety goals, requirements, fundamentals, principles, responsibilities, measures and methods of their implementation for all safety areas, such as the nuclear safety and radiation protection, environmental safety, operational safety, security, physical safety, occupational health and safety and protection against fires, safety

of integrated information system and telecommunication network, protection of classified information, emergency planning and civil protection, personal safety, administrative safety, financial safety, protection of goodwill and planning continuity of activities.

The safety policy is pursued through internal management acts, as well as through checking compliance with these at all levels of company management.

The observance and fulfilment of safety policy content by all employees belongs to main priorities and objectives; safety is an integral part of all activities.

To achieve safety goals the main safety requirements and principles of nuclear safety and radiation protection are set:

- Nuclear safety and radiation protection is a priority and it is superior over any other interests of the company.
- Every employee is responsible for nuclear safety and radiation protection within the scope of his / her competencies, responsibilities and functional responsibilities.
- In all activities relating to nuclear installations principles of safety culture apply.
- Principles of defence in-depth strategy, i.e. multi-level, mutually over lapping measures aimed at prevention, in particular, but also at mitigation of accidents apply in the design of nuclear installations and activities relating to operation of nuclear installations.
- Systems and components having relevance from the safety aspect are tested on a regular basis, with the aim to verify their functionality and operability.
- Safety audits of individual safety systems are carried out periodically.
- The quality management system is developed in compliance with the requirements of the legal order of the Slovak Republic, regulatory authorities, recommendations from the IAEA and the requirements of STN EN ISO 9001:2009 standards.
- The latest knowledge and experience from operation of nuclear installations within the country and abroad are being utilized on a permanent basis.
- International assessments and reviews are utilized on a regular basis to get an independent assessment of the nuclear safety and radiation protection levels.
- An open dialogue with the public, the local and regional bodies of state administration and self-government is applied.
- Safety risks relating to nuclear safety and radiation protection occurring at present are being identified, analyzed, classified and managed across all levels of management. More serious risks are submitted to the Nuclear Safety Committee being the advisory body to the top management of the Operator.
- The operators are spending adequate material and financial resources to achieve the safety goals and fulfil the safety requirements, rules and principles of nuclear safety and radiation protection, improve education and qualification of employees.

The primary responsibility for nuclear safety and radiation protection rests with the licensees.

4.1.3 Role of the Regulatory Authority in nuclear safety

Pursuant to Act No. 541/2004 Coll. l. (Atomic Act) ÚJD SR issues an authorization or a license for use of nuclear energy to natural persons and to legal entities. Section 7 of the Atomic Act defines general and special terms and conditions, which the applicant must fulfil in order to get the authorization or a license. The general terms and conditions according to § 7 par.1 and 2 include capacity for legal acts, integrity of natural person or the person being the statutory body or member of the statutory body, demonstrating a functional technical equipment for the activity being applied for and proving sufficient number of permanent staff with the required qualifications. On the basis of the foregoing, as a condition for issuing authorization or license ÚJD SR requires the following:

1. The Operator's management shall take the relevant steps in order that all the organization units involved in activities directly relating to nuclear installations comply with the policy attributing due priority to nuclear safety;
2. To respect division of competencies so that the primary responsibility for safety of nuclear installation is with the licensee;
3. Coordination of tasks of nuclear safety by an independent unit for nuclear safety within the organization structure of the licensee. The scope of activities of this unit shall be submitted to ÚJD SR. ÚJD SR must be informed about appointment of the head of this unit, as well as on changes in their scope of activity at least one month prior to such changes or appointment taking effect.

In the area of meeting the requirement of professional competence, the Atomic Act includes the obligation of the applicant to demonstrate sufficient number of permanent staff with the required qualification. The necessary number of permanent staff and their required qualification is determined by the licensee himself, and that is in the quality system documentation, which is approved by ÚJD SR.

With regard to professional qualification, interesting is the provision of another law, namely Section 7 par. 1 and par. 2 b) of Act No. 251/2012 Coll.l. This provision implies that the authorisation to conduct business in the energy sector, inter alia, requires also professional capacity of the applicant to carry out the required actions proved by a certificate. In case of a legal person, who applies for a license to produce electricity using nuclear fuel, a condition for issuing such license is professional competence of a member of a statutory body to carry out the requested actions proven by a certificate and completed university degree of the first level in technical, economic or natural sciences field of study focusing on mathematics, physics or chemistry and four-year practical experience in the energy sector or university degree of the second level in technical, economic or natural sciences field of study focusing on mathematics, physics or chemistry and three years of practical experience in the energy sector. In case of natural person, professional competence is proven by the applicant or his representative responsible. The authorization itself for doing business in the energy sector is issued by the Regulatory Office for Network Industries. Issuing license for production of electricity does not affect the obligation of the license holder to obtain licenses and authorisations for the use of nuclear energy under the Atomic Act.

4.1.4 Safety of technical equipments

Labour inspection is performed by the labour inspectorate Nitra. It focuses primarily on compliance with the legal regulations to ensure occupational health and safety, including relevant consulting. Yet an integral part of occupational health and safety is the safety of the technical equipment. This is characterized by the physical status of individual pieces of equipment ensuring their strength, tightness, reliability and functionality within the scope of designed operating limits and conditions throughout their life cycle. Its integral part is maintaining technical documentation of the equipment and technical and organizational measures aiming at reliability of operation without threat to persons or property.

4.2 Financial and Human Resources

Art. 11

1. *Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.*
2. *Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation throughout its life.*

4.2.1 Financing of operations and of safety improvement programs

One of the principles of nuclear *safety* and radiation *protection* of the license holders is a commitment to available necessary financial resources for nuclear *safety* and radiation *protection* and to ensure the continuous education and qualification of its staff. For the *license holders* to be able to meet this commitment, financial strategies were established within the companies, which in addition to the tasks mentioned, would allow them to have a development program.

Financial strategy of operators is defined as securing financing of operational and investment needs of the company with optimal utilization of its own and external resources.

4.2.2 Financial resources for the decommissioning programs of NI and RAW treatment

Act on Nuclear Fund sets the rules for management, contributions and the use of the Fund. The basic source of the Fund is an obligatory contribution from license holders operating a nuclear installations that generate electricity, for every megawatt of installed electrical power and from the selling price of electricity produced in the nuclear installation.

The purpose of the National Nuclear Fund (hereinafter only as the Fund) is to collect and manage financial resources determined for the back end of nuclear energy in sufficient level and in a transparent and non-discriminatory manner to provide these funds to the applicants to cover eligible costs incurred for activities related to the back-end of nuclear energy.

Implementing EC Decision on State Aid (SA.31860 (N506/2010) – Slovakia), partial financing of decommissioning of the shutdown nuclear power plants (A1 and V1), dated 20 February 2013, approved the procedure for the establishment of contributions from the operators of transmissions

networks to cover the so-called historical debt for NPP A1 and NPP V1. Annual collection represents an amount of approx. 70 mil. €. This amount was historically set to envisaged minimal annual requirement for covering the costs of decommissioning of NPP A1 and NPP V1.

Another source of financing for decommissioning of NPP V-1 is the Bohunice International Decommissioning Support Fund (BIDSF), which was established on the basis of Framework Agreement concluded between the Government of the Slovak Republic and the European Bank for Reconstruction and Development.

Part of the costs related to the decommissioning of NPP A1 and NPP V1 and treatment of RAW from the decommissioning of NPP A1 and NPP V1 is paid from own resources of JAVYS, a. s., which is the owner of these nuclear facilities.

4.2.3 Human Resources

High quality of human resources is the basic prerequisite for providing for safe, reliable, economical and ecological operation of nuclear installations. The term “high quality human resources“ means a summary of professional, health and mental capacity of employees for performance of work activity with licensees. From the view of influence of work activities on nuclear safety the staff of the licensee are divided into two basic groups:

- Employees having direct impact on nuclear safety – selected employees, whose special professional competence is verified by an exam (written exam, oral exam and verification of competencies on a representative full-scale simulator) and a practical exam before an examination committee for selected employees, which is established by ÚJD SR, which issues License of Special Professional Competence;
- Employees having impact on nuclear safety – professionally competent employees, whose professional competence was verified by an expert committee established by the operator of a specialized facility in a form of written and oral exams and which issues a Certificate of Professional Competency. Depending on the nature of works they are divided to daily and shift professionally competent employees.

Special professional competence of employees according to Atomic Act means a summary of expertise, practical experience, principal attitudes and knowledge of generally binding legal regulations and operating procedures issued by the licensee for ensuring nuclear safety, which is necessary for performing work activities having direct impact on nuclear safety.

Professional competence means summary of expertise, practical experience, knowledge of generally binding legal regulations and operating procedures issued by the licensee and necessary for performing work activities of licensee´ employee. Professional competence is acquired by successful completion of training at a specialized facility.

The licensee is responsible for general (professional, health and mental) capacity of his employees to perform work activities at nuclear installations. The licensee charges his employees with performance of work activities. For every selected and professionally competent employee a “Authorization to perform work activities” is issued as part of integrated management system (IMS) of quality assurance

for nuclear installation – licensee. Authorization to perform work activities is issued for the given job position and a specific nuclear installation only for those selected and professionally qualified staff of the licensee, who hold valid certificates of special competence or certificates of professional competence and completed the relevant type of training. The authorization is an evidence of working competency of an employee in relation to regulatory authorities.

In the system of professional training each position has defined requirements for education, experience, training, health and mental capacity. The direct supervisor of the employee is responsible for meeting these requirements.

System of staff training of the license holder is updated based on operational experience, organizational changes, technical changes (upgrading) of equipment, requirements of regulators, audits, reviews and IAEA recommendations. It is provided for by the necessary human, financial and material resources.

Staff training of the license holder, as well as third parties (third parties are supplier organizations) is carried out in accordance with the documents of the *integrated management system,* developed and maintained in accordance with:

- Generally binding legal regulations of the Slovak Republic,
- IAEA regulations, recommendations and guides,
- Series of standards STN EN ISO 9001:2009 and 14001:2004,
- Management documentation in the Quality System.

Management documentation for the human resources sets the procedures and responsibilities for:

- Selection of staff and assignment of staff for positions,
- Defining the goals of training,
- Description of the methodology used in the training, based on systematic approach that logically progresses from identification of competencies through development and implementation of training programs, including the appropriate teaching aids for subsequent evaluation of this training,
- Staff development,
- Obtaining and maintaining the general competence of staff of the supplier sector,
- Description of training documentation management and records on training,
- Division and definition of competencies and staff responsibilities in relation to their training.

Scheme of the staff training system is shown in Fig. 4.2.3.

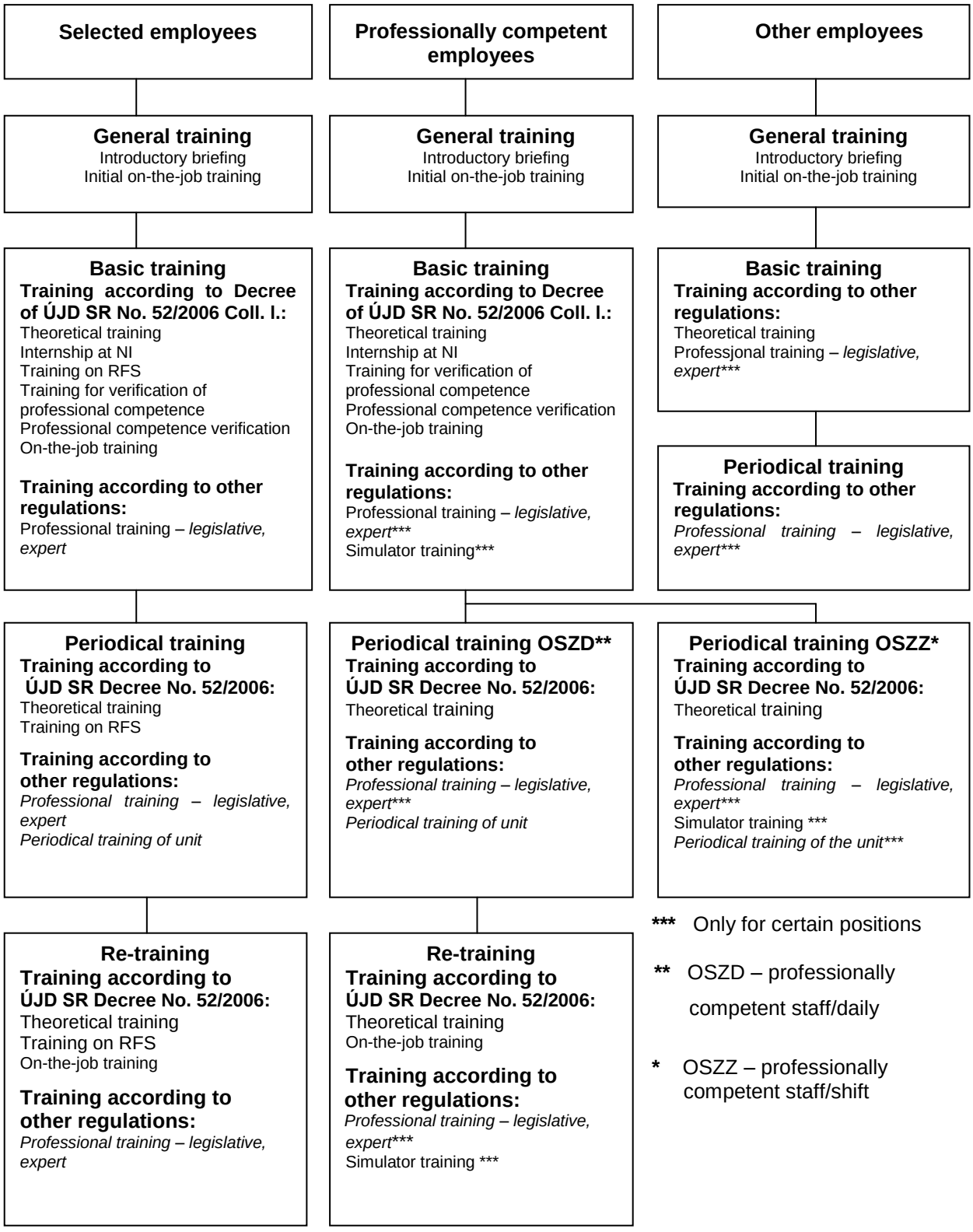


Fig. 4.2.3 Chart of Professional training system for employees

With respect to impacts on nuclear safety the employees are assigned to the relevant type and phase of professional training and they are divided according to performed work activities into six categories, which are further sub-divided into occupational groups and sub-groups, according to their professional orientation:

Training category I

In this category of training there are specially professionally competent staff – selected employees performing work activities (managerial, handling) with direct impact on nuclear safety of NI: secondary circuit operator, primary circuit operator, reactor unit supervisor, shift supervisor, control physicist and employees performing work activities with impact on nuclear safety (according to TPP catalogue), for example.: lecturer for simulator training.

Training category II

In this category of training there are professionally competent staff - managers, heads, specialists, engineers, technicians, technology experts, foremen, or others performing work activities – managerial, technical, engineering, inspection, maintenance – with impact on nuclear safety of NI in 14 professional groups.

Training category III

In this category of training there are professionally competent staff – machine attendant, fitters, electricians, or others performing work activities – operator and maintenance – with impact on nuclear safety of NI in 9 professional groups:

S – training category

This category of training includes selected staff performing work activities with direct impact on nuclear safety of NI – leading scientists for the start-up.

M – training category

This category of training includes professionally competent staff performing work activities with impact on nuclear safety of NI, in managerial positions in SE, a.s.: SR nationals with experience from international nuclear institutions - IAEA, WANO, INPO, etc. or in nuclear power companies and foreign staff.

T – training category

This category of training includes professionally competent staff performing work activities with impact on nuclear safety of NI – foreign staff – technician, technology experts, specialists in SE, a.s., not in management work positions.

Training category IV

From 2016 is integrated into training category III.

Training category V

This category includes professionally competent staff providing for decommissioning of NI and handling RAW and spent fuel, with impact on nuclear safety (only JAVYS, a.s. staff).

Training category VI

This category includes other staff performing work activities without impact on nuclear safety of NIs.

Facilities for staff training

The training and exercise of employees of the licensee, as well as of contractor staff is carried out at specialized facility, which is holder of authorization for professional training issued by ÚJD SR on the basis of written application upon assessment of the technical equipment used in professional training and competence training of the applicant's staff. The training is performed in compliance with the approved system of training according to the staff training programs. The following full scope simulators are available:

- at VUJE, a. s. – in operation and Unit 3 of NPP Bohunice is a reference unit,
- at NPP Mochovce – in operation and Unit 1 of NPP Mochovce is a reference unit,
- at NPP Mochovce 3&4 – under construction and Unit 3 of NPP Mochovce 3&4 is a reference unit.

Severe Accident Management

SAM project being currently implemented in both NI NPP Bohunice and NI NPP Mochovce is based on originally defined scope with assumptions for occurrence of a severe accident on only one of the two units. In view of the lessons learned the project completion will be followed by evaluation of a possible extension to management of a severe accident on both units at the same time. Further SAMG improvement and preparation of additional supporting documents for decision making by SAMG and main control room teams will be adopted based on results of validation at the project completion.

Significant element in improving the staff qualification is cooperation with the universities, in particular in form of post-gradual and distance study at the Slovak Technical University, the School of Economics and the Comenius University in Bratislava. To train control physicists at the research and school reactors, cooperation with foreign research and educational institutions in the Czech Republic, Hungary and Austria is being utilized.

4.3 Human Factor

Art. 12

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

The basic approach to development of individuals is using the principles of active listening and questioning. This leads the employees to attempt to develop their own activity in finding answers and problem solutions and to responsibility in the given working area.

Particular importance is given to the existing conditions at the workplace that affects the behaviour and which result from the organizational processes, culture or other conditions.

Importance is also attached to a set of management and leadership practices, processes, values, culture, corporate structures, technology, resources and control mechanisms that influence the behaviour of individuals at the workplace. The basic objective of introducing them was to minimize the number of events with serious consequences, the direct cause of which was a human error. To achieve this two basic approaches are applied:

- Minimizing the active and latent human errors, which lead to events having consequences in the whole process of management of nuclear power plants.
- Reducing the severity of events by identifying and eliminating deficiencies in barriers against occurrence of events with consequences.

The aim of the so called Human Factor Reliability Program is to improve functioning of the organization in the field of nuclear safety, occupational health and safety, radiation protection and other safety areas. The objective can be achieved by improving the staff behaviour, which will lead to prevention of human error occurrence and creating solid organizational barriers through setting, defining and implementing:

- standards and expectations in the field of human factor reliability,
- responsibilities and powers under the program,
- instruments for human error prevention,
- initial and periodic training and practical training in the field of human factor,
- observing and coaching of employees at work,
- rapid *information on* events affecting human factor,
- monitoring and evaluation of program effectiveness.

4.3.1 Management and organizational measures

Management documentation relating to human factor impacts

The human factor is a significant factor affecting safe and reliable operation of nuclear installations. For this reason due attention is paid to human factor issues in the system of quality assurance management. The licensee focuses mainly on factors pertaining to the given job and a given person. Factors are incorporated into the given working environment and influence the behaviour of the employee during work (the precursor of errors).

Protection, including technical, administrative, cultural or regulatory mechanisms, which under certain conditions fails in protecting people or equipment, will not prevent the execution of active error and will not prevent consequences of an error. For this reason tools have been introduced to prevent human errors. The use of these tools should change the behaviour of the employees and thus to reduce the risk of occurrence of human error.

Several documents of the quality management system are related to this:

- Addressing events at nuclear installations,
- Tools to prevent human errors,
- Management observation and coaching,
- Rapid *information on* events with humand factor *and expert review,*

- Timekeeping of human reliability and performance indicators,
- *Initial,* periodic *and extraordinary* training in the field of human factor reliability,
- Walk-down inspection by members of the company management,
- Walk-down inspection by heads of sections,
- Walk-down inspection by shift personnel,
- Labelling of technical equipment put into secure condition based on S-Order, as deficiency, short-term adjustment and temporary modification,
- Organization of periodical tests of systems and equipment,
- Working capacity, organization and implementation of training employees and contractors,
- Content and form of documentation and manual for its development,
- Organization of safe work and rules for shift operation,
- Independent audit.

4.3.2 Methods used to prevent human errors

Methods used in the power plants are based on the five basic principles of human factor reliability (WANO Excellence in Human Performance, 2002):

1. **People are fallible and even the best ones make mistakes.**
2. **Situations, where an error is more likely, foreseeable, prevention is possible and thus the error is not inevitable.**
3. **Individual behaviour is influenced by organizational processes and values of the organization.**
4. **People reach high quality of work mainly on the basis of encouragement and praise from the leaders and colleagues.**
5. **Events can be avoided by understanding the causes of errors and to apply lessons learned from the past events, and not by asking a question: "Who made the mistake"?**

There are several methods and systems available to prevent human errors. The most important ones include:

- Staff training and exercise described in more details in chapter 4.2.3,
- High-quality *and available* documentation,
- Application of system of rules *and instruments to prevent human errors* when performing works on the facility,
- Testing systems and equipment on the basis of "Surveillance programs",
- Transparent labelling of equipment,
- Control and walk down inspection,
- *Observation and coaching.*

Operating and maintenance staff performing activity according to the approved documentation, which is continuously maintained, updated and amended pursuant to the requirements as defined by the relevant quality assurance standards (for more details see chap. 5.3.3.).

Handling, activities and procedures, which are not described in the valid operating documentation, can only be performed on the basis of a program developed and approved in advance.

Significant reduction of the probability of human errors at occurrence of failure or emergency conditions and thus also improved defence in-depth have been achieved by introducing symptom-oriented operating procedures. These guidelines undergo process of validation during their revisions in number of cases also in a form of training on the full scope simulator with the aim of their subsequent use.

In order to prevent human errors by the staff during repair and maintenance works, reconstruction and implementation of design changes on the technological equipment a system setting the rules for performance of works on the equipment of NPP is introduced and described in the Quality Assurance (QA) standards on the basis of the following permissions:

- ***Job**, managing document in both electronic and printed form serving to perform work in a safe and efficient manner. „Job" is a document permitting execution of work required on the equipment with relation to sequence of activities in related documents, i.e. determines the time, job description, schedule of operations – their resource and material needs, list of requisite controls for individual operations, list of documents needed to perform the works.*
- ***ZP-Clearance Order**, electronic or printed order for a secure clearance of an equipment for maintenance. It defines the type, location, time and method of clearance, identifies equipment isolating work place from surrounding technology, its positioning and measures against ineligible configuration change, conditions of work performance and putting the equipment into operable condition after the maintenance intervention. It sets out the necessary safety measures and the positions of staff members responsible for individual steps in this process.*
- ***M-Order**, a document to perform unscheduled non-standard handling by the operating personnel of the technology of NPP, which is not described in the applicable operating documentation. As a principle, it is issued by the reactor unit supervisor of the relevant Unit, on which action is to be performed, in consultation with the lead worker. The lead worker must perform the intervention exactly as described in the M-order, shall not perform any other handling or change the order of handling operations. Validity of the M-order is limited by the shift duration, during which the M-Order was issued.*
- ***B-Order**, a document on ordered technical and organizational measures to ensure safety of workers when working on electrical equipment or near them. It is issued and closed by the shift operations foreman for the electrical parts.*
- ***R-Order**, written order to perform work in conditions of increased radiation risk, which determines the location, time and conditions of work, the necessary measures and means for radiation protection, the composition of the working group and listing by name of the persons responsible for compliance with the radiation protection rules. Validity of the R-Order is usually 24 hours.*
- ***PO-Order,** an order to execute activity with an increased risk of fire, is a printed order about ordered technical and organizational measures used to ensure security of the equipment and fire*

safety in the conduct of activity. Work can begin only after fulfillment of all designated fire prevention measures in the PO-order. PO-order does not replace other documents for clearance of equipment (ZP-order, R-order, or B-order) or documents for execution of the work on the equipment itself (Job), etc.

- ***A-Permit**, clearance document for work on equipment of technical means of physical protection or in the protection zone of these devices, with a risk of possible activation, performed by the staff of SE, a. s., or contractor staff.*

Any works on the technological equipment of the nuclear installation can only be performed with one of the orders mentioned above. As a principle no work can be commenced by the daily staff, interrupted, or completed without the knowledge and consent from the relevant shift foreman and the operating staff.

Performance of equipment tests:

Significant reduction of human error probability during testing of equipment can be achieved by application of extensive "Surveillance programs" (for more details see chap. 5.3.3.).

Control and walk-down inspection activity

System of walk-through and control activity is described precisely in the quality system documentation. From the hierarchy point of view it is subdivided to:

- "Walk-down checks by the shift personnel" - the documents contain definition of personnel's obligation when performing these checks together with the procedure for reporting deficiencies found. The sheet for walk-down inspection is developed for each shift position together with the route and frequency of inspection. The activity focuses on detecting deficiencies on the equipment so that this periodical check according to the prescribed instruction with a high probability *leads to detecting* important facts due to failure of human factor.
- "Control and walk-through activity by the managerial staff" – described in chapter 4.3.1.

Other measures applied by the operator to prevent human errors:

- Colour identification of documentation by units on the site, which prevents any errors due to potential confusion of units;
- System of labelling technological equipment being under repair or with a failure using tabs or labels, which shall ensure permanent visual inspection and an overview about equipment in operation, under maintenance or repair;
- System of checklists for handing over and taking over shift for the staff of block control rooms – the checklists are used to check and tick the condition of the equipment, defects, failures, etc., which is to prevent potential human error due to not transferring an important piece of information from one shift to another shift;
- System of checklists for taking over the safety systems from a repair condition serves for excluding staff errors resulting from incoherent putting the equipment into the relevant status;
- Independent review of correctness of handling and the correct position of equipment components and systems important for safety – the aim is to prevent failure or false incorporation of systems

important for the safety of the power plant caused by human error. An independent review means handling being performed by one person, while another person is watching.

4.3.3 Methods of detecting and correcting human errors

Detecting human errors and adopting measures to prevent their recurrence in the future is an integral part of the system to investigate operating events at nuclear installations and their root causes, for which there are specialized groups set up within the safety departments of the nuclear power plants. chapter 5.3.5 describes the process of investigating events at nuclear installations in detail. Here we are only describing some aspects relating to human factor.

There are standards, requirements and expectations for human factor reliability. The basic standards, requirements and expectations in human factor reliability are complemented with expectations defined in the **Model of values and behaviours of SE, a. s.** The standards, requirements and expectations defined in the program are in compliance with the mission, values and expected behaviour, vision and strategy of SE, a. s. All employees shall comply with the established standards, requirements and expectations for the human factor reliability program.

Managing staff are examples models in compliance with the standards, requirements and expectations for the human factor reliability program. When working they apply observation of using instruments for prevention of human errors, compliance with operating procedures and meeting expectations of the organization. Its objective (using the methods of observation, recording facts and coaching) is to achieve immediate or subsequent closing of the gap between the required and actual behaviour of the employees.

The object of observation is the behaviour of the staff, not the equipment.

The results of observations are documented in the record of observation.

Observation at work consists of the following parts / phases:

- Planning of observation,
- Preparation for observation,
- Observation itself,
- Record of findings,
- Processing and analysis of findings,
- Implementation of corrective actions.

The process of reporting on events by means of rapid information on events with human factor

Rapid reporting on events with human factor is carried out immediately after the incident, which was caused by human error or the course of which and / or consequences are aggravated by human error.

Rapid reporting is required in the following cases:

a) For all events meeting the criteria for human factor clock reset of the plant,
b) For all events meeting the criteria for human factor clock reset of the department.

Rapid reporting on events with human factor is carried out on two levels:

- On the plant level,
- On the department level.

The results of investigation of an event with human factor clock reset plant are discussed by the Extraordinary Failure Commission for human factor of the plant.

The results of investigation of an event with human factor clock reset department are discussed by the Extraordinary Failure Commission for human factor of the department.

The aim of rapid reporting on events with human factor is to:

- *Provide in a reasonably short period of time initial view of the event and its direct causes,*
- *Provide a basis for determining, whether and which criteria for reset of the timer of the human factor were met,*
- *Formulate lessons learned from human error during an event for the staff, to promptly inform the employees of NI,*
- *Identify human error that contributed to the emergence and course of events and to identify the causal factors that led to the human error,*
- *Set transitional and permanent compensatory measures to prevent the recurrence of human error or to mitigate its consequences.*

Rapid reporting starts immediately after identification of events involving human factor to ensure that the information and the statements by the personnel are collected when they are still fresh in the memory of the personnel concerned. Requirements for timely investigation (the dates for commencement and completion) are the following:

1. *In case of an event involving human factor requiring rapid information on events with human factor at the plant level is required to start within 12 hours of the identification of the event and to complete it within 24 hours of the event identification;*
2. *In case of events involving human factor requiring rapid reporting on events with human factor at the section / unit level, is required within 24 hours of the event identification and to complete it within 48 hours of the event identification.*

One of the effective methods used for detecting and subsequent correction of human errors is the HPES method (Human Performance Enhancement System). This methodology was developed in the US and later on it was adopted as a general instruction for analyzing operating events at nuclear power plants.

Process of investigating events with the help of HPES

The HPES system includes three main areas of evaluation:

- WHAT had happened
- HOW it had happened (mechanism)
- WHY it happened (cause)

The HPES method utilizes several techniques of analyses as an instrument to reveal causes of situations influencing human performance. These techniques are applied by the operators depending on the type of operating event.

SE, a. s., uses the process of investigating events by means of TapRooT- TapRooT System is based on analysis of patterns, rules and theories of human activity and reliability of equipment and on application of these rules with the aim to improve performance. The result of problem analysis by TapRooT system is identification of all causes of the problem occurrence, as usually the problem has several causes. By using this system other causes do not remain hidden (not visible), which improves significantly the conditions for determining effective corrective measures.

Feedback-System of corrective and preventive measures

Rapid reporting on events involving human factor is not intended to replace the standard investigation of operational events using methods of root cause analysis (RCA) or apparent cause analysis (ACA). Results of human factor analyses are incorporated into the root causes analysis or analysis of apparent causes. The result of investigation of a failure event is identification of the root cause of its occurrence and a subsequent adoption of measures to prevent recurrence. Efficiency of this process is evaluated and analyzed on a regular basis. The results, together with other proposed measures and recommendations, are processed and submitted to the management.

For all events there is also standard investigation carried out following the procedures in the System of Remedy and Prevention (SNaP), the result of which will be a report submitted to the Committee for the system of remedy and prevention (VSNaP) for discussion.

The personnel receive training on results of investigation of causes of events and their analyses on a regular basis. Besides that this information is available also from the company computer networks.

To improve the safety culture and for self-assessment the operators develop action plans for safety culture, which are evaluated on a yearly basis and submitted to the plant management for approval. The action plan is of a general application for the operator. Safety culture indicators are defined to evaluate it.

4.3.4 The role of the Regulatory Authority

The Atomic Act defines requirement for the professional competence of staff of the licensee, determines the methods and conditions for verification of professional competence and defines the conditions for issuing authorization for training of staff of licensees.

Work activities, which can be performed only by professionally competent staff or selected staff, training of professionally competent or selected staff, setting up an expert committee and the examination committee, the method of verification of professional competence and special professional competence of staff – licensees, issuing certificates on professional competence, issuing licenses on special professional competence, issuing authorizations for performance of work activities is stipulated by ÚJD SR Decree No. 52/2006 Coll. l. on professional competence as amended by the ÚJD SR Decree No. 34/2012 Coll. l.

ÚJD SR approves the system of staff training of the licensee, training programs and implementation of a change in documentation for professionally competent staff and the technical equipment of the specialized facility.

Special professional competence of staff – licensees – is verified by the examination committee for selected staff, established by the ÚJD SR. Members of the examination committee for selected staff are appointed and removed by the chairman of the Authority. Activity of the examination committee is governed by the statute of the examination committee for selected staff, which is developed by the Authority.

The licensee shall apply for verification of special professional competence through an application. Verification of special professional competence consists of a written test and a practical test. The test consists of: written verification, oral verification and verification of competencies on a representative full scope simulator (hereinafter only as "RFS"). After successful verification of special professional competence ÚJD SR issues to the applicant a license on special professional competence having validity for three years. ÚJD SR keeps records on issued licenses on special professional competence.

Professional competence of staff – licensees – is verified by the examination committee set up by the operator of specialized facility. Activity of the examination committee is governed by the statute of the examination committee, which is developed by the operator of specialized facility. The exam consists of a written test and an oral part and after passing the test the operator of specialized facility shall issue certificate of professional competence to the applicant.

The regulatory activity resulting from the Atomic Act is carried out in the field of qualification and training of staff of the licensee through regular inspections. The subject of the inspections are the implementation of the staff training system, control of documentation used for staff training, etc.

ÚJD SR inspectors are authorized to examine the competence of selected staff and they are authorized to withdraw the certificate of the employee if there are serious deficiencies found in the relevant competence.

ÚJD SR also carries out inspections at the operator of a specialized facility, which is a licensee for training of staff of the licensee.

Subject of inspection are the review of the quality management system documentation used for training of staff, of licensee, audit of technical equipment of the specialized facility, checking the lecturers authorized to training of selected staff, control of fulfilment of training programs for professionally competent staff of the licensee, checking fulfilment of the training system for the staff, licensees, control of fulfilment of tasks, which the specialized facility operator must fulfil for training of staff, licensees, as well as checking removal of shortcomings found from the previous protocols.

Part of the technical equipment of a specialized training facility can also be RFS (representative full scope simulator), which is representing a real block control room. Exercise on RFS for the selected staff of the licensee is performed by the staff of the specialized training facility – lecturers, whose professional competence is verified by an examination committee for lecturers, set up by the Authority.

Members of the examination committee are appointed and removed by the chairman of ÚJD SR and the activity of the examination committee is governed by its statute, developed by the Authority. Verification of professional competence of lecturers consists of an oral exam and after passing it ÚJD SR issues a license on professional competence to the lecturer having five years validity.

The specialized training facility is obliged to make reference tests on RFS once a year in order to prove compliance with the real nuclear installation. During assessment of functionality of RFS the parameters and the history of entered values are reviewed, random simulation of a technological process following a selected scenario is checked. Subject of inspection is also the documentation of all modifications made on RFS, induced by the results of tests on RFS, or by implementing technical solutions and design modifications on the referential Unit. Part of this review is also control of the technical and organizational background for the exercise on RFS, as well as the professional competence of lecturers for exercises on RFS.

4.4 Licensee´s Quality System

Art. 13

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programs are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

4.4.1 History of development of Quality Management Systems at the operators of NI

There are two operators of nuclear installations - Slovenské elektrárne, a.s. (hereinafter only as „SE, a. s.“) and the Nuclear and Decommissioning Company (hereinafter only as „JAVYS, a. s.“). Development of their Quality Management System is a continuous process, which until 2006 ran together under a single company, SE, a. s., therefore the initial and the current status in both organizations is similar, and will be described together.

Currently the quality management systems of the licensee under the Atomic Act No. 541/2004 Coll. l. are based on:

- Fulfillment of requirements of the Slovak legislation and the *EU law*,
- Fulfillment of recommendations, directives and standards of the IAEA, *WANO, INPO and other international organizations,*
- Fulfillment of international *standards and* norms ISO 9001; ISO 14001, OHSAS 18001, *ISO/IEC 20000-1, ISO/IEC 27001 and ISO 31000,*
- Implementation of internal needs of the company when developing an effective management system *aimed to improve efficiency and overall performance of the company.*

Act No. 541/2004 Coll. l. (Atomic Act) imposes the following:

A special condition for issuing authorization or permit for construction of a nuclear installation, its commissioning, operation, decommissioning, management of nuclear materials and other activities

specified in the law, is approval of documentation of the quality management system for the licensed activity.

The licensee is required to establish, document, introduce, maintain and review a quality management system and to provide for financial, technical and human resources to create and maintain a quality management system.

ÚJD SR Decree No. 431/2011 Coll.l. on quality management system as amended by ÚJD SR Decree No. 104/2016 Coll.l. governs the requirements for the quality management system of the license holder. Further it regulates the requirements for the quality system documentation, quality assurance of nuclear installations and quality assurance of the qualified equipment.

Requirements defined in the annexes to the ÚJD SR Decree No. 431/2011 Coll. l. apply for quality management system and the quality management system documentation of licensees.

The requirements for quality assurance of a nuclear installation are included in the quality assurance programs, the *structure and the* content of which is defined in Annex *4* to the *ÚJD SR Decree No. 431/2011 Coll.l.*:

- Preliminary program of quality assurance for nuclear installations, which includes the basic requirements for quality assurance for all phases of nuclear installation life;
- Phase program of quality assurance for nuclear installations, which includes the requirements for quality assurance always only for a specific phase of nuclear installations life (from the design phase until decommissioning).

Requirements for quality assurance of qualified equipment are specified in the quality plans of the qualified equipment, the content of which is defined in Annex 5 to the ÚJD SR Decree No. 431/2011 Coll. l.

Individual management systems of license holders are developed as part of the Integrated Management System (hereinafter only as IMS). *These are* management systems that meet the requirements for the *quality management,* safety management *and occupational health and safety management*, *management* of environmental protection (or other management systems), in accordance with the IAEA recommendations, *in particular the IAEA* GS-R-3 *and IAEA GS-G-3.1, and also the world´s best practice of operators of nuclear installations (for example, WANO, INPO, ...).*

4.4.2 Policies declared and implemented by the NPP operator

Integrated Policy of the company expresses priority on nuclear safety and integrates areas of quality, environmental protection, safety (occupational health and safety, nuclear safety, radiation protection), corporate security (crisis management, including HPP and general security) and human resource management. It is periodically reviewed with regard to the timeliness and appropriateness.

Integrated Policy of the company takes into account the requirements of the international norms, the Slovak and the EU law and recommendations of international organizations (for example, the IAEA).

For meeting the Integrated Policy, company objectives are set for that particular year.

The objectives are proposed by the directors and managers responsible for the individual processes and are approved by the top management of the company.

The objectives are further elaborated into conditions and activities of organizational units operating in the company.

Objectives are defined so as to be:

- With deadlines, measurable, and so that they can be evaluated,
- Reasonably achievable,
- Comprehensible,
- Usable and appealing to the company,
- Economically justifiable.

4.4.3 Developing Integrated Management System on the basis of Quality Management System

The Integrated Management System (IMS) is the cornerstone for determining the integrated policy and objectives of the company and the method of their fulfillment in an efficient and effective manner. At the same time it ensures compliance with all relevant requirements of the stakeholders, i.e. customers, owners, suppliers and even their own employees.

In accordance with the principles of safety culture (according to WANO directive GL 2006-02) IMS provides the organizational structure and the direction of the company in a a manner that promotes safety culture development, along with achieving high safety standards.

The IMS includes the following principles, approaches and values:

- *Safety is paramount, every employee is personally responsible and makes a contribution to increasing the safety standard,*
- *Focus on prevention, continuous improvement and learning,*
- *Support for optimal processes with an appropriate organizational structure,*
- *Providing information about process performance and the performance of the whole company,*
- *Use of the results and proposals from the ongoing projects for continuous improvement of IMS,*
- *Focus on internal and external customers, providing information on customer satisfaction and of other stakeholders, flexible response to the legitimate demands of the stakeholders.*

The basic requirements that the IMS must meet, are the general requirements of international standards ISO 9001, ISO 14001 and OHSAS 18001.

The IMS is process-based, the process owners are identified, processes are hierarchically arranged and divided into three groups (management processes, key / main processes, supporting processes) with identification of processes relevant to nuclear safety.

Operators of nuclear installations must respect and apply also a number of legal and other requirements and recommendations, in particular:

- *Legislative requirements set out in the Atomic Act, the follow-up implementing decrees issued by*

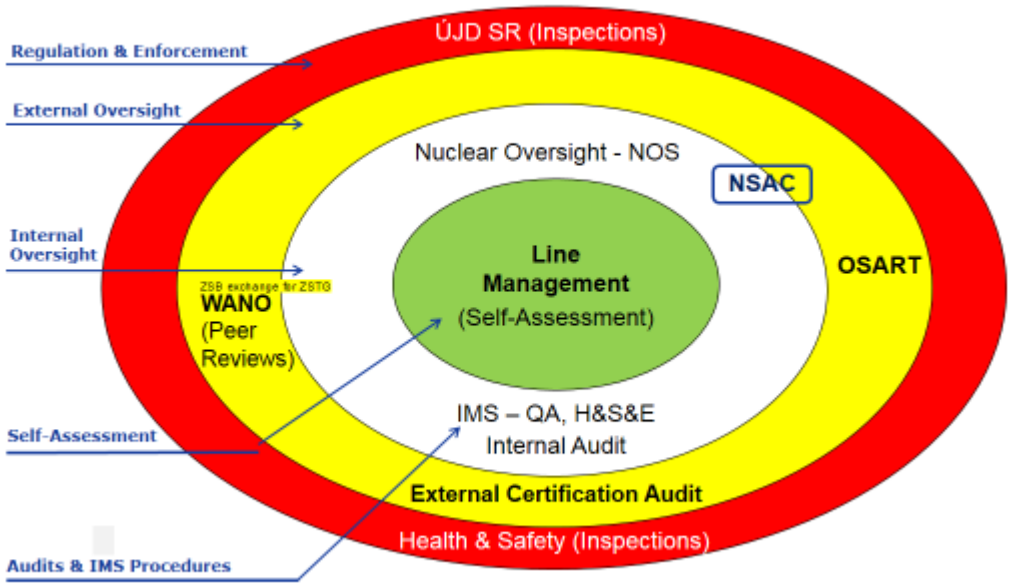
the Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR),

- *Requirements and recommendations of the relevant regulations of the International Atomic Energy Agency in Vienna (IAEA), in particular GS-R-3 Management System for facilities and activities (Safety requirements) and GS-G-3.1 Applying the management system to installations and activities (Safety Guide) on IMS, or the management system, which are to integrate strategy, planning and objectives for safety, occupational health and safety, environment, quality assurance, economic aspects and other areas, such as for example, social responsibility, etc.,*
- *recommendations from the peer reviews and missions of the international organizations (WANO, OSART) and inspections by the regulators, such as for example, ÚJD SR, NIP and others,*
- *experience and information gathered from the self-assessments and benchmarking realized in cooperation with the foreign nuclear operators,*
- *advice and experience of local and foreign consulting and advisory firms, results of benchmarking (comparing with the best), continuous improvement projects.*

4.4.1 Verification of the Integrated Management System efficiency

The IMS of the company covers safety and operational objectives and requirements, the scope and method of applying the graded approach, and continuous improvement programs.

Model of corporate governance and its oversight includes the key elements needed to ensure that the company is able to achieve and maintain a high level of operational safety, reliability and sustainability.



Safety, and in particular nuclear safety, is continously monitored and assessed through:

- *Periodical self-assessments by the line management,*
- *Independent evaluations realized by the unit of independent nuclear safety assessment (NOS),*
- *Internal audits of the IMS processes and external audits by SMK suppliers,*
- *WANO reviews, OSART missions from the IAEA (International Atomic Energy Agency) and potential verification missions of the European Commission,*
- *Inspections conducted by ÚJD SR and controls performed by other regulators,*
- *Certification and regulatory audits by external accredited certification companies.*

4.4.1.1 *Nuclear Safety Committees*

External Nuclear Safety Advisory Committee (NSAC)

NSAC is an external part of an independent nuclear safety assessment in SE, a. s. It is an advisory body to the Board of Directors of SE, a.s., assessing its standard and proposes solutions to complex safety issues of nuclear installations. It reports directly to the Board of Directors.

NSAC is composed of international experts having years of experience in top managerial positions in the nuclear energy sector.

The Nuclear Safety Committee of SE - EMO meets quarterly and the subjects of the discussions are: Report on the state of safety of operation of SE - EMO, evaluation of the effectiveness of the radiation protection program. Once a year it discusses the Report on feedback to SE - EMO from internal and external events and Report on operation of nuclear fuel and the core in SE - EMO. The outcome of these assessments is adoption of corrective actions.

The Nuclear Safety Committee of SE - EBO is an advisory body to the Plant Manager. In SE - EBO it meets once in three months. The basic subject of the discussion is the Report on the state of safety of operation of SE EBO Units. The Report contains evaluation of Operational Safety Indicators. The safety assessment of operation of NIs of SE, a. s., is part of the self-assessment by the operator and is based on international experience and the latest IAEA recommendations described in the following documents:

* *IAEA-TECDOC-1141 „Operational Safety Performance Indicators for Nuclear Power Plants“, and*
* *TECDOC-1125 „Self-assessment of Operational Safety for Nuclear Power Plants“.*

The Report fully complies with the requirements contained in the ÚJD SR Decree No. 430/2011 and in the ÚJD SR Decision No. 1012/2013.

The Nuclear Safety Committee, on a quarterly basis, also discusses report on analysis of discharges of r-agents and the impact of Units operation on the staff and the surroundings of the NPP.

Once a year a report on evaluation of the fuel cycle of nuclear reactors of SE EBO and report on the feedback from internal and external events are discussed.

The findings identified during audits, inspections, or controls are consistently analyzed in detail at the appropriate levels. Based on these analyses, effective and efficient corrective and preventive measures are taken, the implementation of which is regularly checked. Results are presented for consideration to the company management. The findings of recertification and regulatory audits form the basis for continuous improvement of IMS, the measures taken are continuously monitored and evaluated. Certificates confirm fulfillment of requirements of international norms in the field of quality assurance (ISO 9001); environmental protection (ISO 14001) and occupational health and safety (OHSAS 18001) in the applied IMS.

Quality Management System Audits at Suppliers

License holders carry out audits of quality management systems of selected suppliers affecting nuclear safety of nuclear installations, at which they check the effectiveness of application of requirements for the quality management systems according to ISO 9001, ISO 14011 standards and specific nuclear requirements arising from national legal norms EU and the IAEA recommendations. Requirements posed on the suppliers are transferred through contracts, including general terms and conditions, technical and safety requirements for performance, which are attached to the contracts. The purpose of these audits is to ensure quality and reliable suppliers.

4.4.2 Role of regulatory authorities

The activities and the roles of ÚJD SR in exercising state regulation over nuclear safety in the field of quality assurance, are given by the Atomic Act, ÚJD SR Decree No. 431/2011 Coll.l. on quality management system and ÚJD SR Decree No. 430/2011 Coll.l. *on requirements for nuclear safety (amended by the ÚJD SR Decree No. 103/2016). ÚJD SR Decree No. 430/2011 Coll.l. lays down the details of requirements* for nuclear safety of nuclear installations during their siting, design, construction, commissioning, operation, decommissioning and closing of a repository, as well as the criteria for categorization of selected equipment into safety classes. Requirements for classification of classified equipment of nuclear installations into safety classes from I to IV are divided according to the type of safety function, which they provide. ÚJD SR Decree No. 430/2011 Coll. l. at the same time sets the requirements for the form and content of the lists of classified equipment approved by the Authority.

In exercising state regulation in the field of quality assurance ÚJD SR concentrates on four basic activities:

1. Review and approval of quality management system documentation.
2. Review and approval of requirements for quality and requirements for quality assurance.
3. Review and approval of changes in the quality management system.
4. Inspections of the quality management system and fulfilment of requirements specified in the quality management system documentation of the licensee.

During inspections in the field of quality assurance, the ÚJD SR inspectors check on how the operators, according to the Atomic Act and Decree No. 431/2011 Coll. l. and the conditions set out in the Decisions issued by the ÚJD SR, and how do they comply with the approved documentation of the

quality management system and the requirements for quality. The inspection activity of the inspectors, upon approval of the relevant document, focuses on checking fulfilment of its individual requirements and practical implementation of requirements, i.e. observance of the approved documented procedures and actual activities. The inspector prepares a record or protocol on the inspection and discusses it with the responsible organization.

In case of any deficiencies identified on the selected equipment, in activities or the documentation the inspector is authorized to impose measures for their removal. Inspections are carried out according to the approved program; they have their objective and a specified form of their documenting.

Labour inspection from the Labour Inspectorate Nitra focusing on the Quality Assurance Systems from the point of occupational health and safety consist of control of legal entities and natural persons performing certain activities (production, installation, repairs, reconstruction, inspections, tests, revisions, maintenance, import of equipment, ...) on equipment being subject to labour inspection (point 3.1.5.2). During verification of competence the Quality Assurance System is also subjected to it, respectively the documentation, records, physical state of the technical equipment of legal entities and natural persons.

4.5 Assessment and Verification of Safety

Art. 14

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

(i) Comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

(ii) Verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

4.5.1 Characteristics of nuclear power plants in operation

Basic data about all units covered by this report are in the table:

Plant	NPP Bohunice V-2	NPP Mochovce 1&2	NPP Mochovce 3&4
Site	Bohunice	Mochovce	Mochovce
Reactor type	WWER 440/V213	WWER 440/V213	WWER 440/V213
Reactor thermal power,MWt	1471	1471	1375
Total reactor electric power, MWe	505	470	440
Plant status	In operation	In operation	Under construction
Date of first criticality	1984 - 85	1998 - 99	Under construction
Latest update of Safety Analysis Report	2009	2010	2008

Latest update of PSA Level 1/Level 2	*2014*	2010 - 2011	2008, update in progress
Last Periodic Safety Review	2008	2009	-

4.5.2 Safety assessment of nuclear power plants

The safety of nuclear installations is demonstrated through the documentation proving that its systems and equipments are capable to operate in a safe and reliable manner both during normal and also during an extraordinary event, and that the impact of the nuclear installation on its employees, the population and the environment is on an acceptable level.

ÚJD SR assesses the NPP safety preliminary to the power plant operation commencement. Safety assessment includes a systematic critical analysis of methods how constructions, systems and components can fail, and determines the consequences of such failures. The purpose of the assessment is to uncover weak places in the project. The basic document, according to which safety is being assessed, is the Safety Report containing the description of the power plant to the extent that is sufficient for an independent evaluation of the safety features. The review of the safety report by ÚJD SR forms the foundation for issuance of authorization for construction and operation and proves that all safety-related issues has been sufficiently addressed.

In the present time, there are two mutually supporting methods used for assessment and verification of NPP safety in the design phase. Those are the deterministic and probabilistic methods. These methods are used also later during the operation of the power plant, when planning modifications on the power plant and during evaluation of operational experience.

Probabilistic safety assessment *(PSA)*

The first PSA study in Slovakia was elaborated for NPP Bohunice V-2 in 1995 within the comprehensive safety assessment of NPP Bohunice V-2. Subsequently the PSA study has been updated several times, it was expanded and its quality was improved, utilizing the specific data and supporting analyses carried out for the given NPP. The PSA study is being updated every time when there is a material modification in the design of NPP, in the operating regulations, data, methodology used, or when new facts are found that materially change the information contained. The PSA studies are being elaborated according to the generally binding legal regulations of SR, ÚJD SR guides and good practice, which are based on the IAEA guides *(such as, for example:* Procedures for Conducting Probabilistic Safety Assessments of Nuclear Power Plants (Level 1), Safety Series No. 50-P-4, IAEA, July 1992; Probabilistic Safety Assessment for Seismic Events, TECDOC-724, October 1993; Human Reliability Analysis in Probabilistic Safety Assessment for Nuclear Power Plants, Safety Series No. 50-P-10, IAEA, December 1995; *Application of Probabilistic Safety Assessment (PSA) for Nuclear Power Plants, IAEA TECDOC-1200, Vienna, 2001; Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-3, IAEA, April 2010; Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No. SSG-4, IAEA, May 2010),* the US NRC guides (such as, for example: Individual Plant Examination: Submittal Guidance, NUREG-1335, U. S. Nuclear Regulatory Commission, August 1989; *Evaluation of Severe*

Accident Risks: Methodology for the Containment, Source Term, Consequence, and Risk Integration Analyses. - NUREG/CR-4551, U. S. Nuclear Regulatory Commision, December 1993), the OECD/NEA documents *(such as, for example: Probabilistic Safety Analysis of other External Events than Earthquake, Report NEA/CSNI,/R(2009)4, OECD, Paris, France (2009)**;** Probabilistic Risk Criteria and Safety Goals, OECD Nuclear Energy Agency, Nuclear Safety, NEA/CSNI/R (2009)).* Results of the PSA studies elaborated since 1995 show a gradual reduction both in CDF and LERF, which is a result of increasing safety of NPP Bohunice V-2.

The PSA study for NPP Bohunice V2 was *updated* in 2013 *(PSA Level 1) and in 2015 (PSA Level 2). These studies take into account Unit conditions after implementation of systems and guides for severe accident management. Their* scope is summarized in the following table 4.5.2a).

Level 1	Level 2	Initiating events		Power operation	Shutdown unit
		Internal	External		
Yes	Yes	Yes	Yes	Yes	Yes

Table 4.5.2a): Scope of the PSA study for NPP Bohunice V-2

The PSA studies are being reviewed by the ÚJD SR, the technical support organizations of the regulator and also by the IAEA missions. The results of PSA studies are used to review safety, in support of improving safety.

Monitoring of risk in real time – program environment Risk Monitor EOOS

The Risk Monitor EOOS is an analytical software tool for risk monitoring in real time. It is used for an assessment of imminent risk based on the current unit configuration. It enables the nuclear power plant personnel to execute operational decisions to minimize risk during the unit operation, as well as maintenance. EOOS includes CDF and LERF monitors.

Development of PSA studies for NPP Mochovce Units 1&2 follows the same rules and the same methodology as the PSA studies for NPP Bohunice V-2. The PSA study for NPP Mochovce Units 1&2 was updated in 2011. The scope of the PSA study is summarized in the following table 4.5.2b).

These results represent the Unit condition before implementation of the severe accident management project. The updated PSA for the NPP Mochovce 1&2 after implementation of the severe accident management project is being prepared and the process of approval is underway.

Level 1	Level 2	Initiating events		Power operation	Shutdown unit
		Internal	External		
Yes	Yes	Yes	Yes	Yes	Yes

Table 4.5.2b): Scope of the PSA study for NPP Mochovce Units 1&2

The PSA studies are reviewed by ÚJD SR, by the technical support organizations of the regulator and the operator, and possibly by the IAEA missions. Results of the PSA studies are used for safety assessment, to support safety improvement, as well as to support safe operation of NPP Mochovce.

Risk monitoring in real time – Safety Monitor software environment

Since 1 January 2004 the risk monitoring at NPP Mochovce Units 1&2 is done by using the analytical software tool, the Safety Monitor. The tool is used to assess the immediate risk on the basis of current unit configuration. It enables the NPP staff to take operative decisions to reduce the risk during power operation or during decreased output operation, or when reactor is shutdown. The Safety Monitor includes both CDF and also LERF monitors.

Deterministic safety analysis

Deterministic safety analysis means purposeful and meaningful analytical work generally carried out using computer programs to evaluate the safety of nuclear installations. Deterministic safety analyses examine the response of a nuclear facility or its part to events and failures that are prescribed, i.e. deterministically set. The calculations are performed for all operating modes and conditions of a nuclear facility. They include the expected operational events, design accidents, beyond-design accidents and selected severe accidents. The results of calculation are time-spatial dependence of monitored parameters (neutron and thermal capacity, pressure, temperature, flow rate, liquid flow rate, tension in structural materials, physical and chemical composition of the atmosphere, concentration of radioisotopes, radiation dose, and other). The results of the safety analyses are evaluated in terms of the acceptance criteria.

A significant role in the process of safety assessment was accomplished in cooperation with the IAEA, that conducted a few tens of missions focused on verification of design and operational safety of nuclear power plants. The assessment results created a whole set of documents summarizing deficiencies in respect to nuclear safety, which are contained in documents IAEA TECDOC 640 WWER 440/230 Ranking of Safety Issues and IAEA-EBP-WWER-03 Safety Issues for WWER 440/213 and their Ranking. These documents have become a foundation for determination of program for safety improvement of reactors of V230 and V213 type. Details on the safety assessment are provided under chapter 2. Deterministic analyses are elaborated on the basis of relevant IAEA documents (such as: Accident Analysis for Nuclear Power Plants. Safety Report Series No. 23, IAEA, Vienna, November 2002; Accident Analysis for Nuclear Power Plants with Pressurized Water Reactors. Safety Report Series No. 30, IAEA, Vienna, November 2003; Accident Analysis for Nuclear Power Plants. Specific Safety Guide SSG-2, IAEA, Vienna, 2009; Best Estimate Safety Analysis for Nuclear Power Plants: Uncertainty Evaluation. Safety Report Series No. 52, IAEA, Vienna 2008) and the WENRA recommendations (such as: Harmonization of Reactor Safety in WENRA Countries. Annex 1, Issue E – Design Basis Envelop for Existing Reactors and Issue F – Design Extension for Existing Reactors. Report by WENRA Reactor Harmonization Working Group. WENRA, January 2008).

ÚJD SR performs independent operational safety assessment with the support of safety indicators. An event analysis, which pursues the elimination of events repetition and the utilization of experience on national level, is also important in respect to the operational safety. ÚJD SR also uses experience from events on international level (IRS /IAEA / NEA / OECD).

Periodic safety review (PSR)

By periodic safety review ÚJD SR gets involved in the assessment process, which is carried out by the licensee. Requirements of ÚJD SR for the periodic review are specified in more details under chap. 2.2.1 and 2.3.1. For periodic safety review the relevant IAEA documents are used (such as, Periodic Safety Review of Nuclear Power Plants, IAEA, Safety Guide No. NS-G-2.10, Vienna, 2003), as well as other WENRA documents.

4.5.3 International nuclear safety reviews (*latest*)

At the request of the Slovak Republic, in 2010 the IAEA Operational Safety Review Team (OSART) visited NPP Bohunice. The purpose of the mission was to review operating procedures in areas, such as the management of organization and administration, operation, maintenance, technical support, radiation protection, operating experience, chemistry and emergency planning and readiness. At the request of the plant this team also reviewed the long-term operation programs (LTO). In addition, an exchange of experience and knowledge took place between the experts and their counterparts at the plant on how it would be possible to pursue the common goal of excellence in operational safety.

In 2012, there was a follow-up OSART mission, which concluded that: 9 issues identified were solved, in 10 issues satisfactory progress has been achieved to date, and there was no such issue, where there would be lack of progress.
Conclusion of the OSART mission: "The willingness and motivation of the power plant management to consider new ideas and to implement a comprehensive program of safety improvement was evident. It should be noted that this was achieved in time, when the workload of the plant was significantly increased as a result of measures that were taken post Fukushima accident".

Based on WANO recommendations during the period from April to October 2011 non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed at the operating units. The tests included verification of the long-term run of diesel generators, the possibility for delivery of cooling water from the bubbler-condenser to the spent fuel pool, feedwater supply to steam generators from a mobile source, supplying of water from cooling towers to essential service water system, connection of a back-up power supply from the hydro power plant, and others. The short-term measures cover elimination of defects found out during an inspection in the site of both NPPs immediately after the Fukushima accident in compliance with WANO SOER 2011 - 2, 3, 4 documents.

Results of specific short term actions made on NPPs Bohunice performed just after the Fukushima accident

Test title	Performance data / Planned performance	Test result
Test of reactor and SG auxiliary venting throughput during an overhaul.	Unit 3: 30 July 2011 Unit 4: 26 June 2011	Completed satisfactorily Completed satisfactorily
Test of opening connection from MCP motor room to steam generator compartment.	Unit 3: week 34 Unit 4: 30 June 2011	Completed satisfactorily Completed satisfactorily
Test of SFP make-up from bubble-condenser tower flumes.	Unit 3: 4 August 2011 Unit 4: 27 June 2011	Completed satisfactorily Completed satisfactorily
Test of electricity supply from the 3rd source of V-2 NPP home consumption from Madunice HPP.	week 34-35	
Test of make-up water recovery to V-2 NPP.	All-Plant Exercise 19 October 2011	
Long-term type test 72 hours DG.	Unit 4: 24 June 2011	Completed satisfactorily
Test of recovery of water supply by a mobile source to SG.	Unit 3: 18 August 2011	Completed satisfactorily
Test of capacity of petrol pumps from circulation cooling water tower pools to the ESW system.	25 May 2011	Completed satisfactorily
Test of unit cool-down by RHR system.	Unit 3: 31 July 2011	Completed satisfactorily
Test of auxiliary water pumping by fire pumps from flooded areas.	All-Plant Exercise 19 October 2011	-
Test of minimum pressurizer safety valve opening pressure.	Unit 3: 31 July 2011	Completed satisfactorily
Inspection of areas, where parts of auxiliary safety systems under the terrain level are situated, from the viewpoint of potential flooding during extremely long-time rains.	Unit 3: 21 April 2011 Unit 4: 21 April 2011	Completed satisfactorily, measures proposed
Inspection of barriers against water penetration between rooms inside V-2 NPP.	Unit 3: 21 April 2011 Unit 4: 21 April 2011	Completed satisfactorily, measures proposed
Inspection of rain water system capacity. Inspection of condition of barriers preventing water penetration from outside to power plant premises during extremely long-time rains.	Unit 3: 21 April 2011 Unit 4: 21 April 2011	Completed satisfactorily, measures proposed

Results of specific short term actions made on NPPs Mochovce performed just after the Fukushima accident

Test title	Performance data / Planned performance	Test result
Test of reactor and SG auxiliary venting throughput during an overhaul.	Unit 1: 10 May 2011 Unit 2: October 2011 during the outage	Completed satisfactorily
Test of opening connection from MCP motor room to steam generator compartment.	Unit 1: 29.4.2011 Unit 2: October 2011 during the outage	Completed satisfactorily
Test of SFP make-up from bubble-condenser tower flumes.	Unit 1: 27.4.2011 Unit 2: October 2011 during the outage	Completed satisfactorily
Test of make-up water recovery to NPP Mochovce 1&2.	April 2011	Completed satisfactorily
Test of recovery of water supply by a mobile source to SG.	Unit 1: 18 August 2011	Completed satisfactorily
Test of capacity of petrol pumps from circulation cooling water tower pools to the ESW system.	6 May 2011	Completed satisfactorily
Test of auxiliary water pumping by fire pumps from flooded areas.	April 2011	Completed satisfactorily
Inspection of areas, where parts of auxiliary safety systems under the terrain level are situated, from the viewpoint of potential flooding during extremely long-time rains.	Unit 1: 21 April 2011 Unit 2: 21 April 2011	Completed satisfactorily, measures proposed
Inspection of barriers against water penetration between rooms inside NPP Mochovce1&2.	Unit 1: 21 April 2011 Unit 2: 21 April 2011	Completed satisfactorily, measures proposed
Inspection of rain water system capacity. Inspection of condition of barriers preventing water penetration from outside to power plant premises during extremely long-time rains.	Unit 1: 21 April 2011 Unit 2: 21 April 2011	Completed satisfactorily, measures proposed

The European Council at its aession in March 2011, as a follow up to the Fukushima NPP accident in Japan adopted conclusions according to which safety of all European Union nuclear power plants (hereinafter only as the "EU") was to be reviewed on the basis of a comprehensive and transparent risk, and safety assessment (the "stress tests"). The European Commissiion (hereinafter only as the"Commission") in cooperation with the European Nuclear Safety Regulators Group (hereinafter only as the "ENSREG"), published a joint statement in May 2011 specifying the scope and the methods for implementation of these tests within a coordinated framework based on lessons learned from the accident in Japan and with full participation of the Member States. At the same time the European Council requested the Commission to invite the neighbouring countries to participate in the process

of these stress tests.

The stress tests were defined as targeted review of the safety margins of nuclear power plants relating to extreme natural disasters threatening the safety of nuclear power plants. These tests were conducted by the independent national authorities and through a peer review process in close cooperation with the operators of nuclear power plants, the regulatory authorities and the Commission.

In Slovakia the implementation of the stress tests started in accordance with the generally accepted schedule from 1 June 2011. In November 2011 the Commission published an interim report on evaluation of the stress tests and on the basis of this report, from January to April 2012 an extensive peer review process took place. The outcome of this process was a summary report from the peer review by ENSREG, which this group approved in April 2012, as well as seventeen independent national reports, including the national report of Slovakia, containing detailed recommendations.

In June 2012 the European Council in its conclusions invited the Member States to ensure the full and timely implementation of the recommendations presented in the report from ENSREG, while the Commission and the ENSREG group agreed that further work is needed in this field. As a follow up, in July 2012 ENSREG agreed that the affected states should elaborate and adopt action plans focusing on actions as a follow-up to implement recommendations resulting from the peer review process.

Several ENSREG recommendations adopted on the basis of the stress tests coincides with the on-going projects on, such as:

1. Severe accidents management (SAM) such as
    - To analyse the necessity of filtered venting of the containment to support SAM,
    - To analyse a response to severe accidents at multi units at the same site.
2. NPP resistance against risks with very low probability of occurrence (occurrence less than 1.10^{-4}/year)
    - External floods (spreading of floods inside the power plant, drain system capacity etc.),
    - Seismic event.

Actions resulting from the stress tests, as well as other measures of ÚJD SR and MoI SR are included under an Action Plan. Some of them have already been implemented. The tasks are divided into the following groups:

- Short-term – to be completed by 31/12/2013,
- Medium-term – to be completed by 31/12/2015,
- Additional measures, which may result from analyses defined by medium-term measures, will be implemented after 2015.

The Action Plan is divided into three groups:

1. *Natural hazards*
2. *Loss of safety systems*
3. *Severe accident management*

The Action Plan with the status of implementation is attached as Annex 6.5.

4.5.4 Verification of safety by ÚJD SR

ÚJD SR verifies nuclear safety during operation by its inspection activity. The main results of inspections are findings and from them resulting measures for their resolution. The number and importance of findings give notice of safety status in real time.

Some specific measures were based on comparison of selected national standards with those used in countries *with advanced nuclear technologies.* For reactors of VVER-440 type the measures to increase safety in general focused on improving reliability, redundancy, physical, electrical and I&C separation of the safety systems.

Safety improvement programs are the result of recent developments in the field of primary circuit integrity, requirements for reliability of computer managed safety systems, assessment of events at nuclear installations, results of beyond-design bases accident analyses, etc.

ÚJD SR is using deterministic approach for efficient management of the safety improvement process, in particular to improve the safety of safety systems (independence, redundancy). Probabilistic analyses are used to give priority to individual measures to improve safety.

Requirements on safety improvement are partly set with respect to accident probability. Acceptance criteria for accident analyses set by nuclear regulation are generally expressed as acceptable radiological consequences that differ according to the probability of the initiating event. Moreover, conservative or so-called best-estimate procedures for accident analyses have been prescribed. Best-estimate procedures are only accepted for accidents with a very low probability of occurrence (less than 10^{-6}).

Another principle used by the regulator in the process of safety improvement is the time limitation of the duration of nuclear power plant operation through issuance of approvals for a limited period of time, which enables management of the safety measures implementation process. Authorization for further operation of nuclear installation is issued upon review of results of its periodical nuclear safety assessment, conducted according to requirements of the ÚJD SR Decree No. 33/2012 Coll. as amended by the ÚJD SR Decree No. 106/2016 Coll.l.

4.5.5 Requirements of ÚJD SR to improve safety of VVER 440/V213 reactors within periodic safety review (PSR)

Details of the requirements for safety improvement are given in chapters 2.2 and 2.3.

4.5.6 Verification of safety operation by the licensee

Licensee is obliged according to ÚJD SR Decree No. 430/2011 Coll.l., draw up quarterly and annual operational safety assessment in the form and content as *defined in the ÚJD SR Decision No. 1012/2013* using the IAEA TECDOC-1141 “Operational safety performance indicators for nuclear power plants“ and TECDOC-1125 “Self-assessment of operational safety for nuclear power plants“.
In 2003 safety indicators were developed for all nuclear installations on the basis of IAEA TECDOC-1141 document. In 2004 the trial operation of the new safety assessment system was completed at SE, a. s. The system is supported by the database software PPRC. In 2006 the system of safety

assessment - PPRC (Power Plant Risk Control) was upgraded and renamed to SPUB (System of operational safety indicators).

In 2011 an update of the whole system of safety assessment was completed in relation to the processes introduced by the management of NPPs. The system of safety indicators was complemented with a number of new indicators to monitor individual processes. The updated version was reflected also in the SPUB software so to create new functionalities supporting the generation of reports in the required time periods. The system is described in detail in the methodology guide SE/MNA-171.01 – Safety assessment in operation of nuclear installations of SE, a. s.

By means of this software it is possible to enter, collect, keep records and evaluate the indicators. Based on the entered actual values and the set evaluation criteria, the software evaluates the safety status of the NI in a transparent manner. Evaluation of indicators can be done in four levels and at the same time it is presented in four colour distinct zones. Furthermore, the software allows data archiving, tracking indicator trends, generating uniform reports and comparisons of achieved results.

The assessment results are processed by the operators on a quarterly and annual basis and presented in a form of report on the status of operational safety of nuclear facilities of SE, a. s. and sent to the regulatory body, ÚJD SR.

In case any degradation of status in any of the areas under safety assessment is indicated, corrective actions are adopted aimed at preventing further degradation of operational safety.

4.5.7 Ageing Management Programs

The process of ageing management has been systematically implemented in SE, a. s., since 1996. The objective of ageing management is to ensure safe and reliable operation of units, to minimize unplanned shutdowns and to create conditions for long-term operation of 60 years. The requirements for ageing management are defined in the safety guide *BNS I.9.2/2014* "Ageing management in nuclear power plants", issued by the Nuclear Regulatory Authority of SR and in the safety standard NS-G-2.12 issued by the IAEA. An internal document of SE, a. s. for ageing management is the methodological guide "Ageing of systems, structures and components of NPPs". This document describes the process of ageing management, defines the organizational arrangements, the system for developing ageing management programs, the content structure and the scope of individual ageing management programs. Currently there are *17* ageing management programs defined, which are common for both nuclear power plants Bohunice and Mochovce. The details are given in chapter 5.3.3.4.

4.6 Radiation Protection

Art. 15

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low

as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

4.6.1 Legislation in the field of Radiation Protection and its Implementation

The issues of health protection against ionizing radiation are regulated by the Act No. 355/2007 Coll. as amended. The latest knowledge on public health care protection is reflected therein for the first time. The aim of the Act is to protect most effectively the health and environment against harmful effects not only of ionizing radiation, but also against other factors that could endanger health. Along with the cited Act, European Commission Directives concerning the issue of radiation protection were transposed into governmental ordinances. These are binding on all the ministries (Annex 6.2):

- Governmental Ordinance No. 345/2006 Coll. on basic safety standards for the protection of the health of workers and the general public against ionizing radiation transposing Council Directive 96/29/Euratom of 13 May 1996;
- Governmental Ordinance No. 340/2006 Coll. on the health protection of individuals against harmful effects of ionizing radiation in relation to medical exposure transposing Council Directive 97/43/Euratom of 30 June 1997;
- Governmental Ordinance No. 346/2006 Coll. on the radiation protection of outside personnel exposed to the risk of ionizing radiation during their activities in controlled areas transposing Council Directive 90/641/Euratom of 4 December 1990;
- Governmental Ordinance No. 348/2006 Coll. on requirements for control of high-activity sealed radioactive sources and orphan sources transposing Council Directive 2003/122/Euratom of 22 December 2003.

For details on providing Act No. 355/2007 Coll., as amended, see implementing regulations in Annex 6.2.

4.6.2 Radioactivity Monitoring by the Operator

Under Act No. 355/2007 Coll., as amended, every natural person and every legal entity performing activity relating to the occurrence of factors harmful to health shall be obliged to provide for qualitative and quantitative determination thereof in the workplace and its surrounding area. Details on requirements for ionizing radiation monitoring in relation to ionizing radiation are set out in the appropriate Governmental Ordinance and Slovak Ministry of Health Decree No. 545/2007 *laying down the details of requirements for ensuring radiation protection in activities leading to exposure and activities relevant in terms of radiation protection*.

The operator shall be obliged to develop a monitoring programme and compliance therewith. The monitoring is performed on continual, periodical or operational basis. The monitoring shall be carried out continuously, periodically or operatively. The monitoring plan contains according to the type of activity to be performed: the monitoring in routine operation, in predictable deviations from routine operation, in radiation incidents and accidents. The plan is structured into parts regulating the monitoring of:

a) a workplace using ionizing radiation sources,

b) the surrounding area of a workplace using ionizing radiation sources,
c) individuals,
d) release of radioactive materials from a workplace using ionizing radiation sources into the environment.

The monitoring plan shall contain:
a) quantities relevant to radiation protection to be monitored, the method, scope and frequency of measurements,
b) guidelines for measurement results evaluation and method of record-keeping,
c) reference levels and measures in exceeding thereof,
d) specification of measurement methods,
e) specification of parameters of used types of measuring instruments and tools.

The monitoring plan shall allow for the management of radiation protection, compliance with exposure limits and early identification of deviations from routine operation, and prove that the radiation protection is optimized. The monitoring results shall be recorded by the operator so that these can be used to estimate personal doses.

Personal doses are determined through individual monitoring. Individual monitoring shall be carried out systematically for Category A workers. When a suspicion arises based on the monitoring or calculation that the limits for exposure of workers with ionizing radiation sources can be exceeded, then the exposure conditions and circumstances shall also be taken into consideration while determining personal doses. Personal monitoring can be performed by authorized dosimetry service under a specific regulation.

A personal dosimeter shall allow for measurement of all types of radiation involved in the worker external exposure in activities leading to an exposure. If a personal dosimeter fails to allow for such measurements, other personal dosimeters shall be used; this is not the case, when it is technically impossible to use the personal dosimeter. Such being the case, the estimation of doses is provided using the results from workplace monitoring or through calculation.

In workplaces with open radioactive sources where an internal exposure of workers may occur, the internal exposure shall also be evaluated. The intake of radionuclides and committed effective doses are determined by measurement of radionuclides activity in an employee's body or his secretions, by measuring airborne radionuclide concentrations, by measuring the workplace contamination and conversion to the radionuclide intake using relevant coefficients and models for respiratory and digestive tract.

The operator shall be obliged to send regularly reports on monitoring results to the state administration bodies according to the conditions set out in the license and provide the latter in inspections with an inspector.

Gaseous and liquid discharges

The release of liquid and gaseous discharges from nuclear installations is managed by three kinds of legal regulations:

- health protection regulations,
- indirectly also by the provisions of the Atomic Act – within the limits and conditions of safe operation and decommissioning,
- liquid discharges are referred to in the provision of Governmental Ordinance No. 296/2005 Coll. setting out limit values for surface water pollution.

The Governmental Ordinance No. 345/2006 Coll. on basic safety standards for the protection of the health of workers and the general public against ionizing radiation states in paragraph 1.2 of Annex 3 thereto (Criteria of release of radioactive substances into the environment):
The Governmental Ordinance No. 345/2006 Coll. on basic safety standards for the protection of the health of workers and the general public against ionizing radiation states in paragraph 1.2 of Annex 3 thereto (Criteria of release of radioactive substances into the environment):
"It shall be allowed to release radioactive substances from a nuclear installation into the atmosphere and surface waters where it is assured that effective doses as a result of such releases in a particular critical group of the public do not exceed per calendar year 250 μSv. This value shall be considered a limit dose for design and construction of nuclear installations. If there are a number of nuclear installations in one location affecting the dose to the public in the same critical group, this value shall also apply to the overall exposure from all nuclear installations in the location or the region".

The Public Health Authority of SR in the permit authorizing discharge of radioactive substances into the environment from nuclear installations, established for each nuclear installation the reference capita effective dose caused by discharges per calendar year as a basic radiological limit. This limit represents a fraction of the dose limit for the site, while the sum of basic radiological limits for all nuclear installations in the area must be less than 250 μSv per calendar year. The reference capita effective dose is calculated based on the balance of activity measurements of discharges by an approved calculation software and refers to the sum of all routes of exposure caused by gaseous and liquid discharges.

Gaseous discharges

In addition to the basic radiological limit the permit specifies the following:

- benchmarks for radionuclide activity or the amount of activity group of radionuclides released into the environment per calendar year; these variables are measured continuously or continuously sampled, which are subsequently measured.
- reference levels which do not have direct relation to the radiologic limit above. They serve as the basis to identify and investigate a contingent occurrence and a contingent intervention at the source of the discharge. These are magnitudes of radionuclide activity per time unit (in case of gaseous discharges a day or a week) or volume activities, as appropriate. There are three reference levels: recording, investigation and intervention. The magnitude values themselves were produced by expert assessment of the respective balance value fractions, while taking account into consideration the type of nuclear installation and also the possibilities of devices used in such case for signal monitoring.

The Slovak Public Health Care Authority (ÚVZ SR) has established the limits for gaseous discharges as set out in paragraph 6.4.

Radioactivity discharge reference values are set based on safety reports for individual nuclear facilities.

The authorization sets out the requirements for the following:

- *measurements of radionuclides, including the measurement of nuclides, for which reference values are not explicitly stated* (for example, tritium and ^{14}C),
- measuring the amount of discharged air mass and specification of compulsory measured radioisotopes,

Measurements performed in order to balance or evaluate the dose rate to the public are made using classified measurement devices which are verified by state metrology authorities pursuant to metrological regulations.

Liquid discharges

The approach to liquid radioactive discharges is basically the same as in the case of gaseous ones.

As with gaseous discharges, it is required to perform further measurements in the representative samples of released waters so as to determine the annual committed effective dose equivalent for an individual from the public critical group (which may not be the same individual as with gaseous discharges).

A special case is the limitation on and follow-up monitoring of liquid discharges from the Mochovce RAW repository. These discharges consisting of collected rainwater and groundwater from beneath the clay seal of disposal structures (i.e. seepage of rainwater from the area outside the clay basins of disposal structures, so called monitored drainage) are released into the Telinsky stream, which after approx. 2 km flows into the Čifársky pond. Concentration activity of tritium, ^{137}Cs, ^{90}Sr, ^{60}Co a ^{239}Pu are monitored, thus fulfilling the legal requirements.

4.7 Emergency Preparedness

Art. 16

1. *Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.*
   For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.
2. *Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.*

3. *Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.*

4.7.1 Legislation in the field of Emergency Preparedness

The Slovak legislation regulates emergency preparedness, planning and emergency response plans in several pieces of legislation listed in Annex 6.2.

To the basic legal regulations belong also other laws in the area of crisis management and partially emergency planning.

- Constitutional Act No. 227/2002 Coll. on State Security at Wartime, State of War, State of Crisis and State of Emergency, *as amended*, which concerns, inter alia, management of situations relating to terrorist and violent criminal acts,
- Act of the NC SR No. 42/1994 Coll. on Civil Protection of the Public, as amended,
- Act No. 387/2002 Z. z. State administration in crisis situations except wartime, state of war as amended,
- Act No. 129/2002 Coll. on the Integrated Rescue System, as amended,
- Act No. 128/2015 Coll.l. on prevention of severe industrial accidents *and on amendments to certain laws as amended to Act No. 91/2016 Coll.l.,*
- Act No. 45/2011 Coll. l. on critical infrastructure,
- Act No. 179/2011 Coll. l. on economic mobilization and on changes and amendments to the Act No. 387/2002 Coll. l. on management of state in crisis situations outside time of war and hostilities, as amended.

All of the aforesaid documents *and their implementing decrees* take into consideration in regard of emergency preparedness the relevant European Union directives and the Vienna-based International Atomic Energy Agency recommendations (see 6.3).

4.7.2 Implementation of Legislation in the field of Emergency Preparedness

4.7.2.1 *National Organization on Emergency Preparedness*

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

Crisis management bodies are: Government of the Slovak Republic; the Security Council of the Slovak Republic; ministries and other central government authorities; the National Bank of Slovakia; security council of the region, district office; security council of the district; municipality.

The Government of the Slovak Republic, as the supreme authority of crisis management, in compliance with the Act No. 378/2002 Coll. l. establishes a Central Crisis Staff as its executive body

that coordinates the activity of government bodies, local government bodies and of other components designed to resolve a crisis situation during a crisis period, i.e. during resolution of an incident or an accident of a nuclear installation or during transport of nuclear material (but does not have a preventive function).

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

Part of the National Emergency Preparedness Organization is also the National Strategy for Security Risks Management of the Slovak Republic adopted by the Government Resolution No. 3/2016 dated 13 January 2016. The Strategy addresses creation of a National Register of Security Threats (ranging from terrorist attacks to natural disasters through accidents of various type including nuclear and radiation accidents) including their monitoring, system for addressing them and restoration to the state before the occurrence of a potential threat.

To ensure necessary measures to cope with a nuclear installation emergency and measures to protect the public and the economy in an occurrence of event with environmental impacts, the National Emergency Preparedness Organization (Fig. 4.7.2.1) is structured into three levels as follows:

The first level is formed by emergency committees of nuclear facilities with the prime function made of management of works and measures at nuclear installation sites so as to enable identification of the technological equipment conditions, and the management of measures to cope with emergency and to mitigate the consequences on personnel, plant, environment, and population.

Another function of this level is the informative function for activities of state administration bodies on the level of local state administration, which will provide for information concerning the equipment conditions and the possible impacts on surrounding.

The second level is organized on the regional level and consists of crisis staffs as crisis management bodies of the local government, the territory of which falls into an area at risk, in which there may be threat to life, health or property, and where measures are planned to protect the population. This area is determined *as a circle with a diameter of* 21 km around NPP V2 Jaslovské Bohunice and with a *diameter of* 20 km around NPP Mochovce.

The third level is a national level, the Central Crisis Staff of the Government of the Slovak Republic with its supporting units (*e. g.:* Emergency Response Center of ÚJD SR, Center of Radiation Monitoring Network – ÚRMS, Central Monitoring and Control Centre - CMRS). Their task is to address an emergency, if the scope of an extraordinary event exceeds the territory of the region.

A part of this level are Emergency commissions of operator of nuclear installation, which closely cooperate with ERC of ÚJD SR, but also with local state administration. The main task of Emergency commission is mainly to organize and coordinate quick liquidation of major and emergency events in corresponding production and distribution facilities.

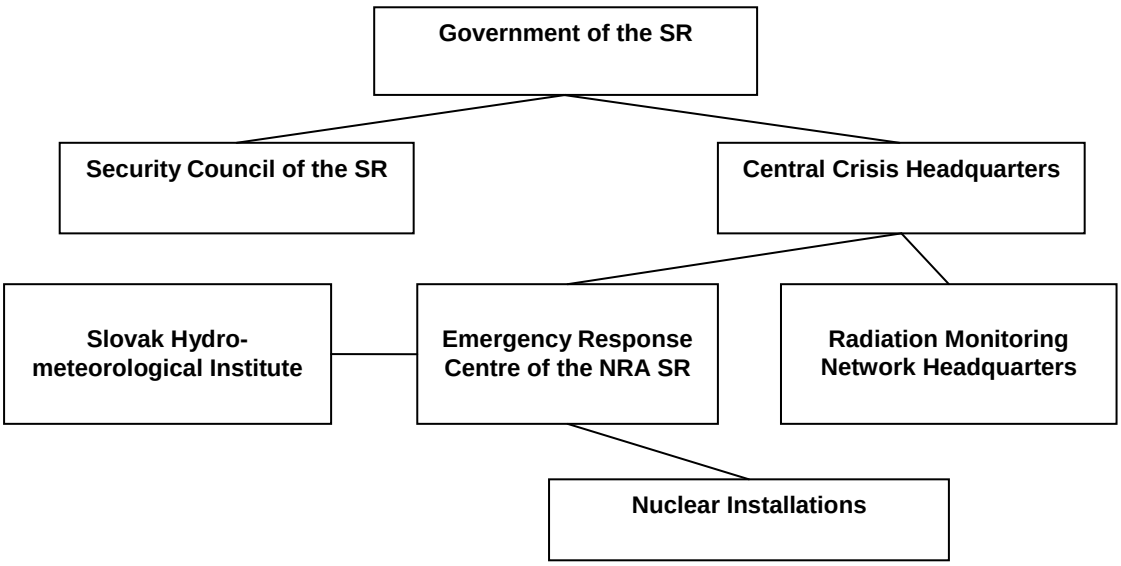


Fig. 4.7.2.1 National Emergency Response Organization

4.7.2.2 *Professional and technical resources of a national organization of emergency preparedness*

ÚJD SR´s Emergency Response Centre (hereinafter referred to as "ERC") is a technical support vehicle to monitor NI operation and assess technical condition and radiation situation in the event of a nuclear or radiation emergency, and to forecast emergency evolution and consequences by course of Act No. 541/2004 Coll. The Centre at the same time serves as a CCS technical support vehicle.

The Slovak Centre of Radiation Monitoring Network (hereinafter referred to as "SCRMN" is a technical support body intended to provide an effective monitoring system involving the monitoring systems of the respective government departments. CCS may invite representatives of ÚRMS in an emergency situation.

Central Monitoring and Control Centre (CMCC)

For the purpose of monitoring, control, evaluation and to support the public administration a Central Monitoring and Control Centre (CMCC) was established under the auspicies of the Ministry of Interior. The CMCC of MoI SR consists of spatial, personnel, documentation and technological resources with information, communication and other technologies.

The CMCC analyses and evaluates incidents and emergencies in the Slovak Republic and abroad. It prepares supporting documentation and proposals for emergency measures, provides concurrence with the crisis staff of the Ministry of Interior of SR and the Central Crisis Staff.

The CMCC provides for continuous operation of the National Contact Point for receiving and passing on warning messages, information reports and requests for assistance of the coordination centres of the integrated rescue system. It represents the national contact point for the neighbouring countries,

the International Atomic Energy Agency (IAEA), 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 the Coordination of Disaster Relief at NATO (EADRCC), the Coordination centre for the emergency response of the European Union (ERCC), the European Atomic Energy Community (EURATOM) and the relevant authorities of the Slovak Republic. On the basis of bilateral and multilateral agreements provides the necessary information about emergencies at NIs, which may affect the territory of another State.

Emergency Response Centre (ERC)

In line with the current legislation ÚJD SR has established the Emergency Response Centre (ERC) as a vehicle to assess the course and consequences of NI incidents and accidents of relevance to their possible impact on the surrounding area, preparation of draft measures or recommendations on further course of action. The ERC is included in the Slovak Emergency Preparedness System and co-operates with the CCS on the preparation of recommendations. The latter can invite specialists from various ministries to deal with an event. The relationship among the respective entities for management of public protection measures in an incident or an accident involving radioactive substance environmental impacts is shown in Fig. 4.7.2.1.

ÚJD SR has set up an emergency Staff from among its employee specialists and other employees to work within the ERC. The main functions of the Emergency Staff are to:

- analyze the state of a nuclear installation in case of an occurrence,
- make forecasts on the evolution of an occurrence – incident or an accident and radiological impacts on the public and the environment,
- propose recommendations on public protection measures and refer them to *the Ministry of Interior of the SR,* the appropriate *district* offices in the region seat and other authorities concerned,
- prepare background documents and recommendations for the Authority Chairman who is a member of the CCS and the Security Council of the Slovak Republic,
- carry out supervision over activities of the NI operation licensee during an emergency,
- inform the EC, the IAEA and neighbouring countries under the Slovak Republic´s commitments whose co-ordinator is the Authority (multilateral and bilateral agreements), inform the media and the public.

The emergency staff consists of ÚJD SR staff and it can work in four shifts so as to ensure continuity of its work also during actual events that may take longer than 8 hours. Each of the sequences has its management composed of a chairperson *and its assistant / deputy* and group leaders. Following groups are established:

- Reactor Safety Group
  - Local Inspectors Sub-Group
- Radiation Protection Group
  - Mobile Dosimetry Sub-Group
- Logistic Support Group
- News Service Group (public relations)

Radiation Monitoring Network (RMN)

The core of the Radiation Monitoring Network in a normal situation consists of permanent monitoring components within selected public health care offices, the Slovak Hydrometeorological Institute, civil protection systems, Armed Forces of the SR, the Nitra-based State Veterinary and Food Institute, Nuclear Installation Environs Radiation Control Laboratories, university specialized workplaces, research institutes, some other organizations, and accredited privately-owned facilities, as appropriate.

In case of accidents, in addition to permanent components, also other mobile and laboratory components will get involved in operative monitoring, as instructed by the Centre of Radiation Monitoring Network.

The whole of the Slovak Republic´s territory is continuously monitored for radiation situation by stationary systems:

- teledosimetric system of the NI operation licensee at NPP Bohunice and NPP Mochovce within a distance of 21 km (or 20 km),
- stationary monitoring systems – Crisis management division of Ministry of Interior of the SR, Armed Forces of the SR, the Ministry of Health, the Slovak Ministry of Environment (Slovak Hydrometeorology Institute - SHMU).

Real-time monitoring data is also provided Slovak Hydrometeorology Institute to the EURDEP network run by the European Commission whose data is available to all the member states via a protected website.

Radiation Monitoring Network of SR *(RMN) consists of permanent and emergency services.* Among the permanent components of RMN are the organizations, authorities and institutions in the following sectors:

- Ministry of Health ot the SR, securing 4 mobile monitoring groups, stationary monitoring systems and laboratory groups of the Public Health Authority (ÚVZ SR), Regional Authority of Public Health Banská Bystrica and Košice and State Health Institute of the SR (SZU) in Bratislava;
- Ministry of Interior of the SR, securing departmental evaluation centre, stationary monitoring system, mobile monitoring groups, 3 supporting laboratory KCHL groups;
- Ministry of Defence of the SR, securing departmental evaluation group (RCHBO OS SR centre, Trenčín), stationary network of ARIS system, mobile monitoring groups;
- Ministry of Environment of the SR, securing stationary network of early warning, short, medium and long-term weather forecasts;
- Ministry of Economy of the SR, which through the operator of NPP Jaslovské Bohunice and NPP Mochovce secures its own monitoring centres with the local radiation monitoring networks, rapid monitoring groups for NPP Bohunice and NPP Mochovce, mobile monitoring groups and 2 support laboratory groups;

- Ministry of Transport of the SR, Construction and Regional Development provides for 1 mobile monitoring group.

Emergency components of RMN include mainly the support laboratory groups of PF UK, FMFI UK, VÚVH, VUJE and laboratories of sanitary and veterinary service.

Financing of the activities of individual permanent and emergency components of RMN is the obligation individual ministries participating on the monitoring, on the basis of resolution of the Government No. 614/1995, and based on the Act of NC SR No. 387/2002 Coll.

The activity of RMN is running in two modes:

- At the time outside of radiation accident, or nuclear accident or incident (so called “standard monitoring mode“), when the nationwide monitoring of the current radiation situation is secured, including monitoring and evaluation of consequences of previous extraordinary events (Fig. 4.7.2.2),

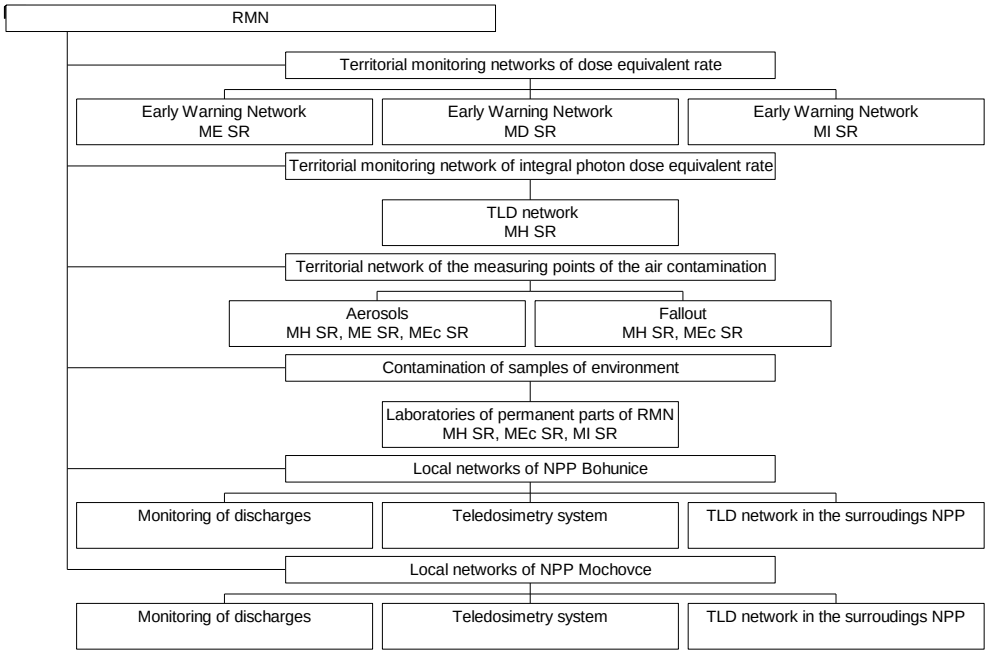
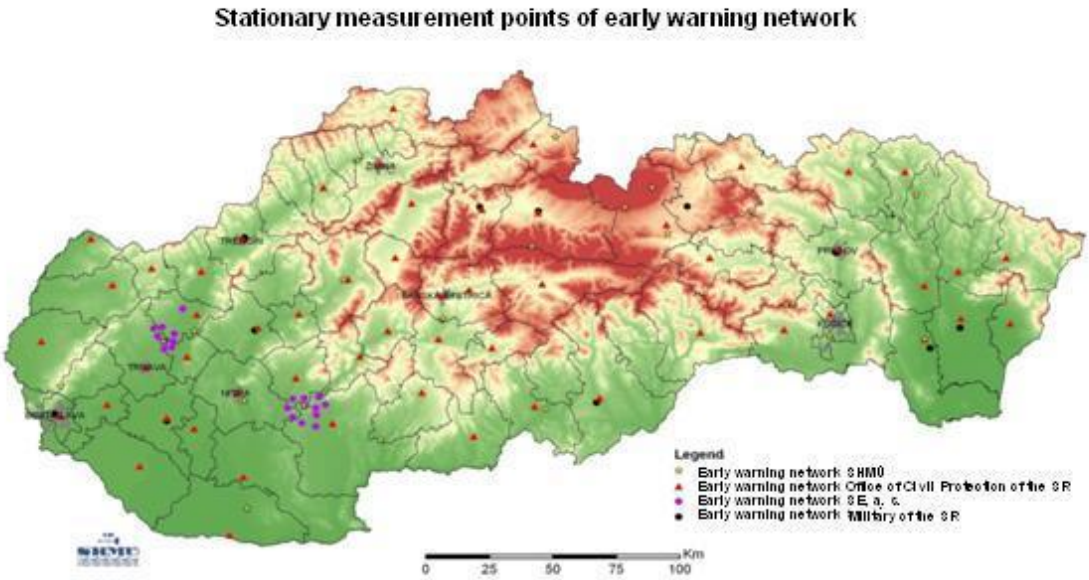


Fig.4.7.2.2: Activity of the Radiation Monitoring Network at the time outside of radiological risk

- In case of nuclear accident or extraordinary event associated with release of radionuclides into the environment, or when suspecting their origination either on the territory or outside the territory of SR.

Monitoring under standard mode is secured by RMN SR in compliance with the monitoring plan approved by the chief hygienist of SR and is a source of data for monitoring and assessing of radiation status of the population from the sources of ionizing radiation in the environment.



4.7.2.3 *Emergency Documentation*

To cope with emergencies at nuclear installations and their impact on the surrounding environment, emergency documentation has been developed laying down the operating procedure and organization at the respective emergency stages at different levels of the national emergency preparedness as detailed in 4.7.2.1.

The licensee has on-site emergency plans elaborated setting forth the organization of emergency response and its implementation concerning the management of emergencies and personnel protection, including employee health protection.

In addition the licensee it has operating regulations, allowing recognition and classification of an emergency event according to international recommendations.

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.

The Act No. 128/2015 Coll.l. imposed an obligation on the Ministry of Interior of SR to develop a National Emergency Plan for all kinds of industrial emergencies including nuclear. The National Emergency Plan is under development.

4.7.3 On-site Emergency Plans

Internal emergency plans and related documents are drawn up so as to ensure the protection and training of staff for the case where there is a significant release of radioactive materials into the working environment or the surroundings, and it is necessary to take measures to protect the health of persons at the nuclear installation or population in its vicinity, while creating a system, the goal of which is to introduce effective measures before the real release of radioactive substances.

The purpose of the on-site emergency plan is to provide for the preparedness of NI employees for planned measures implementation in case of an occurrence at NI, emphasizing the accomplishment of the following basic goals:

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

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

ERO consists of units, ensuring in particular:

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

4.7.4 Public Protection Plans (Off-site Emergency Plans)

Protective measures are part of the public protection plan, drawn up by the territorially competent state authorities and municipalities located in the area at risk with a defined distance up to 21 km for NPP Bohunice V-2 and 20 km for NPP Mochovce.

The aforesaid public protection plans are linked to the off-site emergency plan of the licensee that shall be obliged to present the public protection plans elaborator with documents relating to the public protection in the area of threat.

Public protection plans developed for the region territory are subject to the process of assessment by ÚJD SR and of approval by the Slovak Ministry of Interior. They describe in detail the method of implementing measures, with selected measures containing activity by severity level and time behaviour of an incident or an accident including available and usable worforces and means to carry out rescue works and ensure the implementation of public protection measures. Also part of documentation are activity methodologies, databases and aids necessary for effective and proper decisions.

In an extraordinary event having a nature of a radiation incident at NI, the local authorities - the crisis management bodies, provide for measures resulting from the public protection plans. These activities are carried out by the relevant crisis staffs that work together with the CCS of the Government of the Slovak Republic as needed. To prevent the risk of delay in fulfilling tasks related to the public protection, the appropriate commissions are part of the national emergency response organization.

In line with the on-site emergency plan, the public protection plan and based on the assessment of the technology situation, identification of the source member, values measured by the teledosimetry

system, first measurements of the radiation situation in the NI environment and the meteorological situation, the licensee provides for notification of the appropriate authorities and organizations in the area at risk and for immediate warning of the public in the occurrence of a level 2 event and of a level 3 event, respectively. Subsequently, *upon a decision of central government authorities*, local government and municipalities, other immediate and follow up measures are provided for, mainly of iodine prophylaxis, sheltering or evacuation, etc. These measures are to be implemented in the territories affected by the radiation event consequences, including those where the emergency consequences may spread in terms of forecast.

In case of an incident or an accident at the nuclear installation involving release of radioactive substances (in accordance with the Act No. 42/1994 Coll.l. on civil protection) the competent authorities to deal with the crisis are:

- municipality and municipality mayor if an event does not extend beyond the municipality territory,
- *the District* Office and the head of the *District* Office, if the incident does not extend beyond the *cadastral area of the* municipality and does not extend beyond the *boundary of the territorial jurisdiction of the District Office*,
- *the District* Office at the seat of the region and the head of the *district* Office at the seat of the region, if the incident extends beyond the boundary of the *territorial jurisdiction of the District Office* and does not extend beyond the territory of the region,
- the Government and the Prime Minister, if an event extends beyond the region‘s territory.

Each of these authorities manages relief works within its territorial competence and prepare proposals of measures to address the crisis and supporting documentation for adopting decisions to effectively address the situation on the endangered area.

4.7.4.1 *Emergency Transport Guidelines*

For the purposes of transportation of fresh and spent nuclear fuel, nuclear materials and radioactive waste, the *applicant for an authorization* of transport (within the meaning of the Atomic Act and ÚJD SR Decree No. 55/2006 Coll.l*. on details concerning emergency planning in case of an incident or accident, as amended by ÚJD SR Decree No. 35/2012 Coll.l.),* shall develop emergency transport guidelines (hereinafter only as „ETG“). The aim of such ETG is to provide for preventive and protective measures in case of an accident or an incident during the transport. *The applicant for authorization of transport of radioactive materials* develops the ETG for the transport of these materials on roads and railways. Once reviewed by ÚJD SR and other authorities involved, ETG is approved by the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

4.7.5 Warning and Notification Systems for the Population and Personnel

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

The warning and notification of the public in case of a threat is the obligation of legal entities, whose

activities may endanger life, health or the property of its employees or other persons.

The warning and notification system is provided for by the license holder for operation of nuclear facilities through a network of electronic sirens. *It provides* early warning and notification to all employees and persons present on the premises of nuclear installations and also to all residents within the 21 km emergency planning zone for the NPP Bohunice V2 and 20 km area of emergency planning zone for the NPP Mochovce 1&2. It is fully interlinked with the national system, but if necessary it can be activated and used also locally, for example during floods.

Both nuclear installations, in order to speed up the notification, a system of automatic telephone notification to individuals is used. 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.

The shift engineer of the unit in accident decides upon the initiation of population warning and authorities, organizations and personnel notification. Regular testing of the means of notification and warning system are performed once a month.

4.7.6 Emergency Preparedness Maintenance Systems

The Bohunice a Mochovce personnel are classified into *three* categories by the scope of emergency training:

Category I - personnel with a short-term stay at NI (visits, excursions, etc.),
Category II - personnel permanently working at NI,
Category III - personnel involved in ERC.

The training includes two parts:

- theoretical training,
- hands-on training.

The power plant personnel emergency training is conducted according to the respective categories in the form of a presentation, explanation, group seminars, practical demonstrations and hands-on training sessions - drills. Emergency training of shift personnel constitutes a separate part of the training. In both sites of licensees (SE, a. s. and JAVYS, a. s.) shift drills are performed twice a year, site emergency drills with all site personnel involved are held annually and a collaboration emergency drill laid on in concurrence with local state administration and self-governing authorities, ÚJD SR ERC, and other ERC units, as appropriate (fire brigades, heath care, army, etc.), is undertaken on a three-year basis. *The exercises are attended by observers and referees, who after completion of the exercises evaluate their course and on the basis of their conclusions measures are taken to improve the activities of ERO.*

The most recent interoperability exercise with the participation of CHO ÚJD SR and the local government authorities was held in *2015 at both sites – Bohunice and Mochovce. These exercises involved crisis management bodies at local level.*

In June 2015, within the three-year cycle, ***„Interoperability exercise EMO 2015“*** *was organized in*

20 km area of emergency planning zone for NPP Mochovce, which aimed to practice activities, cooperation and communication between the operator of NPP Mochovce and the crisis management bodies of local government and the self-government of Nitra region, including their crisis staff and services of the Integrated Rescue System (IZS) when responding to consequences of a simulated radiation accident.

The exercise involved, along with NPP Mochovce, the crisis management bodies with their crisis staffs and the relevant evacuation commissions of the District Office in the seat of the Nitra region, the district offices and the services of the Integrated Rescue System (IZS): Regional Police Directorate in Nitra, District Police Directorate in Levice, Regional directorate of Fire and Rescue Corps in Nitra, District Directorate of Fire and Rescue Corps in Levice, Control chemical laboratory of civil protection Nitra, Red Cross regional branch Levice and the Ministry of Defense of SR and the Armed Forces of the Slovak Republic – chemical protection battalion in Rožňava.

The benefit of the exercise is the fact that it verified the functionality of the information system of civil protection in the Nitra region.

*In October 2015, interoperability emergency exercise **TUKAN 2015** was organized within the 21 km emergency planning zone of the NPP Jaslovské Bohunice. The theme of the exercise was the activity of crisis management bodies and their crisis staffs, the local government authorities, legal entities, basic services of the Integrated Rescue System, OS and emergency response services in dealing with an emergency situation and securing measures to protect the public in case of an accident in NPP Jaslovské Bohunice.*

One of the important tasks during the exercise was to verify the functionality of the information system and communication between the different levels of management (region – district – municipality):

- real verification of the time needed to convene the members of the crisis staffs and evacuation committees,

- real verification of the time needed for acknowledgement of receipt of orders sent with limited communication options (loss of fixed and mobile telephone network).

Exercises also pointed to deficiencies in staffing and technical resources of the intervening services.

*In December 2015, a 2-day interoperability exercise was organised with the scenario of developing a simulated incident at NPP Mochovce entitled INEX 5 in a series of international exercises, organized by the Organisation for Economic Cooperation and Development - OECD and its Nuclear Energy Agency - NEA. The **INEX 5 exercise**, as **staff exercise**, addressed the aspects of the management of emergencies in the notification, internal and external crisis communication and interfaces within the Slovak Republic and also in relation to international organizations at all levels of management from the Central Crisis Staff (hereinafter only as „CCS“) and crisis staffs of the district offices to the activities of the license holder.*

4.7.6.1 *Emergency Preparedness Equipment and Resources*

They consist of the units referred to in chapter 4.7.3 and are supplemented with the following

equipment:

- Backup emergency centre (BEC) serves as a substitute workplace of the Emergency Commission in case of extremely adverse radiation or unfavourable weather conditions *at the Bohunice or Mochovce site*. It is located off-site in Trnava (for the Bohunice site) and Levice (for the Mochovce site).
- Civil protection shelters are used as the primary shelter for shift and intervention personnel and serve for handout of individual protection means and special kit for intervention units.
- Civil protection assembly points serve for personnel (not included in OHO) and other persons staying in the NI territory. Thanks to their equipment they create conditions fore a short-term stay of personnel while using individual protection means.
- In-house Medical Centre (IHMC) is intended for basic medical provision, giving pre-medical and medical aid and preparation for transfer of those afflicted to specialized health care facilities. Also part of IHMC is a decontamination point and workplaces to measure individual internal contamination.
- On-site communication facilities and equipment:

a) Slovak Telecom´s public telephone network,
b) power telephone network,
c) mobile telephone sets,
d) Motorola special-purpose radio network,
e) paging network,
f) in-house radio and operational (unit) radios,
g) *satellite telephones and faxes.*

4.7.6.2 *Post-accident Management*

In accordance with legal framework the licensee notifies the central government authorities already at the first level – alert / emergency. Then informs the central government authorities, among them also ÚJD SR on the developments. On the first level it starts the warning system in the vulnerable objects of NI. On the second level it starts the warning system on the whole territory of a NI. On the third level it triggers the warning system and notification system in vulnerable sectors in the area at risk around the NI.

State administration authorities in the emergency planning zone have their own emergency plans. According to these plans, authorities take following measures for public protection:

Period (Phase)	Measures
Threat / Emergency	Notification of emergency staff (Emergency response organization) and preparation for public notification.
	Preparation for taking urgent measures in emergency planning zone in early phase of the accident.
	Notification of public about measurement taken during emergency phase.
Early Phase	Warning of emergency staff (Emergency response organization) and also public warning.
	Monitoring of radiological situation.
	Access regulation (persons and vehicles).
	Sheltering.
	Iodine prophylaxis.
	Evacuation.
	Use of individual protection means and special individual protection means.
	Partial sanitary cleaning of persons and objects.
	Ban of non-protected food, water and feed consumption.
Intermediate and Late Phase	Control of persons and vehicles movement.
	Control of consumption of food, water and feed contaminated by radioactivity.
	Relocation of population according to the evaluation of current radiation situation and prognosis of its development.
	Deactivation of impacted area.

The ÚJD SR, together with the working group consisting of specialists from the Ministry of Interior SR, Ministry of Health SR, Ministry of Defense SR, Ministry of Environment SR - SHMÚ, *district offices* in the seat of the region of Trnava and Nitra, and the representatives of the self-government in the emeregency planning zone of NI Bohunice and Mochovce, developed the following handbooks:

1. Handbook for management of contaminated populated areas.
2. Handbook for management of taken measurements after the change of event status.
3. Handbook for management of drinking water after contamination.
4. Handbook for management of contaminated populated areas after the event.

These Handbooks are prepared especially for Slovak Republic and include rehabilitation / recovery of contaminated territories during the late phase of an accident at NPP.

Individual procedures concerning introduction of emergency management provisions targeted to mitigation of radiation accident consequences, factors affecting realization of these measures, establishment of recovery strategy, calculations of cost necessary for forces and means as well as economic, politic and social impact on society are elaborated in these handbooks. Developed model scenarios of different types of accidents with release of radioactive substances and decision-making scheme are a part of handbooks. All handbooks were distributed to MoI SR, to district offices in the area at risk and to other central government authorities.

In 2014 and 2015 the following activities were realized:

- *Updating Handbooks for the population – part of 2-year calendars (2015 - 2016) and their distribution in the emergency planning zones.*
- *In 2014, targeted self-assessment of the process „emergency planning and preparedness" was carried out according to WANO criteria. Based on the findings Action Plans were drawn up containing measures aimed at increasing the level of emergency preparedness and achieving compliance with the international standards.*
- *In 2015, the project „Improving emergency planning and preparedness" was launched, which aims to adapt the current process of emergency preparedness in SE, a.s. in accordance with the requirements of WANO PO&C 2013-1, following the gradual introduction of severe accident management for all operating units of NPPs. Project completion is scheduled for 31 December 2016.*
- *In 2015, following the targeted self-assessment of emergency preparedness according to performance targets and criteria of the WANO Organization in 2014, the NPPs elaborated action plans with the aim of achieving excellence in the field of emergency preparedness and achieving compliance with the international standards.*
- *In 2015, the project „Improving emergency preparedness" was launched. The project aims to examine the process of emergency preparedness in terms of severe accidents, incidents in nuclear power plants in the world and the use of the best practice in relation to HPP. The output of the project will define areas for improvement in the process of HPP. Finalization of project is scheduled by 31 December 2016.*

Securing health care

Securing health care is a legal obligation based on the Act of NC SR No. 576/2004 on health care Section 45 par. (1) letter v), the Ministry of Health ensures uniform training of health services for the national defence. Also the basic provisions of the Constitutional Act No. 227/2002 on national security and state of emergency, in Article 1 par. 2) the basic role of the health care sector to undertake all necessary measures to save lives and the health of persons.

State of emergency can be declared by the government only on condition that it occurred or there is an imminent threat on the life and health of persons, environment or a threat on substantial assets as a consequence of natural disaster, industrial, traffic or other operational accident; state of emergency can only be declared on an affected area or an area that is under imminent threat. State of emergency can be declared to the extent necessary and for a necessary time, maximum up to 90 days. During the time of state of emergency to the extent necessary and for a necessary time, depending on the seriousness of threats the fundamental rights and freedoms can be restricted and obligations imposed on affected or on imminently threatened areas, such as:

- Imposing obligation to work to secure supplies, maintenance of roads and railways, transportation, operation of water mains and sewerage systems, generation and distribution of electricity, gas and heat, health care, maintaining public order or removal of damages;

- Restricting freedom of movement and residence by curfew in a specified time and no access to the affected area or area under imminent threat;
- Ensuring access to broadcasting of radio and TV combined with the calls and information for the public.

At the time of state of emergency the President, upon proposal from the government, may order the professional soldiers, the pre-service soldiers and the national service soldiers performance of extraordinary service, to call to an extraordinary service soldiers in ambush.

In a state of emergency proposals to solve the crisis are prepared by the Security Council of the Slovak Republic, working closely with the Central Crisis Staff in preparing measures to address the crisis.

The Government, by its resolution No. 819 dated 19 December 2011, approved measures to support national defence for the period 2012 – 2017. Part of this document, among others, shall ensure support and maintenance of the medical support system, services and activities within the scope and the structure according to the requirements of armed forces within the defence system of the SR. Currently there are negotiations being held at ministerial level to improve the status for securing health care in case of nuclear or radiation accident.

4.7.7 International Treaties and Co-operation

4.7.7.1 *European Union Information System*

Currently great efforts concentrate on the transposition of the Council Directive 2013/59/Euratom, laying down basic safety standards for the protection against dangers arising from ionizing radiation. This Directive transposed the Council Directive 89/618/Euratom on informing the general public about health protection measures to be taken. The Council Decision 87/600/Euratom remains in force, based on which the ECURIE communication system was developed.

After the accession of the Slovak Republic to the EU it also became part of the ECURIE system. In this system ÚJD SR is a contact point and a competent body with 24-hours uninterrupted service. The contact point for the ECURIE system is identical with the contact point for the purposes of Convention on Early Notification of Nuclear Accident. The contact point for the ECURIE system is backed with a contact point at the MoI SR. For the ECURIE system a national coordinator and its deputy have been appointed. In 2012 the activity of the CoDecS notification system was terminated and notification is now provided by the WebECURIE system.

4.7.7.2 *Conventions of the International Atomic Energy Agency*

The Slovak Republic is a signatory of international Conventions on Early Notification in Case of a Nuclear Accident and on Mutual Assistance in Case of a Nuclear Accident, thereby ensuring international cooperation in minimizing consequences of a nuclear accident. The conventions regard in particular technical and organizational arrangements to reduce radiation effects on people and the environment due to accidents at nuclear installations.

Convention on early notification of a nuclear accident and the Convention on assistance in the case of nuclear accident or radiological emergency.

The Slovak Republic notified the succession to both of the conventions on 10 February 1993 (effective as of 1 January 1993). The expert coordinator for fulfillment of provisions of the Convention is ÚJD SR, which at the same time is the contact point and a competent Authority of the Slovak Republic for early notification of nuclear accident. The Slovak Republic takes part on a regular basis through ÚJD SR on international drills. Since the Conventions coming into force no such accident has occurred in the Slovak Republic's territory as would require to perform the provisions thereof.

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.

4.7.7.3 *Agreements and Cooperation with Neighbouring Countries*

Further to Art. 9 of the Convention on early notification of a nuclear accident, the Slovak Republic succeeded or concluded bilateral agreements in the field of early notification of a nuclear accident, exchange of information and co-operation with all neighbouring countries. The agreements lay down the form, the method and the scope of information to be provided to contracting parties in the case of an accident relating to nuclear installations or nuclear activities, and establish the co-ordinators of contact points. The purpose of the said agreements is to make a contribution toward minimizing the risk and consequences of nuclear accidents and creating a framework for bilateral co-operation and exchange of information in areas of common interest in regard of peaceful uses of nuclear energy and protection against radiation.

4.7.7.4 *The Slovak Republic´s Participation in International Drills*

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 (ECURIE Level 1 and ConvEx 1). ÚJD SR and the contact point at Crisis management division of Ministry of Interior of the SR in all these exercises in recent years responded on time.

In addition to these exercises every year there is at least one major international exercise verifying the functionality of the early warning system of the European Union, ECURIE Level 3 and other exercises of the IAEA ConvEx 2 and ConvEx3 levels. Slovakia has been actively involved in most of these exercises. *On 13 and 14 of October 2015,* the ECURIE Level 3 exercise took place, *and also several communication exercises of the ECURIE system.*

On 6 November 2014, interoperability exercise was conducted with the emergency centre of the IAEA. During the exercise the communication took place by means of official forms of the USIE Exercise website.

Specific exercise, which was organized in 2015, was INEX 5 exercise under the auspices of the

OECD / NEA, which involved 25 countries. INEX 5 exercise focused on notification, communication and interconnectivity during an incident, which can be caused by increasing destructive factors and their subsequent accumulation as a result of natural disasters and accidents at NIs.

4.7.7.5 *Cooperation among the EU Member States in the field of civil protection*

Decision of the *Eurepean Parliament and* Council No*. 1313/2013/EU on the EU mechanism in the field of* civil protection

The Council Decision establishes a Community mechanism to facilitate reinforced cooperation between the Community and the Member States in civil protection assistance interventions in the event of major emergencies or the case of imminent threat thereof (hereinafter only as the "Mechanism").

The Mechanism consists of series of elements and activities, which include:

1. Identifying the *modules or other resources in the area of response* and other intervention support, which are available in the Member States for assistance intervention in case of emergency;
2. The introduction and implementation of the training program to *members of modules* and other intervention support, as well as for the expert teams responsible for the assessment and / or coordination (hereinafter only as „assessment and / or coordination teams");
3. Workshops, seminars and pilot projects on the main aspects of interventions;
4. Creation and deployment of assessment and / or coordination teams;
5. Establishment of the *Emergency Response Coordination Centre* (*ERCC*), which is available 24 hours a day and capable of immediate response, and which will serve to Member States and the Commission for the purposes of this mechanism;
6. Establishment and management of a common communication and information system for emergencies CECIS to facilitate communication and sharing of information between MIC and the contact points of the member states;
7. Contributing to the development of detection and early warning systems for disasters, which may have an effect on the territory of the Member States, to enable a rapid response by the Member States and the Community, as well as to contributing to the establishment of such systems through studies and assessments of their feasibility and activities promoting their links to the *ERCC* and CECIS. Such systems must take into account and make use of the existing information sources and resources for monitoring and detection;
8. Support for the Member States in obtaining access to equipment and means of transport by:
   a) providing and sharing information on equipment and vehicles that may be available to Member States to facilitate the pooling of such equipment or vehicles;
   b) assistance provided to the Member States to identify vehicles that may be available from other sources including commercial ones, and to facilitate access of Member States to them;
   c) assistance provided to the Member States to identify equipment that may be available from other sources, including commercial ones;
9. Complementing the transport provided for by the Member States by providing additional means of transport necessary for ensuring a rapid response in case of major emergencies;

10. Support to consular assistance for EU citizens in the event of major emergencies in third countries, in respect of activities in the field of civil protection, where required by the consular services of the Member States;
11. Other supporting and complementary action necessary in the mechanism, referred to in Article 4 of the Council Decision 2007/162/EC, Euratom of 5 March 2007 establishing a Civil Protection Financial Instrument.

Decision 2007/162/EC, Euratom: Council Decision of 5 March 2007 establishing a Civil Protection Financial Instrument

This decision:

1. Establishes a Civil Protection Financial Instrument (hereinafter only as the „Instrument“) in order to support and complement Member States' efforts in protecting the population in particular, but also the environment and property, including the cultural heritage in the event of natural disaster and man-made disasters, terrorist acts and technological, radiological or environmental accidents and to facilitate reinforced cooperation between Member States in the field of civil protection.
2. Lays down the rules for granting financial assistance for:
   a) Projects in the field of Community mechanism to support reinforcement of cooperation in civil protection assistance interventions (hereinafter only as the "Mechanism");
   b) Measures aimed at preventing or limiting consequences of emergencies; and
   c) actions designed to enhance the Community's preparedness to respond to emergencies including actions enhancing EU citizens' awareness.
3. Contains also special provisions to fund certain vehicles in the event of a major emergency to facilitate a rapid and effective response.
4. This Decision takes into account special needs of isolated, outermost and other regions or islands of the Community in the event of an incident in the EU, which has to support and complement the efforts of the Member States aimed primarily at protecting people, but also the environment and property, including cultural heritage, in case of natural and man-made disasters, acts of terrorism and technological, radiological or environmental accidents and to facilitate reinforced cooperation between the Member States in the field of civil protection.

The instrument applies for the period between 1 January 2007 and 31 December 2013.

Based on Article 196 of the Treaty on the functioning of the European Union – for the Civil Protection Policy the European Union encourages cooperation between the Member States in order to improve the effectiveness of systems for preventing natural disasters or man-made disasters and to protect against them.

The activity of the Union in the field of civil protection aims to:

a) support and complement Member States' action at national, regional and local levels in risk prevention, in training their civil protection personnel and interventions in case of occurrence of natural disasters or man-made disasters within the Union;
b) promote swift and effective operational cooperation within the Union between national civil protection units;

c) promote consistency in activities carried out at the international level in the field of civil protection.

4.8 Public Relations

The access to information is guaranteed by the Constitution and other instruments on human rights since the early 1990´s. The Act No. 211/2000 Coll. (Freedom of Information Act) provides the citizens with a statutory way of obtaining necessary information. This Act, together with the Atomic Act, Act No. 24/2006 Coll.l. on environmental impact assessment *and Act No. 205/2004 Coll.l. on collection, storage and dissemination of environmental information,* implement inter alia, also the Convention on Access to Information, Public Participation in the Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention), and as such constitute the legislative framework of communication with the public in the field of nuclear energy. The license holder shall be liable under Section 27 par. 4 d) of the Atomic Act, to inform ÚJD SR on events occurring in the nuclear facilities, *as well as about incidents and accidents.* According to Section 27 par. 4 f) of the Atomic Act, *the license holder is required to inform the public in the event of an incident or accident, and under Section 28 par. 4 of the Atomic Act to inform the public about preventive actions and procedures.* Among the obligations of the licensee, according to the Atomic Act (Section 10, par. 1l) is to inform the public through its web site, press or other publicly accessible ways, always as at 30 April, also on assessment of nuclear safety of their operated installations for the past calendar year.

The operation, improving safety of the *NPP Bohunice V2 and NPP Mochovce 1&2*, as well as construction of Units 3&4 in Mochovce, greatly influenced the life in the regions, which have necessitated the intensification of mutual communication with the regions in the vicinity of NI, as well as at the national level. Transparent information about all aspects of NI construction, operation and decommissioning and making the information publicly accessible via information channels have become an integral part of the operators´ and regulatory authorities´ open policy on informing and participation by the stakeholders in decision-making processes. The most important communication channels of license holders include:

- Mochovce and Bohunice information centres plus on-site excursions. As many as 12 000 to 15 000 visitors from across the country and abroad make a visit to the premises of the Bohunice and Mochovce plants plus external lectures in schools,
- the monthly Atóm.sk distributed free of charge in the Mochovce and Bohunice regions and other printed matters (newsletters and leaflets at Infocentres and websites of the operators) where information is processed in an accessible and comprehensible format,
- websites of the operators – www.seas.sk, www.javys.sk,
- Mochovce and Bohunice Civil Information Commissions (hereinafter referred to as CIC) composed of elected and other representatives of the regional public. CIC members have regular meetings with the operators management and thus obtain qualified first-hand information,
- regional associations of towns and municipalities which communicate and tackle their problems in concurrence with NI operators in a given region,

- operators local sponsorship programs helpful in areas which need it most and bring in generally useful benefits (education, health care and charity, culture, sports, the environment),
- Open Plant Days for personnel and the public held annually at both NI´s,
- others: seminars for journalists, mayors and local-government officials; press conferences and briefings in major happening, press releases for the media, active involvement in domestic and foreign exhibitions, conferences, etc.

ÚJD SR provides information upon request and at the same time makes public information on the state of nuclear installations in the Slovakia and on its regulatory activities, thereby allowing the public and the media to check data and information on both nuclear installations and ÚJD SR. The Authority´s website (www.ujd.gov.sk) publishes in addition to the above information started, ongoing and completed administrative procedures under Act of the NC SR No. 71/1967 Coll. on administrative proceedings, as amended, as well as decisions issued by ÚJD SR unabridged with reasoning.

ÚJD SR holds competencies in respect to keeping the public informed on nuclear safety matters and monitors other media sources with a view to getting the necessary overview of information policy on a given subject. ÚJD SR independently from nuclear installation operators provides information on nuclear safety of nuclear installations, including information on the management of radioactive wastes, spent nuclear fuel, nuclear materials, control and accounting for thereof, as well as information on other fuel cycle phases.

Under the Atomic Act, ÚJD SR prepares annually a report on activities and on safety of nuclear installations in Slovakia for the past year to be submitted for discussion of the Government and of the National Council. Also a paperback Annual Report is published in Slovak-English version, which is distributed to libraries, ministries, other central government authorities, to state organizations, regional governments and municipalities at nuclear installation sites, to schools, embassies of foreign countries in the SR, embassies of the SR abroad, foreign regulatory bodies, international and other organizations.

ÚJD SR places great emphasis on communication with the public in the regions with nuclear installations, striving for continuous improvement in a form of cooperation with CIC *Bohunice and Mochovce*, representatives of municipalities, as well as by distribution of informative materials, such as leaflets and contributing to regional press and TV.

ÚJD SR sends out annually to Slovak news agencies, dailies and e-media contributions on its domestic and foreign activities and organizes press conferences for journalists. Along with the Czech State Authority for Nuclear Safety (SÚJB) are the publisher of the journal “Bezpečnosť jadrovej energetiky“ focusing on the presentation of the latest knowledge on nuclear safety in Slovakia and the Czech Republic.

District offices and municipalities, according to the Act of NC SR No. 42/1994 Coll. l. on the Civil Defence, are publishing information to the public on the web site or on a public notice board, while there is a 30 days period, during which the affected public can raise comments. Justified comments shall be reasonably taken into consideration in developing the public protection plan. Information is

reassessed and updated, as needed; once updated, it is published as a minimum on a three-year basis. The public information includes in particular information about the source of threat, the possible scope of an emergency and the consequences in the territory and environment affected, hazardous properties and identification of substances and preparations which might give rise to an emergency, information on the method of public warning and rescue efforts, tasks and actions in an emergency, particulars of where further information relating to the public protection plan can be obtained. State administration authorities and self-governing bodies issue manuals for the public containing advice for the public which are aimed to furnish as much as possible information on how to act and behave in natural disasters, accidents and calamities. Since 1999 the Ministry of Interior has issued the popular and educational periodical “Civilná ochrana, revue pre civilnú ochranu obyvateľstva” addressed to all who are actively involved in the performance of tasks under Act of the NC SR No. 42/1994 Coll. on public civil protection, but also to all readers interested in the public civil protection issues. The revue brings in the respective columns up-to-date information, runs methodical supplements devoted to practical performance of civil protection tasks, etc. A separate space is devoted to local-government as well.

5. Safety of Nuclear Installations in Slovakia

5.1 Siting

Art. 17

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

(i) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

(ii) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

(iii) for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;

(iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.

5.1.1 Legislation in the field of Siting

Requirements and responsibilities for siting a nuclear installation and for selecting the location, are stated in the Atomic Act and in the ÚJD SR Decree No. 430/2011 Coll.l. *(amended by ÚJD SR Decree No. 103/2016 Coll.l.*) ÚJD SR Decree No. 430/2011 Coll.l. *(amended by ÚJD SR Decree No. 103/2016 Coll.l.*) setting the properties of the area, which exclude its use for siting a nuclear installation. When evaluating seismic risks, it should be based on the relevant IAEA documents, *which are reflected also in the safety guides issued by ÚJD SR* (such as for example, Single Failure Criterion, BNS I.4.1/2014, ÚJD SR, Bratislava, 2014; Requirements for chapter 16 of the Pre-Operational Safety Report – Limits and Conditions, BNS I.2.5/2005, ÚJD SR, Bratislava, 2005).

5.1.2 Meeting Criteria in the Bohunice and Mochovce sites

Earthquakes

There are no tectonic structures located on the territory of Slovakia and adjacent territories that could cause extremely strong earthquakes comparable to catastrophic earthquake in Japan. Nevertheless, the seismicity is an issue which was seriously considered in design, operation and safety upgrading of the plants and covered by the stress tests. The seismic monitoring system has been implemented and is currently in use around the nuclear sites for early identification of any seismic activity potentially affecting the NPPs.

The assessment of the seismic level of the sites was developed in accordance with IAEA recommendations. It is reflecting the current state of the art and was accepted by several international missions. In subsequent safety upgrading steps, capability of all nuclear units to maintain fundamental safety functions have been strongly increased since the original design. For NPP Bohunice V-2 the initial design basis value of horizontal acceleration at ground level (PGA) 0,025 g has been increased through PGA=0.25 g (upgrading performed in 1995) up to the current value PGA=0,344 g, with corresponding upgrading completed in 2008. Similarly, in Mochovce the initial site value PGA=0,06 g was increased (based on the IAEA recommendation) to 0,1 g, which was used for the plant construction. Recently using the state of the art method the site seismic level has been raised to 0,143 g. Subsequently the regulatory body has set up the value PGA=0,15 g as a design basis for construction of NPP Mochovce 3&4 and for safety upgrading of NPP Mochovce 1&2 units. Since the upgrading was largely based on conservative approach considering mainly elastic behaviour of the structures, there is a margin even above the increased PGA values. Taking into account properties of materials used for individual safety system components, with increasing loads first the occurrence of plastic deformation should take place and only after exceeding the structural limit values the component damage will occur. However, such assessment is beyond the current regulatory requirements and international standards, and the margin was not quantified yet. More refined analyses are in progress in order to define the extra margin embedded in the original conservative design assumptions. The preliminary estimates indicate that safety margins are well beyond the design values. These margins are expected to be quantified by further evaluations.

In spite of the fact that robustness of the plant against earthquakes has been significantly increased recently and it is considered adequate in accordance with the current requirements, there are additional safety upgrading measures envisaged including in particular quantification of margins of key SSCs for earthquakes beyond the design basis earthquake and development of a seismic PSA.

Flooding

Floods from surface water sources, failure of dams, effects of underground water and extreme meteorological conditions as potential sources of flooding were thoroughly analyzed. *The assessment also considered internal flooding of NPPs due to burst pipes after the earthquake.* Due to the inland location of the sites, their distance from the sources of water and the site topography and plant layout conditions, flooding of the site due to the sources of surface water from rivers or lakes can be screened out, similarly as from the ground water. Analysis of potential failures of dams on the rivers Vah and Hron has shown that the induced flooding wave can temporarily disable pumping stations which provide raw water to the plants. These events are conservatively addressed in the stress test report as long-term losses of the ultimate heat sink.

The only meaningful sources of the site flooding are extreme meteorological conditions (strong rain, snow, combination of rain and snow melting). Recently (2011) updated study of extreme meteorological conditions for the Mochovce site was used for the assessment. Flooding of the site due to extreme precipitation is very unlikely; only if extreme precipitation is conservatively combined with blockage of the sewer system and with neglecting any recovery staff actions, up to 10 cm site water level was conservatively estimated for the return period of 10 000 years.

Electrical components / systems are the most vulnerable to flooding, depending on their location / elevation in the relevant civil structures. Proper sealing of the buildings and sufficient elevation of the entrance doors provide an adequate protection against flooding. Detailed verification has demonstrated that in both Mochovce plants large margins (more than 2-times) are already available. In Bohunice, adequate temporary fixing has been implemented and the final permanent protection is in its pre-design stage. In addition, for the situations without any fixing time for flooding safety important components / systems was estimated demonstrating that the time margin to flooding of essential power supply is more than 72 hours. It is important to state that flooding due to precipitation does not occur suddenly and it is not associated with damaging hydrodynamic wave, therefore time margins exist and damaging impact is much less significant.

The measures for further improvements of the current situation include updating the procedures for prevention of the blockage of inlets to the sewer system, development of an updated meteorological study also for the Bohunice site, completion of the on-going implementation of preventive measures against water entering into the buildings and providing additional fire brigade pumps for removal of water from the flooded area. In addition it is required that the comprehensive assessment of the extreme meteorological conditions will be performed and corresponding parts of the SARs will be updated in order to take into account new meteorological data, ongoing plant upgrading measures and state of the art methodology.

Extreme meteorological conditions (other than extreme precipitation)

Assessment performed within the stress tests included meteorological events and their combinations, such as extreme temperatures and humidity, extreme drought, ice and snow impact, extreme direct and rotating wind. Feasibility of logistics needed for the emergency preparedness was also evaluated.

Due to location of Slovakia in the mild meteorological region of Europe, extreme conditions were not considered as a major issue in the past, resulting in some cases in limited design information regarding resistance of plant systems, structures and components. Subsequently the evaluations of the effects of extreme meteorological conditions in the stress test report are mostly qualitative (in particular in NPP Bohunice V-2), based on operating experience and on engineering judgment. Nevertheless, the performed assessment and operational experience has proved that the resistance of the plant against meteorological extremes is acceptable. Extreme drought does not represent serious safety issue since it is a slowly evolving process and the site water inventory is sufficient for more than 10 days of residual heat removal. In addition the upgrading measures implemented with the primary aim to increase seismic resistance contribute also to improved resistance against the wind. Since development of extreme meteorological conditions (except very strong wind) to severe loads on the plant requires certain time, the evaluations also show sufficient time margins for adoption of countermeasures in extreme conditions.

As already mentioned, the new metrology study has been elaborated both for Mochovce site and for Bohunice site. These new site data as well as ongoing plant upgrading measures and state of the art methodology will be taken into account in updating of the corresponding parts of the SARs also regarding extreme weather conditions (i. e. extreme wind, temperatures and humidity, snow amount, freeze and icing, and their combinations). This should include the detailed assessment of impact

of extreme meteorological conditions on the vulnerability of high voltage line at the Bohunice and Mochovce sites. Among the prepared operational measures there are changes in plant operating procedures and preventive arrangements including increased frequency for plant walk-down to diesel generator stations during period of low temperatures, snowing and icing, and preventive measures at ambient temperatures bellow design values to maintain the functionality of the required equipment.

ÚJD SR International Agreements

All bilateral agreements with the neighbouring countries are effective in regard of the planning and construction of NI´s on the Slovak Republic´s territory. The Slovakia is obliged thereunder to notify the neighbouring countries of planned nuclear installations and of the expected period for commissioning such nuclear installations.

As regards multilateral agreements, the Slovak Republic is party of the following conventions:

- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo),
- Convention on Access to Information, Public Participation in Decision-making process and Access to Justice in Environmental matters (Aarhus Convention),
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel).

5.1.3 International Aspects

Environmental impact assessment in a transboundary context on the international level is governed by the Convention on Environmental Impact Assessment in a Transboundary Context – the Espoo Convention (Slovak Republic is a party to this Convention). The Espoo Convention provides that parties, either individually or jointly, shall take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary impacts on the environment, which can be caused by the proposed activity.

For the Member States of the European Union the impact assessment is governed by the Directive of the European Parliament and the Council 2011/92/EC of 13 December 2011 on Environmental Impacts Assessment of certain public and private projects.

In the Slovak Republic the transboundary assessment is governed by the Act No. 24/2006 Coll. l. (see also chap. 3.1.2.2).
Impact assessment does not apply to strategic documents, whose sole purpose is national defense, civil protection, financial or budget plans and programs.

5.2 Design and Construction

Art. 18

Each Contracting Party shall take the appropriate steps to ensure that

(i) the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defense in depth) against the release of radioactive materials, with a view

to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;

(ii) the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

(iii) the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

5.2.1 Legislation in the field of Design and Construction

As the implementing regulation to the Atomic Act, ÚJD SR issued a Decree No. 430/2011 Coll.l. *(amended by the ÚJD SR Decree No. 103/2016 Coll.l.*) laying down the details in siting, design, construction, commissioning, operation and decommissioning of *nuclear installations*, and in closing a repository.

The design of the reactor core and related protection systems shall ensure that limit parameters of fuel assemblies during normal and abnormal operation are not be exceeded. In case of emergency conditions, the limit failure of the fuel assemblies shall not be exceeded; it is necessary to ensure that limit parameters of fuel assemblies, which serve as the basis for design of other equipment, are not exceeded during normal operation, abnormal operation and design accidents.

Control systems shall be equipped so as to monitor, measure, register, and manage systems of relevance to nuclear safety.

Protection systems shall be capable of automatically starting up reactor protection systems, with operating personnel having the possibility of starting up these systems manually. Protection systems shall be backed up and allow for functionality testing.

The primary circuit design principles require that sufficient strength be provided under normal and abnormal operation so as to prevent a loss of coolant and allow throughout the whole operation for periodic or continuous monitoring for the primary circuit condition and testing necessary to verify the nuclear safety.

A nuclear installation shall be equipped with a confinement to restrict, under emergency conditions involving a leakage of radioactive substances, such leaks into the environment so as to keep them below the limit values, unless the function is provided other technical facilities.

Building structures, technological systems and components of relevance to nuclear safety of the nuclear installation shall be designed, manufactured, assembled, and tested so as to ensure their reliable function. The investor - the holder of an authorization to construct a nuclear installation under Art. 5 (3) of the Atomic Act - shall ensure that the manufacturers and suppliers of classified equipment (equipment of relevance to nuclear safety), materials and accessories thereof are obliged to set out in the supply quality documentation the results of selected quality production checks and tests of properties of components, equipment, base material, welded joints and weld deposits, material properties and composition as well as indications and removed material defects detected by an inspection (ÚJD SR Decree No. 431/2011 Coll.) (e. g. keeping evidence samples).

Control systems shall allow for monitoring, measurement, registration, and management of values and systems of relevance to nuclear safety. Devices and actuators shall be designed and arranged so that maintenance personnel constantly have sufficient information on operation of the nuclear installation (ÚJD SR Decree No. 430/2011 Coll.). The control room shall allow for safe and reliable operation control.

The construction of nuclear installations is governed by Act No. 50/1976 Coll. (Building Act) and implementing regulations thereof, the approved Framework Quality Assurance Programme for a given nuclear installation, its Stage Quality Assurance Programme for construction and the quality assurance requirements referred to in quality plans of classified equipment during their assembly and post-assembly testing.

5.2.2 NI project preparation in the NPP Mochovce 3&4 site

See chapter 2.3.2.

5.3 Operation

Art. 19

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

(i) the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

(iii) operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;;

(iv) procedures are established for responding to anticipated operational occurrences and to accidents;

(v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;

(vi) incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;

(vii) programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;

(viii) the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any

necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

5.3.1 The Procedure for obtaining a license

To obtain a license, the applicant must demonstrate its ability to comply with and fulfil all requirements of the laws and decrees of the Slovak Republic, in particular the requirements of the Atomic Act and implementing regulations to this Act. The applicant must also demonstrate that the nuclear installation is or will be operated safely.

The licensing process consists of several permits issued by various national authorities. At all stages of licensing ÚJD SR plays an irreplaceable role. If some permit is not issued directly by ÚJD SR, the applicant must submit to the issuing authority the opinion of ÚJD SR.

The whole licensing process consists of the following steps:

Spatial planning – any new nuclear installation must be approved in the national and regional land use plan and in the zoning plan, which explicitly specifies where the nuclear facility will be situated.

License to engage in the energy business – issued by the Ministry of Economy of SR and it is issued in accordance with the Energy Policy of the Slovak Republic. It is issued based on a positive opinion from ÚJD SR.

Environmental impacts assessment – the applicant must submit a statement, a decision or final position from the process of assessing impacts on the environment and human health of the given activity issued by the competent authority in accordance with the Act No. 24/2006 Coll. l. on environmental impact.

Permission for siting – issued by the Regional Building Authority as an outcome of the land use proceedings. Before its issuance it is necessary to submit the opinion of ÚJD SR for siting a new nuclear installation.

The following licenses are issued by ÚJD SR and in order to obtain them it is necessary to submit documentation in compliance with the requirements of the Atomic Act. In all these cases it is necessary to submit the relevant Safety Report prepared at the relevant level and within the given scope.

Building permit – in case of constructing a nuclear facility ÚJD SR performs activities of a building authority and after fulfilling the requirements it issues the relevant permit.

Commissioning of a nuclear installation is divided into several stages, while for each stage there must be a separate consent from ÚJD SR. Consent for the next stage of commissioning is issued by the ÚJD SR after reviewing the report on assessment of the previous stage.

Operating license – issued based on a written application and after fulfilment of all legal requirements*. Operating license is not limited in time, but the license holder must demonstrate, based on the provisions of law, every ten years by means of a periodic safety review, the readiness of the facility for further operation. ÚJD SR can complement the operating license with conditions, or can order a reduction in power or shut-down of a nuclear facility.*

Commissioning of the facility – begins at the motion of the building permit holder after a positive evaluation of the trial operation.

5.3.2 Limits and Conditions for Operation

Limits and conditions for safe operation are set for:

a) means intended to check the status of safety barriers,
b) parameters for monitoring the status of safety barriers,
c) technical means, the failure of which create initiating conditions for an incident or an accident,
d) parameters, whose change in the value create initiating conditions for an incident or an accident,
e) means intended to mitigate consequences of design basis accidents.

For the Units of EBO and EMO nuclear power plants, the L&Cs are currently developed separately for each Unit in a form and content based on a guide of the US Nuclear Regulatory Commission (NRC) NUREG-1431 US NRC.

Existing L&Cs use the experience gained during commissioning and operation of Units 3&4 of EBO, Units 1&2 of EMO and other NPPs. L&Cs are developed based on the current state of equipment after the modernization of Units 3&4 of EBO (MOD V2) and after the implementation of the Power Uprate Project (ZVB) at NPP EBO and EMO. The basis for a fundamental change in L&C was the update of safety reports at the above mentioned NPPs, due to MOD V2 and the units power uprate projects.

5.3.3 Management and Operational Documentation for Operation, Maintenance, Testing

Operation, maintenance, reviews of systems and procedures for transient and emergency conditions of nuclear installations are carried out according to the management and operational documentation, which is required by the Act No. 541/2004 Coll. l. and its implementing regulations.

Documentation management is part of quality management system of the licensee which is part of the integrated management system. Documentation of the *quality management system, including operational documentation* meets the requirements contained in the Atomic Act, the implementing decree of ÚJD SR No. 431/2011 Coll.l. (amended by ÚJD SR Decree No. 104/2016 Coll.l.) *in the international* standard *STN EN ISO* 9001:200*8* and using the IAEA recommendations, in particular GS-R-3 and GS-G-3.1 (for details see chapter 4.4).

Specialized departments are constituted at the respective power plants for management of operational documentation. Its main tasks include:

- maintain a uniform operational documentation system including a uniform system of operational documentation identification, rules for work with operational documentation and a uniform system of operational documentation registration,
- organize approval of operational documentation,
- issue, distribute and update operational documentation as required by departments,
- conduct periodic review for up-to-datedness of operational documentation at three-year intervals,
- provide approval and issue of revisions and changes of operational documentation and distribution thereof in an established procedure,

- keep the original of operational documentation with originals of signatures in hard-copy, keep the original of operational documentation in e-format,
- keep and update the distribution list of controlled operational documentation,
- notify of issue of new and repealing of invalid documents,
- keep and store the history of operational documentation,
- keep and make accessible applicable operational documentation and information thereon to users in e-format,
- disposal of invalid documents.

Described below are the following basic types of documentation in use:

- Operational documentation;
- Documentation on equipment verification and testing;
- Maintenance technologic processes.

5.3.3.1 *Operational Documentation*

This is a set of documents developed to set forth the method of organization, management and control of operation, the mode of technologic equipment operation under nominal steady and transient conditions, as well as under abnormal and emergency conditions. It also defines procedures for the performance of certain activities directly related to operation, equipment quality documentation, determination of operating personnel job responsibilities, lists of documentation at the shift service point, assurance of fire protection of operational workplaces, and for documenting the course of operation and related issues.

Operational documentation contains:

Standardising documentation which defines basic organizational and technical requirements for reliable, economic and safe operation of the nuclear power plant.

Organizational and operational documentation which deals with the organization of operation and operation of the units proper under nominal and non-nominal conditions. It consists, e. g., of:

1. *Technological* operating procedures *for normal operation*;
2. Regulations for *addressing abnormal conditions*;
3. *Regulations for optimal procedure (POP) and Regulations to restore functions (POF)*;
4. *Severe Accident Management Guidelines (SAMG);*
5. Other operational documentation;
6. Fire guidelines for workplaces.

5.3.3.2 *Documentation for Equipment Verification and Testing*

"Surveillance program" is a written code for testing a particular system or equipment. The personnel follow it step by step and record the course of the test, thus significantly reducing the probability of their mistake. The IAEA Safety Guide SG 50-08 was used to develop it. It is not allowed to skip points or change the text of the program, *changes can only be made in a prescribed manner*. For some programs an independent check is required. The program specifies: the supervisor of the test, the

objective and purpose of the program, safety measures, initial conditions and preparatory works, the test procedure, success conditions, and the test evaluation.

The operator´s nuclear safety departments manage the entire process of uniform development of "Surveillance Programs", record-keeping and test evaluation.

Documentation on conducted checks is used to perform in-service inspections and serves to:

- record major measures, tolerances and settings in repairs relevant to assessment and further maintenance planning,
- verify and assess the required quality of repair works and used materials to assess the fitness for operation,

Control documentation consists of the following:

- atest slips of material used,
- list of welds and X-ray images with evaluation,
- measurement record, setup protocol,
- record on conducted non-destructive test,
- record on visual inspection.

5.3.3.3 *Technologic and Operating Procedures for Maintenance*

Providing a clear structure of regulations, their content and classification of quality checkpoints is dealt with in operators´ internal documents. These set forth rules for developing technologic processes as a whole of acts and operations to carry out maintenance actions, including requirements for safe operating procedure and their firmness in maintenance activities on NI sites.

In preparing operations to perform maintenance intervention, graded approach is applied, which ensures that all works on the components relevant for nuclear safety will be prepared, implemented and evaluated with the required level of assertiveness, attention and detail. There are success criteria for repair and checkpoints in the progress of implementation to prevent non-conformities, as well as the improvement of nuclear and conventional safety. Developing and using reference *technological* processes *and type actions and operations for carrying out maintenance intervention* creates protection against non-compliance when developing technological procedures, determining their uniqueness. Reference *technological* procedures are part of the controlled documentation to compare consistency of copies for their authorization for routine use.

Firm schedule for the assessment and development of all *controlled* maintenance regulations is part of the quality system. Control and monitoring of maintenance actions are part of the planned care for basic means within operator´s information systems "Care of Equipment", which also includes plant equipment record-keeping, items of the annual maintenance plan during in outage and weekly plans.

5.3.3.4 *Long-term operation of NPP Bohunice V2*

Long-term operation, means operation of NPP beyond the originally intended time frame. For the power plant to be operated under these conditions, it is necessary to confirm its safety margins through safety assessment by taking into account the processes and properties of systems, structures

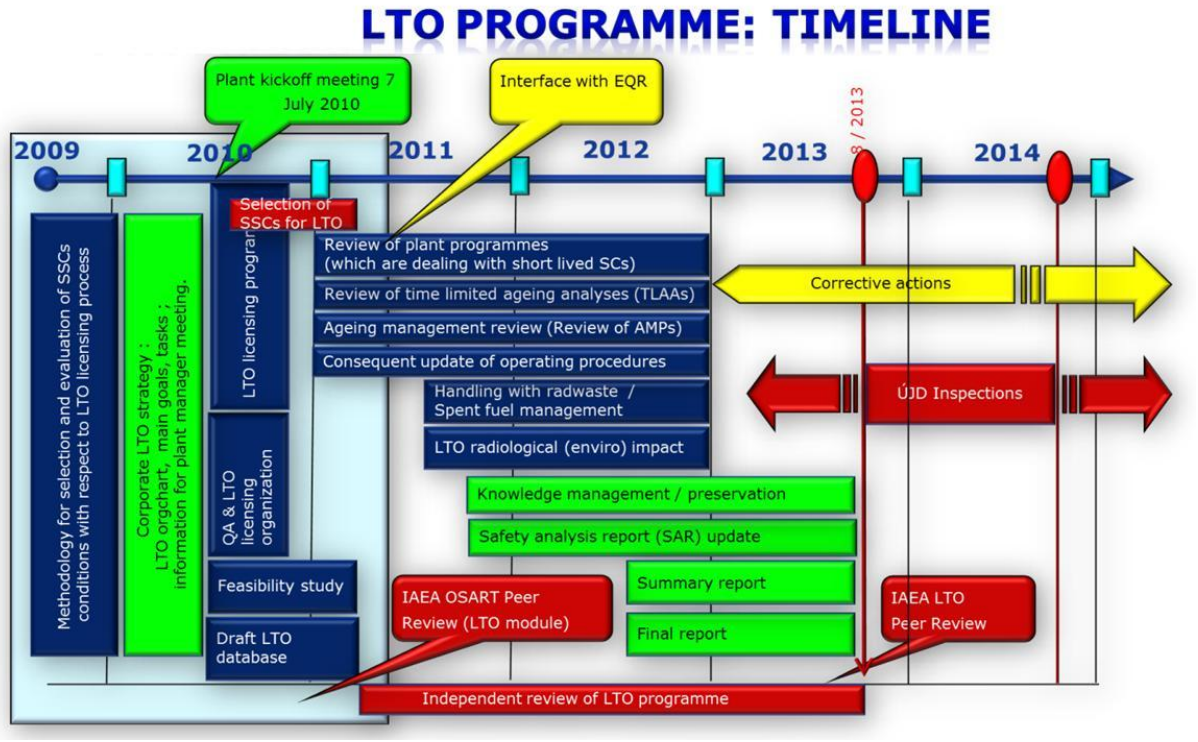
and components (SSC) limiting their lifecycle. Safe long-term operation of a nuclear power plant should be based on experience and practice of different countries in such areas as the requirements in the licensing processes for operation, procedures and activities in permitting long-term operation, and implementation of periodic safety review. In terms of long-term operation, there are dominating and related activities, such as aging management and modernization of operations.

All activities of the power plant linked to the approval of long-term operation, are in compliance with the applicable legislation, (ÚJD SR Decree No. 33/2012 Coll.l. on a regular, comprehensive and systematic assessment of nuclear safety of nuclear installations as amended by the ÚJD SR Decree No. 106/2016 Coll.l.).

Slovenské elektrárne, a.s., as the license holder (according to ÚJD SR Decree No. 33/2012 as amended by ÚJD SR Decree No. 106/2016) carried out an assessment of operation of NPP Bohunice V2 after reaching the designed life. Based on the assessment, the company issued a report containing an Action Plan of corrective actions for the long-term operation program of NPP V2. [Part of the Action Plan is the Long-term Operation Program of NPP V2 (hereinafter also „PDP V2")].

The aim of the program on long-term operation was to demonstrate that the facilities concerned (SCC) will perform their *intended* safety functions throughout their 60 years of operation (Unit *3 until 2044; Unit 4 until 2045). Apart from the program on long-term operation, there is also a comprehensive program for replacement of other, operationally relevant components. This program is aimed at replacing structures and components (SCC), which were not replaced during the modernization program (2000 – 2008) or the power uprate project at both units with new or retrofitted or modified pieces. The LTO project, according to the approved time schedule, will continue until 2024.*

The long-term operation program will be subject to further review during the periodic safety review (2018).



5.3.3.5 *Severe Accident Management Guidelines*

The project to develop Severe Accident Management Guidelines (SAMG) had been implemented over 2002 - 2004 under the joint project for NPP V-2 and NPP Mochovce. SAMG were developed in co-operation with Westinghouse Electric Belgium with a view to ensuring the utmost consistence with regulations on emergency conditions and continuously covering the area of management of accidents of all gravities. SAMG are to be used in the Technical Support Centre and in the main control room. The guidelines were being developed for the state of V-2 and Mochovce after making a set of hardware modifications securing a higher success probability of applicable strategies. For this reason, introduction of SAMG into practice was linked to implementing hardware modifications *(see chapters 2.2.1 and 2.3.1, Annex 6.5 - ID 27bis).*

In NPP Bohunice V2 *the project* „Severe Accident Management" was realized with the task to implement hardware modifications needed for the application of SAMG. Under this project, SAMG guidelines were updated and introduced in the technical support centre. Severe Accident Management Guidelines of NPP Bohunice V2 *were* introduced after training of the staff, in 2013.

For NPP Mochovce the original plan envisaged their introduction by 2015. *The task is partially fulfilled – SAMGs are approved, organizational support for emergency preparedness is provided for and also the standby of the emergency committee for the SAM management in the Emergency and Control Centre (ECC).*

Another task in the field of Severe Accident Management was to analyze the SAM project in terms of manageability of severe accident occurring at all nuclear Units on site at the same time (fuel placed in reactor core and in the storage pool and the spent fuel). It was necessary to prepare a plan to implement additional measures to extend the SAM project to improve the ability of managing severe accidents on all Units of the site at the same time. Implementation of additional measures to be coordinated with possible new increased requirements for strengthening physical security of NPPs in case of violent attacks.

Part of the task was to prepare a report „Management of severe accidents on all units on site", which identifies potential areas for improvement, both in organizational support of managing the accident, and in adequacy of HW resources. SE, a.s., developed a self-assessment in management of severe accidents according to the latest criteria of the World Association of Nuclear Operators (WANO) and under this self-assessment a corrective action plan was developed.

The Action Plan includes measures as lessons learned from the accident at NPP Fukushima Daichi in case of possible damage to infrastructure, including disruption of communication at the level of plant, company and the State, long-term accidents (lasting several days) and accidents having impact on several units and on adjacent industrial facilities.

Analysis of this project was done by the end of 2015.

For determination of safety margins in nuclear units a systematic approach called Configuration Matrix Method was developed. The approach is based on verification of performance of the fundamental safety functions for occurrence of events during operation at power as well as during shutdown

modes, taking into account both fuel in the reactor as well as in the spent fuel pools. The approach identifies all feasible configurations of plant systems, both safety and operational, capable of maintaining safety functions with consideration of all possible connections available according to the design as well as those that can be set-up by personnel under given conditions in available period of time. The approach verifies presence of all conditions for functioning of the systems (i. e. power supply, working medium, instrumentation, environmental conditions, accessibility by operators, availability of procedures) and assesses how eventually these systems will be disabled in their turn with increasing load induced by the external hazards. The evaluation includes consideration of the human factor, logistic and administrative provisions for staff response in case of events initiated by unlikely extreme external conditions. All relevant information was arranged in a special database containing approximately 2,500 structures, systems and components, which will remain available for future plant safety assessments. The Configuration Matrix Method was subsequently adopted by the IAEA as one of the approaches for IAEA independent reviews.

5.3.4 Operation Technical Support

Technical support and safety divisions are a part of the operator's organizational structure. Their main tasks include:

1. Organize measures to protect health of personnel and of the public in the plant surrounding area against ionizing radiation by applying the ALARA principle to work with ionizing radiation;
2. Organize external and internal radiation control, personal dosimetric monitoring and supervision over compliance with the radiation safety rules;
3. Provide technical support in meeting NPP requirements for safe and reliable operation of plant generation equipment in the following areas:

   A. Concept for management of technical changes within the plant and Technical Committee activities to the extent of:
      - general management process of changes and modifications to NPP systems, structures and components in line with the requirements for nuclear and radiation safety, quality assurance and maintenance of the NPP design integrity, reduction of adverse impacts on the environment, fire and technical safety, operation and maintenance effectiveness,
      - supervision over qualification and classification and maintenance of qualification of systems, structures and components,
      - seismic reassessment of systems, structures and components,
      - management and co-ordination of programmes for residual lifetime assessment and controlled ageing of NPP systems, structures and components,
      - monitoring of seismic activity of the plant surrounding area using a seismic monitoring network,
      - management and co-ordination of the plant nuclear facility decommissioning programme,
      - care of technical documentation including conditions for long-term and safe keeping of technical documentation;

B. Concept for inspections of equipment´s technical condition inspections pursuant to the current legislation;
C. Providing conditions and the performance of inspections of equipment´s technical condition inspection activities;
D. Concept for standardisation activities within the NPP;

4. Organize the development of operating procedures for normal and emergency operation and other operational documentation and permanent update thereof;
5. Supervise compliance with the nuclear safety rules during operation and review of all design changes in equipment and operational modes in terms of nuclear safety;
6. Organize an analysis of events at nuclear installations, develop their analyses and overall organization of feedback from own and external nuclear installations;
7. Probabilistic Safety Assessment (PSA) and application thereof;
8. Design a programme for periodic checks of equipment and systems relevant to nuclear safety,
9. Keep records of nuclear materials, fuel loading calculations and fuel cycle strategy, supervise nuclear safety during refuelling and physical start-up;
10. Organize and assure safety emergency analyses;
11. Manage projects of international technical co-operation;
12. Provide fire protection;
13. Organize and co-ordinate communication with state regulatory authorities on nuclear and technical safety;
14. Manage and organize emergency planning.

The operator co-operates in providing the above tasks with external support organisations such as:

- Various research institutes, project and analytical organisations - VUJE, a. s., RELKO, s. r. o., Bratislava,
- Slovak Hydro Meteorological Institute,
- Universities and colleges,
- Slovak Academy of Sciences,
- Commercial supplier organisations domestic and from abroad such as Areva, VÚEZ Tlmače, a. s., ÚJV Řež, a. s.

The Nuclear Safety Committees and the Technical Committee are advisory bodies of the management in the operator's respective organisational units. Their main task is to assess nuclear safety standards, propose and approve solutions to changes and modifications concerning safety and other issues in nuclear installations.

5.3.5 Event Analysis at Nuclear Installations

Definition of operational events, their categorization (failures, incidents, accidents), the requirements for their resolution and reporting are defined in Section 27 of the Atomic Act. More details regarding the method and the scope of notification of operational events are in ÚJD SR Decree No. 48/2006*, laying down details on the method of reporting operational events and incidents during transport and details of investigation of their reasons, (amended by* ÚJD SR Decree No. 32/2012).

Legislative requirements are reflected in the operator's internal regulations on feedback from operational events and their precursors laying down the procedures and responsibilities for reporting and management of occurrences.

5.3.5.1 *Definition and Classification of Operational Events at Nuclear Installations*

Operational events at a nuclear installation and occurrences in transport of radioactive materials are defined under Art. 27 of Act No. 541/2004 Coll. as follows:

1. An operational event is an event in which a threat to, or a violation of, nuclear safety occurred at a nuclear installation during the commissioning, operation, decommissioning stages thereof or during the closure of repository.
2. An event during transport is an event during transport of radioactive materials which caused non-compliance with the requirements for safety in transport of radioactive materials.
3. Operational events and transport events are divided into:

   a) a failure which

      - jeopardized nuclear safety without a direct threat to the performance of safety functions,
      - disrupted safety barriers or other safety measures without direct consequences,
      - gave rise to the lapse of limits and conditions of safe operation and safe decommissioning,
      - caused the violation of limits and conditions without direct consequences on the performance on safety functions,
      - triggered safety systems or triggered them due to real reasons, but without direct consequences,
      - caused a violation of technical conditions or transport regulations in transport without direct consequences,
      - caused other disruption of equipment reliability requiring corrective action to eliminate consequences,
      - caused a release of radioactive substances or ionizing radiation in which exposure limits are not exceeded,

   b) an incident which caused

      - threat to, or disruption of, the performance of safety functions,
      - failure of safety systems or trigger of safety systems for actual reasons which require action to eliminate consequences,
      - serious disruption or failure of safety barriers,
      - release of radioactive substances or ionizing radiation with exposure limits exceeded,

   c) an accident which caused a release of radioactive substances which requires actions to protect the public.

5.3.5.2 *Documentation and Analysis of Operational Events (OE) at Nuclear Installations*

The aim of investigation of operational events is not to identify the culprit but to find out WHAT has happened, HOW and WHY it has happened in order to define necessary corrective action to prevent recurrence of such events or mitigate their consequences.

Root cause analyses are conducted by a team led by analysts. The methodology HPES (Human Performance Enhancement System) developed by INPO) or the methodology TapRooT (since 2009) is used to investigate - see 4.3.3.

From 2010 all non-compliance cases (from minor non-compliance up to failures) are recorded, evaluated, managed under SAP NUCLEAR.

Precursors of operational events - low level events (so-called recorded events) or near misses that do not meet the notification criteria pursuant to Atomic Act are analysed in a similar way, with the scope of analysis to be determined by a potential risk of the precursor and frequency of its occurrence. Corrective action is taken based on the results of precursor analyses. The operator investigates under its internal criteria a far higher number of problems and events than the number of events reported to the regulator - ÚJD SR.

The operator carries out periodic analyses of trends of operational events and their precursors. In case that an unfavourable trend is identified in any area, an analysis of common causes and thereafter root cause analyses are performed. The operator takes corrective action based on the above analyses.

Extraordinary Failure Commission

The Extraordinary Failure Commission (EFC) is convened as soon as information is obtained from the Plant Shift Supervisor about the occurrence of an operational event meeting the criteria to convene EFC under the appropriate directive. The role of EFC is to identify the direct cause of the event, define immediate corrective action and set forth action for further operation of the unit.

Minutes of the EFC convened with a view to immediately discussing the occurred operational event is submitted to ÚJD SR. Minutes of the EFC is a preliminary report on the operational event. The final analysis, including the root cause analysis, shall be prepared by the team in charge of investigation into the event as a standard report of an expert group.

Notification of a NI Operational Event to the Regulatory Authority

The operator notifies ÚJD SR of failure category operational events as per Decree No. 48/2006 Coll. by making written reports on failures summarily for the appropriate calendar month by the 20th day of the following calendar month.

The operator shall be obliged to deliver ÚJD SR the original information on an incident or accident in writing within 45 minutes from its identification by fax, e-mail or in person according to the time of incident or accident occurrence so that the information is demonstrably reported to the ÚJD SR. Also part of the information is OE preliminary assessment according to the INES. The licensee shall have internal regulations ensuring fulfillment of the reporting obligation as required by the ÚJD SR

Decree No. 55/2006 *(amended by ÚJD SR Decree No. 35/2012)* and No. 48/2006 *(amended by ÚJD SR Decree No. 32/2012.* Final report on the operational event, in the category incident or accident, is submitted by the licensee to ÚJD SR as a *summary for the relevant calendar month by the 20th day of the following calendar month by submitting failure reports.*

Notification of an Incident or Accident during Transport

The holder of an authorization forthwith notifies ÚJD SR of the occurrence of an incident or accident during transport by telephone.

The authorization holder delivers written information about an incident or accident during transport in the form as per emergency transport guidelines within 45 minutes from its identification by fax, e-mail or in person according to the time of the event occurrence so that the information is demonstrably reported to the ÚJD SR.

The authorization holder notifies the public within 30 minutes, if an incident or accident during transport was assessed according to the INES with level 2 or higher, in accordance with the requirements under special regulations.

Evaluation of Effectiveness of Corrective Actions Taken

Evaluation of the effectiveness of implemented corrective actions is done using several procedures:

- Assessing the effectiveness of corrective actions to prevent recurrence of a particular event – this evaluation is performed by a person not involved in the analysis of the given event, approx. 6 months after fulfilment of the last corrective action. The result of the evaluation is discussed again at the Committee for correction and prevention system (VSNaP) and if necessary, new corrective actions are taken regarding the given event.
- Quarterly evaluation of indicators set for the process of the Correction and Prevention System (SNaP) in the report from Continuous self-assessments.
- In the system of operational safety indicators (SPUB) there are selected indicators of operational events that are evaluated quarterly and annually. Results of evaluation of trends of identified indicators are elaborated in the report on the status of safety, on the basis of which corrective actions are also taken.
- In the annual report on the feedback from internal events - summary statistical evaluation of operational events and their precursors in order to identify areas for improvement based on negative trends of feedback indicators (e. g. the trend of event recurrence). The Report is discussed in the Nuclear Safety Committee, which based on identified areas for improvement takes decisions on the relevant corrective actions.

Precursors of Operational Events - Events without Consequences

In order to prevent serious events and as a measure to improve the safety culture, operator has put in place an operational event precursors management system. Precursors are low level events and near misses. Definitions:

a) Low level events (so-called registered events) - are defined as events (undesirable deviations) with minimum consequences, not falling under Act No. 541/2004 Coll. (Atomic Act)
b) Near misses - are such precursors for which a deviation was prevented from developing into a potentially safety-relevant event with an adverse consequence.

N.B. Deviation development prevention may be induced either by an appropriate circumstance (good luck) or personnel targeted activity (corrective action) which can be pre-planned (regulation, equipment protection such as a safety valve) or corrective action can intuitively be done by personnel at the time of deviation development.

The aim of reporting and analysing low level events and near misses is to maintain awareness of risk of potential operational events. Using this vehicle, the operator proactively manages known internal factors related to the project, equipment, training, maintenance, regulations, communication, goals, etc., which are present in the activity performance and assessed as hazardous.

Providing feedback including occurrences at nuclear installations of other nuclear power plants abroad

Feedback

The purpose of feedback is to take such measures so as to eliminate repetition of failure on the technological equipment. Due to this, it is essential to investigate the failure in detail and find its root cause.

The operator uses international informative systems on operational experience from nuclear energy (WANO and the IAEA) to apply measures from analyses of events of other NI for its own unit and also to pass his own experience to other operators. The aim of this activity is to eliminate repetition of the same events by implementation of preventive measures.

The procedure of processing and using information about events at other NI is described in detail in the relevant documents of the operator.

5.3.5.3 *Statistical Assessment of Occurrences at Nuclear Installations, Development Trends*

Making use of experience **from outside occurrences**

The operator takes advantage of international information systems on operational experience from the nuclear industry (WANO, INPRO, IRS) to apply measures from other NPP´s event analyses for its own units and also to hand own experience over to other operators. The aim of this activity is to prevent the same events from recurring through taking preventive action.

The procedure of processing and using information about events at other NI is described in detail in the relevant documents of the operator.

For numbers of assessed outside occurrences and numbers of corrective actions taken thereon, see the figures below.

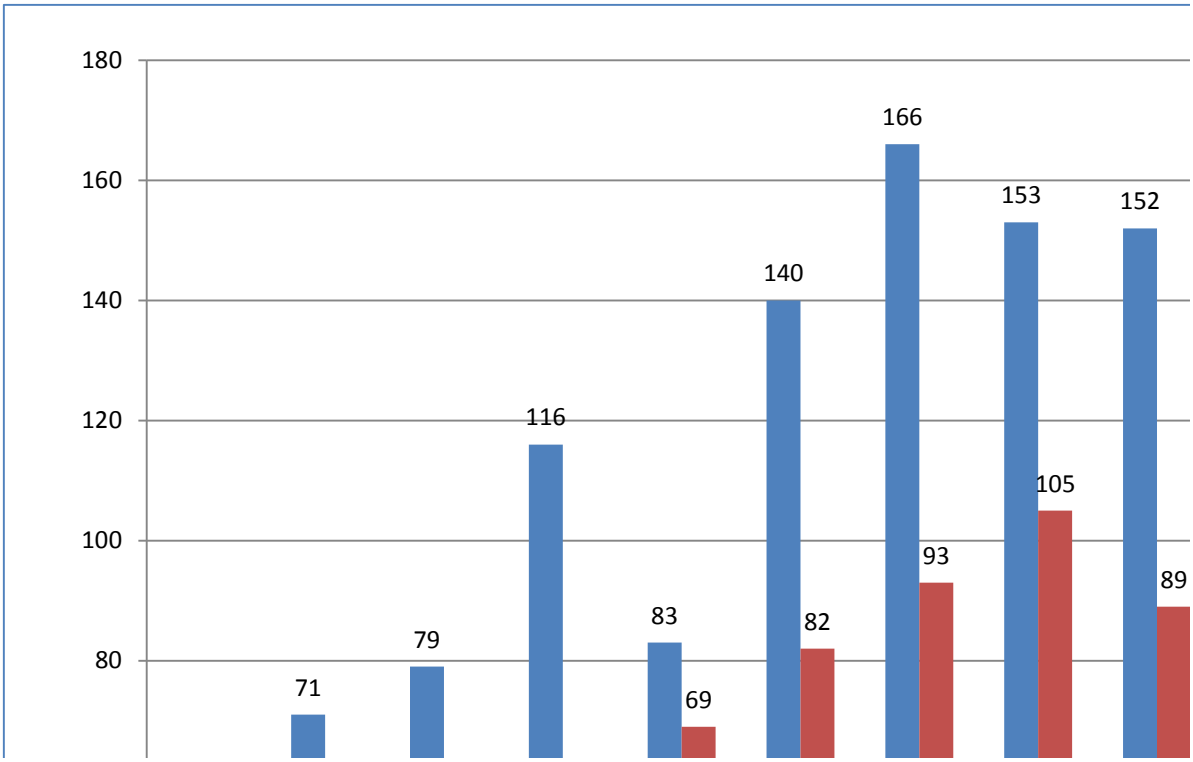


Fig. 5.3.5.3 a) Numbers of analysed outside occurrences - NPP Bohunice

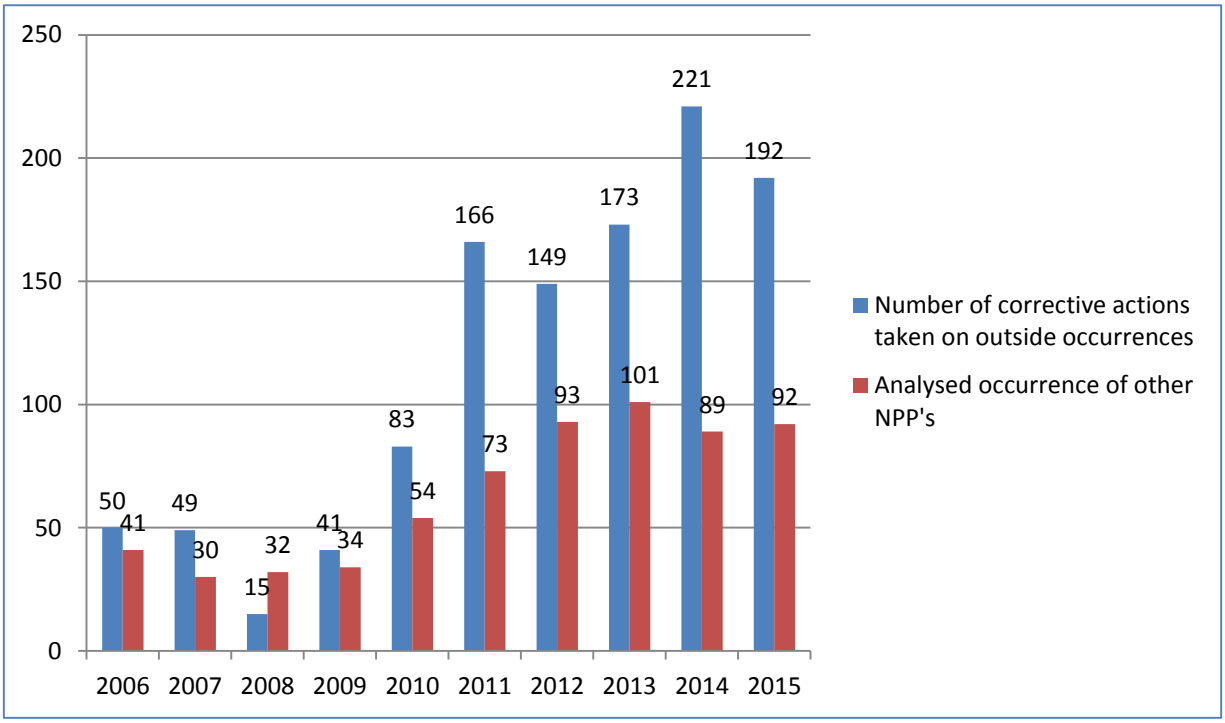


Fig. 5.3.5.3 b) Numbers of analysed outside occurrences – NPP Mochovce

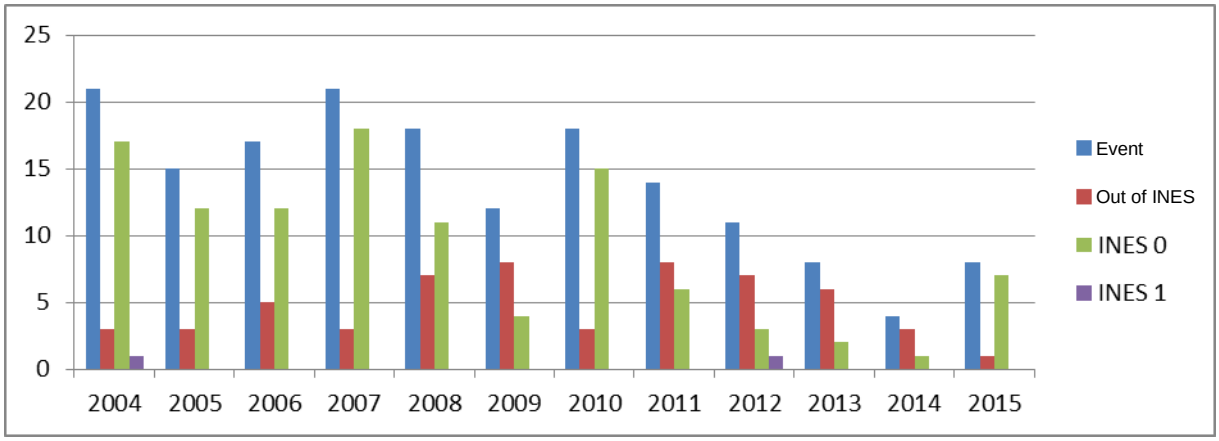


Fig. 5.3.5.3 c) Numbers of reported occurrences and their assessment according to INES - NPP Bohunice V2

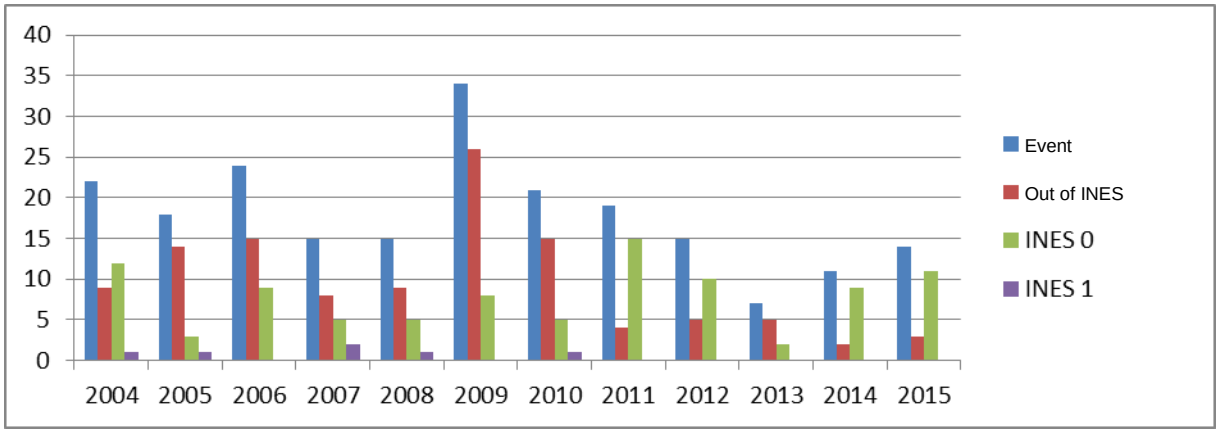


Fig.5.3.5.3 d) Numbers of reported occurrences and their assessment according to INES - NPP Mochovce

The most frequent cause of operational events over the assessed period were equipment failures and personnel errors. Based on identified causes, corrective action is taken to eliminate and prevent events from recurring.

5.3.6 Production of RAW

The amount of produced solid and liquid radioactive wastes is monitored with a view to reducing their production. The reduction of waste volume will lower demands on their storage, *transportation*, disposal and their environmental impact.

The amounts of produced RAW from operation of the Bohunice and Mochovce nuclear power plants in are shown in Figs. 5.3.6 a) and 5.3.6 b).

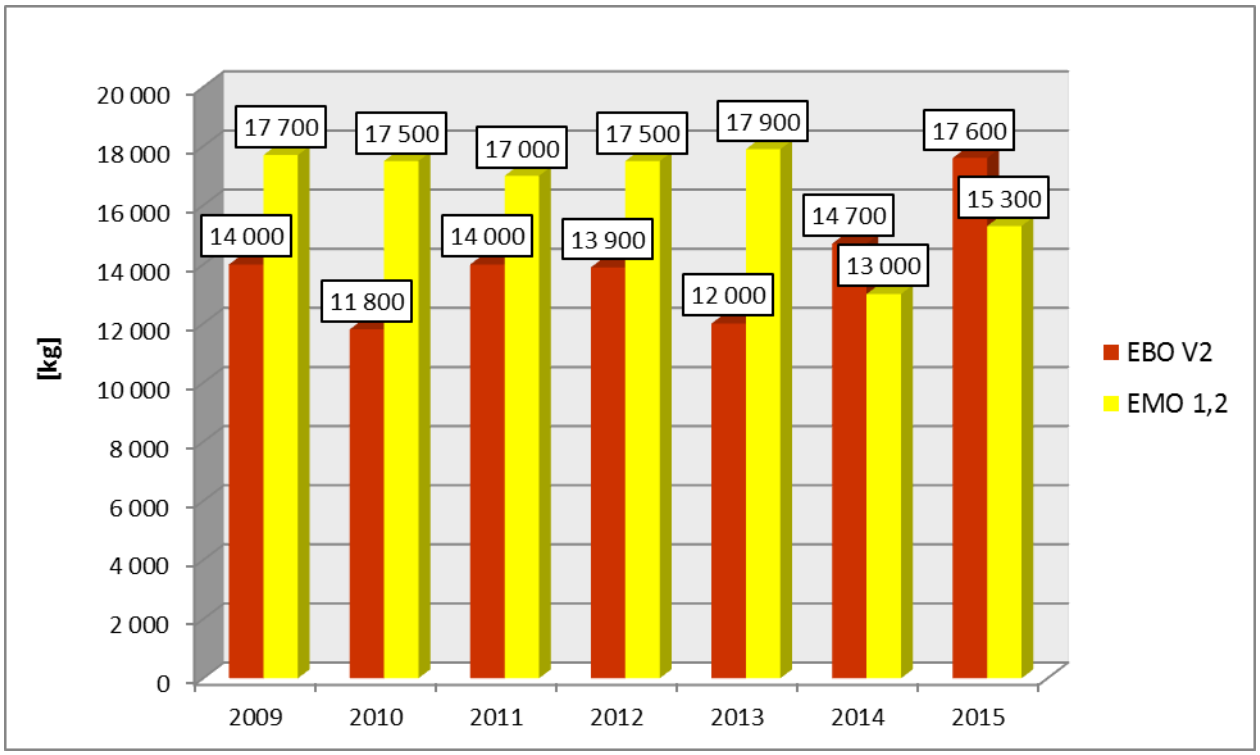


Fig.5.3.6 a) Production of solid RAW at NPP Bohunice, NPP Mochovce

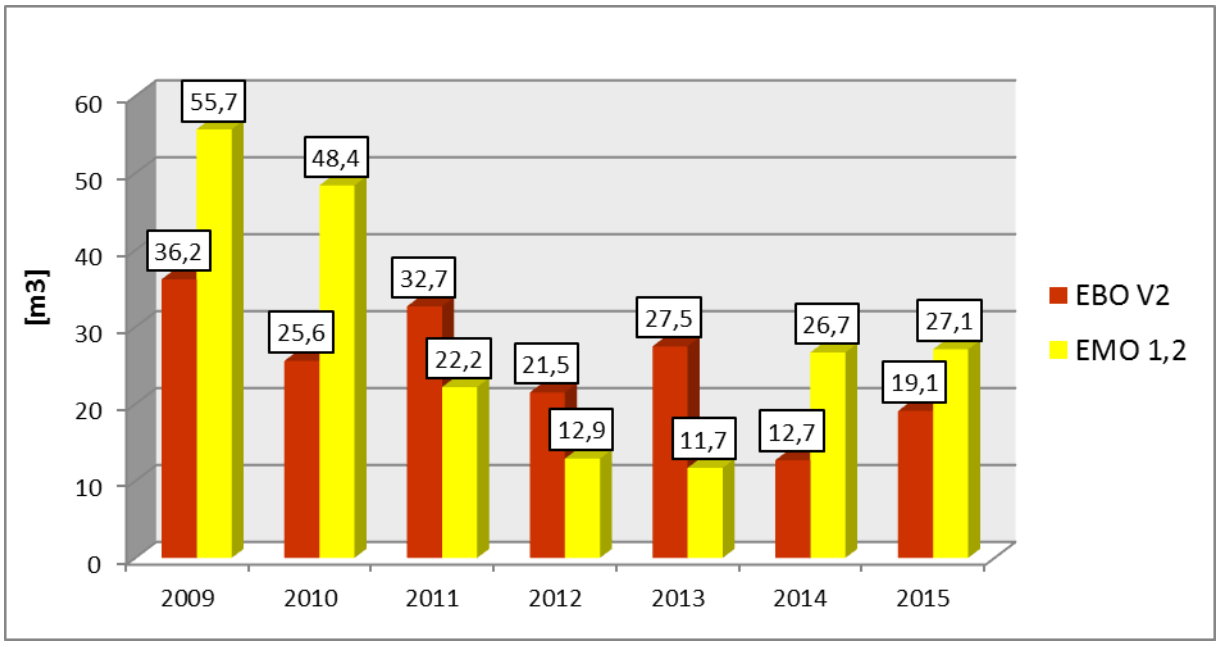


Fig.5.3.6 b) Production of liquid RAW (concentrate and sorbents) at NPP Bohunice, NPP Mochovce

For the concentrate the total volume in $m^3$is recorded, which originated in operation of power plant units for a certain period, calculated to concentration of 120 g/kg H_3BO_3.

5.3.6.1 *Spent nuclear fuel and radioactive waste management at the site*

The details can be found in chapters 2.5 to 2.7, as well as in the National Report compiled under the Joint Convention.

5.4 Planned Activities to Improve Safety of Nuclear Installations

The available legislation provides for sufficient power and flexibility for the regulatory body (ÚJD SR) to address situations like the Fukushima accident. In particular, the Atomic Act among other requires to reassess the safety of nuclear installations and to take adequate countermeasures after obtaining new significant information about the associated risks. The obligation to perform the relevant assessment and implement the countermeasures is put on the licensee.

The regulatory body gradually updates the relevant legislation in accordance with the progress under the WENRA framework and the IAEA Safety Standards.

After Fukushima, several meetings have been held between the operator (SE, a. s.) and ÚJD SR in order to provide for common understanding of the issues. ÚJD SR supported the assessment of the plant´s vulnerabilities and margins against external natural hazards as well as implementation of additional measures for further safety enhancement of the plants.

ÚJD SR is convinced that the process should not be finished by implementation of several individual actions but the issues are comprehensively evaluated and reflected in the updated Safety Analysis Reports. This requirement applies in particular to the need of updating the Safety Analysis Reports in the area of site characteristics relevant for external and internal hazards as well as plant vulnerabilities and resistance against such hazards. It is specifically required that the comprehensive assessment of the extreme meteorological conditions will be performed and corresponding parts of the SARs will be updated in order to take into account new meteorological data, on-going plant upgrading measures and state of the art methodology.

In addition to existing activities ÚJD SR will ask for further systematic and comprehensive assessment of plant resistance to the station blackout and loss of ultimate heat sink taking into account the measures for increasing robustness of the plants. Similarly, adequacy of already available analyses for the progression of severe accidents should be assessed. All the assessment should be followed by the evaluation of adequacy of hardware, procedural and organizational provisions for addressing such situations and corrections implemented, as necessary. In particular, occurrence of severe accidents in parallel at several units (up to all of them) in the given site under conditions of severely damaged area infrastructure should be considered. Approaches are harmonized (consulted) with the operators of similar reactor types, taking into account all relevant lessons learned from the stress tests. Completion of such works is preliminary expected in about 3 years.

Approval of the Action Plan of measures*, as lessons learned from the events at NPP Fukushima Daiichi and from the Stress Tests for NPPs of SE a. s., (EBO, EMO1&2,3&4)*

In compliance with section 27 of the Atomic Act, ÚJD SR by its letter dated 28 December 2012 confirmed the proposed measures aimed at implementation of the National Action Plan (chapter 6.5).

6. Annexes

6.1 List of Nuclear Installations and Technical and Economic Indicators

6.1.1 List of Nuclear Installations

Under Art. 2 of the Convention, the following nuclear installations are being operated in the Slovak Republic´s territory:

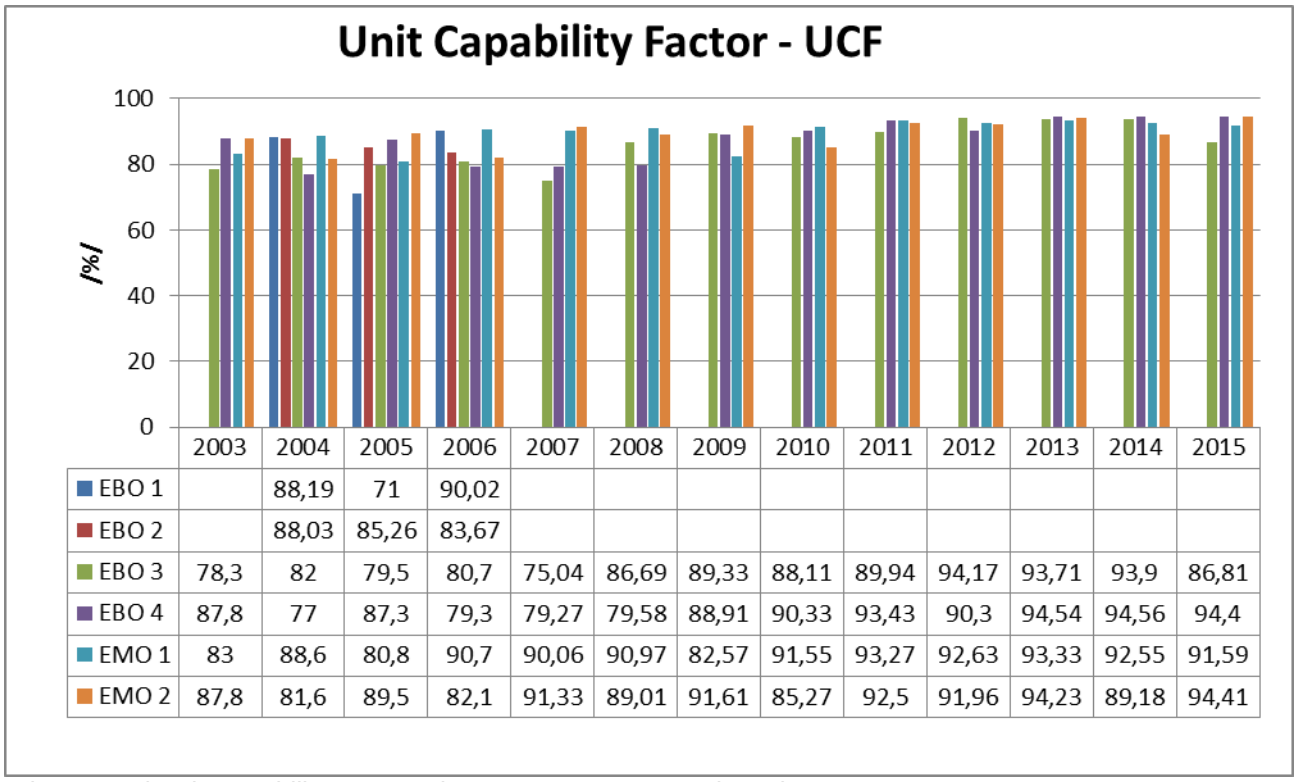
- Nuclear Power Plant Bohunice - V-2 units
- Nuclear Power Plant Mochovce - Units 1&2
- Interim Spent Fuel Storage Facility (ISFSF)
- Technology for RAW treatment and conditioning
- Final treatment of liquid RAW (FS KRAO)
- National RAW Repository

6.1.2 Technical and Economic Indicators

This section presents some of the NPP Bohunice and Mochovce technical and economic indicators.

Unit Capability Factor

Unit Capability Factor (UCF) is a WANO indicator that expresses a percentage achievable to referential unit electricity generation ratio. The achievable electricity generation is the reference electricity generation reduced by those planned and unplanned electricity generation losses which are under the competence of the plant management. The reference electricity generation on the unit is generation less limiting effects under the project defined conditions (see Fig. 6.1.2 a).

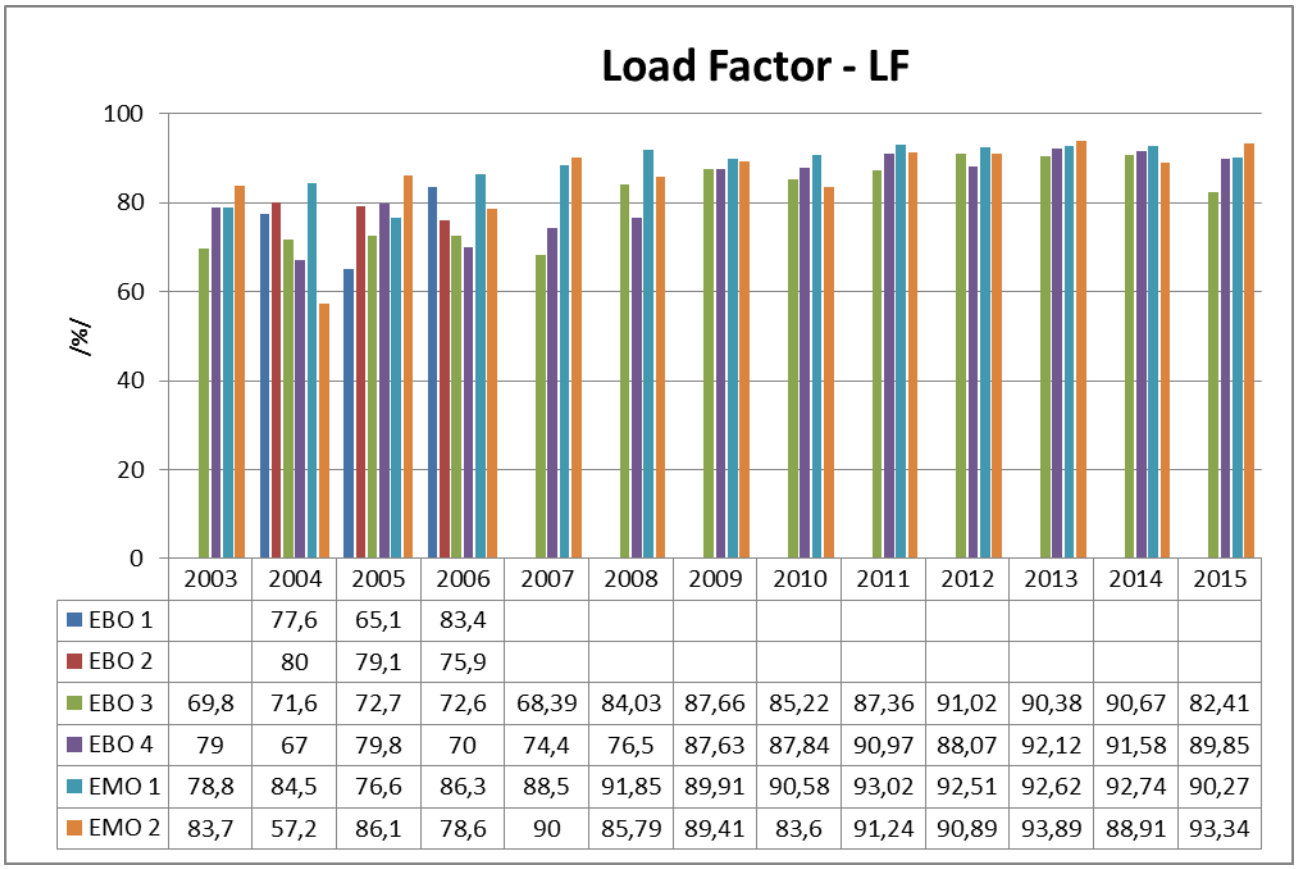


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EBO 1		88,19	71	90,02									
EBO 2		88,03	85,26	83,67									
EBO 3	78,3	82	79,5	80,7	75,04	86,69	89,33	88,11	89,94	94,17	93,71	93,9	86,81
EBO 4	87,8	77	87,3	79,3	79,27	79,58	88,91	90,33	93,43	90,3	94,54	94,56	94,4
EMO 1	83	88,6	80,8	90,7	90,06	90,97	82,57	91,55	93,27	92,63	93,33	92,55	91,59
EMO 2	87,8	81,6	89,5	82,1	91,33	89,01	91,61	85,27	92,5	91,96	94,23	89,18	94,41

Fig. 6.1.2 a) Unit Capability Factor, since 2007, SE, a. s., units only

Load Factor

The load factor is a WANO and IAEA indicator that is defined as a ratio of electricity actually supplied to the power system (limitation on generation due to supervisory control because of the provision of ancillary services is not taken into consideration in generation) to reference supply of electricity, i. e. such as could be supplied to the power system with the unit constantly operated at the reference (rated) output over the monitored period of time - expressed in %. For LF values see Fig. 6.1.2 b).



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EBO 1		77,6	65,1	83,4									
EBO 2		80	79,1	75,9									
EBO 3	69,8	71,6	72,7	72,6	68,39	84,03	87,66	85,22	87,36	91,02	90,38	90,67	82,41
EBO 4	79	67	79,8	70	74,4	76,5	87,63	87,84	90,97	88,07	92,12	91,58	89,85
EMO 1	78,8	84,5	76,6	86,3	88,5	91,85	89,91	90,58	93,02	92,51	92,62	92,74	90,27
EMO 2	83,7	57,2	86,1	78,6	90	85,79	89,41	83,6	91,24	90,89	93,89	88,91	93,34

Fig.6.1.2 b)Load factor for NPP Bohunice and NPP Mochovce units, since 2007, SE, a. s., units only

Electricity generation

In *2015,* NPP Bohunice and NPP Mochovce units generaed a total of *7 623* GWh and *7 523* GWh of electricity, respectively.

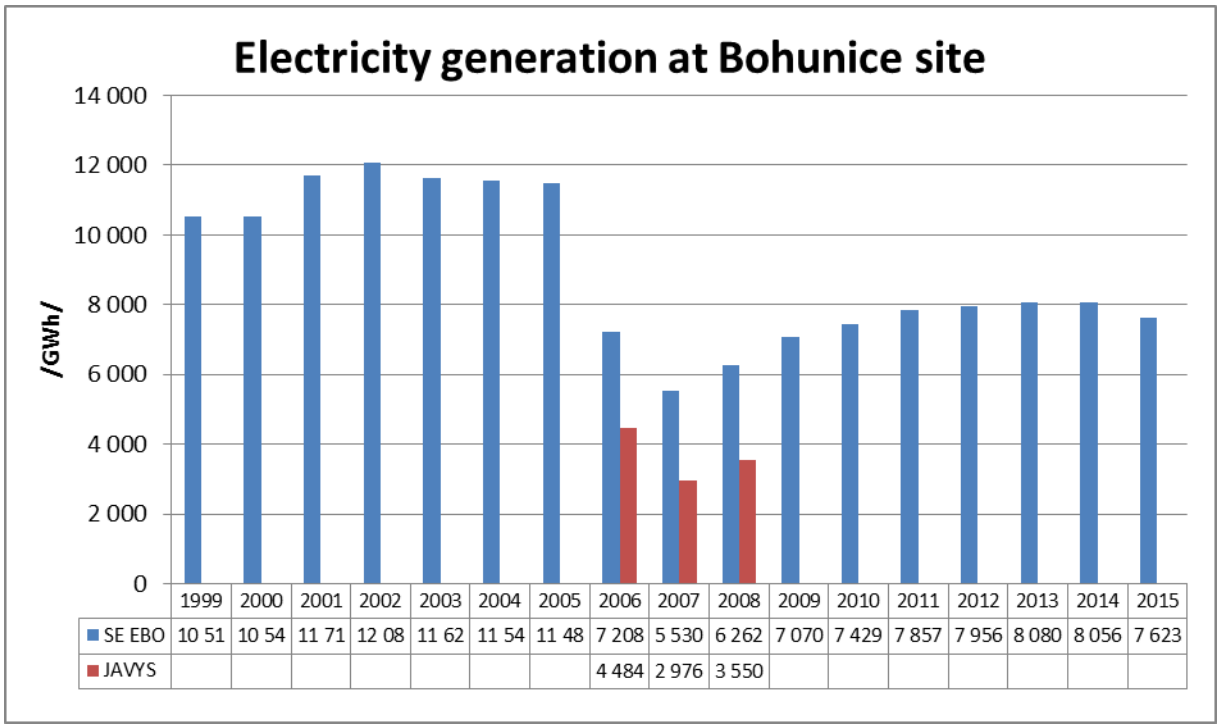


Fig. 6.1.2 c) Electricity generation at Bohunice site (two operators)

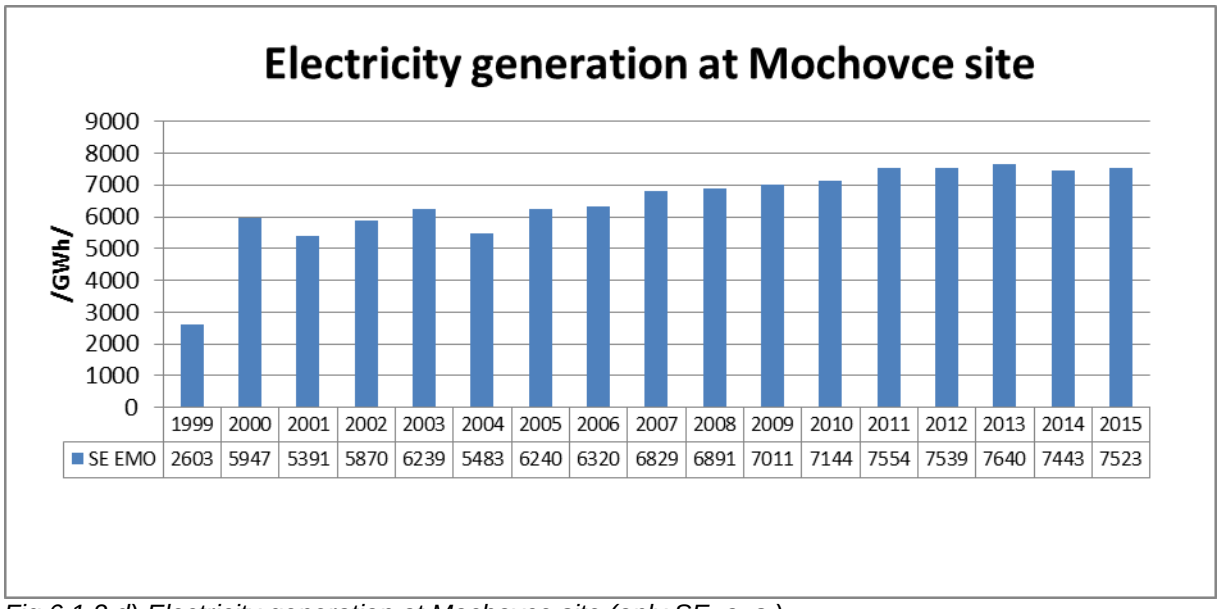


Fig.6.1.2 d) Electricity generation at Mochovce site (only SE, a. s.)

6.2 Selected Generally Binding Legal Regulations and Safety Guidelines in Relation to Nuclear and Radiation Safety

- Act of NC SR No. 71/1967 on administrative procedure *(Administrative Code)* – latest amendment as Act No. *125/2016*

- Act of the NC SR No. 50/1976 Coll. on Land Planning and Building Guidelines (Building Act) as last amended by Act *No. 254/2015 Coll.*
- Act of the NC SR No. 42/1994 Coll. on Public Civil Protection - as last amended by Act No. *č 125/2016* Coll.
- Act No. 264/1999 Coll. on Technical Requirements for Products and on Conformity Assessment and on alteration and amendment to certain laws - as last amended by Act No. *133/2013* Coll.
- Act No. 250/2012 Coll. on Regulation in Network Industries – *as last amended by Act No. 391/2015 Coll.*
- Act No. 575/2001 Coll. on Organization of Governmental Activities and of Central State Administration Organisations - as last amended by Act No. *392/2015* Coll.
- *Act No. 251/2012 Coll. on energy and on amendments to certain laws – as last amended by Act No. 91/2016 Coll.*
- Act No. 215/2004 Coll. on Protection of Classified Information and on alteration and amendment to certain laws - as last amended by Act No. *125/2016* Coll.
- Act No. 541/2004 Coll. Peaceful Uses of Nuclear Energy (Atomic Act) and on alteration and amendment to certain laws - as last amended by Act No. *125/2016 Coll.*
- Act No. 24/2006 Coll. on Environmental Impact Assessment and on alteration and amendment to certain laws - as last amended by Act No. *125/2016* Coll.
- Act No. 124/2006 Coll. on Occupational Health and Safety and on alteration and amendment to certain laws - as last amended by Act No. *378/2015* Coll.
- Act No. 125/2006 Coll. on Labour Inspection and on alteration and amendment to Act No. 82/2005 Coll. on Illegal Work and Illegal Employment - as last amended by Act No. *440/2015* Coll.
- Act NC SR No. 238/2006 Coll. on the National Nuclear Fund for Decommissioning of Nuclear Installations and for the Management of Spent Nuclear Fuel and Radioactive Wastes (Nuclear Fund Act) and on alteration and amendment to certain laws - as last amended by Act No. *143/2013* Coll.
- Act No. 355/2007 Coll. on Protection, Support and Development of Public Health and on alteration and amendment to certain laws - as last amended by Act No. *125/2016* Coll.
- Act No. 309/2009 on Support of Renewable Sources of Energy and High Efficiency Cogeneration and on alteration and amendment to certain laws - as last amended by Act No. *173/2015 Coll.*
- *Act No. 39/2011 Coll. on Dual Use Items and on amendments to Act No. 145/1995 Coll. on administrative fees – as last amended by Act No. 444/2015 Coll.*

- *Act No. 254/2011 Coll. on transportable pressure equipment, and on amendments to certain laws.*
- *Act No. 133/2013 Coll. on construction products and on amendments to certain laws – as last amended by Act No. 91/2016 Coll.*
- *Act No. 54/2015 Coll. on civil liability for nuclear damage and on its financial coverage and on amendments to certain laws.*
- *Government Ordinance No. 234/2015 Coll. on making simple pressure vessels available on the market – effective from 20 April 2016.*
- *Government Ordinance* No. 576/2002 Coll., *laying down the details of technical requirements and conformity assessment procedures for pressure equipment, amending the Government Ordinance No. 400/1999 Coll., laying down the details of technical requirements for other designated products, as amended – as last amended by Government Ordinance No. 41/2015 Coll. – effective until 19 July 2016.*
- *Government Ordinance No. 1/2016 Coll. on making pressure equipment available on the market – effective from 20 July 2016.*
- *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 Minimum Safety and Health Requirements at Work with Display Units.
- *Government Ordinance No. 340/2006 Coll. on the protection of human health against adverse effects of ionizing radiation in medical exposure – as last amended by Government Ordinance No. 85/2007 Coll.*
- Government Ordinance No. 345/2006 Coll. on Basic Safety Requirements for the Protection of the Health of Workers and the General Public against Ionizing Radiation (transposition of Council Directive 96/29/Euratom).
- Government Ordinance No. 346/2006 Coll. on Requirements for Radiation Protection of Outside Workers Exposed to the Risk of Ionizing Radiation during Their Activities in Controlled Areas (transposition of Council Directive 1990/641/Euratom).
- Government Ordinance No. 348/2006 Coll. on Requirements for the Control of High-Activity Sealed Radioactive Sources and Orphan Sources (transposition of Council Directive 2003/122/Euratom) - *as last amended by Government Ordinance No*. 497/2011 Coll.
- Government Ordinance No. 387/2006 Coll. on Requirements for Assurance of Occupational Health and Safety Labelling - *as last amended by Government Ordinance No. 104/2015 Coll.*
- Government Ordinance No. 391/2006 Coll. on Minimum Health and Safety Requirements for a Workplace.
- *Government Ordinance No. 392/2006 Coll. on minimum safety and health requirements for the use of work equipment.*

- *Government Ordinance No. 393/2006 Coll. on minimum requirements for safety and health protection at work in explosive environment.*
- *Government Ordinance No. 395/2006 Coll. on minimum requirements for the provision and use of personal protective aids.*
- Government Ordinance No. 396/2006 Coll. on Minimum Health and Safety Requirement for the Construction Site.
- Government Ordinance No. 312/2007 Coll. Laying Down Particulars of the Method of Collection and Payment of the Mandatory Contribution to the National Nuclear Fund for Decommissioning of Nuclear Installations and for the Management of Spent Nuclear Fuel and Radioactive Waste - *as last amended by Government Ordinance No*. 145/2012 Coll.
- *Government Ordinance No. 35/2008 Coll., laying down the details on technical requirements and procedures for conformity assessment for personal protective aids.*
- *Government Ordinance No. 436/2008 Coll., laying down the details on technical requirements and procedures for conformity assessment for mechanical equipment – as last amended by Government Ordinance No. 140/2011 Coll.*
- Government Ordinance No. 426/2010 Coll. l, laying down the details on the amount of levy on electricity supplied to the final customers and on the method of its collection for the National Nuclear Fund for Decommissioning of Nuclear Installations and for Spent Nuclear Fuel Management and Radioactive Waste Management, the most recent amendment to the Government Ordinance is No. 297/2013 Coll.
- *Government Ordinance No. 148/2016 Coll. on making electrical equipment designed for use within certain voltage limits available to the market.*
- *Government Ordinance No. 149/2016 Coll. on equipment and protective systems designed for use in potentially explosive atmosphere.*
- *SÚBP Decree No. 59/1982 Coll., laying down the basic requirements to ensure safety at work and technical equipment – as last amended by SÚBP Decree No. 484/1990 Coll.*
- *SÚBP Decree No. 25/1984 Coll. to ensure safety at work in low-pressure boiler rooms, as amended by Decree No. 75/1996 Coll.*
- *SÚBP Decree No. 208/1991 Coll. on safety at work and technical equipment during operation, maintenance and repair of vehicles.*
- Decree of the Slovak Ministry of Environment No. 453/2000 Coll. Implementing Certain Provisions of the Building Act.
- Decree of the Slovak Ministry of Environment No. 55/2001 Coll. on Land Planning Materials and Land Planning Documentation.
- Decree of the Slovak Ministry of Labour, Social Affairs and Family (MPSVR SR) No. 508/2009 Coll. Laying Down Particulars for Assurance of Health and Safety at Work with Pressure, Lifting,

Electric and gas Equipment and Laying Down Technical Equipment Considered Clasified Technical Equipment – *as last amended by* MPSVR SR Decree No. *234/2014 Coll.*

- *MPSVR SR Decree No. 147/2013 COll., laying down the details to ensure the safety and health protection during constructino work and related Works, and the details of professional competence to perform certain work activities – as last amended by MPSVaR SR Decree No. 100/2015 Coll.*
- ÚJD SR Decree No. 46/2006 Coll. on dual-use goods (special materials and equipment) subject to ÚJD SR regulation.
- ÚJD SR Decree No. 48/2006 Coll. laying down particulars of the method of notification of operational events and events during transport and particulars of determination of their causes – *as last amended by* ÚJD SR Decree No. 32/2012 Coll.
- ÚJD SR Decree No. 51/2006 laying down requirements for providing physical protection.
- ÚJD SR Decree No. 52/2006 Coll. on professional competence - *as last amended by* ÚJD SR Decree No. 34/2012 Coll.
- ÚJD SR Decree No. 54/2006 Coll. on record-keeping and control of nuclear materials and on notification of classified activities.
- ÚJD SR Decree No. 55/2006 Coll. on particulars in emergency planning in case of an incident or an accident – *as last amended by* ÚJD SR Decree No. 35/2012 Coll.
- ÚJD SR Decree No. 57/2006 Coll. laying down particulars of requirements for transport of radioactive materials – *as last amended by* ÚJD SR Decree No*. 105/2016 Coll. – effective from 1 March 2016.*
- ÚJD SR Decree No. 58/2006 Coll. laying down particulars of the scope, content and method of preparation of nuclear installation documentation necessary for particular decisions – *as last amended by* ÚJD SR Decree No. *102/2016 Coll. – effective from 1 March 2016.*
- ÚJD SR Decree No. 430/2011 Coll. l. on requirements for nuclear safety – *as last amended by* ÚJD SR Decree No*. 103/2016 Coll. – effective from 1 March 2016.*
- ÚJD SR Decree No. 431/2011 Coll. l. on quality management system - *as last amended by* ÚJD SR Decree No.*104/2016 Coll. – effective from 1 March 2016.*
- ÚJD SR Decree No. 30/2012 Coll. l., laying down the details of requirements for nuclear materials management, radioactive waste and spent nuclear fuel management – *as last amended by* ÚJD SR Decree No*. 101/2016 Coll. – effective from 1 March 2016.*
- ÚJD SR Decree No. 33/2012 Coll. l. on periodic, comprehensive and systemic nuclear safety assessment of nuclear installations – *as last amended by* ÚJD SR Decree No. *106/2016 Coll. – effective from 1 March 2016.*
- *ÚJD SR Decree No. 170/2015 Coll., establishing a list of radioactive materials, their quantities and their physical and chemical parameters justifying the low risk of nuclear damage (effective from 1 January 2016).*

- Decree of the Slovak Interior Ministry No. 533/2006 Coll. on particulars of public protection against the effects of hazardous substances – as last amended by *MoI SR* Decree No. 160/2012 Coll.
- MoI SR Decree No. 328/2012 Coll. l., laying down details of evacuation.
- MoI SR Decree No. 388/2006 Coll. l. regarding details to provide technical and operational conditions for the information system of civil protection – as last amended by *MoI SR Decree No. 15/2013 Coll.*
- MoI SR Decree No. 523/2006 Coll. l. regarding details on securing rescue works and organization of civil protection units - as last amended by *MoI SR* Decree No. 443/2007 Coll.
- MoI SR Decree No. 532/2006 Coll. l. on details for securing construction specifications and technical specifications of civil protection facilities – as last amended by *MoI SR Decree No. 399/2012 Coll.*
- Decree of the Slovak Ministry of Health No. 524/2007 Coll. laying down particulars of the radiation monitoring network.
- *MoH Decree No. 528/2007 Coll., laying down the details of requirements to reduce exposure from natural radiation – as last amended by MoH SR Decree No. 295/2015 Coll.*
- *MoH SR Decree No. 545/2007 Coll., laying down the details of requirements for radiation protection during activities leading to exposure and activities relevant in terms of radiation protection.*
- *Decree of the Ministry of Transport, Construction and Regional Development of SR No. 162/2013 Coll., establishing a list of groups of construction products and systems of assessing parameters.*
- Treaty establishing the European Atomic Energy (1957).
- *Consolidated version of the Treaty establishing the European Atomic Energy Community (2012/C327/01) Ú. v. EU C 327, 26 Oct. 2012.*
- Council Regulation (Euratom) No 87/3954/Euratom of 22 December 1987 laying down maximum permitted levels of radioactive contamination in foodstuffs and of feeding stuffs following a nuclear accident or any other case of radiological emergency, as amended by Council Regulation 89/2218/Euratom of 18 July 1989.
- Commission Regulation (Euratom) No 90/770/Euratom of 29 March 1990 laying down maximum permitted levels of radioactive contamination of feeding stuffs following a nuclear accident or any other case of radiological emergency.
- Council Regulation (Euratom) No 1493/93 of 8 June 1993 on shipments of radioactive substances between Member States.
- Council Regulation (Euratom) No 2587/1999 of 2 December 1999 defining the investment projects to be communicated to the 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 determining procedures for effecting the communications prescribed under Article 41 of the Treaty establishing the European Atomic Energy Community, as amended by 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) No. 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering, and transit of dual use items – *last amendment – Commission Delegated Regulation (EU) 2015/2420 of 12 October 2015.*
- Commission Regulation (Euratom) No 66/2006 of 16 January 2006 exempting the transfer of small quantities of ores, source materials and special fissile material from the rules of the chapter on supplies.
- *Council Regulation (Euratom) No. 237/2014 of 13 December 2013, establishing an instrument for cooperation in the field of nuclear safety.*
- Council Directive 62/302/ES of 5 March 1962 on freedom to take skilled employment in the field of nuclear energy.
- Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in event of a radiological emergency – *with effect for SR from 6 Feb. 2018 repealed by Directive 2013/59/Euratom.*
- Council Directive 90/641/Euratom of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas – *with effect for SR from 6 Feb. 2018 repealed by Directive 2013/59/Euratom.*
- Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation – *with effect for SR from 6 Feb. 2018 repealed by Directive 2013/59/Euratom.*
- Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel.
- Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations – *with effect for SR from 15 Aug. 2017 amended by Directive 2014/87/Euratom.*
- Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.
- Directive 2012/18/EU of the European Parliament and of the Council 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 No. 2013/59/Euratom of 5 December 2013, laying down the basic safety*

standards for protection against the 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 2014/87/Euratom of 8 July 2014, amending Directive 2009/71/Euratom, establishing Community framework for nuclear safety of nuclear installations.*
- Council Decision 87/600/Euratom of 14 December 1987 on Community arrangements for the early exchange of information in the event of a radiological emergency.
- Council Decision 2007/162/EC, Euratom of 5 March 2007 establishing a civil protection financial instrument.
- Council Decision 2007/779/EC, Euratom of 8 November 2007 establishing a Community Civil Protection Mechanism.
- *Commission Decision 2008/312/Euratom of 5 March 2008, establishing a standard document for the supervision and control of shipments of radioactive waste and spent fuel, referred to in Council Directive 2006/117/Euratom.*
- *Council Decision 2013/434/EU of 15 July 2013, authorising certain Member States to ratify, or to accede to, the Protocol amending the Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963, in the interest of the European Union and to make a declaration on the application of the relevant internal rules of Union law.*
- Commission Recommendation *2006/40/ES* of 15 December 2005 on guidelines for the application of Regulation (Euratom) No. 302/2005 on the application of Euratom safeguards.
- *Commission Recommendation 2006/851/Euratom of 24 October 2006 on the management of financial resources for the decommissioning of nuclear installations and for the management of spent fuel and radioactive waste.*
- *Commission Recommendation 2008/956/Euratom of 4 December 2008 on criteria for the export of radioactive waste and spent nuclear fuel to third countries.*
- Commission Recommendation *2009/120/Euratom* of 11 February 2009 on the implementation of a nuclear material accountancy and control system by operators of nuclear installations.
- *Commission Recommendation 2009/527/Euratom of 7 July 2009 for a secure and effective system of transmission of documents and information relating to the provisions of Council Directive 2006/117/Euratom.*

ÚJD SR safety guidelines:

BNS I.7.4/2016 Periodic safety review on NPP

BNS I.4.1/2014 Single Failure Criterion

BNS I.12.3/2014 PSA Quality for PSA applications

BNS I.4.4/2014 *Operation of nuclear facility after reaching its designed lifecycle – Requirements and Guidelines*

BNS I.9.2/2014	Ageing management of nuclear power plants – requirements
BNS I.1.2/2014	The Scope and the Content of the Safety Report
BNS I.11.1/2013	*Requirements on deterministic safety analyses of NPP with VVER-440/V213*
BNS I.6.2/2013	Requirements on description of a nuclear reactor in the Safety Analysis Report.
BNS I.12.1/2012	Requirements on the quality assurance of software for safety analyses.
BNS II.2.1/2012	Requirements on Fire Safety Assurance of Nuclear Installations in view of Nuclear Safety.
BNS II.5.1/2012	Welding at nuclear power installations. Basic requirements and rules.
BNS II.5.2/2012	Supervision of welding and quality of welded joints of selected nuclear power installations. Requirements.
BNS II.5.3/2011	Welding materials for welding of engineering & technological components of NPP´s.
BNS II.3.3/2011	Metallurgical products and spare parts for nuclear power plants.
BNS II.5.4/2009	Qualification of systems for non-destructive examination in nuclear power engineering.
BNS II.5.5/2009	Examining of mechanical features, chemical composition and classified characteristics of resistance against violation of marginal condition of materials and weld joins of engineering- technology components of installations of VVER440 type.
BNS II.5.6/2009	The rules on design, production, montage, repairing, changing and reconstruction of engineering- technology components of classified equipments of nuclear installations of VVER440 type.
BNS II.1.1/2008	Accounting and control of nuclear materials.
BNS II.3.1/2007	Evaluation of acceptability of faults detected during the operation inspection of nuclear installation selected equipment.
BNS III.4.4/2007	Requirements for realization and evaluation of results of physical tests in start-up process.
BNS II.3.4/2006	Corrosion monitoring of safety significant components of nuclear facilities.
BNS I.8.1/2005	Requirements for Preliminary Plan of Physical Protection and Plan of Physical protection.
BNS IV.1.3/2005	Requirements for Design and Operation of Nuclear Spent Fuel Storage Facility.
BNS I.2.5/2005	ÚJD SR requirements on chap. 16 of Safety analysis report "Limits and Conditions".
BNS III.4.3/2000	Requirements on assessment of fuel loading for VVER 440 reactors.

BNS III.4.1/2000 Requirements on ÚJD SR permit issue for fuel use in VVER 440 reactors.

6.3 Applied selected international documents

1. INTERNATIONAL ATOMIC ENERGY AGENCY – Fundamental Safety Principles, Series No. SF-1, IAEA, Vienna (2006)
2. INTERNATIONAL ATOMIC ENERGY AGENCY – Preparedness and Response for Nuclear Radiological Emergencies, Safety Requirements Series No. GS-R-2, IAEA, Vienna (2002).
3. INTERNATIONAL ATOMIC ENERGY AGENCY – The Management System for Facilities and Activities, Safety Requirements Series No. GS-R-3, IAEA, Vienna (2006).
4. INTERNATIONAL ATOMIC ENERGY AGENCY – Governmental, Legal and Regulatory Framework for Safety General, Safety Requirements Part 1 Series No. GSR Part 1, IAEA, Vienna (2010).
5. INTERNATIONAL ATOMIC ENERGY AGENCY– Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards – Interim Edition General Safety Requirements Part 3 Series No. GSR Part 3 (Interim), IAEA, Vienna (2011).
6. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety Assessment for Facilities and Activities General Safety Requirements Part 4 Series No. GSR Part 4, IAEA, Vienna (2009).
7. INTERNATIONAL ATOMIC ENERGY AGENCY – Predisposal Management of Radioactive Waste, General Safety Requirements Part 5 Series No. GSR Part 5, IAEA, Vienna (2009).
8. INTERNATIONAL ATOMIC ENERGY AGENCY – Decommissioning of Facilities Using Radioactive Material Safety, Safety Requirements Series, No. WS-R-5, IAEA, Vienna (2006).
9. INTERNATIONAL ATOMIC ENERGY AGENCY – Site Evaluation for nuclear Installations, Safety Requirements Series, No. NS-R-3, IAEA, Vienna (2003).
10. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety of Nuclear Fuel Cycle Facilities, Safety Requirements Series, No. NS-R-5, IAEA, Vienna (2008).
11. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety of nuclear Power Plants: Design, Specific Safety RequirementsNo. SSR-2/1, IAEA, Vienna (2012).
12. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety of nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements No. SSR-2/2, IAEA, Vienna (2012).
13. INTERNATIONAL ATOMIC ENERGY AGENCY – Disposal of Radioactive Waste, Specific Safety Requirements No. SSR-5, IAEA, Vienna (2011).
14. INTERNATIONAL ATOMIC ENERGY AGENCY – International Basis Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No. 115, IAEA, Vienna (1996).

15. INTERNATIONAL ATOMIC ENERGY AGENCY – Software for Computer Based Systems Important to Safety in Nuclear Power Plants, Safety Guide Series No. NS-G-1.1, IAEA, Vienna (2000).

16. INTERNATIONAL ATOMIC ENERGY AGENCY – Seismic Design and Qualification for Nuclear Power Plants, Safety Guide Series No. NS-G-1.6, IAEA, Vienna (2003).

17. INTERNATIONAL ATOMIC ENERGY AGENCY – Protection against Internal Fires and Explosions in the Design of Nuclear Power Plants Safety Guide, Series No. NS-G-1.7, IAEA, Vienna (2004).

18. INTERNATIONAL ATOMIC ENERGY AGENCY – Protection against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants, Safety Guide Series No. NS-G-1.11, IAEA, Vienna (2004).

19. INTERNATIONAL ATOMIC ENERGY AGENCY – Fire Safety in the Operation of Nuclear Power Plants, Safety Guide Series No. NS-G-2.1, IAEA, Vienna (2000).

20. INTERNATIONAL ATOMIC ENERGY AGENCY – Maintenance, Surveillance and In-service Inspection in Nuclear Power Plants, Safety Guide Series No. NS-G-2.6, IAEA, Vienna (2002).

21. INTERNATIONAL ATOMIC ENERGY AGENCY – Periodic Safety Review of Nuclear Power Plants, Safety Guide Series No. NS-G-2.10, IAEA, Vienna (2003).

22. INTERNATIONAL ATOMIC ENERGY AGENCY – Ageing Management for Nuclear Power Plants, Safety Guide Series No. NS-G-2.12, IAEA, Vienna (2009).

23. INTERNATIONAL ATOMIC ENERGY AGENCY – Severe Accident Management Programmes for Nuclear Power Plants, Safety Guide Series No. NS-G-2.15, IAEA, Vienna (2009).

24. INTERNATIONAL ATOMIC ENERGY AGENCY – External Human Induced Events in Site Evaluation for Nuclear Power Plants, Safety Guide Series No. NS-G-3.1, IAEA, Vienna (2002).

25. INTERNATIONAL ATOMIC ENERGY AGENCY– Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants, Safety Guide Series No. NS-G-3.2, IAEA, Vienna (2002).

26. INTERNATIONAL ATOMIC ENERGY AGENCY – Review and Assessment of Nuclear Facilities by the Regulatory Body, Safety Guide Series No. GS-G-1.2, IAEA, Vienna (2002).

27. INTERNATIONAL ATOMIC ENERGY AGENCY – Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide Series No. GS-G-2.1, IAEA, Vienna (2007).

28. INTERNATIONAL ATOMIC ENERGY AGENCY – Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body, Safety Guide Series No. GS-G-1.3, IAEA, Vienna (2002).

29. INTERNATIONAL ATOMIC ENERGY AGENCY – Application of the Management System for Facilities and Activities, Safety Guide Series No. GS-G-3.1, IAEA, Vienna (2006).

30. INTERNATIONAL ATOMIC ENERGY AGENCY – Format and Content of the Safety Analysis Report for Nuclear Power Plants, Safety Guide Series No. GS-G-4.1, IAEA, Vienna (2004).

31. INTERNATIONAL ATOMIC ENERGY AGENCY – Deterministic Safety Analysis for Nuclear Power Plants Specific Safety Guide Series No. SSG-2, IAEA, Vienna (2010).

32. INTERNATIONAL ATOMIC ENERGY AGENC – Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Safety Standards Series No. SSG-3, Specific Safety Guide, IAEA, Vienna (2010).

33. INTERNATIONAL ATOMIC ENERGY AGENCY – Development and Application of Level 2 Probabilistic Safety Assessments for Nuclear Power Plants, Safety Standards Series No. SSG-4, Specific Safety Guide, IAEA, Vienna (2010).

34. INTERNATIONAL ATOMIC ENERGY AGENCY – Seismic Hazards in Site Evaluation for Nuclear Installations, Specific Safety Guide Series No. SSG-9, IAEA, Vienna (2010).

35. INTERNATIONAL ATOMIC ENERGY AGENCY – Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations, Specific Safety Guide, Series No. SSG-18, IAEA, Vienna (2011).

36. INTERNATIONAL ATOMIC ENERGY AGENCY – Generic models for use in assessing the impact of discharges of radioactive substances to the environment, Safety Report Series No.19, IAEA, Vienna (2001).

37. INTERNATIONAL ATOMIC ENERGY AGENCY – Accident Analysis for NPPs, Safety Reports Series, No.23, IAEA, Vienna (2002).

38. INTERNATIONAL ATOMIC ENERGY AGENCY – Review of Probabilistic Safety Assessments by Regulatory Bodies, Safety Reports Series No.25, IAEA, Vienna (2002).

39. INTERNATIONAL ATOMIC ENERGY AGENCY – Accident Analysis for NPPs with Pressurized Water Reactors, Safety Reports Series, No.30, IAEA, Vienna (2003).

40. INTERNATIONAL ATOMIC ENERGY AGENCY – The Role of Probabilistic Safety Assessment and Probabilistic Safety Criteria in Nuclear Power Plant Safety, Safety Series No.106, IAEA, Vienna (1992).

41. INTERNATIONAL ATOMIC ENERGY AGENCY – Procedures for Conducting Probabilistic Safety Assessments of Nuclear Power Plants (Level 1), Safety Series No. 50-P-4, IAEA, Vienna (1992).

42. INTERNATIONAL ATOMIC ENERGY AGENCY – Procedures for Conducting Probabilistic Safety Assessments of Nuclear Power Plants (Level 2): Accident Progression, Containment Analysis and Estimation of Accident Source Terms, Safety Series No. 50-P-8, IAEA, Vienna (1995).

43. INTERNATIONAL ATOMIC ENERGY AGENCY – Analysis in Probabilistic Safety Assessment for Nuclear Power Plants, Safety Series No. 50-P-10, IAEA, Vienna (1996).

44. INTERNATIONAL ATOMIC ENERGY AGENCY – Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency, Updating IAEA-TECDOC-953, IAEA, Vienna (2003), EPR-METHOD (2003).

45. INTERNATIONAL ATOMIC ENERGY AGENCY – Generic Assessment Procedures for Determining Protective Actions during a Reactor Accident, IAEATECDOC-955, IAEA, Vienna (1997).

46. INTERNATIONAL ATOMIC ENERGY AGENCY – A Framework for a Quality Assurance Programme for PSA, IAEA-TECDOC-1101, IAEA, Vienna (1999).

47. INTERNATIONAL ATOMIC ENERGY AGENCY – Probabilistic Safety Assessments of Nuclear Power Plants for Low Power and Shutdown Modes, IAEA-TECDOC-1144, IAEA, Vienna (2000).

48. INTERNATIONAL ATOMIC ENERGY AGENCY – Determining the Quality of Probabilistic Safety Assessment for Applications in Nuclear Power Plants, IAEA-TECDOC-1511, IAEA, Vienna, (2006).

49. INTERNATIONAL ATOMIC ENERGY AGENCY – INES the International Nuclear and Radiological Event Scale User's Manual 2008 Edition, IAEA, Vienna (2009).

50. INTERNATIONAL ATOMIC ENERGY AGENCY – IAEA Safety Glossary: Terminology Used in Nuclear Safety and Radiation Protection: 2007 Edition, IAEA, Vienna (2007).

51. INTERNATIONAL ATOMIC ENERGY AGENCY – Safe Long Term Operation of Nuclear Power Plants, Safety Reports Series No.57, IAEA, Vienna (2008).

52. INTERNATIONAL ATOMIC ENERGY AGENCY – Periodic Safety Review for Nuclear Power Plants, Specific Safety Guide No. SSG-25, IAEA, Vienna (2013).

6.4 Limit values for annual discharges of radioactive substances

The limit values for gaseous and liquid discharges are part of L&C approved by regulatory authorities.

The basic radiological limit for limiting radiation exposure of the public in the vicinity of a nuclear installation caused by radioactive substances discharged into the atmosphere and surface waters during operation of the NPP Bohunice, or NPP Mochovce, the effective dose of the representative person is 50 μSv per calendar year.

A representative person is any person, whose dose caused by discharges of radioactive substances is representative of the exposure of individuals in the zone, where the highest radiation exposure was in the surroundings of NPP Bohunice, or NPP Mochovce.

(Decision of ÚVZ SR OOZPŽ 6774/2011 of 25 October for NPP Bohunice).

(Decision of ÚVZ SR OOZPŽ 6773/2011 of 20 October 2011 for NPP Mochovce).

Limit values of annual discharges							
	Ventilation chimney					Liquid discharges	
	Rare gases (arbitrary mixture)	Iodines (gaseous and aerosol phase)	Aerosols – mixture of long-lived radionuclides	Sr 89, 90	Pu238,239,240 Am241	Tritium	Other corrosive and fissile products
	Bq/year	Bq/year	Bq/year	Bq/year	Bq/year	Bq/year	Bq/year
Bohunice JAVYS V1	$2{,}0.10^{15}$	$6{,}5.10^{10}$	$8{,}0.10^{10}$	$1{,}4.10^{8}$	$2{,}0.10^{7}$	$2{,}0.10^{13}$ Váh	$1{,}3.10^{10}$ Váh
Bohunice JAVYS V1	-	-	-	-	-	2.10^{11} Dudváh	$1{,}3.10^{8}$ Dudváh
NPP Bohunice V2	$2{,}0.10^{15}$	$6{,}5.10^{10}$	$8{,}0.10^{10}$	$1{,}4.10^{8}$	*$2{,}0.10^{7}$*	$2{,}0.10^{13}$ Váh	$1{,}3.10^{10}$ Váh
NPP Bohunice V2	-	-	-			$2{,}0.10^{11}$ Dudváh	$1{,}3.10^{8}$ Dudváh
NPP Mochovce 1&2	$4{,}1.10^{15}$	$6{,}7.10^{10}$	$1{,}7.10^{11}$	unlimited		$1{,}2.10^{13}$	$1{,}1.10^{9}$
JAVYS			$9{,}4 \cdot 10^{8}$	$2{,}8 \cdot 10^{7}$	$8{,}8 \cdot 10^{6}$	$1{,}0 \cdot 10^{13}$ Váh	$1{,}2 \cdot 10^{10}$ Váh
						$3{,}7 \cdot 10^{10}$ Dudváh	$1{,}2 \cdot 10^{8}$ Dudváh
ISFS			$3{,}0 \cdot 10^{8}$				

	Reference levels for daily discharges - examination				Volume activity [Bq/m^3]	
	Rare gases (arbitrary mixture)	Iodines (gaseous and aerosol phase)	Aerosols – mixture of long-lived radionuclides	Sr 89, 90	Tritium	Other corrosive and fissile products
	Bq/day	Bq/day	Bq/day	Bq/day	[Bq/m^3]	[Bq/m^3]
NPP Bohunice V2	*$1{,}6.10^{12}$*	*$5{,}3.10^{7}$*	*$6{,}6.10^{7}$*	unlimited	*$6{,}5.10^{7}$*	*$3{,}7.10^{4}$*
NPP Mochovce 1&2	*$1{,}1$*.10^{13}	*$1{,}8$*.10^{8}	*$0{,}5$*.10^{9}	unlimited	$3{,}0.10^{7}$	4.10^{4}

	Reference levels for daily discharges - intervention				Volume activity [Bq/m^3]	
	Rare gases (arbitrary mixture)	Iodines (gaseous and aerosol phase)	Aerosols – mixture of long-lived radionuclides	Sr 89, 90	Tritium	Other corrosive and fissile products
	Bq/day	Bq/day	Bq/day	Bq/day	[Bq/m^3]	[Bq/m^3]
NPP Bohunice V2	*2,7.10^{13}*	*8,9.10^{8}*	*1.1.10^{9}*	*nelimitované*	*1,95.10^{8}*	*3,7.10^{4}*
NPP Mochovce 1&2	5,5.10^{13}	9,0.10^{8}	2,5.10^{9}	nelimitované	1,0.10^{8}	*4,0*.10^{4}

Table 6.4 SE, a. s. limits for discharges from NPP Bohunice (V1, V2) and Mochovce

6.5 Action Plan

RECOMMENDATIONS OF TOPIC 1 (NATURAL RISKS)

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
1.	ENSREG Compilation of recommendations 2.2	Periodic safety review	Re-assessment of natural risks as a part of periodic safety assessments Status: According to ÚJD SR Regulation No. 33/2012 Coll., Section 2 the licensee is obliged to conduct periodic assessment by the date up on which ten years have elapsed since the previous PSR. The objective of PSR (§9) is to assess the extent, up-to date and quality of deterministic safety evaluations, probability-related safety evaluations and analyses of the effect of internal and external hazards in terms of the current condition of the project and operation, structures, systems and components of nuclear equipment, the analytical methods used, calculation instruments and data, as well as in terms of the condition predicted by the date of the next periodic evaluation.	Completed (before 2013)	Completed (before 2013)	Under construction
2.	ENSREG Compilation of recommendations 2.3 EC Communication – specific to Slovakia	Confinement integrity	To analyse a necessity of filtered venting of the containment and other potential technical measures for long-term heat removal from the containment and reduction of radiation load of the environment taking into account activities	31/12/2015 Completed	31/12/2015 Completed	31/12/2015

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
	5.11 XCNS		**in this area at other operators of WWER-440/V213 NPP types and considering measures implemented within the SAM project. <u>Status:</u> Analyses completed. The best solution based on the outcomes is a SAM dedicated, independent long-term heat removal system. Concept of a full fledged filtered containment venting system for severe accident (FVKTH) raises problems with permanent loss of coolant from the containment required for external cooling of reactor pressure vessel. FVKTH additionally sets high requirements for cooling of discharged steam-air mixture or for creating large inventory of coolant. Technical meetings are organized (information exchange) with other operators of VVER 440 on the subject matter.**			
3.	**ENSREG Compilation of recommendations 2.4**	**<u>Prevention of accidents because of natural risks and limitation of their consequences</u>**	**The National Action Plan covers all tasks in an integrated/comprehensive manner. <u>Status:</u> <u>Short term (immediate) measures:</u> Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment**	**Completed**	**Completed**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located). **<u>Long-term measures:</u>** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** **Measures resulting from assessment of EMO1,2 civil structures are being incorporated into the ongoing seismic reinforcement documentation (project IPR 20400).** **The outcomes of the study on "Impact of extreme external temperatures in selected rooms of EBO, EMO NPPs after loss of cooling" are being evaluated.** **(See ID 4, 8, 12, 13, 14)**	**In progress**	**In progress**	
4.	**ENSREG Compilation of recommendations 3.1.1** **XCNS**	**<u>Hazard frequency related to weather</u>**	**To evaluate resistance of selected systems, structures and components (SSC) at extreme external events (floods caused by heavy rain, high and low external temperatures, direct wind and other relevant events for the given locality) on the basis of updated new studies on meteorological conditions for Jaslovské Bohunice and Mochovce localities, and to**			**Before put of the respective unit into operation, common EMO structures before put of Unit 3 into operation**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			consider events with intensity corresponding to the probability of occurrence once per 10,000 years or less; to prepare a plan for implementation of additional measures or to implement them. **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **New metrological studies for the site were developed for EBO /2/ and for EMO /3/.** **A time schedule of implementation of measures for 2014 - 2018 to enhance the resistance of selected EBO and EMO1&2 civil structures was prepared.** **<u>Long-term measures:</u>** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** **Measures resulting from assessment of EMO1&2 civil structures are being**	**Completed** **In progress**	**Completed** **In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			incorporated into the ongoing seismic reinforcement documentation (project IPR 20400). **The outcomes of the study on "Impact of extreme external temperatures in selected rooms of EBO, EMO NPPs after loss of cooling" are being evaluated.** **(See ID 3, 8, 12, 13, 14)**			
5.	**EC Communication Annex**	**<u>Hazard frequency related to seismicity</u>**	**To analyse seismic margins of selected systems, structures and components (SSC).To evaluate the resistance of selected SSC at a seismic event with intensity corresponding to the probability of occurrence less than once per 10,000 years.** **<u>Status:</u>** **Seismic margins of civil structures evaluated /4/.** **<u>* Additional measures:</u>** **Evaluation of seismic margins (GIP method) for additional seismically qualified equipment performed and being implemented (project IPR 20400).**	**31/12/2013 Completed**	**31/12/2013 Completed***	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
6.	EC Communication Annex EC Communication– specific to Slovakia 5.11	Seismicity – minimum peak ground acceleration 0,1 g	To immediately prepare priorities for determination of an order of actions implemented within the seismic reinforcement of EMO1&2 SSC on the basis of their contribution to safety; to include seismic reinforcement of EMO common structures to actions with the highest priority. To implement the seismic reinforcement of relevant SSC based on the valid ÚJD SR decision No. 100/2011, taking into account the set order. Status: EMO1,2: According to decision of ÚJD SR No. 100/2011 the required minimum peak ground acceleration is 0,15 g. Priorities of the tasks defined. Priority 1 (highest) contains buildings where equipment important for long-term residual heat removal after a seismic event are situated: Fire station, access point for external power supply, pipeline of emergency SG feed, emergency response centre, etc. (2016 – 2018). Additional measures: EMO and EBO: Draft seismic PSA was prepared: assessment of the seismic margins for mechanical systems and seismic margins of concrete and steel parts of the main reactor building.	Completed (before 2013)	In progress	Included in the basic design

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
7.	ENSREG Compilation of recommendations 3.1.2	Secondary effects of earthquakes	To prepare a scenario for put of NPP units into safe condition after a seismic event. Status: Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event). (See ID 21) Additional measures: Contract concluded with the Research institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO completed. Outcomes are analysed. (See ID 55)	Completed	Completed	Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.
8.	ENSREG Compilation of recommendations 3.1.3 Peer review country Report of the SR 4.3 EC Communication Annex EC Communication – specific to Slovakia 5.11	Protection against penetration of water into buildings. Proving of protection against floods for identified rooms and	To evaluate resistance of selected systems, structures and components (SSC) at extreme external events (floods caused by heavy rain, high and low external temperatures, direct wind and other relevant events for the given locality) on the basis of updated new studies on meteorological conditions for Jaslovské Bohunice and Mochovce sites, and to consider events with intensity corresponding to the probability of occurrence once per 10,000 years or less; to prepare a plan for implementation of additional measures or to			Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			implement them. **<u>Status:</u>** **<u>Short term (immediate) measures:</u>** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **<u>Long-term measures:</u>** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** **Measures resulting from assessment of EMO1,2 civil structures are being incorporated into the ongoing seismic reinforcement documentation (project IPR 20400).** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O63: Unit Cool down after MDBE, 3-3,4LPS-001/O64: Activities of OP at Flooding of Structure).** **(See ID 3, 4, 12, 13, 14)**	**Completed** **In progress**	**Completed** **In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
9.	ENSREG Compilation of recommendations 3.1.4	Notices on time warning	To implement the warning and notification system in case of deteriorating weather and to implement procedures of NPP operating staff response. Status: The predictive regulation No. 0-HP/3006 – EMO12, 3,4LPS-064, 065 – EBO34 - For measures against extreme climatic conditions was prepared and implemented. Additional measures: Contract concluded with the Hydrometeorological institute on providing data.	Completed	Completed	Before put the respective unit into operation.
10.	ENSREG Compilation of recommendations 3.1.5 EC Communication Annex	Monitoring of seismicity	Arrangement of Bohunice, Mochovce seismic monitoring stations was proposed and built based on detailed seismic and geological survey prepared by the Geophysical Institute of the Slovak Academy of Science and reviewed by IAEA missions in 1998 and 2004. Monitoring results are summarized in quarterly reports. Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event).	Completed before 2013	Completed before 2013	Completed before 2013

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			Operating procedure developed EBO3,4 - ,4-LPS-001/O60, EMO12 - ,2-NS-0300/ES-0.4, 0.6, FR-H.1, 7-NS-0400/SD-E-2, 0.3, SD-FR-H.1: Activities after Earthquake including training.			
11.	**ENSREG Compilation of recommendations 3.1.6**	**Qualified walkdowns**	**To prepare regulations for qualified walk downs related to natural risks and to update them after preparation of an international guide.** **Status:** **Guidelines for the walk down checks of equipment which are defined for the management of external events (seismicity, floods, low and high temperatures, wind) were updated (e. g. EMO/NA-332.0201).** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 21)**	**31/12/2015**	**31/12/2015**	**Before put the respective unit into operation.**
12.	**ENSREG Compilation of recommendations 3.1.7**	**Assessment of reserves for floods**	**To analyse maximal potential water levels in the locality on the basis of 10,000 annual values. To specify places where water collects. To immediately implement temporary solutions and to propose a final solution.** **Status:**			**Included in the basic design.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			<u>Short term (immediate) measures:</u> **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located).** **New metrological studies for the site were developed for EBO /2/ and for EMO /3/.** **A time schedule of implementation of measures for 2014 - 2018 to enhance the resistance of selected EBO and EMO1,2 civil structures was prepared.** **<u>Long-term measures:</u>** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** **Measures resulting from assessment of EMO1,2 civil structures are being incorporated into the ongoing seismic reinforcement documentation (project IPR 20400).** **(See ID 3, 4, 8, 13, 14)**	**Completed** **In progress**	**Completed** **In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
13.	Peer review country report of the SR 2.3.3	Reserves at external risks	The National Action Plan covers all tasks in an integrated/comprehensive manner. Status: Short term (immediate) measures: Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed. (Immediate measures - flood protection bags were implemented in buildings where safety systems are located). Long-term measures: The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented. Measures resulting from assessment of EMO1,2 civil structures are being incorporated into the ongoing seismic reinforcement documentation (project IPR 20400). The outcomes of the study on "Impact of extreme external temperatures in selected rooms of EBO, EMO NPPs after loss of cooling" are being evaluated. (See ID 3, 4, 8, 12, 14)	Completed In progress	Completed In progress	Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
14.	**ENSREG Compilation of recommendations 3.1.8**	**Protection against extreme weather conditions**	**The National Action Plan covers all tasks in an integrated/comprehensive manner.** **Status:** **Short term (immediate) measures:** **Based on WANO recommendations during the period from April to October 2011 the non-standard tests and inspections of equipment important for coping with extreme conditions exceeding the basic design were successfully performed.** **Long-term measures:** **The procurement process and the implementation of measures in EBO and EMO is ongoing. Some of the measures are already implemented.** **Measures resulting from assessment of EMO1&2 civil structures are being incorporated into the ongoing seismic reinforcement documentation (project IPR 20400).** **The outcomes of the study on "Impact of extreme external temperatures in selected rooms of EBO, EMO NPPs after loss of cooling" are being evaluated.** **(See ID 3, 4, 8, 12, 13)**	 **Completed** **In progress**	 **Completed** **In progress**	**Included in the basic design.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
15.	Peer review country report of the SR 2.2.3 EC Communication–specific to Slovakia 5.11 XCNS	Regulatory monitoring of actions (flooding)	The activity is subject to regulatory review and inspection. Status: The inspection plans for 2013, 2014 and 2015 as well contained inspection activities. No deviation from the prepared actions has been identified.	Annually In progress	Annually In progress	Annually
16	Peer review country report of the SR 2.3.3 EC Communication–specific to Slovakia 5.11 XCNS	Regulatory monitoring of actions (extreme weather conditions)	The activity is subject to regulatory review and inspection. Status: The inspection plans for 2013, 2014 and 2015 as well contained inspection activities. No deviation from the prepared actions has been identified. (See ID 15)	Annually In progress	Annually In progress	Annually
17	Peer review country Report of the SR 2.1.3	Regulatory monitoring of actions (seismic upgrade)	The activity is subject to regulatory review and inspection. Status: The inspection plans for 2013, 2014 and 2015 as well contained inspection activities. No deviation from the proposed actions has been identified. (See ID 15, 16)	Completed	Annually In progress	Annually

RECOMMENDATIONS OF TOPIC 2 (LOSS OF SAFETY SYSTEMS)

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
18.	**ENSREG Compilation of recommendations 3.2.1**	**Alternative cooling and heat sink**	**To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **Status:** **Feed water make-up pumps to steam generators for each reactor units were purchased in 2012. The pumps are situated on a fire truck chassis.** **In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**
			To review physical availability of technology needed for gravity filling of SG from feed water tanks in case of SBO. **Status:** **Physical access for gravity filling of SG was tested. Because of the necessity of physical manipulation with selected valves it was decided to procure power supply to ensure a remote operation of these valves. This measure is part of EOP.** **In addition: electricity generators for control of selected valves are tested.**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			To finish required modifications of existing equipment for connection of diverse mobile feed water and power sources resistant to external events. **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **<u>Additional measures:</u>** **Project for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers under completion (EBO, EMO).** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG" – under completion.**	**31/12/2015 Completed**	**31/12/2015 Completed**	**Before put the respective unit into operation.**
			To analyse and if needed to ensure means for cooling water make up from in-site and off-site water sources in the case of lack of cooling water, incl. preparation of respective procedures. **<u>Status:</u>** **Necessary equipment has been analysed and purchased for example: portable pumps, portable switchboards.** **Training programmes for the diverse mobile**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			devices for cooling water make up from in-site and off-site water sources were prepared implemented and through emergency exercises tested (e. g. EBO 2015). <u>Additional measures:</u> Contract concluded with the Research Institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO completed. Outcomes are analysed.			
19.	ENSREG Compilation of recommendations 3.2.2	<u>AC Power supplies.</u>	To install a 400 kV circuit breaker in the local substation for disconnection of units from the power grid and thus to enable operation in the home consumption mode in the case of damaged transmission lines. <u>Status:</u> The project for completion of circuit breakers into the power output diagram and their positioning in the 400 kV substation in the EMO1,2 substation is completed. The procurement process has started. *Comm.: The national action plan required to submit a time schedule for the 400 kV circuit breaker installation (in EMO12). Installation is ongoing (2017 – 2018).	Completed	Completed *	In the basic design.
			To update the operating documentation for DG (in case of failure of DG connection to the	Completed (before 2013)	Completed (before 2013)	Before put the respective unit

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			6 kV section of the emergency power supply of the 2nd category). **<u>Additional measures:</u>** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG" – under completion.**			**into operation.**
			To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units.** **(See also ID 18).**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**
20.	**ENSREG Compilation of recommendations 3.2.3**	**<u>Power supply (DC)</u>**	**To diversify emergency power sources by assurance of mobile DG for charging of accumulator batteries.** **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units.** **<u>Additional measures:</u>** **Mobile rectifiers 240 V, 24 V for each units to charge accumulators from the mobile 0.4 kV DG were supplied.**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
21.	**ENSREG Compilation of recommendations 3.2.4**	**<u>Operating and training activities</u>**	**To prepare operating procedures and to implement training programmes for operators of diverse mobile devices.** **<u>Status:</u>** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event).** **3,4-LPS-001/O63: Unit Cool down after MDBE,** **3-3,4LPS-001/O64: Activities of OP at Flooding of Structure** **3,4-LPS-001/O65: Strong wind in SE-EBO locality** **3,4-LPS-001/O66: Loss of service water supply in PS Pecenady** **0HP/3001 Loss of external power supply,** **0HP/3002 Loss of raw water supply,** **0HP/3003 Back-up water make-up** **0HP/3004 Transport of employees for non-standard and calamity situations,** **0HP/3005 External and internal floods,** **1TP/6009 Cool down after seismic event** **0HP3006: Measures against extreme climatic conditions.** **Operating instructions for mobile DG 0,4kV: 6-TPP-332 and for feed water pump CAS30/10000-S2 prepared and implemented.** **Procedures for the actions necessary in response to EEE are developed, implemented**	**31/12/2015 Completed**	**31/12/2015 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015). **(See ID 11)**			
22.	**ENSREG Compilation of recommendations 3.2.5**	**<u>Instrumentation and monitoring</u>**	**To specify a list of important parameters needed for monitoring of safety functions.** **<u>Status:</u>** **EBO3&4, EMO1&2 - A list of important parameters needed for monitoring of safety functions has been defined.**	**Completed (before 2013)**	**Completed (before 2013)**	**Before put the respective unit into operation.**
			To analyse the availability of important parameters, and if needed, to ensure mobile measuring units which can use stabile sensors also without standard power supply. **<u>Status:</u>** **Analyses completed.** **The technical specification for procurement of the mobile measuring unit completed (e.g. equipment for measuring of temperature and pressure in the primary circuit and water level in the SG).** *** The project "Implementation of mobile measuring unit is ongoing (IPR 10178/12, 51900/13)". Implementation date during overhaul 2016 EBO, EMO.**	**31/12/2015 Completed***	**31./12/2015 Completed***	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
23.	ENSREG Compilation of recommendations 3.2.6	Improvement of shutdown	To diversify emergency power sources by assurance of mobile DG. Status: Mobile DG 0.4 kV with connecting cabling were purchased in 2012 for all units. (See ID 19, 20)	31/12/2013 Completed	31/12/2013 Completed	Before put the respective unit into operation.
			To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. Status: The project of feed water connection point to SG and diverse power sources in EBO and EMO completed. Additional measures: Project for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers – under completion (EBO, EMO). EMO project "Autonomous cooling for emergency DG" – was finished. EBO "Autonomous cooling for emergency DG" – under completion. (See ID 18c).	31/12/2015 Completed	31/12/2015 Completed	Before put the respective unit into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
24.	ENSREG Compilation of recommendations 3.2.7	Seals of reactor coolant pumps (RCP)	To check if the existing procedures sufficiently solve the situation after de-sealing of RCP glands. Status: The sufficiency of existing procedures checked JSC VNIIAS-All Russian Scientific Institute for NPP Operation 109507, Russian Federation, Moscow, May 2013.	Completed Implemented in 2013	Completed Implemented in 2013	Before put the respective unit into operation.
			To obtain data documenting behaviour of RCP glands at long-term failure of cooling (more than 24 hours) and to prepare a plan of potential necessary measures. Status: The analyses made by VNIIAS are available. Resistance of RCP glands GCN-317 for 72 hours confirmed.	31/12/2013 Completed	31/12/2013 Completed	Before put the respective unit into operation.
25.	ENSREG Compilation of recommendations 3.2.8	Ventilation	To analyse conditions of the environment of rooms where equipment for control of events with long-term station blackout (SBO) and events with long-term loss of ultimate heat sink (UHS) and severe accidents is situated. To prepare a plan of required measures. Status: Environment of rooms, where safety systems	31/12/2013 Completed	31/12/2013 Completed	Before put the respective unit into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			ensuring fulfilment of key safety function in the main reactor building and safety systems which are in direct contact with the external environment (ESW, AFWS, DGS) were analysed /8/. Impact of extreme external climate conditions in selected rooms (for both NPPs). The SAM project includes also the habitability of the main control room and the control of selected equipment from the ERC. Preliminary analysis indicates that no additional measures are necessary.			
26.	ENSREG Compilation of recommendations 3.2.9	<u>Main control room and emergency control room</u>	a) To diversify emergency power sources by assurance of mobile DG. <u>Status:</u> Mobile DG 0.4 kV with connecting cabling are available for both EBO and EMO1,2 units. (See also ID 18) <u>Additional Measures:</u> Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0,4 kV DG were supplied.	31/12/2013 Completed	31/12/2013 Completed	Before put the respective unit into operation.
			b) Remote control of selected equipment installed within the SAM project in all EMO units in the ongoing project of EMO	Completed (before 2013)	Completed*	Before put the respective unit into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			Emergency Centre modification. **<u>Status:</u>** **EMO1,2 - The SAM project requiring remote control of selected equipment installed within the project in all EMO units (1,2,3,4) has been considered in the ongoing project of EMO Emergency Response Centre upgrade.** ***Implementation of the seismic reinforcement with qualification to extreme external conditions is in progress.**			
27.	**EC Communication Annex**	**<u>External hazard safety</u>**	**To analyse seismic margins of selected systems, structures and components (SSC). To evaluate the resistance of selected SSC at a seismic event with intensity corresponding to the probability of occurrence less than once per 10,000 years.** **<u>Status:</u>** **(See ID No. 4, 5, 6 and 7)** ***A time schedule of implementation of measures for 2014 - 2018 to enhance the resistance of selected EBO and EMO1&2 civil structures was prepared.**	**31/12/2013 Completed**	**31/12/2013 Completed***	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation**
27.bis	**ENSREG Compilation of recommendations 3.2.10**	**<u>Spent fuel pool</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated**			**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>**			**Common EMO structures before put of Unit 3 into operation**
			SAMG are developed and implemented and cover all plant states (for single units) – full power, shut down, spent fuel pool, …	**Completed**	**Completed**	
			The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").	**Completed**	**Completed**	
			To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.**	**Completed**	**Completed**	
			Necessary measures are being implemented and inspected by ÚJD SR. Post Fukushima SAMG update is in progress to implement Post	**In progress**	**In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement. **(See ID 32, 34. 39, 41, 43, 44**			
28.	**ENSREG Compilation of recommendations 3.2.11**	**<u>Isolation and independency</u>**	**To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **<u>Status:</u>** **Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012.The pumps are situated on a fire truck chassis.** **In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**
			To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO and EMO1&2 units.** **(See also ID 18, 26)**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			<u>Additional measures:</u> **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV DG were supplied and were tested.**			
			To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **(See ID 18)** **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **<u>Additional measures:</u>** **Projects for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers - under completion (EBO, EMO).** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG" – under completion.** **(See ID 18c)**	**31/12/2015** **Completed**	**31/12/2015** **Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
29.	ENSREG Compilation of recommendations 3.2.12	Flow path and access availability	a) To prepare operating procedures and to implement training programmes for operators. Status: Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event). 3,4-LPS-001/O63: Unit Cool down after MDBE, 3-3,4LPS-001/O64: Activities of OP at Flooding of Structures 3,4-LPS-001/O65: Strong wind in SE-EBO locality 3,4-LPS-001/O66: Loss of service water supply in PS Pecenady 0HP/3001 Loss of external power supply, 0HP/3002 Loss of raw water supply, 0HP/3003 Back-up water make-up 0HP/3004 Transport of employees for non-standard and calamity situations, 0HP/3005 External and internal floods, 1TP/6009 Cool down after seismic event 0HP3006:Measures against extreme climatic conditions Training programmes for the diverse mobile devices were prepared implemented and through exercises tested at EBO and EMO. Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of	31/12/2015 Completed	31/12/2015 Completed	Before put the respective unit into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			emergency exercises (e. g. EBO 2015). **(See ID 11, 21)**			
			b) To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are available for both EBO and EMO1&2 units.** **<u>Additional Measures:</u>** **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV DG were supplied.** **(See ID 18, 26, 28)** **Physical access to critical equipment is ensured (e. g. bypass to turne stilles).**	**31/12/2013 Completed**	**31/12/2013 Completed**	**Before put the respective unit into operation.**
			c) To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **(See ID 18)**	**31/12/2015 Completed**	**31 12/2015 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			Status: **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **Additional measures:** **Projects for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers - under completion (EBO, EMO).** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG" – under completion.** **(See ID 18, 28)**			
			d) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources. **(See ID 18a)** **Status:** **Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012. The pumps are situated on a fire truck chassis.** **In 2014, flow rate sensors were additionally**	**31/12/2013** **Completed**	**31/12/2013** **Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			installed on the mobile feed water source high-pressure pump discharge pipe. **The mobile feed water sources are regularly tested during operation and main overhauls as well.**			
30.	**ENSREG Compilation of recommendations 3.2.13**	**<u>Mobile devices</u>**	**a) To diversify the emergency feed water source to SG by assurance of mobile high-pressure sources.** **(See ID 18a, 28a, 29)** **<u>Status:</u>** **Feed water make-up pumps to steam generators for each reactor unit were purchased in 2012. The pumps are situated on a fire truck chassis. In 2014, flow rate sensors were additionally installed on the mobile feed water source high-pressure pump discharge pipe.** **The mobile feed water sources are regularly tested during operation and main overhauls as well.**	**31/12/2013** **Completed**	**31/12/2013** **Completed**	**Before put the respective unit into operation.**
			b) To diversify emergency power sources by assurance of mobile DG. **<u>Status:</u>** **Mobile DG 0.4 kV with connecting cabling are**	**31/12/2013** **Completed**	**31/12/2013** **Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			available for both EBO and EMO1&2 units. **<u>Additional Measures:</u>** **Mobile rectifiers 240 V, 24 V for each unit to charge accumulators from the mobile 0.4 kV DG were supplied.** **(See ID 20, 26, 28, 29)**			
			c) To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event. **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **Projects for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers - under completion (EBO, EMO).** **<u>Additional measures:</u>** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG"**	**31/12/2015 Completed**	**31/12/2015 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			– under completion. **(See ID 18, 28, 29)**			
			d) To prepare operating procedures and to implement training programmes for operators of diverse mobile devices. **<u>Status:</u>** **Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event).** **3,4-LPS-001/O63: Unit Cool down after MDBE,** **3-3,4LPS-001/O64: Activities of OP at Flooding of structures** **3,4-LPS-001/O65: Strong wind in SE-EBO locality** **3,4-LPS-001/O66: Loss of service water supply in PS Pecenady** **0HP/3001 Loss of external power supply,** **0HP/3002 Loss of raw water supply,** **0HP/3003 Back-up water make-up** **0HP/3004 Transport of employees for non-standard and calamity situations,** **0HP/3005 External and internal floods,** **1TP/6009 Cool down after seismic event** **0HP3006:Measures against extreme climatic conditions** **Training programmes for the diverse mobile devices were prepared implemented and**	**31/12/2015 Completed**	**31/12/2015 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			through exercises tested at EBO and EMO. **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 11, 21, 29)**			
31.	**ENSREG Compilation of recommendations 3.2.14**	**<u>Bunkered/Hardened systems</u>**	**To finish required modifications of existing equipment to enable connection of diverse feed water sources and power sources ensuring physical access and resistance under conditions evoked by an external event.** **<u>Status:</u>** **The project of feed water connection point to SG and diverse power sources in EBO and EMO completed.** **Projects for sheltering of mobile DG and cabling between the 0.4 kV mobile DG and selected consumers - under completion (EBO, EMO).** **<u>Additional measures:</u>** **EMO project "Autonomous cooling for emergency DG" – was finished.** **EBO "Autonomous cooling for emergency DG" – under completion.** **(See ID 18, 28, 29, 30)**	**31/12/2015 Completed**	**31/12/2015 Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
32.	**ENSREG Compilation of recommendations 3.2.15**	**Multiple accidents**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **Status:** **a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation**
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.**	**Completed**	**Completed**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			c) Necessary measures are being implemented and inspected by ÚJD SR. Post Fukushima SAMG update is in progress to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement. (See ID 27bis, 34. 39, 41, 43)	In progress	In progress	
33.	ENSREG Compilation of recommendations 3.2.16	<u>Equipment inspection and training programmes</u>	To prepare operating regulations and to implement training programmes for operators of diversity mobile devices. <u>Status:</u> Updated scenarios were incorporated into Operating Instructions for Emergency Situations (3,4-LPS-001/O60 - EBO34, 1,2 TPP 004 EMO12: Cooling of Re after a seismic event). 3,4-LPS-001/O63: Unit Cool down after MDBE, 3-3,4LPS-001/O64: Activities of OP at Flooding of structures 3,4-LPS-001/O65: Strong wind in SE-EBO locality 3,4-LPS-001/O66: Loss of service water supply in PS Pecenady 0HP/3001 Loss of external power supply, 0HP/3002 Loss of raw water supply, 0HP/3003 Back-up water make-up 0HP/3004 Transport of employees for non-standard and calamity situations, 0HP/3005 External and internal floods,	31/12/2015 Completed	31/12/2015 Completed	Before put the respective unit into operation.

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			1TP/6009 Cool down after seismic event **0HP3006:Measures against extreme climatic conditions** **Training programmes for the diverse mobile devices were prepared implemented and through exercises tested at EBO and EMO.** **Procedures for the actions necessary in response to EEE are developed, implemented and exercised in accordance with the plan of emergency exercises (e. g. EBO 2015).** **(See ID 11, 21, 29, 30)**			
34.	**ENSREG Compilation of recommendations 3.2.17**	**<u>Further studies to address uncertainties</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **<u>Status:</u>** **a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
			Units on Site"). **(See ID 27bis, 32)** **<u>Additional measures:</u>** **Contract concluded with the Research institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO completed. Outcomes are analysed.** **(See ID 7, 18d)**			
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.**	**Completed**	**Completed**	
			c) Necessary measures are being implemented and inspected by ÚJD SR. Post Fukushima SAMG update is in progress to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement. **(See ID 34. 39, 41, 43)**	**In progress**	**In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO34
35.	EC Communication Annex	The time the operator has at disposal for recovery of safety functions in case of SBO and/or loss of UHS should be longer than an hour.(without human action)	Heat removal from PC: Due to interruption of feed water supply and failure of RCP after SBO, the residual heat removal from the core in the natural circulation regime is to the detriment of gradual reduction of the secondary circuit coolant. Exploitation of nominal inventory of coolant in SG occurs during 5 hours. Containment integrity: After two days, 60 ºC is expected in the containment wall centre. The containment integrity isn't endangered at this temperature. Coolant inventory in PC: Time reserve: PC coolant inventory is sufficient for fuel cooling for 24 hours.	Completed (before 2013)	Completed (before 2013)	Part of design
36.	EC Communication Annex	EOPs should cover all conditions of a power plant (from full power to shut-down reactor)	Symptom oriented procedures for design basis and beyond design basis emergency conditions were fully implemented in EMO1,2 and EBO3,4 in 1999 (for events initiated during power operation) and in 2006 (for events initiated at shut-down reactor or in SFP). Long-term maintenance programme with Westinghouse provides for the cutting edge status of EOPs.	Completed (before 2013)	Completed (before 2013)	Basic design

RECOMMENDATIONS OF TOPIC 3 (SEVERE ACCIDENT MANAGEMENT)

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
37.	**ENSREG Compilation of recommendations 3.3.1**	**Reference WENRA levels**	**A. In corporation of reference WENRA values related to severe accident management (SAM) to the national legal framework.** **B. To implement the SAM project.** **Status:** **Based on this evaluation full harmonisation of safety regulations with WENRA Reference Levels (2008) has been achieved in Slovakia.** **Additional measures:** **On 21. 08. 2014 ÚJD SR Board meeting approved "The principles of new Atomic Act". The principles represent the basis for the work of a Working Group to prepare the new Atomic Act. A draft of new Atomic Act as a result of the Working Group is expected to be completed by end of 2016 and the new Atomic Act be published by the end of 2016. The new/revised Atomic Act will take into account new EU legal documents:** **e.g. Directive 2014/87/Euratom, Directive 2013/59/Euratom as well as the latest WENRA Reference levels**	**Implemented**	**Implemented**	**Implemented**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			(2014) to the extent possible.			
38.	**ENSREG Compilation of recommendations 3.3.2 XCNS**	**SAM technical measures**	**To implement the SAM project.** **Status:** **SAM project implemented and completed at EBO, implementation at EMO in progress according to schedule. The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/. A plan of implementation of additional measures is under preparation.** ***Some minor deficiencies identified during completion will be corrected in 2016.**	**31/12/2013 Completed**	**31/12/2015 Completed***	**Included in the design**
39.	**ENSREG Compilation of recommendations 3.3.3**	**Evaluation of SAM measures after severe external events**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.**	**Analysis and plan of implementation of additional measures by 31/12/2014**	**Analysis and plan of implementation of additional measures by 31/12/2014**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			Status: **a) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").**	**Completed**	**Completed**	
			b) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.**	**Completed**	**Completed**	
			c) Necessary measures are being implemented and inspected by ÚJD SR. Post Fukushima SAMG update is in progress to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement. **(See ID 27bis, 34. 41, 43)**	**In progress**	**In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
40.	**ENSREG Compilation of recommendations 3.3.4**	**Update of severe accident management guidelines (SAMG)**	**To analyse the SAM project with regard to potential damage of infrastructure, including violation of communication at a level of power plant, branch and state, long-term accidents (taking several days) and accidents with an impact on several units and neighbouring industrial facilities.** **Status:** **Contract concluded with the Research institute of Transport on analysis of critical roads at the plant. Reports for EBO and EMO completed. Outcomes are analysed.** ***Post Fukushima SAMG update is in progress with Westinghouse to implement up to date Post Fukushima Westinghouse Owners Group / Pressurized Water Reactor Owners Group enhancement.** **(See ID 7, 18, 34)**	**Analysis and plan of implementation of additional measures by 31/12/2015***	**Analysis and plan of implementation of additional measures by 31/12/2015***	**Before put the respective unit into operation.**
41.	**ENSREG Compilation of recommendations 3.3.5**	**SAMG verification**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be**	**31/12/2016***	**31/12/2016***	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site. **<u>Status:</u>** ***Comm.: A contract has been concluded with Westinghouse on verification and validation according to legal requirements.** **A new deadline for completion of verification and validation has been set by ÚJD SR for Post Fukushima update.**			

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
42.	**ENSREG Compilation of recommendations 3.3.6**	**SAM exercises**	**a) To prepare conditions for cooperation with selected external organisations at emergency response control during external events and severe accidents.** **Status:** **Agreement with the Ministry of Interior of the Slovak Republic on mutual assistance and cooperation and its provision at occurrence of an extraordinary event in nuclear installation (No. SE/2012/22100-01).** **The cooperation tested during the emergency exercise (2014) in EBO and EMO (2015).** **(See ID 50)**	**31/12/2014 Completed**	**31/12/2014 Completed**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**
			b) Review of the national emergency arrangements based on the outcomes of the so called HAVRAN exercise. **Status** **(See ID 57)**	**31/12/2014 Completed**	**31/12/2014 Completed**	**31/12/2014 Completed**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
43.	**ENSREG Compilation of recommendations 3.3.7**	**SAM training**	**a) Based on the extended SAM to modify the SAM training taking into account the severe accident occurrence at multi (all) units at the same site.** **Status:** **The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").** **The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.** ***Comm.: The analyses has been completed and evaluated by the licensee. A plan of implementation of measures was developed. Necessary measures are being implemented and inspected by ÚJD SR.**	**Analysis and plan of implementation of additional measures by 31/12/2014 Completed***	**Analysis and plan of implementation of additional measures by 31/12/2014 Completed***	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**
			b) Modifications to training materials **Status:** **Modifications to training materials will**	**In progress**	**In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			start after completion of Post Fukushima SAMG update with Westinghouse. **(See ID 27bis, 32, 34, 39, 41)**			
44.	**ENSREG Compilation of recommendations 3.3.8 EC Communication Annex**	**<u>Extension of SAMG to all plant states</u>**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented.** **<u>Status:</u>**			**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**
			a) SAMG are developed and implemented and cover all plant states (for single units) – full power, shut down, spent fuel pool, …	**Completed**	**Completed**	
			b) The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site").	**Completed**	**Completed**	
			c) To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe	**Completed**	**Completed**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			accident manageability at its simultaneous occurrence in all units at the same site. **Comm.: The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.**			
			d) Necessary measures are being implemented and inspected by ÚJD SR. Post Fukushima SAMG update is in progress to implement Post Fukushima Westinghouse Owners Group /Pressurized Water Reactor Owners Group enhancement. **(See ID 27bis, 32, 34. 39, 41, 43)**	**In progress**	**In progress**	
45.	**ENSREG Compilation of recommendations 3.3.9**	**<u>Improved communications</u>**	**Remote control of selected equipment installed within the SAM project in all EMO units in the ongoing project of EMO Emergency Centre modification.** **<u>Status:</u>** **Remote control of selected equipment and technological information system installed.**	**Completed (before 2013)**	**Completed**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
46.	**ENSREG Compilation of recommendations 3.3.10 EC Communication Annex**	**<u>Presence of hydrogen in unexpected places</u>**	**To implement the SAM project. To analyse the SAM project from the viewpoint of potential migration of hydrogen to other places.** **<u>Status:</u>** **a) Analyses completed. The main outcomes are as follows: the atmosphere of the reactor hall is inertized by steam and probability of hydrogen detonation is very low; migration to selected rooms outside the containment identified.**	**31/12/2015** **Completed**	**31/12/2015** **Completed**	**Before put the respective unit into operation.**
			b) Preparation of potential countermeasures.	**In progress**	**In progress**	

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
47.	**ENSREG Compilation of recommendations 3.3.11**	**Large volumes of contaminated water**	**To prepare solutions for treatment of large volumes of contaminated water after an accident at a study level from the conceptual viewpoint.** **Status:** **Study completed. The aim of the study was the preparation of a conceptual study for addressing issues, dealing with high activity liquid wastes after severe accident.**	**31/12/2015** **Completed**	**31/12/2015** **Completed**	**31/12/2015** **Completed**
48.	**ENSREG Compilation of recommendations 3.3.12**	**Radiation protection**	**To implement the SAM project. To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **Status:** **The analysis of severe accident management at all units on the site (including reactors at full power,**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed***	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed***	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site") The SAM project includes also the habitability of the main control room and the control of selected equipment from the ERC. The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/. **This self-assessment contained a chapter dealing with local radiation conditions in those technological premises to which access is necessary for long term control of SAM.** **(See ID 27bis., 32, 34, 39, 41, 43, 44)** ***Comm.: The analyses has been completed and evaluated by the licensee. A plan of implementation of measures was developed. Necessary measures are being implemented and inspected by ÚJD SR.**			
49.	**ENSREG Compilation of recommendations 3.3.13 EC Communication Annex**	**<u>On site emergency center</u>**	**Remote control of selected equipment installed within the SAM project in all EMO units in the ongoing project of EMO Emergency Centre modification.** **<u>Status:</u>**	**Completed** **(before 2013)**	**In progress**	**Before put the respective unit into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			Remote control of selected equipment for all EMO units (1,2,3,4) has been considered in the ongoing project of Emergency Response Centre upgrade. **The procurement process of the seismic reinforcement – technology in the emergency centre in progress (e.g. reinforcement of air-condition, electrical cabinets, etc.).** **(See ID 45)**			
50.	**ENSREG Compilation of recommendations 3.3.14**	**Support of local operators**	**To prepare conditions for cooperation with selected external organisations at emergency response control during external events and severe accidents.** **Status:** **Agreement with the Ministry of Interior of the Slovak Republic on mutual assistance and cooperation and its provision at occurrence of an extraordinary event in nuclear installation (No. SE/2012/22100-01).** **The cooperation tested during the all-plant emergency exercise (2014) in EBO and EMO (2015).** **(See ID 42)**	**31/12/2014** **Completed**	**31/12/2014** **Completed**	**Before put the respective unit into operation. Common EMO structures before put of Unit 3 into operation.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
51.	**ENSREG Compilation of recommendations 3.3.15**	**Level 2 Probabilistic Safety Assessment**	**The PSA Level 2 was prepared for EBO3&4 and for EMO1&2 and are continuously updated.**	**Completed**	**Completed**	**Before put the respective unit into operation.**
52.	**ENSREG Compilation of recommendations 3.3.16**	**Severe accident studies.**	**To analyse the SAM project from the viewpoint of severe accident management at multi units (all) at the same site (fuel situated in the reactor core and in the spent fuel pool); to modify the SAM project, if needed, so that sufficient measures can be implemented. To prepare a plan of implementation of additional measures for extension of the SAM project to improve the severe accident manageability at its simultaneous occurrence in all units at the same site.** **Status:** **The analysis of severe accident management at all units on the site (including reactors at full power, reactors in shutdown and spent fuel pool) has been prepared (Report No. CVV 12/2014-01 "Management of Severe Accidents on All Units on Site"). The licensee performed a self-assessment on the implementation of severe accident management /9/ and /10/.** **(See ID 27bis, 32, 34, 39, 41, 43, 44)**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed***	**Analysis and plan of implementation of additional measures by 31/12/2014**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			***Comm.: The analyses has been completed and evaluated by the licensee. A plan of implementation of measures was developed. Necessary measures are being implemented and inspected by ÚJD SR.**			
53.	**Peer review country Report of the SR 4.3 EC Communication – specific to Slovakia 5.11**	**SAM modification implemented according to the proposed schedule**	**The activity is subject to regulatory review and inspection /6/, /7/, /11/.**	**Annually In progress**	**Annually In progress**	**Annually**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
54.	**Peer review country** **Report of the SR 4.3**	**<u>To verify leak-tightness of all penetrations (e.g. RPV cap, SG cap) through the containment under severe accident conditions (in particular leak-tightness of seals).</u>**	**To analyse the SAM project from the viewpoint of resistance of seals and penetrations of the containment under severe accident conditions.** **<u>Status:</u>** **A study (including experimental verification) was prepared by UJV Řež to test the sealing under SA conditions. This study was prepared within the implementation of SAM project.** **<u>Additional measures:</u>** **Replacement of seals at the reactor pressure vessel cavity lids completed. Sealing of doors in line with the maintenance schedules.**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Analysis and plan of implementation of additional measures by 31/12/2014** **Completed**	**Analysis and plan of implementation of additional measures by 31/12/2014.**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
55.	**Regulatory initiative**	**<u>The concept of large-area fire control – (bigger than considered in the design)</u>**	**To prepare the fire control documentation – operative plan of large-area fire control.** **<u>Status:</u>** **A report was prepared by the Technical University in Ostrava.** **Based on the analysis, the fire brigade on the site prepared an operative fire control plan. Plan of procurement of technology, training of the personnel in cooperation with external organisations in progress.** *** <u>Additional measures:</u>** **Purchase of special streamlines large-scale fire extinguishing flammable liquids, hose wagon with automatic laying, etc. for both EBO and EMO plant sites.**	**31/12/2015** **Completed***	**31/12/2015** **Completed***	**31/12/2015** **NPP under construction**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
56.	**Regulatory initiative**	**<u>Physical protection</u>**	**To harmonise the implementation of additional SAM measures with potential new increased requirements for physical protection in case of aggravated assaults.** **All equipment which are part of SAM measures are located within the physical protection barriers of the NPPs (e.g. fire brigade, mobile equipment)**	**31/12/2014** **Completed**	**31/12/2014** **Completed**	**31/12/2014** **NPP under construction**
57.	**Regulatory initiative**	**<u>Emergency arrangements</u>**	**Comprehensive review of the national emergency arrangements based on the outcomes of the so called HAVRAN exercise.** **<u>Status:</u>** **Government Resolution No. 28/2013 requested the Minister of Interior to submit to the Government a report on the progress in implementing the measures resulting from the HAVRAN 2012 exercise. The report was submitted to the government in January 2014 and took note of the progress achieved.** **<u>Additional measures:</u>** **A comprehensive review of the civil protection and emergency management has been initiated. The Ministry of Interior proposes that an amendment to**	**31/12/2014** **Completed**	**31/12/2014** **Completed**	**31/12/2014** **NPP under construction**

ID	Source	Recommendation	Fulfilment of recommendation	EBO3&4	EMO1&2	MO3&4
			Law No. 42/1994 Coll. on Civil Protection of Citizens to be prepared. This amendment is also necessary to implement the Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances. **The Government by its resolution No. 3/2016 approved A National Strategy for the Management of Security Risks (Emergency situations).** **The material dealing with management of security/emergency risks, register and assessment of security/emergency risks, risk mitigation measures, financing options, processes of continuous improvement, etc.**			

REFERENCES

/1/ WENRA: Qualitative Reporting on Status of Harmonisation of Safety of Existing Reactors

/2/ Súhrnná správa SHMÚ pre lokalitu Jaslovské Bohunice, Bratislava, Január 2012

/3/ Súhrnná správa SHMÚ pre lokalitu Mochovce, Bratislava, Marec 2011

/4/ Report on estimation of limit seismic margin of civil structures for EBO, EMO12)

/5/ Seismic PSA for seismic re-evaluation of the 1st and 2nd NPP EMO-Final Report

/6/ ÚJD SR Inspection Plan 2013

/7/ ÚJD SR Inspection Plan 2014

/8/ Impact of extreme external climate conditions in selected rooms (for both NPPs) STMSE000015

/9/ Report on targeted self-assessment in the area of civil accidents according to WANO methodology (POC 2013 – 1) at EMO

/10/ Report on targeted self-assessment in the area of civil accidents according to WANO methodology (POC 20132013 – 1) at EBO

/11/ ÚJD SR Inspection Plan 2015

6.6 Vienna Declaration on Nuclear Safety

Vienna Declaration on Nuclear Safety

On principles for the implementation of the objective of the Convention on Nuclear Safety to prevent accidents and mitigate radiological consequences

Adopted by the Contracting Parties meeting at the Diplomatic Conference of the Convention on Nuclear Safety

Vienna, Austria

9 February 2015

THE CONTRACTING PARTIES

TO

THE CONVENTION ON NUCLEAR SAFETY

i) ***taking into account*** the significant number of efforts and initiatives taken place after the accident at the Fukushima Daiichi Nuclear Power Plant on a national, regional and international level, to enhance nuclear safety;

ii) ***noting*** changes adopted in the Guidance Documents INFCIRC/571, 572 and 573 to strengthen the review process of the Convention on Nuclear Safety (hereinafter referred to as CNS);

iii) ***recalling*** the observations of the Contracting Parties of the CNS at the 2nd Extraordinary Meeting in 2012, confirmed at the 6th Review Meeting in 2014, that the displacement of people and the land contamination after a nuclear accident call for all national regulators to identify provisions to prevent and mitigate the potential for severe accidents with off-site consequences;

iv) ***reaffirming*** the fundamental safety principles provided by the CNS and the commitment it entails to the continuous improvement of the implementation of these principles;

v) ***aware of*** the world-wide Action Plan on Nuclear Safety endorsed by all Member States of the International Atomic Energy Agency in September 2011; and,

vi) ***having considered*** the proposal by the Swiss Confederation to amend Article 18 of the CNS presented at the 6th Review Meeting of the CNS;

have adopted the following principles to guide them, as appropriate, in the implementation of the objective of the CNS to prevent accidents with radiological consequences and mitigate such consequences should they occur:

1. New nuclear power plants are to be designed, sited, and constructed, consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.

2. Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner.

3. National requirements and regulations for addressing this objective throughout the lifetime of nuclear power plants are to take into account the relevant IAEA Safety Standards and, as appropriate, other good practices as identified inter alia in the Review Meetings of the CNS.

The Contracting Parties to the CNS further decide that:

(1) The agenda of the 7th Review Meeting of the CNS shall under its process include a peer review of the incorporation of appropriate technical criteria and standards used by Contracting Parties for addressing these principles in national requirements and regulations, which should lead the CNS to a process of consideration of key areas to be agreed at Review Meetings for subsequent Review Meetings.

(2) With immediate effect, these principles should be reflected in the actions of Contracting Parties, in particular when preparing their reports on the implementation of the CNS, with special focus on Article 18 as well as other relevant Articles, including Articles 6, 14, 17 and 19, starting with the national reports to be submitted by Contracting Parties for consideration during the 7th Review Meeting of the CNS.

(3) Each national report should include inter alia an overview of implementation measures, planned programs and measures for the safety improvements identified for existing nuclear installations.

(4) Contracting Parties are committing to ensuring that the safety objectives set out above form an integral part of considerations during future Review Meetings and will be used as a reference to help strengthening the peer review process of the CNS.

The Contracting Parties to the CNS request the IAEA Director General to:

a. ***transmit*** this Declaration to the IAEA Commission on Safety Standards for its consideration with the four safety standards committees under its aegis, of the technical elements contained therein with a view to incorporating them as appropriate into the relevant IAEA Safety Standards; and

b. ***publish*** this Declaration as an INFCIRC for its widest dissemination including to States which are not Contracting Parties to the CNS, and the public in general.

6.7 IAEA Action Plan on Nuclear Safety

Action addressed to Member States	Reference (Article)
Member States to promptly undertake a national assessment of the design of nuclear power plants against site specific extreme natural hazards and to implement the necessary corrective actions in a timely manner.	Chapter 6.5 National Report of the SR 2016 – ID3 Action Plan
Member States to be strongly encouraged to voluntarily host IAEA peer reviews, including follow-up reviews, on a regular basic; the IAEA Secretariat to respond in a timely manner to request for such reviews.	Chapter 1.3 Chapter 2.2 Chapter 3.1.3.4
Member States to conduct a prompt national review and thereafter regular reviews of their emergency preparedness and response arrangements and capabilities, with the IAEA Secretariat providing support and assistance through Emergency Preparedness Review (EPREV) missions, as requested.	Chapter 4.7.6
Member States to consider, on a voluntary basis, establishing national rapid response teams that could also be made available internationally through RANET.	National response teams are available on the basis of Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. Membership in RANET is under consideration.
Member States to conduct a prompt national review and thereafter regular reviews of their regulatory bodies, including an assessment of their effective independence, adequacy of human and financial resources and the need for appropriate technical and scientific support, to fulfil their responsibilities.	Chapter 3.1.3.4
Each Member State with nuclear power plants to voluntarily host, on a regular basis, an IAEA IRRS mission to assess its national regulatory framework. In addition, a follow-up mission to be conducted within three years of the main IRRS mission.	Chapter 3.1.3.4

Member States to ensure improvement, as necessary, of management systems, safety culture, human resources management, and scientific and technical capacity in operating organizations; the IAEA Secretariat to provide assistance to Member States upon request.	
Each Member State with nuclear power plants to voluntarily host at least one IAEA Operational Safety Review Team (OSART) mission during the coming three years, with the initial focus on older nuclear power plants. Thereafter, OSART missions to be voluntarily hosted on a regular basis.	Chapter 1.3
Member States to utilize as broadly and effectively as possible the IAEA Safety Standards in an open, timely and transparent manner. The IAEA Secretariat to continue providing support and assistance in the implementation of IAEA Safety Standards.	Chapter 6.3
Member States to be encouraged to join and effectively implement these Conventions.	Chapter 4.7.7.2
Member States to work towards establishing a global nuclear liability regime that addresses the concerns of all States that might be affected by a nuclear accident with a view to providing appropriate compensation for nuclear damage. The IAEA International Expert Group on Nuclear Liability (INLEX) to recommend actions to facilitate achievement of such a global regime. Member States to give due consideration to the possibility of joining the international nuclear liability instruments as a step toward achieving such a global regime.	Chapter 3.1.2.2 and 3.1.2.3
Member States to create an appropriate nuclear infrastructure based on IAEA Safety Standards and other relevant guidance, and the IAEA Secretariat to provide assistance as may be requested.	Chapter 6.3

Member States to voluntarily host Integrated Nuclear Infrastructure Reviews (INIR) and relevantpeer review missions, including site and design safety reviews, prior to commissioning the first nuclear power plant.	Not relevant.
Member States with nuclear power programmes and those planning to embark on such a programme to strengthen, develop, maintain and implement their capacity building programs, including education, training and exercises at the national, regional and international levels; to continuously ensure sufficient and competent human resources necessary to assume their responsibility for safe, responsible and sustainable use of nuclear technologies; the IAEA Secretariat to assist as requested.Such programmes to cover all the nuclear safety related areas, including safe operation, emergency preparedness and response and regulatory effectiveness and to build upon existing capacity building infrastructures.	Chapter 3.1.3.5 Chapter 4.2
Member States with nuclear power programmes and those planning to embark on such a programme, to incorporate lessons learned from the accident into their nuclear power programme infrastructure.	Chapter 6.
Member States, the IAEA Secretariat and other relevant stakeholders to facilitate the use of available information, expertise and techniques for monitoring, decontamination and remediation both on and off nuclear sites and the IAEA Secretariat to consider strategies and programmes to improve knowledge and strengthen capabilities in these areas.	See National Report of the SR compiled in terms of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radwaste Management (August *2014*). See ID 47 Action Plan (chapter *6.5*)
Member States, the IAEA Secretariat and other relevant stakeholders to facilitate the use of available information, expertise and techniques regarding the removal of damaged nuclear fuel and the management and disposal of radioactive	Chapter 6. ID 47 Action Plan (chapter *6.5*)

waste resulting from a nuclear emergency.	
Member States, the IAEA Secretariat and other relevant stakeholders to share information regarding the assessment of radiation doses and any associated impacts on people and the environment.	Chapter 4.7.7
Member States, with the assistance of the IAEA Secretariat, to strengthen the emergency notification system, and reporting and information sharing arrangements and capabilities.	Chapter 4.7.7
Member States, with the assistance of the IAEA Secretariat, to enhance the transparency and effectiveness of communication among operators, regulators and various international organizations, and strengthen the IAEA's coordinating role in this regard, underlining that the freest possible flow and wide dissemination of safety related technical and technological information enhances nuclear safety.	Chapter 4.7.7

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