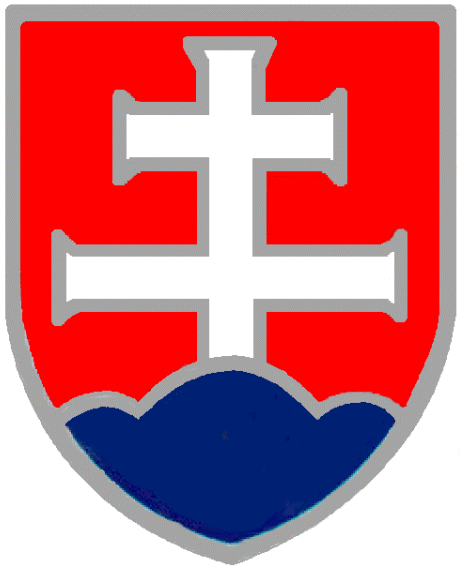
NATIONAL REPORT OF THE SLOVAK REPUBLIC



DRAFT

COMPILED IN TERMS OF THE CONVENTION ON NUCLEAR SAFETY

MAY 2007

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Abbreviations

AKOBOJE	Automatized complex of nuclear power plant security system
AZ	Reactor active zone
ALARA	As low as reasonable achievable
BO	Common repair
Bq	Bequerel (unit)
BS	Safety report
BSC	Bohunice Processing Centre
BDBA	Beyond Design Basis Accident
BNS	Safety instructions
CCS	Central Crisis Staff
CDF	Core damage frequency
CO	Public protection
CHO	Emergency Response Centre
ČP	Fresh fuel
ČSSR	Czechoslovak socialist republic
ČSFR	Czech - Slovak Federative Republic
ČSKAE	Czechoslovak Atomic Energy Commission
DBA	Design Basic Accident
DG	Diesel generator
EBO	Nuclear Power Plants Bohunice
EdF	Electricité de France
ESFAS	Engineering Safety Features Actuation System
GO	General overhauling
GovCo, a. s.	Decommissioning company
EOP	Emergency Operating Procedures
HCČ	Main circulation pump
HDP	Emergency transport order
HDO	Mass remote control
HRS	Emergency Control Centre
HVB	Main manufacturing unit
ICRP	International Commission for Radiation Protection
IDE	Individual dose equivalent
INES	International Nuclear Event Scale
INSAG	International Nuclear Safety Advisory Group
ISM	Integrated management system
JAVYS, a. s.	Joint-stock company JAVYS (Nuclear and Decommissioning company)
JE	Nuclear power plant
JE A-1	Nuclear power plant Bohunice A -1
JE V-1	Nuclear power plants V-1 Jaslovské Bohunice (1st and 2nd unit)
JE V-2	Nuclear power plants V-2 Jaslovské Bohunice (3rd and 4th unit)

JE Mochovce	Nuclear power plants Mochovce
JZ / JEZ	Nuclear installation / nuclear power installation
KDE	Collective dose equivalent
KKC	Emergency and Co-ordination Centre of the Slovak Nuclear Regulatory Authority
KO	Presurizer
KKRH	Regional Commission for Radiation Accidents
KRH	Slovak Government's Commission for Radiation Accidents
LaP	Limits and conditions for operation
LBB	Leak Before Break
LOCA	Loss of coolant accident
MAAE/IAEA	International Atomic Energy Agency
MaR	Measuring and regulation
MO-ASR	Ministry of Defence of the Slovak Republic – Army of the Slovak Republic
MOD	Modernization and improvement of NPP V-2
MoI SR	Ministry of Interior of the Slovak Republic
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak. Republic
MSK –64	Medvedev Sponhauer Karnikov Seismic Events Classification Scale
MSVP	Interim spent fuel storage
MVRR SR	Ministry of Construction and Regional Development of the Slovak Republic
MZ SR	Ministry of Health of the Slovak Republic
MŽP SR	Ministry of Environment of the Slovak Republic
NIP	National Labour Inspectorate
NUSS	Nuclear Safety Standards
OHO	Emergency Response Organization
OKRH	District Commission for Radiation Accidents
OOPP	Personal protective working aids
ORS	Operative-managing Group
PpBS	Pre-operational safety report
PHARE	EU initiative for the reconstruction of economy of central and east European countries
PO	Primary circuit
PS	Operational set
PSA	Probabilistic safety assessment
PSR	Periodic safety assessment
PG	Steam Generator
PG (SHN)	Super-accident steam generator feeding
PÚ	Occupational accident
QA	Quality Assurance
RAO	Radioactive waste
RČA	Quick-acting fitting
RGO	Extended general overhaul
RÚ RAO	National Radioactive Waste Repository

SAMG	Severe Accident Management Guidelines
SBEOP	Symptom-oriented emergency regulations
SE, a. s.	Joint-Stock Company Slovenské elektrárne
SE-EBO	Nuclear power plants Jaslovské Bohunice, subsidiary of SE, a. s.
SE-EMO	Nuclear power plants Mochovce, subsidiary of SE, a. s.
SE-VYZ	Decommissioning of Nuclear Installations and Management of Radioactive Waste and Spent Fuel, subsidiary of SE, a. s.
SHMU	Slovak Hydrometeorologic Institute
SIRM	Safety Improvement of Mochovce NPP Project Review Mission – occlusions of IAEA mission performed at Mochovce in June 1994
SK	Quality system
SKK	Construction and components system
SPSA	Probabilistic safety assessment for low power and shut-down
SKR	Control system
SR	Slovak Republic
SÚBP	Slovak Work Safety Office
SÚRMS	Slovak Center of Radiation Monitoring Network
STN	Slovak technical standard
ŠFL JEZ	State Fund for Decommissioning of Nuclear Power Installations and Management of. Spent Nuclear Fuel and Radioactive Waste
ŠZÚ	State Health Institute of the Slovak Republic
ÚVZ SR	Public Health Authority of the Slovak Republic
TG	Turbo-generator
TNR	Reactor pressure vessel
TŠBO	Technical Safety Measure Specification
TVD	Important technical water
UJZ/PU	Event or nuclear installation / Operational event
ÚCO	Office of Civil Protection of the Ministry of Inner Affairs of the Slovak Republic
ÚBP SR	Office of Labour Safety of the Slovak Republic
ÚJD	Nuclear Regulatory Authority of the Slovak Republic
ÚKŠ	Central Crisis Headquarters
US NRC	United States Nuclear Regulatory Commission of the USA
VJP	Spent nuclear fuel
VTZ	Selected technical installations
VTZ JE	Selected technical installations in nuclear power plant engineering
VUJE, a. s.	Joint – stock company (Nuclear Power Plant Research Institute)
VUEZ	Power Equipment Research Institute
VBK	Fibre-concrete container
WANO	World Association of Nuclear Operators
ZHRS	Reserve emergency Centre
ZZS	Company Health Centre

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1. Introduction

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 and its structure complies with the recommendations of the Guidelines regarding the National Reports. The Slovak Republic Slovakia presented its first National Report in September 1998, the second one in September 2001 and the third one in September 2004. The present-day fourth National Report reports on fulfilment of provisions of the Convention for the period from July 1st 2004 to July 1st 2007 and at the same time it contains basic information from the previous National Reports. These three documents have to be viewed as an integral whole, along with the document entitled Answers to Questions of April 1999. The National Reports of the 1998, 2001, 2004 and 2007 are located on the web page of the Nuclear Regulatory Authority of the Slovak Republic – www.ujd.gov.sk/documents.

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

1.2 Conception of utilization of nuclear sources in the Slovak Republic

The Slovak Republic is substantially dependent on import of primary power sources representing as much as 78 per cent of inland consumption. The most important import items of the primary power sources represent the crude oil, ground gas, black coal and nuclear fuel from the Russian Federation.

The production of nuclear power plants participates markedly in the coverage of the overall consumption of electricity in the Slovak Republic. The share of nuclear sources on total installed capacity and the share of electric power production from nuclear power plants on coverage of overall consumption in the Slovak Republic are presented in the Figures 1.1.1. and 1.1.2.

At present there are 5 nuclear units (equipped with nuclear reactors WWER-440) in operation in Slovak Republic, as well as other nuclear installations located at Jaslovské Bohunice and Mochovce sites. Until 2006 all the nuclear units were operated or decommissioned by the company Slovenské elektrárne, a. s. In 2006 the company for decommissioning of nuclear power installations (VYZ, o. z. Jaslovské Bohunice) was set apart, including 2 units of NPP V-1 and NPP A1 being under decommissioning and based at Jaslovské Bohunice site. New company's business name was GovCo, a. s., afterwards it was renamed to JAVYS, a. s. On December 31st 2006 the operation of NPP V-1 unit was terminated in accordance with commitment of the Slovak Republic, resulting from EU Accession Treaty.

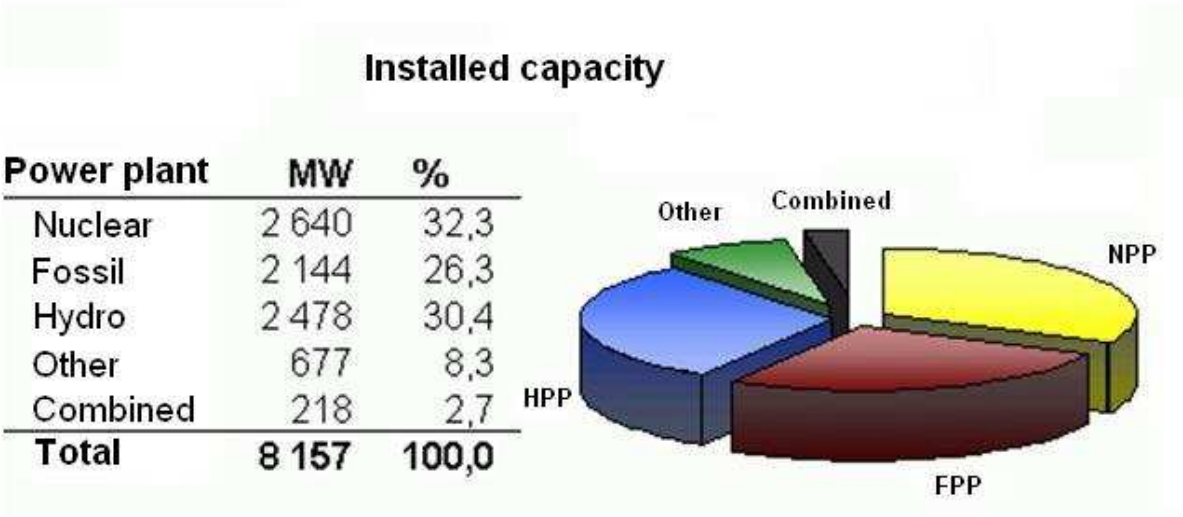


Figure No. 1.2.1Share of nuclear sources on total installed capacity in the Slovak Republic /2006 /

Note: JE –nuclear power plants, TE – thermal power plants, VE – water power plants, ZE – factory power plants, PPC – steam-gas cycle

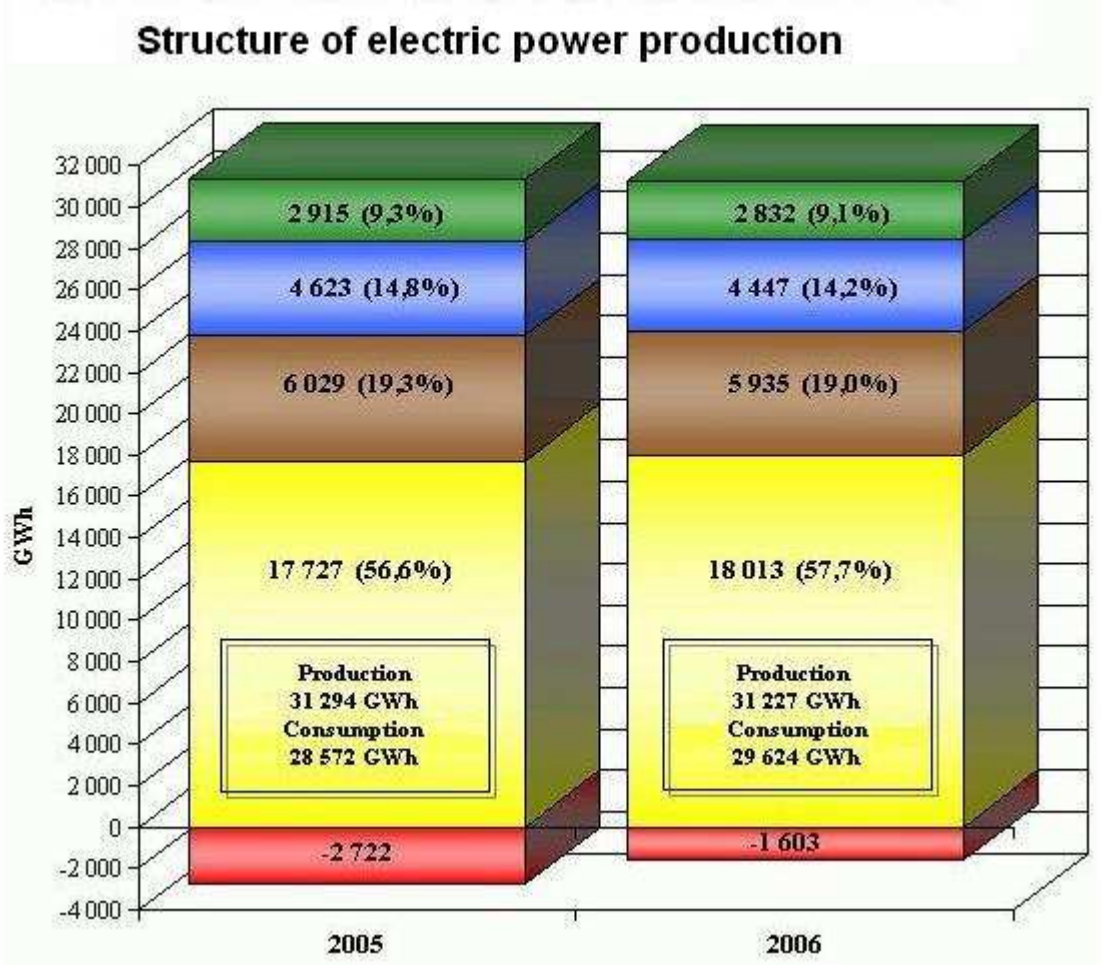


Figure No. 1.2.2 Development of consumption and structure of electric power production in the Slovak Republic

The following objectives are relevant for future utilization of the nuclear power-plant engineering in the Slovak Republic:

1.Short-term objectives:

- to ensure the modernization, improve the safety and capacity of NPP V-2 unit at Jaslovské Bohunice site,
- to compile the conception of economic, factual and time procedure of solution on spent nuclear fuel management and procedure of solution on nuclear Installations decommissioning and submit them for approval procedure,
- to adopt relevant decisions and start the works concerning finishing of the 3rd and 4th unit of the power plant Mochovce,
- to create conditions for activity of the „Nuclear Forum“ in the Slovakia.

2. Mid-term objectives:

- realization of programme of nuclear safety improvement in the NPP V-2 unit – to supplement the list of measures focused on achievement of safety level in accordance with requirements of the Nuclear Regulatory Authority of the Slovak Republic and IAEA,
- to ensure the modernization and power output increase of the 1st and 2nd unit of the nuclear power plant Mochovce,
- to put into operation the 3rd and 4th unit of the power plant Mochovce as the significant factor of stabilization and safety of the electric power supply in the Slovakia.

3. Strategic objectives:

- the fulfilment of international agreements in the field of environment, nuclear safety, investments and trade in power engineering (Kjótó Protocol, Convention on Nuclear Safety, Energy Charter, Protocol to Energy Chapter on energy effectiveness issues and adjacent ecological aspects, etc.),
- to prepare new projects concerning the construction of nuclear sources completing and replacing the decommissioned capacities,
- final solution of the conception nuclear fuel cycle back end.

Reorganization of the company SE, a. s.

In 2003 the Board of Directors of the company SE, a. s. approved the Strategic Plan of the company SE, a. s. for the period from July 1st 2003 to December 31st 2005. The aim of this plan was the financial stabilization of the company and its preparation for competitive market environment in the field of power-plant engineering through internal restructuralisation of the company SE, a. s. The project Restructuralisation of the company SE, a. s. was one of the main tools supporting the fulfilment of objectives of the Strategic Plan. The main tools for mentioned period were:

- reduction of total costs of the company,
- reduction of number of employees.

The side effect of the changes was the transformation of functionally managed company to procedurally managed company. The expected benefit of the project was the achieving of higher market value of the company before the sale of the stocks to foreign investor.

13 procedural areas including the full set of activities performed in the company SE, a. s. were restructuralised. This restructuralisation involved the reorganization of the procedures of Operation and Assets Management and centralization of following procedures or activities; internal audits and inspection, legal affairs, environment, planning, financing, accounting, telecommunication, human resources, employee's affairs, registry, quality, defence and protection, public relations - communication, public tender, nuclear safety and radiation safety, physical security, fire protection, transport, supply, investments, maintenance and processes in the field of technical support.

The project Restructuralisation of the company SE, a. s. was finished in December 2005. Changes and related arrangements of the organizational structure of the company SE, a. s. were implemented after previous detailed analysis and subsequent setting-up of restructuralised processes.

In 2006 (even before the integration of the company SE, a. s. to the company Enel S.p.A) the company for decommissioning of nuclear power installations (VYZ, o. z. Jaslovské Bohunice) based at Jaslovské Bohunice site - was set apart (including 2 units of NPP V-1 and A-1 NPP being under decommissioning). The business name of new company was GovCo, a. s.; afterwards it was renamed to JAVYS, a. s. The operation of the 1st Unit of NPP V-1 unit was terminated on December 31st 2006 in accordance with commitment of the Slovak Republic resulting from EU Accession Treaty.

At present there are 5 nuclear units with nuclear reactors WWER-440 in operation in Slovakia, as well as other nuclear installations located at Jaslovské Bohunice and Mochovce sites.

2. Nuclear installations in the Slovak Republic in terms of the Convention

2.1 Nuclear power plant Bohunice - units V-1

2.1.1 Description of the NPP V-1 units

The nuclear power plant V-1 is located in the Western Slovakia in the region Trnava, about 3 km far from the village Jaslovské Bohunice.

The power plant NPP V-1 has 2 pressurized water reactors WWER-440/230. The 1st NPP V-1 was put into operation in December 1978 and the 2nd one in March 1980.

In accordance with the Resolution of the Government of the Slovak Republic No. 809/1998 the operation of the 1st unit was terminated on December 31st 2006. The 2nd unit is still in operation but its operation will be also terminated on December 31st 2008.

The activities connected with the operation termination and preparatory activities for decommissioning are going on at the 1st NPP V-1 unit. The beginning of decommissioning of the 1st and 2nd NPP V-1 units is planned since 2011, after transport of spent nuclear fuel to the interim spent fuel storage (MSVP) within the Nuclear Power Plants Bohunice (EBO) site, processing of radioactive waste from operation and after obtaining the permission for decommissioning.

The primary coolant circuit of V-1 units comprises six cooling loops with main closing valves on cold and hot loop legs, one main circulation pump per loop, six horizontal steam generators. Volume compensator with safety valves is connected to the inseparable part of the primary circuit. The reactor pressure vessel is lined with stainless austenitic steel, similarly as the main circulation pipe, and all other components of the primary circuit are made of stainless austenitic steel. Steam from six generators is channelled to two turbogenerators, 220 MW each. The coolant water circulation circuit is closed, with four cooling towers for V-1 units. The coolant water is taken from the river Váh. Each of the units is connected to the power grid via two 220 kV power outlets to the substation Krizovany.

From April 1st 2006 the power plant V-1 is set apart from the company Slovenské elektrárne, a. s. (SE, a. s.) as the new organization Jadrová a vyraďovacia spoločnosť, a. s. (JAVYS, a. s. - Nuclear Decommissioning Company, joint-stock company) during privatisation of the company Slovenské elektrárne, a. s.

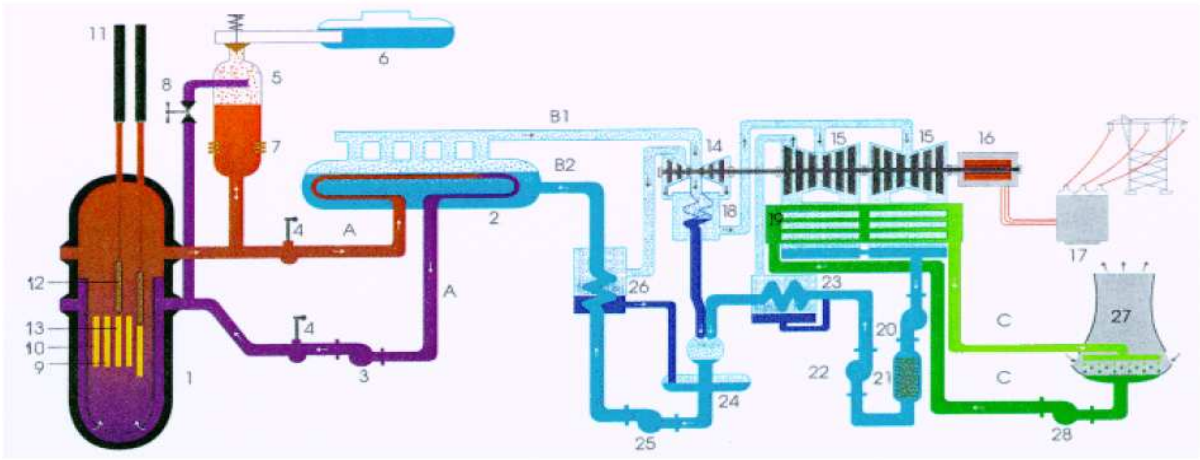


Figure No. 2.1.1Principal diagram of WWER 440 unit

A – Primary circuit coolant water
B1 – Steam from PG
B2 – PG feed water
C – Condenser coolant water

1. Reactor
2. Steam generator
3. Main circulation pump
4. Main closing valve
5. Pressurizer
6. Bubbling tank
7. Electrical heaters
8. Pressurizer showers
9. Core
10. Fuel assembly
11. Control assembly electric drives
12. Absorption portion of control assembly
13. Fuel portion of control assembly
14. High-pressure turbine side
15. Low-pressure turbine side
16. Generator
17. Transformer
18. Separator – post - heater
19. Condenser
20. Grade 1 condenser
21. Condensate unit Treatment
22. Grade 2 condenser pump
23. Low-pressure heaters
24. Feeding tank
25. Feeder pump
26. High-pressure heaters
27. Cooling tower

2.1.2 Performed Safety Assessment of Bohunice V-1 Units

2.1.2.1 External review missions

The following safety review missions have been conducted during the operation of the Bohunice V-1 units:

1. IAEA Fact finding Mission, September 3 – 7, 1990; the objective of the Mission was to document safety measures taken to improve safety of operation.
2. Mission of the Siemens company to assess the project and safety level, August - November 1990.
3. Commission of the CSFR government and Federal Ministry of the Environment - August - September 1990.
4. Austrian Expert Commission, August - October 1990.
5. IAEA ASSET Mission (Assessment of Safety Significant Events Team) – October 1 - 12, 1990.
6. IAEA Safety Review Mission – April 1 – 26, 1991 within the “IAEA WWER-440 P230 Nuclear Power Plants Safety Program.

7. IAEA Safety Review Mission in Relation to the Design of Seismic Upgrading for Bohunice NPP – September 2 - 6, 1991.
8. IAEA Safety Review Mission, April 27 - 30, 1992.
9. IAEA Seismic Safety Review Mission Relating to the Seismic Upgrading of Bohunice NPP, May 5 – 7, 1992.
10. IAEA Seismic Safety Review Mission Relating to the Seismic Upgrading of Bohunice NPP, April 5 – 8, 1993.
11. IAEA Peer Review Mission to Review the Probabilistic Assessment of V-1 Units Safety Study, March 8 – 12, 1993.
12. IAEA ASSET (Assessment of Safety Significant Events Team Follow-up Mission), July 5 – 9, 1993.
13. IAEA "Small Reconstruction" Assessment Mission, July, 1993.
14. The IAEA Site Safety Review Mission to Review the Design Basis Seismic input for Bohunice and Mochovce NPP Sites – October 18 – 22, 1993.
15. Review of the "Leak Before Break" Concept Application to the Bohunice WWER 440/230 NPP, consultation meeting; February 28 – March 2, 1994.
16. IAEA Peer Review Mission to evaluate PSA NPP V-1 Study, February 28 – March 11, 1994.
17. A seminar organized by ÚJD in cooperation with IAEA to evaluate embrittlement and baking of the WWER 440 reactor pressure vessel (RPV) – March 29 – 31, 1994.
18. Consultation Meeting on Safety Improvements to WWER 440/230 NPPs – September 26 – 30, 1994, Vienna.
19. IAEA Safety Mission to Slovakia: Seismic Safety Review for Bohunice and Mochovce NPPs – October 31 – November 4, 1994.
20. IAEA Technical Safety Review Mission – May 6 – 8, 1996.
21. IAEA Gradual Reconstruction Review Mission – June 15 – 19, 1998.
22. Mission of the World Association of Nuclear Operators – WANO Peer Review to NPP Bohunice V-1 on 19 October – 6 November, 1998.
23. Repeated IAEA Mission – Assessment of seismic data (SIDAM) for the Nuclear Power Plants Bohunice and Mochovce, on 16 – 20 November, 1998.
24. Visit of an IAEA expert group to review the preparedness for the Project Y2K (the year 2000), on 26 – 28 April, 1999.
25. IAEA "Follow-up Review Mission on Seismic Capacity and Upgrading of Bohunice V-1 NPP" took place on 1 – 8 September, 1999.
26. WENRA Task Force Mission to NPP V-1 took place on 12 – 15 October, 1999 at Jaslovské Bohunice and on 15 October, 1999 at ÚJD. The Mission focused on completion of information for

the WENRA review report on the status of nuclear safety in countries applying to join the EU, of March 1999.

27. IAEA Mission to Review the Results of the Gradual Upgrading at Bohunice WWER 440/230 NPP Units 1 and 2 – 20 – 24 November, 2000. The IAEA Mission took place base on ÚJD´s request secondary to Slovak Government's Resolution No. 302/1999 of 21 April, 1999.
28. IAEA – IPSART International Mission, assessment of a Level 1 PSA study for NPP V-1 Bohunice full power held between 10 June and 19 June, 2002.

All the technical designs as well as organizational measures suggested in final reports of these evaluations were directly or in modified form included to Safety Improvement Programme.

As for the safety, results of missions showed that nuclear power plant V-1 is comparable to other power plants in operation in EU of the same vintage.

2.1.2.2 NPP V-1 safety analysis report

The initial safety analysis report was compiled in 1978. Its structure and contents accounted for the requirements of the „Guidelines for the Setting up and Contents of Safety Reports" issued by former ČSKAE in 1977.

The amendment of the safety report was done in 1990. This innovation included the compilation of chapters replacing the chapter „Safety Analysis".

In connection with the „small" reconstruction of NPP V-1 units in preparation, a solution was adopted according to which no other chapters of the initial 1978 Safety Report were rewritten.
The necessity of new amendment of some chapters being the part of safety analysis of NPP V-1 safety report issued in 1993 raised due to reconstruction realized in accordance with Decisions of the ČSKAE No. 5/91 and No. 213/92. This innovation of the chapter „Safety Analysis" was done in 1993 by the company VUJE, a. s.

A NPP V-1 safety analysis report for gradual reconstruction was compiled in 1993.

Safety report after gradual reconstruction and its amendments

The project preparations of NPP V-1 gradual reconstruction included the revaluation of range of necessary safety report amendment. As for its structure, it was decided that it will follow the structure listed in instruction NRC RG 1.70, updated in accordance with specific conditions in NPP V-1, taking into account the IAEA documents concerning the valuation of safety of units with WWER reactors.

The objectives of the individual chapters remained preserved, although the contents of some parts were adjusted and updated for the conditions of NPP V-1.

Any principal deviations from the Guidelines RG 1.70 arise from the guidelines developed and issued by IAEA and the Nuclear Regulatory Authority of the Slovak Republic after 1993, thus accounting for the most recent level of knowledge and approaches to analyses, and approaches and taking into account also the specifics of WWER-440 reactor units.

In 2003 the following modified chapters of the safety report after gradual reconstruction were compiled in connection with introduction of „profiled fuel“ (in 2003 on the unit No. 2 and in 2004 on the unit No. 1) with enrichment of 3,82 %:

4. Reactor
15. Safety analyses
16. Limits and conditions

Chapter 13. Operational aspects were updated in 2005 in connection with changeover of the operation licence to new operator.

In 2006 the following chapters were updated in connection with the shut-down of unit No. 1:

15. Safety analyses
16. Limits and conditions

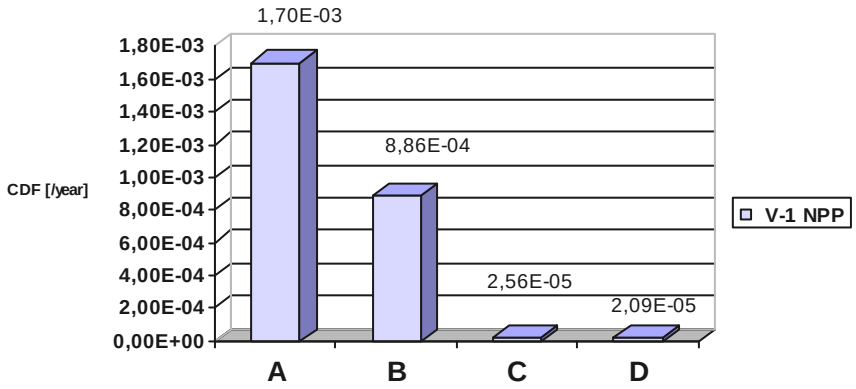
2.1.2.3 NPP V-1 accident analyses

Summary of accident analyses

Accident analyses were performed over the entire extent of the anticipated initiating events, while applying qualified methods and practices. The analytical work is in accordance with the IAEA recommendations for emergency analyses of WWER type reactors and the selection of the events was confirmed by comparing with power-plant specific PSA. All of them are included in SAR chapter 15. The whole SAR was updated so as to describe the condition of the power plant and its safety following the gradual upgrading. The structure is in accordance with the practices adopted in many developed countries.

The analyses have shown that acceptance criteria are met for transients and accidents, including design bases accident (i.e. LOCA 2 x Φ 200 mm) and for selected beyond design basis accidents, including LOCA 2 x Φ 500 mm. The analyses play a key role with respect to the conviction that the project and the implementation of the gradual upgrading of NPP V-1 have been successful.

2.1.2.4 Probabilistic safety assessment



Level 1 Probabilistic safety assessment (PSA) for power operation

A. **First of Level 1 PSA studies** for NPP V-1 was compiled by the English company Electrowatt Engineering Services in cooperation with the Slovak company RELKO, s. r. o. and VUJE (Nuclear Power Plant Research Institute, Joint – Stock Company), a. s. in 1992 as the part of the PHARE Programme.

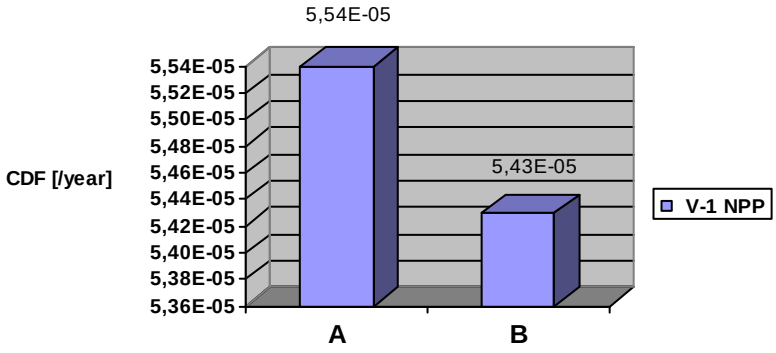
B. As in July 1992 the preparation for „small reconstruction“ of NPP V-1 took place, the obtained Probabilistic safety assessment (PSA) model was used for assessment and completition of suggested changes in project.

   The changes of configuration of both NPP V-1 units being realized until the end of 1993 and completition of symptom-oriented procedures for emergency operation led to new model of Level 1 Probabilistic safety assessment (PSA).

   Level 1 PSA study after „small reconstruction“ was compiled in December *1993***.**

C. After finishing the „gradual reconstruction” of NPP V-1 new Level 1 PSA model was compiled, reflecting the final current condition of the unit in 2000. Level 1 PSA study after „gradual reconstruction” of NPP V-1 was compiled by Slovak engineering and research companies RELKO, s. r. o. and VUJE, a. s.

D. The symptom-oriented procedures SB EOP in 1st and 2nd NPP V-1 unit were introduced into use in December 2003. In accordance with this change and based on recommendations of IAEA mission the updated Level 1 PSA study was compiled in 2003.



Level 1 PSA concerning low power and shut-down - SPSA

A. Level 1 PSA study **for** SPSA for reference 1st NPP V-1 unit was finished in 2002. The study reflects the condition of unit after ”gradual reconstruction” of NPP V-1.

   The frequency of damage of reactor core and fuel is comparable with CDF (Core damage frequency) for operation with constant density of neutrons flow.

B. In 2003 this study was updated for reasons of introducing symptom-oriented procedures during accident conditions at full power for in 1st and 2nd NPP V-1 units.

   Level 2 PSA

   Level 2 PSA study concerning full power shut-down reactor at reference 1st NPP V-1 unit was completed in 2003.

   Results of Level 2 PSA study concerning the condition of 1st unit in 2000: LERF = 1,22E-05/year at full power.

Amendment of Level 1 and Level 2 PSA concerning SPSA

The following studies were compiled in connection with the termination of operation:

a) Level 1 PSA study concerning the 1st NPP V-1 unit for the period after termination of operation (years 2007 – 2008). The study considers the location of fuel in the spent fuel storage pool and calculates the frequency of uncovery and damage of fuel after the termination of operation.

   Results of Level 1 PSA study concerning the condition of the 1st unit within the period 2007- 2008: CDF = 3,27E-08 / year.

b) Level 1 PSA study concerning the reactor of 2nd NPP V-1 unit being shut-down within the period 2007 – 2008: **CDF = 4,69E-05 / year.**

c) Level 2 PSA study concerning the full power and shut-down of the 2nd NPP V-1 unit within the period 2007 – 2008: **LERF = 8,01E-06 / year.**

NPP V-1 real time risk monitor

The NPP Bohunice V-1 has had since the beginning of 2004 the full scope risk monitor (EOOS) for both Level 1 and 2 PSA. The EOOS is currently available at the NPP´s Nuclear Safety Department and

is used in particular for the purpose of minimising high-risk configurations in planning of activities and co-ordination during V-1 unit shutdowns, monthly evaluation of the unit real risk profile and cumulated CDF process during operation and shut-down. The risk monitor reflects the actual status and configuration of equipment of the respective reactor units.

2.1.3 Programmes on Bohunice V-1 units safety assurance

Implementation of the project of gradual reconstruction of NPP V-1 represents the fulfilment of objectives set up in Decisions of the Nuclear Regulatory Authority of the Slovak Republic No. 1/94 and 110/94, being the condition for permission for next operation of the NPP V-1 units. Implementation of reconstruction works significantly improved nuclear safety of NPP V-1. At the same time the conditions were created for continuation of safe, reliable, economical and environmentally – friendly operation of NPP V-1 at least until the end of its designed service time.

Within the scope of access negotiations the government of the Slovak Republic by its Resolution No. 801/1999 approved the date of termination of operation of NPP V-1 units – the 1st unit in 2006, 2nd unit in 2008.

2.1.3.1 Implementation of gradual reconstruction project

The original Russian project with type WWER 440/V-230 units dates from the late 1960s and early 1970s. With respect to the gradual upgrading of V-1, it was decided to develop project and safety-related documentation in two steps:

Step 1: Basic Engineering and Preliminary Safety Report

It was mainly SIEMENS KWU that took care of the development of the BASIC ENGINEERING project for the gradual upgrading of NPP V-1, in cooperation with Slovak companies such as VUJE Trnava, VÚEZ Tlmače, PPA Bratislava, EZ Bratislava and others.

Step 2: Executive projects and Safety Report drafted according to approved outputs from Basic Engineering and the Preliminary Safety Report for the individual systems. The drafting of the executive projects and of the safety report was under responsibility of the General Contractor, the REKON Consortium comprising the Consortium leader – Siemens KWU and the Slovak institution VUJE.

ÚJD approved projects for the individual functional systems for construction permits, preliminary safety reports, executive projects, as well as individual plans of quality assurance.

The implementation of the gradual upgrading of NPP V-1 was organized by the REKON Consortium under a general delivery contract. The scope of the general delivery included:

- development of projects for construction permits for the individual systems,
- development of executive projects for the individual systems,
- drafting of the safety analysis report and conduction of analyses,
- development of programs of pre-operational testing,
- drafting of operating procedures,
- delivery of equipment systems and components, including delivery of technical documentation, equipment maintenance schedules, and staff training plans,

- assembly of the systems, including pre-operational testing, commissioning and handing over to the client.

The gradual upgrading programme was partly implemented during normal operation of V-1 units, but mainly during planed unit refuelling outages and overhauls (OH). The outages were extended depending on the extent of the upgrading works to be performed. The gradual upgrading commenced during unit 2 OH in 1996 and was completed during unit 1 OH in 2000.

The implementation works were divided among the following 15 functional technological systems.

1. Upgrading of pressurizer safety valves and the relief line from pressurizer to the relieve tank, that cover the “BLEED” function for “Primary Side Bleed and Feed”.
2. Upgrading of the emergency feed water system, to cover the “FEED” function for “Secondary Side Bleed and Feed”. The system is currently designed for 72 hours of operation without the need of being supplied by feed water.
3. Upgrading of the steam generators relieve valves, to cover the “BLEED” function for “Secondary Side Bleed and Feed”.
4. Grid III Madunice – off-site emergency power supply from the near-by hydroelectric power station, to improve black-out management.
5. Upgrading of the emergency core cooling system to provide for two separate and independent redundancies, to cover the function of core cooling for extended LOCA accidents and the “FEED” function for “Primary Side Bleed and Feed”.
6. Improved fire resistance – 14 measures.
7. Upgrading of the electro system to provide two independent and separate redundancies.
8. Upgrading of the instrumentation and control system (I&C).
9. Upgrading of the containment spray system to provide two separate and independent redundancies.
10. Installation of an accidents localization system within the confinement after LOCA
11. Improvement of the confinement integrity, through adding of fast-acting flaps to the air conditioning piping at the confinement border. The tightness improvement of units 1 and 2 confinement is illustrated in Fig. 2.1.2.
12. Confinement reinforcement, to provide for confinement resistance against overpressure and negative pressure. For overpressure the resistance is 60kPa for DBA, i.e. break of ∅200 mm and 120KPA for BDBA, i.e. break of ∅500 mm. Resistance for negative pressure is 15 kPa.

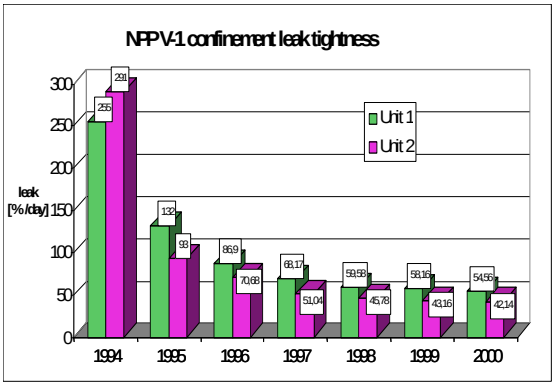


Figure No. 2.1.2 Results of the NPP V-1 units confinement leak tightness improvement

13. Installation of the essential service water system for cooling of safety systems and its separation from old service water system (non safety related). The new system of essential service water was designed to ensure 72 hours of operation without the need of other external water source.

14. Upgrading of air conditioning systems for cooling the new electric and I&C systems compartments.
15. Improvement of the seismic resistance of equipment that may negatively effect safety systems.

A simplified draft of safety systems of the NPP V-1 primary circuit following the gradual upgrading is on Fig. 2.1.3 (a new 80 m^3 boric acid concentrate tank not included).

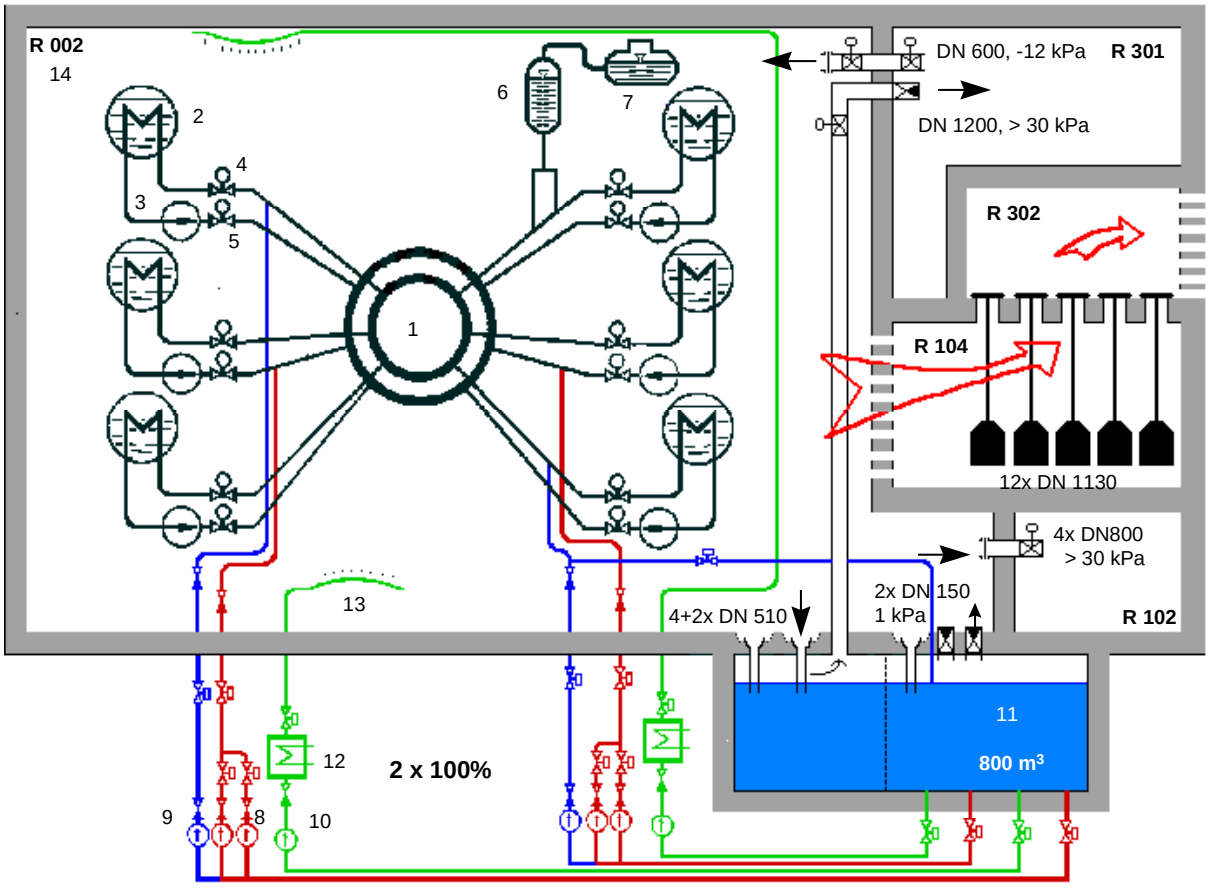


Figure No. 2.1.3 Safety systems of NPP V-1 units after gradual reconstruction

1. Reactor
2. Steam generator
3. Main circulation pump
4. Main isolation valve – hot leg
5. Main isolation valve –cold leg
6. Pressurizer
7. Pressurizer relieve tank
8. HP emergency core cooling pump
9. Low-pressure emergency core cooling pump
10. Spray system pump
11. Emergency boric acid storage tank
12. Heat exchangers
13. Spray system nozzles
14. Containment

Previously, ÚJD approved further operation of NPP V-1 units conditional upon meeting the above criteria connected with the progress of works on safety improvement. The approval remained valid for always one fuel cycle. Based on a review of the safety report following the gradual upgrading of the units, ÚJD issued decisions on the approval of continued operation of NPP V-1 stating conditions listed in the annex of the decisions:

- Decision No. 144/2001 with approval of further operation of NPP V-1 1st unit
- Decision No. 220/2001 with approval of further operation of NPP V-1 2nd unit.

2.1.3.2 Measures taken to keep safety during the process of operation termination

Government of the Slovak Republic approved by its Resolution No. 801/1999 the final shut-down of 1st unit of NPP V-1 in 2006 and 2nd unit in 2008. The operation of 1st NPP V-1 unit was definitely terminated on December 31st 2006.

In 2004 the „Action Plan for Maintaining High Level of Nuclear Safety until the shut-down of the V-1 Nuclear Power Plant" was issued based on tasks resulting from Decisions of ÚJD No. 144/2001 and 220/2001. This action plan contained the requirement to compile and realize the Plan of Termination of the NPP V-1 Operation including the measures for improvement of motivation of NPP V-1 employees from the point of view to secure high nuclear safety till the termination of units of NPP V-1.

In 2006 the document „Conception of Termination of NPP V-1 operation", defining the basic strategy of operation of both NPP V-1 units, during the termination of operation of NPP V-1 and preparation for their decommissioning.

Period of termination of NPP V-1 operation is the period beginning with the shut-down of 1st unit, and subsequent shut-down of 2nd unit and ending with transport of all spent nuclear fuel to interim spent fuel storage (MSVP) and transport and processing of all operational radioactive waste (i. e. years 2007 - 2011). The main activities within this period include the following activities:

- securing of safe termination of operation of both NPP V-1 units, emphasizing the securing of original safety level of 2nd unit even after final outage of 1st unit,
- securing of appropriate mode of storage and cooling of spent nuclear fuel. With the main objective to transport all of spent nuclear fuel from NPP V-1 to interim spent fuel storage (MSVP),
- securing of safe and continuous operation of systems (devices), which remain in operation,
- safe gradual reduction of number of NPP V-1 operational systems (devices). The objective is to put the power plant into condition enabling the beginning of decommissioning works,
- identification of all license requirements with objective to obtain the permission for 1st stage of NPP V-1 decommissioning in 2011.

Implementation of above-mentioned activities should secure the obtaining of such conditions of NPP V-1, which will enable the beginning of process of NPP V-1 decommissioning after fulfilment of necessary legal requirements.

2.2 Nuclear power plant Bohunice - V-2 units

2.2.1 Description of NPP V-2 units

As compared to units V-1 and with respect to nuclear safety, units V-2, i.e. Units 3 and 4 of the Nuclear Power Plants Bohunice represents a substantially improved series of WWER 440, model V213 Units. Systems for the containment of design basis accidents are installed at the units: bubble towers (equivalent to the western type containment system to actively decrease, upon accident associated with primary circuit leakage, the pressure in burst can to negative pressure with respect to atmospheric

pressure). The units have three independent separated systems of low- and high- pressure emergency coolant injection installed, along with shielding spray systems, four reactor coolant accumulation tanks, substantially improved backup and electric feeding systems (Figure No. 2.2.1).

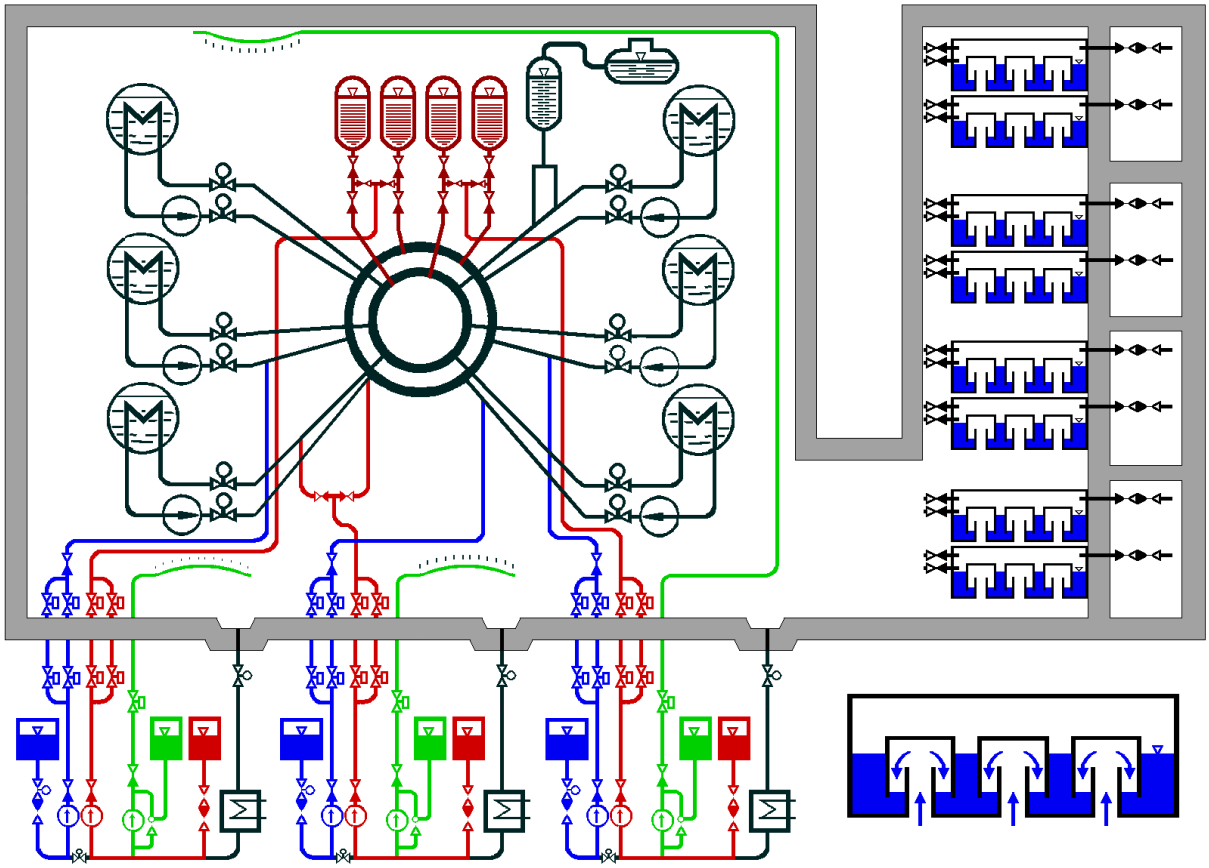


Figure No. 2.2.1 Safety systems of WWER 440 units - model V 213

1. Reactor
2. Steam generator
3. Reactor coolant pump
4. Main isolating valve at the hot leg of the loop
5. Main isolating valve at the cold leg of the loop
6. Pressurizer
7. Safety relief tank
8. Hydroaccumulators
9. HP emergency pump
10. LP emergency pump
11. Spray system pump
12. Reserve tanks of boric acid solution
13. Hydrazine hydrate tank
14. Reserve tanks of boric acid solution
15. Waterjet pump
16. Heat exchanger
17. Sprays
18. Hermetic rooms
19. Connecting corridor between hermetic rooms and bubble-condenser tower
20. Bubble-condenser tower
21. Air traps
22. Steam entrance into bubble-condenser channels
23. Bubble-condenser channel compartment
24. Bubble-condenser channel
25. Check valves
26. Check valves

2.2.2 Performed safety assessment of NPP V-2 units

2.2.2.1 External review missions

In addition to the Bohunice site seismicity review missions mentioned above (Section 2.1.2), the following V-2 safety review missions have been visiting the Bohunice NPP:

- IAEA Safety Review Mission – September 5 – 12, 1994. The aim of the Mission was to compare the NPP design with the current safety-related approach.

- IAEA PSA Peer Review (Probabilistic Safety Assessment Level 1) of V-2 Units – January 17 – 28, 1995.
- IAEA Operation Safety Review Mission (OSART) – September 9 – 26, 1996.
- Follow-up IAEA Operation Safety Review Mission (OSART – Follow-up visit) – March 2 – 6, 1998.
- Apart from the missions mentioned to assess seismicity of the Bohunice site and Y2K issues (see chapter 2.1.2), an International IAEA Review Mission IPERS Review Mission for Bohunice V-2 NPP Low Power and Shut-down PSA – SPSA has taken place on 27 September – 6 October, 1999.
- WENRA stated in its report "Nuclear safety in EU candidate countries", October 2000 that, "…Once the ongoing upgrading measures have been implemented, i.e. around 2002, the safety level of these units is expected to be comparable to that of the Western European reactors of the same vintage.

No external safety assessment of NPP V-2 units was performed within the period 2001 - 2006.

2.2.2.2 V-2 NPP accident analyses

The accident analyses of design, beyond-design and severe accidents developed for different purposes prior to 2001 is described in the National Report 2001.

In addition the analyses for MOD V-2, the focus has shifted over 2002 – 2004 to severe accident analyses. Specifically focused on the V213 containment atmosphere management, an analytic project had been developed in 2002 – 2003 in cooperation with VUJE Trnava in support for the development of severe accident management guidelines (SAMG´s) at the NPP V-2 and NPP Mochovce. The project results were directly used in developing and optimising SAMG´s. A project aimed to apply the in-vessel retention strategy using reactor pit flooding under SAMG´s is implemented by the company IVS Trnava and VÚEZ Levice during 2003 – 2004. This analytic project included also the verification of usability and efficiency of prepared modifications, selected as the part of SAMG strategies development and application strategies optimalization.

Works concerning the preparation of technical specifications of selected modifications started after finishing the SAMG development in 2004. The companies IBOK Bratislava and IVS Trnava compiled the thermal deformation analysis of the reactor pressure vessel (TNR) documenting the possibility of its cooling for realistic composition and stratification of corium on the reactor pressure vessel (TNR) bottom without removing the heat shield. Extensive analytic effort was made to elaborate the technical specifications of suggested modifications for SAMG implementation on technical specification and estimate the costs of their implementation. This project was implemented by company VUJE, a. s. Trnava during the period 2005 – 2006. Its outputs include also new hydrogen strategies using the autocatalytic recombinators representing the improvement of recent SAMG. The conception of next realization of modifications supported with other analyses is presently processed as the part of analytic support of EMO 3, 4.

2.2.2.3 Probabilistic safety assessment

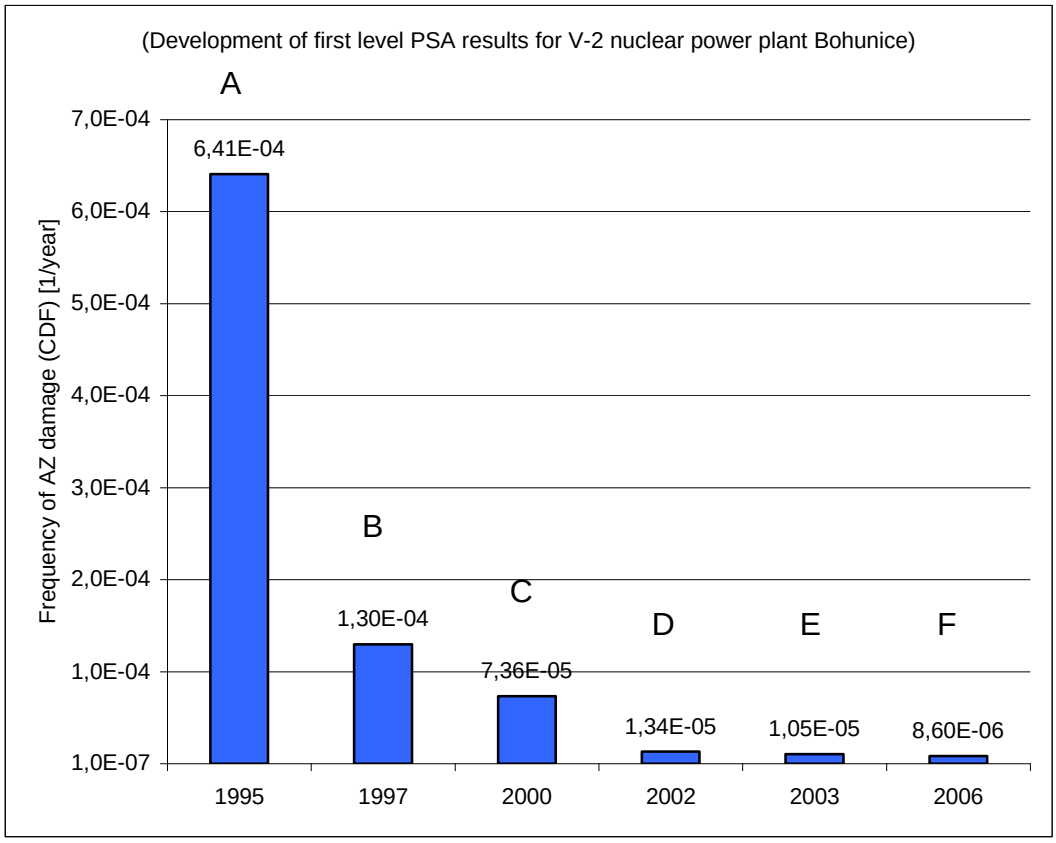


Figure No. 2.2.2 Development of Level 1 PSA results for V-2 nuclear power plant Bohunice

Level 1 PSA for full power operation with constant density of neutron flow

A. Results of Level 1 PSA study concerning the condition of 3rd unit in 2000 were CDF = 7,36.10-5/year

   To decrease the CDF, the PSA study recommended to develop and implement into operation new generation of emergency plans.

B. Results of updated study confirmed that the introduction of new generation of emergency plans helped to reduce the frequency of damage of reactor core (AZ) by 35,4 %.

C. After implementation of SBEOP the units fulfils the requirement of ÚJD concerning the reactor core (AZ) damage frequency (Figure No. 2.2.2).

   The Level 1 full power PSA identified the SG emergency feedwater safety system (EFW) as a dominant contributor to CDF. This was modified in 2002 during the GO pursuant to the proposed PSA study modifications.

D. The results following modification to the EFW status in 2002: CDF = 1,34. 10^{-5}/year

   The updated analyses confirmed that the modification to the SG emergency feedwather safety system reduced the reactor core damage frequency by 82 % (Figure No. 2.2.2).

In 2003 an extended overhaul at Unit 3 took place to implement certain NPP V-2 upgrading measures.

The most important measures affecting PSA results include:

- modification to the low-pressure emergency feedwather system
- Installation of stem dump stations to atmosphere at steam pipelines etc.

E. The results following the implementation of certain Unit 3 upgrading measures in 2003: CDF = 1.05E-05/year

The updated study showed that modifications to Unit 3 made within the implementation of upgrading measures decreased the reactor core damage frequency by 21.6 % (Figure 2.2.1).

F. Results after implementation of some modernization tasks within the period 2004 – 2006.

Modernization of NPP V-2 will continue in accordance with time schedule through the realization of additional tasks and PSA studies will reflect the core damage frequency resulting from implemented modifications of units.

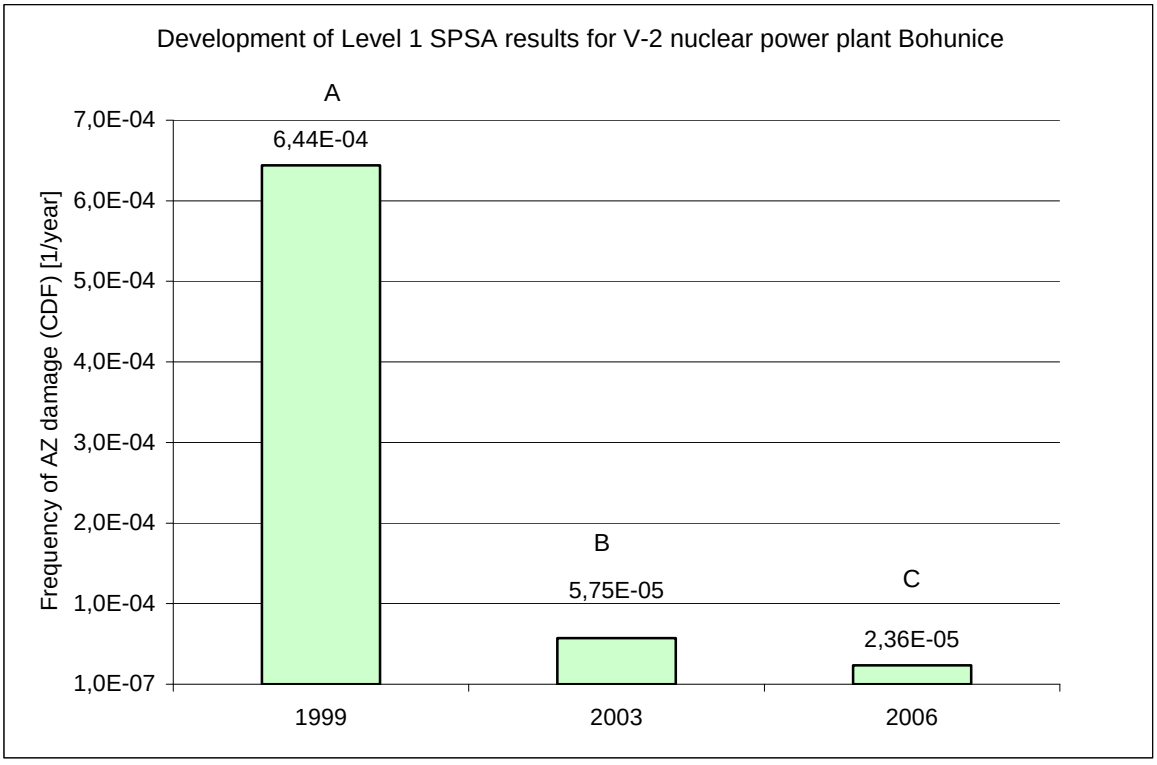


Figure No. 2.2.3 Development of Level 1 SPSA results for V-2 nuclear power plant Bohunice

Level 1 PSA for low power and shut-down

A. Results of level 1 SPSA study concerning the condition of the 3rd unit in 1999.

B. Results and conclusion of Level 1 SPSA study after implementation of some modernization tasks concerning the 3rd unit in 2003.

C. In 2005 the SBEOP´s were introduced concerning the emergency operation of the unit being out of operation. Updated probabilistic assessment of safety of 3rd unit being shut-down confirmed the CDF reduction to the level $2{,}36.10^{-5}$/year.

Level 2 PSA

In March 2001, Level 2 PSA study was completed for full power operations and shut-down reactor on the reference NPP V-2 Unit 3.

The Level 2 PSA results for unit status in 1999: LERF = $7{,}8.10^{-5}$/year under unit power operation. A dominant contribution to LERF is made by the reactor pit hermetic door failure at reactor pressure vessel rupture and intra-hermetic zone hydrogen burning. Recommendations in this area concern the introduction of hydrogen management and technical measures for flooding the reactor pit.

2.2.3 Safety record and periodic safety assessment

A historical overview of NPP V-2 Safety Analysis Report extensions and improvements between 1983 and 2001 is given in the National report 2001.

The currently effective revision No. 2 of the NPP V-2 Safety Analysis Report is according to ÚJD´s decision and by course of corporate standards annually amended to include changes accomplished over the preceding year. During the MOD V-2 project Safety Analysis Reports are prepared as part of upgrading assignments to the extent set out by the corporate standard and submitted to ÚJD. Upon making equipment changes, the sections of the Operating Safety Analysis Report concerned are updated.

A major innovation outside of the MOD V-2 project was the change to new fuel design in 2001, under which Chapter 15 (Safety Analyses) and the affected sections of Chapter 4 (Reactor) and of Chapter 16 (L & C) were completely updated.

Since the beginning of 2004 a complete revision of Chapter 15 (Safety Analyses) has been under way at VUJE Trnava, involving changes in the basic design made under MOD V-2 by the end of 2003.

In 2005 the Chapter 15 safety analyses was updated again, in connection with the changeover to gadolinium fuel of second generation. The analyses were compiled by Russian suppliers. Analyses took into account the project changes connected with running project Modernization and improvement of NPP V-2 output as of the end of the year 2004.

In 2006 the company VUJE, a. s. Trnava compiled the complete new Chapter 15 Safety analyses concerning the status of project after finishing the MOD V-2 and the increase reactor output (107 percent) representing the first step towards planned improvement of NPP V-2 unit.

In 2006 the project of periodic safety assessment of NPP V-2, was completed in accordance with suggested and approved programme. The first requirement – to perform the periodic safety assessment of NPP V-2 – was set up in the Decision of the ÚJD No. 4/1996 of August 26th 1996, by which this authority approved further operation of the 3rd NPP V-2 unit. The first legislative framework setting the contents of periodic safety assessment was the Regulation of ÚJD No. 121/2003, setting its range and terms. The basis for this regulation was the original IAEA document 50-SG-O12.

Performed periodic safety assessment of NPP V-2 represents the first assessment of this type in Slovakia. Slovak experts participated in international events concerning the information about the periodic assessment at nuclear power plant, where such assessment was already performed and these experiences were after that used also at realization and preparation of the V-2 PSR project. The project was realized in cooperation with the VUJE, a. s. Trnava.

Preparation for V-2 PSR in frame of regulation No. 121/2003 began in May 2004. The significant factor affecting the approach to the method of realization of V-2 PSR project was the fact that all the periodic assessment run at the time when the power plant was in transition, non-standard state resulting from the outgoing project on Modernization and improvement of NPP V-2 (MOD V-2), at different levels of finishing of individual modifications. Therefore the approach method concerning the assessment of aspects touched by modernization was agreed with the ÚJD. The following strategy for assessment of project state was adopted:

- generally the condition of systems, constructions and components (SKK) should be checked as of August 26th 2006
- the state of single modifications of systems, constructions and components (SKK), implementation of which was planned as the part of project Modernization and improvement of NPP V-2 PP (MOD V-2) until the end of 2006, was assessed as of December 31st 2006
- as for partly installed modifications which should be realized in future in the second or first redundancy, their condition was assessed after complete redundancies installation – that means the final state
- as for modifications, which realization didn't start accordingly to time schedule of the project Modernization and improvement of NPP V-2 (MOD V-2), their condition was assessed as of August 26th 2006.

The project was finished according to planned schedule and the Report on PSR was compiled in accordance with the Regulation No. 49/2006. This report contains the assessment of findings as well as the integral plan of corrective measures focused on removing the findings from PSR. The report was submitted to ÚJD for review.

2.2.4 Programmes of NPP V-2 units safety improvement

Project MOD V-2

Presently running Programme on Modernization and Improvement of NPP V-2 safety (MOD V-2) is the most significant investment project of the SE, a. s. It should be realized mainly during the planned outages. General designer of modernization of both NPP V-3 units is VUJE, a. s. Trnava. The Programme on Modernization and Improvement of NPP V-2 safety isn't focused only on solving of safety problems but includes also the resolution of operational problems connected with 15-years operation of NPP 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 the measures focused on improvement of technical-economic parameters of NPP 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 report IAEA: IAEA EBP-WWER-03. The project 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 V-2, project 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 facilities in order to rank them to several operational files. 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 V-2 includes above 50 main tasks, from which the most important are:

- 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 KO, relief valve and safety valves of KO,
  - improvement of cooling of HCČ seals,
  - feedwater piping penetrations from HCČ deck to PG box,
  - emergency degasing of PC,
  - adjustment of sealing assembly of primary PG collectors,
  - adjustment of emergency feeding of PC and supplement of PC equipments to secure residual heat removal,
  - transfer of feeding head pieces of SHN system from the floor +14,7 m, securing necessary water supply and completion of the 3rd redundancy system,
  - modification of TVD system to manage cooling of NPP after seismic event and to improve the system operation,
- Replacement and modification of SKR systems to improve the unit management in normal operation, transient and emergency conditions (i. e.):

- modification of functions – algorithms of automatic reactor termination system (RTS), safety system, technological PG protections (ESFAS), 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 TNR protection against cold pressurizing and their integration into the reactor limit system (RLS),
- replacement of the automatic reactor shutdown systems, the safety system, the technological PG 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 VT 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 are designed and implemented in order for the unit to operate at increased power and with extended operation life of NPP V-2 until 2046. A study on increase of unit power and a safety documentation demonstrating the possibility of unit power increase has been devised; a report of Ministry of Environment SR on environmental impacts of operation of NPP V-2 at increased power has been devised and approved.

Modifications of MOD V-2 are implemented gradually since 2002 and their completion is planned in 2008, yet the NPP V-2 Units already achieve in the present time a higher level of safety and reliability in comparison with the year 1996; this fact is documented in the chap. 2.2.2 in the pict. 2.2.1 and 2.2.2. After the completion of all planned tasks, the level of the units´ safety will improve even more.

2.3 Nuclear Power Plant Mochovce - Unit 1 and 2

2.3.1 Description of Nuclear Power Plant Mochovce

Nuclear power plant Mochovce is located in the southern Slovakia, 120 km to the east of Bratislava, in the District Levice. Unit 1. and Unit 2. of the power plant are in operation, additional two units are in an advanced stage of construction and technological installation. All four units are of WWER-440 type,

model V213, with an output of 440 MW. It is a repeated design of the WWER-440/V213 power plant operated in Jaslovské Bohunice, modified to comply with the growing requirements concerning nuclear safety improvements of the new WWER type units, and accounting for geological peculiarities of the site. The key differences include replacement of the original control system by the corresponding equipment by SIEMENS, adjustments of the class 1 secured supply, requirements concerning seismic upgrading of the power plant at the level of 0.1 g as required by international regulations for newly designed units, adjustments of primary and secondary circuit systems arising from the experience with the operation of the same type of the power plant at Jaslovské Bohunice and Dukovany. The year 1990 was crucial for the construction of the NPP Mochovce since the construction works had to be gradually brought to a halt because of the lack of funds. The advanced stage of the construction works forced to seek possibilities of foreign capital input. Funds needed to complete the first two units were raised as late as 1996. The approval for operation of Unit 1. of NPP Mochovce was done by the ÚJD Decree No. 318/1998 on 28. 10. 1998 and the approval for operation of Unit 2. of NPP Mochovce was done by the ÚJD Decree No. 84/2000 on 10. 4. 2000.

2.3.2 Safety Reviews of NPP Mochovce Units

The final goal of the Nuclear power plant Mochovce operator has been to complete the construction and operate the power plant at a safety level complying with the current international practice. Owing to this, several reviews by international experts and organizations were organized already during the construction stage; the results of those reviews have been implemented into the project documentation, and their implementation is expected to help reaching a high safety and reliability standard of the WWER-440/V213 unit operation.

Since the early 1990s, NPP Mochovce has been subject to several international audits oriented towards the review of the safety standards. About 2,000 experts took part in them, and their conclusions can be summarized to state that there are no safety issues which could not be treated and which would prevent the commissioning of NPP Mochovce.

2.3.2.1 External Review Missions

1. IAEA Mission - for OSART, conducted on January 9 - 29, 1993, was focusing on the review of the preparedness of the operator to commission and to operate the plant.
2. IAEA Mission - Safety Improvements Review for NPP Mochovce. The Mission was focusing on the check of safety improvements at NPP Mochovce.
3. IAEA Seismic Safety for Nuclear Power Plants Bohunice and Mochovce Mission. The aim of the Mission was to verify the evaluation method of seismic input data and to assess the effects of external earthquake risk on NPP safety.
4. RISKAUDIT Mission (consortium of technical support organizations IPSN and GRS working for national nuclear authorities of France and Germany) focused on the review of safety improvements of NPP Mochovce and the assessment of design safety was concluded on December 20, 1994.

5. In November 2001, IAEA - IPSART mission for evaluation of Project PSA for low power conditions and reactor shutdown, whose recommendations were taken into account in the final report of the study, was conducted.
6. WANO Peer Review was held in EMO between 7. - 25. of October 2002. Results of the Review were summed up in the final report of WANO.
7. Following N-PRW WANO Peer Review took place between 21. - 25. of June 2004, 19 months after realization of PRW in 2002. Review activity was aimed at inspection of fulfillment of measures drafted under the WANO mission in 2002.
8. Between 4. - 20. 9. 2006, OSART mission – was conducted in NPP Mochovce. The reviewed areas were: management and organization, training and qualification of the personnel, operation, maintenance, technical support, feedback program, radiation protection, chemistry, and emergency planning and preparedness.

A project PSR (Periodic Safety Review) with an extern supplier began in 2006 in compliance with the Decree No. 49/2006 (Periodical evaluation of safety) to gain approval for operation for another 10-year period.

2.3.2.2 Accident Analyses

Accident analyses were carried out in full range of postulated initiating events by application of qualified methods and practices. Work on the analyses is in the line with IAEA recommendations on WWER-type reactor accident analyses - „Guidelines for Accident Analysis for WWER Nuclear Power Plants“ and the selection of events was confirmed by comparing with the utility-specific PSA. The results are included in the chapter 15. POSR.

In connection with the new fuel design, new accident analyses were performed to the full extent of initiating events according to IAEA-EBP-WWER-01 in cooperation with the fuel supplier. Radiation impacts on the environment were not calculated, as the change in the fuel inventory is negligible as compared to the original core project AZ.

In connection with the new use of Gd-II fuel, new accident analyses (chapt. 4 and chapt. 15) were performed in cooperation with the fuel supplier. Evaluation of radiation impacts was done by an extern supplier beyond the scope of the contract for fuel.

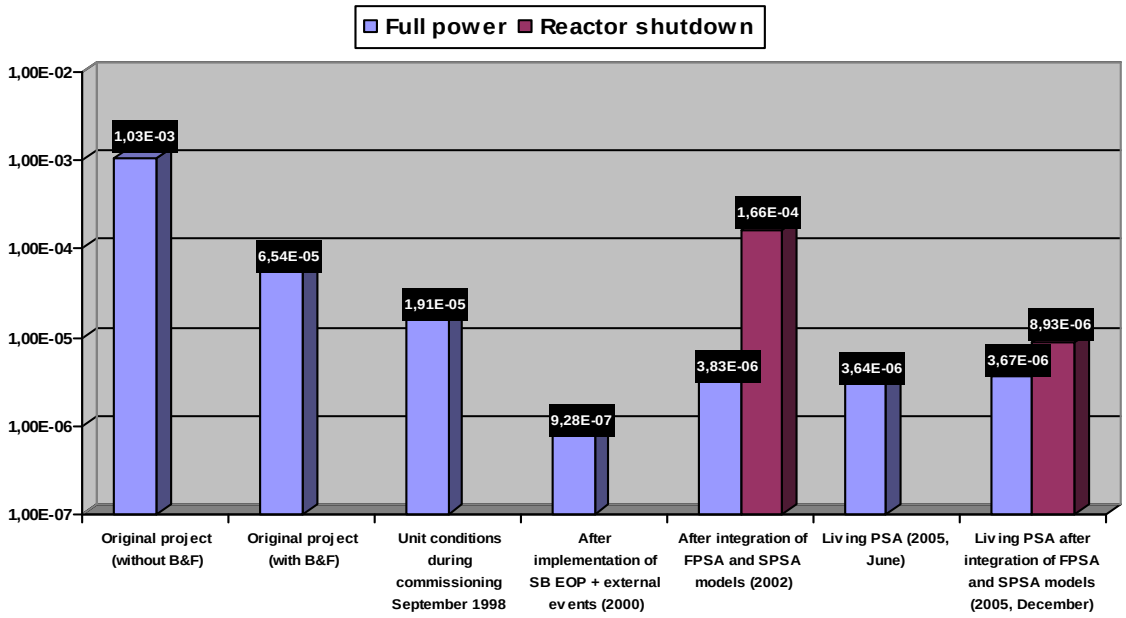
Conditions in the area of beyond-design and severe accidents are the same as those for NPP V-2 Units – see chapter 2.2.2.2. with the difference that a study on the applicability of results of the project PHARE 4.2.7a/93 for SE-EMO (Applicability of PHARE 4.2.7a/93 Project Results to EMO Units 1 and 2 and Analyses for SAMG) was prepared for NPP Mochovce in the first half of 2001. The guidelines for severe accident management were drawn up in 2004 by Westinghouse without their implementation in the power plant. It is inevitable to perform hardware modifications, especially in the field of hydrogen control and control of extern cooling of reactor pressure vessel and others, for their implementation in the power plant.

Other presumed changes in the chapter 15 (change of the fuel type, increase of reactor power, performance of PSR) will be already performed extended for beyond-design accidents, severe accidents and reactors shutdown events in compliance with the legislative requirements.

A task of technical development „Analysis of gas distribution in containment WWER-440/V213 during severe accidents" has been designed to support setting-up guidelines to mitigate the impacts of severe accidents. It is an extensive document, which contains a set of information, analyses supporting the setting-up of SAMGs.

NPP Mochovce and Bohunice participated in the international project VERSAFE to address the issues of severe accidents. The project covered the exchange of information and drafting of possible solutions for severe accident management.

2.3.2.3 Probabilistic Safety Assessment



Pict. 2.3.1 Historical overview of active zone melting frequency for Unit 1. of NPP Mochovce

Real time risk monitoring - program Safety Monitor

Safety Monitor is an analytical tool for monitoring the risk in real time. It is used to assess the immediate degree of risk pursuant to the actual unit configuration. It helps the operating staff of the nuclear power plant in decision-making processes to minimize the risk during operation.

In the current time after finishing the project of the updating of Level 1 PSA study for EMO Unit 1., an actualization of Safety Monitor is in process, to be completed in December 2007.

Level 2 PSA

Level 2 PSA project for full power and shutdown of Unit 1. of NPP Mochovce is conducted since 2006, to be completed at the end of 2007. This project is designed for EMO by RELKO s. r. o with subcontractors VUJE, a. s. Trnava and Slovak Technical University Bratislava.

2.3.3 Programs of Mochovce Units Safety Improvements – historical review

The aim of the safety improvements through safety measures (SM) is to achieve a safety standard for NPP Mochovce to meet the requirements of "in-depth safety concept" according to IAEA - INSAG 3.

SE-EMO´s international cooperation with other countries, having interest in improving the safety standard, may be expressed by the following activities:

- replacement of the original instrumentation and control system ASRTP by SIEMENS system,
- supply of a security and protection system by the company LANDIS & GYR,
- development of an operational quality program in cooperation with the company IVO International from Finland,
- construction of a full-scale simulator for training of the operating staff, supplied by companies S3 Technologies USA and SIEMENS,
- development of study: "Assessment of NPP Mochovce´s Environmental Impact" by the company AEA TECHNOLOGY in 1994 as a part of the "Project Documentation for Public Participation Program" developed by EdF and SE, a. s. This documentation was developed according to EBRD requirements, and was at that time a precondition for foreign capital input to the NPP Mochovce project.
- participation of experts from Electricité de France in the construction and commissioning.

A logical continuation of the activities of EdF in the area of safety reviews as summarized in "Safety Improvement Report" (SIR) which was open to public commenting, is the "NPP Mochovce Safety Improvement Program" developed in 1995. This program has been conceived as a long-term one, yet it is aimed at reaching a safety standard upon the NPP commissioning at the level corresponding to the internationally recognized requirements and standards included in the IAEA safety standard series accepted by ÚJD, and at setting up good conditions for continuous safety improvements in the future.

The NPP Mochovce safety improvement program is based on the IAEA: IAEA EBP-WWER-03 document entitled „Safety Issues and their Ranking for NPP WWER 440/213". Others include the outcomes of the safety review, conducted by RISKAUDIT in 1994, and conclusions of the IAEA Mission (Safety Improvement of Mochovce NPP Project Review Mission - SIRM) taken place at Mochovce in June, 1994.

The operator of SE-EMO in cooperation with VUJE, a. s. developed a set of technical specifications for 87 safety measures (TŠBO) to be implemented in the "NPP Mochovce Nuclear Safety Improvement Program", yet taking into account specifics of the NPP Mochovce project as identified by the RISKAUDIT and Safety Improvement Program of Mochovce NPP Project Review Mission reports as well as experience with Bohunice V-2 and NPP Dukovany Units. This has resulted into certain differences between the "NPP Mochovce Safety Improvement Program" and the IAEA document "Safety Issues and their Ranking for NPP WWER 440/213" (certain measures have been added characterized as „no-category measures“).

2.3.3.1 Study and Analysis Phase

In this phase, the individual safety-related issues were analyzed and concepts of technical solutions (so-called "Basic design") have been suggested in case of need for modification of the NPP design. The results of the analyses and the suggested basic designs were reviewed by all organizations involved, including VUJE, a. s. and were discussed with ÚJD on a continuous basis.

2.3.3.2 Project Development Phase

As soon as the conception of basic solution had been approved, the change in NPP design was accepted based on the corresponding QA programs and the Decree No. 105/81 through an "amendment procedure“. The general designer developed addendums to the initial project. The task of the general designer (EGP) was to coordinate the technical solution with the original concept of NPP Mochovce design, including solution of links to other technological systems (SKR, electrical systems) and impacts on the constructional part. Addendums to the initial project were submitted to ÚJD for approval. The project was then prepared based on the approved addendums to the initial project, serving the implementation of adjustments to the existing technological systems and buildings.

2.3.3.3 Implementation of Safety Measures

Before start-up of the units, safety issues of categories III and II has been resolved in a manner to fulfill requirements of INSAG 3 from the point of view of defense in-depth.

The remaining safety measures were implemented depending on the technological possibilities during operation, and if such measures required unit shutdown, their implementation was postponed to the outage for refueling. This procedure was continuously approved and verified by ÚJD.

The safety improvement program was evaluated after the completion of units 1 and 2 shutdown in 2001. This evaluation confirmed that the implementation of safety measures adopted within the safety improvement project of NPP Mochovce, which was a part of the completion of units 1 and 2, has been principally completed.

This program has been accomplished in full.

Additional safety aspects

Besides safety measures implemented during the completion of NPP Mochovce units 1 and 2 attention has been devoted also to other safety aspects.

In accordance with the IAEA recommendations arising from IAEA mission for assessing seismic data of the site, a precision of seismic-tectonic and geological data of NPP Mochovce site (including new measurements and bores) was performed during 2000 - 2003. These data were used for probabilistic assessment of seismic threat of NPP Mochovce site. Consequently in July 2003, IAEA mission was conducted. The assessment has been presented in the assessment report IAEA-TCR-02029, issued by the end of the mission.

Special attention was devoted to the question of containment. Despite the fact that a complex verification of functionality of the whole system in conditions of maximal design accident within the safety measures has been performed, based on the thermal-hydraulic and strength calculations, supported by a number of verifying experiments, a comparison of full-scale experiments so far performed within a PHARE/TACIS project, has been processed. Czech Republic, Slovakia and Hungary have conducted additional experiments of the bubble condenser upon recommendations of European Union, which have confirmed the functionality of the system for all design accidents. This assumption was also sustained by chairpersons of state regulators of respective countries in

a common statement stated in the letter of May 2003. These additional experiments also confirmed the correctness of results gained in NPP Mochovce. The leak tightness of the containment during operation confirms its quality, when during the outage of units 1 and 2 in 2001 leak rates of 1.6% and 1.7% have been measured.

Symptom-oriented provisions devised by an extern supplier Westinghouse were also implemented in the nuclear power plant for emergency conditions.

2.3.3.4 Pre-Operational Safety Report

The pre-operational safety report (POSR) was prepared in accordance with internationally recognized standards. The overall conception and scheme of POSR has been based on US NRC Regulatory Guide 1.70, Rev. 3; for accident analysis, forming part of this report, the IAEA document "Guidelines for Accident Analysis for WWER Nuclear Power Plants" has been used, respecting the valid Slovak legislation. POSR for the Unit 2. has been elaborated before commissioning of the second unit, in which difference between EMO Unit 1. and 2. are described. After the start up of unit 2, the initial and actual parameters of unit 2 were compared at ÚJD request, based on the results of inactive and active tests. Amendment No. 2 to POSR for Units 1. and 2. resulted from the use of profiled fuel, and reviewed the chapters Reactor (chapter 4) and Safety analyses POSR for Units 1. and 2 (chapter 15). Amendment No. 3 to POSR for Units 1. and 2. resulted from the use of Gd fuel of II. generation, and reviewed the chapters in the same extent as by the profiled fuel with the exception of radiological impacts, which have been added after their completion to the amendment No. 3. New safety analyses will be devised for increased reactor power until the end of 2007 in accordance with the ÚJD Decree No. 50/2006 and BNS ÚJD I.11.1/2006 „Requirements on Safety Analysis Design“. Any amendments of POSR in the form of changes during the operation of units are continuously submitted to ÚJD for review. Revision of POSR will be made in accordance with the ÚJD Decree No. 49/2006 on periodical nuclear safety review after ten years of EMO operation.

2.4 Nuclear Power Plant Bohunice A-1

2.4.1 Description of Nuclear Power Plant A-1

Since all spent nuclear fuel has been transported to the country of origin and the decommissioning program was approved by the ÚJD, this nuclear installation no longer belongs to the scope of the Convention on Nuclear Safety. However, some basic information is provided here for data integrity.

NPP A-1 with a heterogeneous thermal-neutrons-based reactor labeled KS-150 was designed for a gross electric output of 143 MW. Natural metal uranium has been used as fuel, heavy water (D_2O) as moderator, and carbon dioxide (CO_2) as coolant.

The moderator cooling has been provided for by 3 coolant loops, each consisting of 2 heat exchangers and one D_2O pump. The primary coolant circuit (CO_2) is composed of 6 loops, each of them consisting of one steam generator, turbo compressor and two parallel pipes of hot and cold CO_2 coolant legs. Auxiliary systems are part of the primary circuit:

- D_2O storage, feeding and purification,
- CO_2 storage and feeding,
- combustion of the explosive mixture formed above the D_2O level,
- CO_2 treatment,
- isotopic purification of D_2O,
- removal of organic contaminants from D_2O.

Equipment for fuel assemblies (FA) assembly and that of the transport and technological part (TTP) represent a separate unit of NPP A-1, the latter serving the handling of fresh and spent fuel, its post-cooling and storage. Post-cooling and storage of spent fuel assemblies were mainly performed in 2 short-term storage facilities, rod cutting chamber (for rods on which FA were hung in fuel channels in the reactor pressure vessel) and the long-term storage facility. A loading machine was used to place spent FA into casks at the long-term storage site filled with cooling water. Initially, chrompik was used in the long-term storage site casks as coolant, replaced with the organic coolant dowtherm later on. Three turbo generators were the major equipment of the secondary circuit of the NPP, with installed output of 50 MW each.

2.4.2 Power Plant Decommissioning Program

The nuclear power plant A-1 was in operation between years 1972 - 1977. There were two operational events during this period. During the first one in January 1976, a fresh fuel assembly was ejected right after its charge into reactor channel and the cooling gas has partially leaked. During the next operational accident in February 1977, the cladding of the technological reactor channel has failed in its core and the moderator penetrated into cooling circuits. The liquidation of the consequences of the latter appeared as a complicated problem in that time. After technical, economical and safety analyses of restarting the operation of NPP A-1, it was decided in 1978 not to restart it, but commence activities heading towards its decommissioning.

In the following period, a project for the I. stage of decommissioning of NPP A-1 was elaborated. It was aimed at achievement of radiation safe state, which meant for NPP A-1 the removal of all spent fuel, leftover RAW conditioning or its safe storing, restoration of constructional barriers and de-isolation of NPP A-1 objects, containing inventory of ra-substances. The implementation of the I. stage is scheduled in the period 1998 – 2007.

Parallel with completion of the I. stage, preparatory works for the consequent II. stage are performed; the plan of the II. stage is laid out for a time period until 2016. The objective of the II. stage is the dismantling of low and medium contaminated equipments and technological circuits, as well as the dismantling of non-utilizable original construction objects. In the following stages of NPP A-1 decommissioning, an entire dismantling of reactor vessel, its constructional parts and its supporting equipment is considered. The overall process of NPP A-1 decommissioning is planned to be completed by the year 2033.

2.5 Interim Spent Fuel Storage - MSVP

2.5.1 Description of Used Technology

MSVP represents a nuclear installation serving to temporarily and safely store 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.

Spent fuel is transported to MSVP after cca 3-year cooling in storage ponds in HVB JE SE, a. s. and JAVYS, a. s.

Spent nuclear fuel transport from NPP units uses C-30 type shipping container and special railroad cars. The C-30 type shipping container is then moved from the transport railroad corridor to the reception well using a 130 t crane and special transfer beam. After essential handling in the reception well, container de-sealing and lid removal, the cylindrical cask T-12 (T-13) with the spent fuel is moved, using a 16 t crane, to the respective position in the storage pond.

Originally, MSVP was designed for 10 years storage of spent fuel, which would then be transported to the USSR for re-processing. Since 1989 MSVP also stored spent fuel from NPP Dukovany, Czech Republic. This fuel was then gradually transported back to NPP Dukovany within 1995-1997 as soon as the construction of storage site was completed in the Czech Republic.

The overall storage capacity of MSVP is 5,040 pcs of fuel assemblies (approx. 600 t heavy metal).

The interim spent fuel storage facility was reconstructed in 1997-1999 to increase its storage capacity, extend service life and raise its seismic resistance. The overall MSVP storage capacity following the reconstruction and raising of seismic resistance has been almost tripled as compared to the initially designed one. The capacity is being gradually increased by replacing the original T-12 containers by compact containers KZ-48 and will be sufficient to store all spent nuclear fuel produced during the operation of NPP V-1 and V-2 units. Replacement of containers is expected to be completed by 2007. Storage capacity of MSVP after finishing the production and the supply of KZ-48 and the use only of compact containers KZ-48 can be increased to 14 112 pcs of fuel assemblies. A computer-controlled handling equipment VJP MAPP-400 serves for moving spent fuel from original into new compact containers.

Owing to the increased demands on removal of residual heat from spent fuel (greater enrichment, increased burnout, higher amount of VJP), the original cooling system of pool waters has been replaced during the reconstruction by a new one with increased cooling capacity. The system consists of two plate coolers (one being a 100% stand-by), with thermal output 2533 kW of one cooler, and 4 pumps. Heat from cooling water is removed by an autonomous system of cooling water comprising 3 cooling micro-towers and 2 circulation pumps (one of them as a 100% stand-by). The operation of cooling station is periodical, according to the need for cooling of pond waters and keeping its temperature at required values.

The reconstruction and raising of seismic resistance of the constructional and technological parts were concluded according to the project in 1999.

2.5.2 Conducted MSVP Safety Reviews

Internal safety reviews (within Slovakia) were performed during the construction and commissioning of MSVP 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 MSVP operation, monitoring program results and overall conditions of MSVP are submitted to ÚJD on annual basis. No international safety reviews of MSVP have been conducted so far.

After 9 years of MSVP 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 MSVP 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 – Pool Type), and ÚJD requirements resulted from § 72 CFR Title 10 USA and the documents of the IAEA safety series Nos. 116, 117 and 118.

2.5.3 MSVP Safety Improvements Programs

Due to the insufficient storage capacity for fuel assemblies from the SE-EBO units´ a project of an extension of the storage capacity was started and implemented using the compacting approach and at the same time, a MSVP safety improvement program was started (1997 – 1999) by raising seismic resistance of the buildings and technological constructions. Based on the developed project and the submitted safety-related documentation, the Slovak regulatory authorities and organizations approved the starting of the MSVP seismic upgrading and storage capacity extension in late 1997, aiming at increasing the number of MSVP storage capacity and extending the operation life to 50 years. 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/documents).

2.6 Technologies of RAW Treatment and Conditioning

The following technologies are currently in permanent operation within the Technologies of RAW Treatment and Conditioning at the Bohunice side:

- bituminisation lines - PS 44 and PS 100, in building No. 809
- active waters treatment plant, in building No. 41
- vitrification line (VICHR), in building No. 30
- the Bohunice RAW Conditioning Center (BSC RAW), in building No. 808
- fragmentation equipment of metallic RAW, in building No. 34
- high-capacity decontamination equipment, in building No. 34

2.6.1 Brief Description of the Technologies

Description of the technologies can be found 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/documents).

2.6.2 Conducted Safety Reviews of Facilities

Safety reviews of technologies for RAW treatment and conditioning are being conducted in the framework of the assessment of safety documentation (safety reports, quality assurance programs, L&C) by regulatory authorities and SR organizations upon the submission of the documentation at construction and approval proceedings. The annual reviews of the conditions of operation of nuclear and radiation safety are presented to ÚJD.

The operated lines are subject of regular inspections by ÚJD inspectors and other safety authorities. Any faults and/or shortcomings identified are recorded in inspection protocols as tasks required by ÚJD and other safety authorities to be fulfilled at set deadlines.

No international safety review of these technologies has been conducted so far.

In the scope of safety improvement of the BSC RAW technological equipments and RAW treatment and conditioning, many analyses focusing on the safety of the final product and optimal filling of the final product as well as on the possibilities of RAW conditioning into the new wrapped forms were performed on the basis of the present operation and gained experience. Various technical improvements were implemented. Reconstruction works of incinerating facility including modifications aimed at improvement of safety and operational reliability in the field of filtration and purification of burnt gases were performed recently.

2.7 Repository of RAW

The National Repository of Radioactive Wastes is a surface type repository intended for the disposal of solid and solidified low- and intermediate-radioactive wastes generated during the operation of nuclear installations and other institutions in the territory of the Slovak Republic and dealing with activities connected with the generation of radioactive wastes. The area of the repository is located about 2 km north-west of the NPP Mochovce site. Repository is in operation since 2000.

The repository comprises a system of disposal boxes laid out in two double-rows, with 40 boxes each. The capacity of every box is 90 fiber-concrete containers (VBK).

The capacity of the repository's two double-rows (80 storage boxes) is sufficient for storage of 7,200 VBK which is sufficient for cca 10 to 15 years of operation of NPPs. Since the disposal of all radioactive waste (meeting the acceptance criteria) requires to dispose about 35 thousand fiber-concrete containers, the National Radwaste Repository needs to be extended. The site layout enables to extend the capacity up to 10 double-rows.

By the end of 2006, 1260 VBK with RAW in total were disposed of.

Composition of RAW disposed in VBK at RÚ RAW is the following:

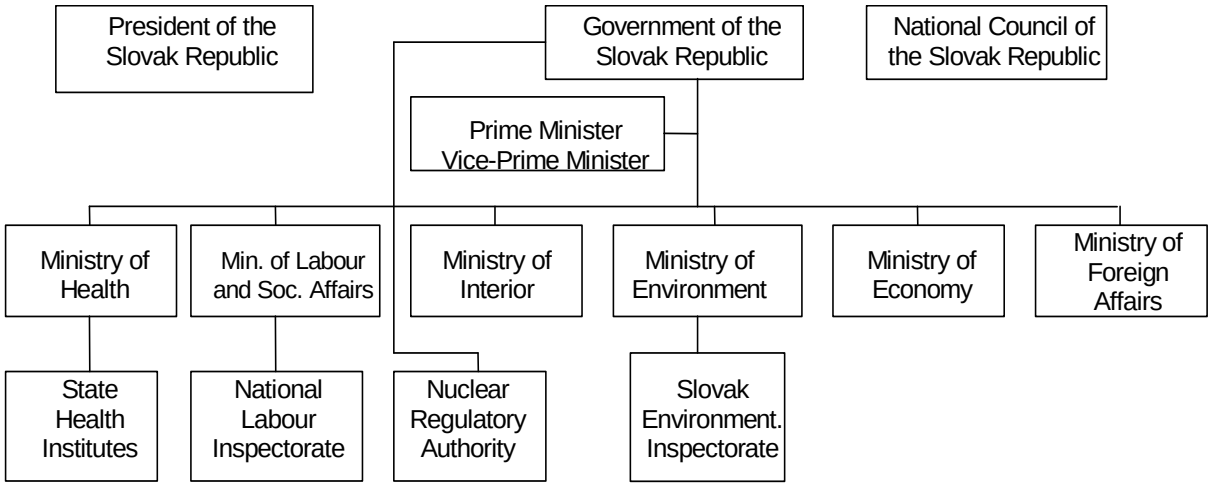
Type	
Drums (pcs)	6111
Compacts (pcs)	5250
average weight of VBK (kg)	8576

3. Legislation and Regulation

3.1 Legislative and Regulatory System

3.1.1 Structure of Regulatory Bodies

Regulation concerning the peaceful use of nuclear energy according to the Act No. 514/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to certain acts is performed by the governmental bodies and organizations within the framework of their competence defined by the respective acts according to the structure described in picture No. 3.1.1.



Pict. 3.1.1 Structure of regulatory bodies

Nuclear Regulatory Authority of the Slovak Republic

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

Ministry of Health of the Slovak Republic and

Public Health Care Office of the Slovak Republic

The Ministry of Health is a central state administration authority for health care, health protection and other activities in the health care sector. State administration in the field of health protection is executed by the Ministry of Health and the Public Health Care Office of the Slovak Republic. The Ministry's competences include establishing radiation limits and the conditions for treatment and disposal of radioactive wastes in terms of potential impacts on health. The Public Health Care Office methodologically directs the health protection against ionizing radiation effects and licenses activities

leading to exposure and activities with relevance to radiation protection, performs the state health supervision at nuclear installations and is a point of contact for the EU on radiation protection.

Ministry of Environment of the Slovak Republic

Ministry of Environment is a central state administration authority for the creation and protection of environment. The following bodies report to the Ministry of Environment:

- Slovak Environmental Inspectorate, through which the Ministry of Environment fulfills the role of the main state supervisor in environmental matters,
- Slovak Hydrometeorological Institute.

Ministry of Interior of the Slovak Republic

The Ministry of Interior is a central state administration authority for (amongst others) the conceptual management and control of fire prevention, the preparation of an integrated rescue system including civil protection of the population and property, public order and personal security. In case of nuclear and radiation accidents, it formulates a concept of organization to grant aid to the public and participates in the management and execution of rescue works (Civil Protection of Population Act No. 42/1994 Coll., as amended).

Ministry of Economy of the Slovak Republic

Ministry of Economy of the Slovak Republic is a central state administration authority for (amongst others) nuclear energy, including the management of nuclear fuel, storage of radioactive waste, search for and exploration of radioactive raw materials and their mining, and authorization of exports of special materials and equipments as dual-use goods.

Ministry of Labor, Social Affairs and Family of the Slovak Republic

The Ministry of Labor, Social Affairs and Family is a central state administration authority for (among others) safety and health protection at work and labour inspection. State administration on labor inspection is executed by state administration bodies MPSVR SR, the National Labor Inspectorate and labour inspectorates.

The Ministry of Labor, Social Affairs and Family SR oversees the National Labor Inspecorate (NLI) and is responsible for the execution of labor inspection.

The National Labor Inspectorate is a governing body for labour inspectorates, which performs (inter alia) also labor inspection in nuclear energy and regulation pursuant to distinctive regulations.

3.1.2 Legislation

3.1.2.1 Introduction

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

1. The supreme fundamental legal document of the state is the Constitution that is passed by the Parliament – it is generally binding in nature.
2. Legal acts stipulate the fundamental rights and obligations specifying principles in various areas; these are passed by the Parliament – they are generally binding in nature.

3. Governmental ordinances are subordinate to legal acts and passed by the Government - they are generally binding in nature.
4. Regulations (decrees) and edicts are rules issued by central state administration authorities (such as ministries) in order to set the particulars for implementation of legal acts and governmental regulations - they are generally binding in nature.
5. Guidelines (manuals) contain detailed requirements and recommended steps to be taken to ensure that the requirements are met. These are issued by regulatory authorities.
6. By-laws (such as directives and orders) are internal organizational rules of a regulatory authority or a nuclear installation operator.

3.1.2.2 Acts on State Regulation

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

Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to certain acts deals with the use of nuclear energy. The act was passed by the Parliament SR on 9.9.2004 and has been meanwhile amended by the Act No. 238/2006 Coll., the Act No. 21/2007 Coll. and Act No. 94/2007 Coll. The Act came into force on 1. 12. 2004 and abolished the original Act No.130/1998 Coll., as well as all its implementary regulations.

Atomic Act lays down conditions for safe use of nuclear energy exclusively for peaceful purposes in accordance with international treaties signed by the Slovak Republic. It also contains clauses determining financial compensations in case of a nuclear accident. It presumes a sum of €75,000,000 as a limit for the operator's financial liability for a nuclear damage caused by a nuclear event on the nuclear installation for energy purposes and a sum of €50,000,000 for other nuclear installations and radioactive material transport. Under the Atomic Act, a nuclear installation means a set of building structures and technological equipments:

1. a part of which is a nuclear reactor(s),
2. for production or processing of nuclear materials or storage of nuclear materials in quantities exceeding one effective kilogram,
3. for processing, treatment and storage of radioactive waste,
4. for disposal of radioactive waste from nuclear installations, institutional radioactive waste or spent nuclear fuel; neither containers and shields in which nuclear material is used as a shielding material for sources or radiation, nor areas where such containers and shields are stored, shall be deemed nuclear installations.

The most important changes in comparison to the original Act No. 130/1998 Coll. have occurred in the field of abolishment of permissions for business in the nuclear field, the take-over of competencies by ÚJD as a special construction authority in the construction permitting and approval proceeding concerning the constructions of nuclear facilities, changes in the field of record keeping system and control of nuclear materials in connection to the EU regulations, changes in permission of transport of radioactive wastes from and to EU, changes in the structure of the act and changes in the civil liability

for nuclear damages (the limit amount of liability and change in the currency, in which the limit of liability is stated).

The Act can be found on the website: www.ujd.gov.sk/legislation.

Generally binding legal provisions implementing the Atomic Act, issued by ÚJD in the form of Decrees, are set out in the list of Annex 6.2.

ÚJD issues safety guidelines as well (Annex 6.2)

Act No. 124/2006 Coll. on Safety and Health Protection at Work and alternations and amendments of certain acts sets general principles of prevention and basic conditions to secure safety and health protection at work and to eliminate risks and factors causing occurrence of occupational accidents, occupational diseases and other occupational health damages („industrial safety"). The Act has abolished and replaced Act No. 330/1996 Coll. on Safety and Health Protection at Work as amended.
Related generally binding legal provisions are in the Annex 6.2.

Act No. 125/2006 Coll. on Labor Inspection and alternations and amendments of Act No. 82/2005 Coll. on Illegal Work and Illegal Employment and alternations and amendments of certain acts

a) regulates labor inspection, through which the protection of employees at work and execution of state administration in the field of labor inspection is asserted,
b) defines the competencies of state administration authorities in the field of labor inspection and their powers by execution of supervision according to special act (Act No. 264/1999 Coll. on technical requirements for products and on conformity assessment and alternations and amendments of certain acts as amended by Act No. 436/2001 Coll.),
c) establishes rights and obligations of labor inspector and duties of natural and legal entities.

The Act has abolished and replaced the Act No. 95/2000 Coll. on Labor Inspection and alternations and amendments of certain acts as amended.

Related generally binding legal provisions are in Annex 6.2.

Act No. 656/2004 Coll. on Energy and alternations of certain acts as amended, effective since 1st of January 2005, has abolished the original Act No. 70/1998 Coll. on Energy as amended. The Act on Energy as one of the basic acts governs conditions of business in nuclear energy as well the rights and obligations of natural and legal entities who make business in this field.

Act No. 276/2001 Coll. on Regulation in Network Industries and alternations and amendments of certain acts as amended provides for scope, conditions and method of regulation in network industries. Production of electric energy is also understood as network industry. Activities in network industries are considered regulated activities, for which a permit of the Regulatory Office for Network Industries is required. The Act provides for conditions of exercise of regulated activities and rights and obligations of entities subject to regulation and rules of operation of the market in electricity and gas.

Act No. 24/2006 Coll. on Environmental Impacts Assessment and alternations and amendments of certain acts, effective since the 1st of February 2006, has abolished and replaced the original Act

No. 127/1994 Coll. on environmental impacts assessment. In order to ensure high environmental protection, the Act establishes process of expert and public assessment of environmental impacts of:

1. strategic documents before their approval (concept of radioactive waste and spent nuclear fuel management, national program of radioactive waste and spent nuclear fuel management), and
2. proposed activities before resolution on their siting or before their approval according to special acts (construction of nuclear installations).

Activities, which are obligatory subject to international assessment of environmental transboundary impacts, are:

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

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

Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Facilities and Management of Spent Nuclear Fuel and Radioactive Wastes (Act on Nuclear Fund) and alternations and amendments of certain acts, that has abolished the original Act No. 254/1994 Coll. and its implementary Decree No. 14/1995 Coll. establishing the National Fund for decommissioning of nuclear facilities and management of spent nuclear fuel and radioactive wastes. The Nuclear Fund is an independent legal entity administrated by the Ministry of Economy SR. The Fund has its own bodies (Board of Trustees, Supervisory Board, Director, Managers of Sub-accounts, Chief Comptroler). Resources of the Nuclear Fund are various – contributions of permission holders, levies collected by operator of transfer and distribution network at prices of supplied electricity directly from final customers (serving to settle the so-called „historical debt“), penalties imposed by ÚJD, interests from deposits, subsidies and contributions from EU funds, state budget and others.

Act No. 126/2006 Coll. on Public Health Care and alternations and amendments of certain acts. The Act lays down conditions for public health protection, execution of state health care regulation and sanctions for violation of obligations in the resort of public health care. Ministry of Health of the Slovak Republic and Public Health Care Office of the Slovak Republic are the public health care authorities. The Public Health Care Office of SR issues permits for activities leading to exposure and activities with relevance to radiation protection, for release of radioactive materials and contaminated objects into environment, as well as verifications of professional competency for activities leading to exposure and activities with relevance to radiation protection. Besides the Act there was a whole set of Slovak approximate governmental ordinances passed that transpose requirements of the EC/EU law in the field of radiation protection (see 6.2).

By an amendment of the Act No. **50/1976 Coll. on Territorial Planning and Construction Order** (so called Construction Act) as amended by new Atomic Act No. 541/2004 Coll. effective since 1. 12. 2004, ÚJD has become a construction authority for constructions of nuclear installations and constructions

located on the site of the nuclear installation. Before approval of siting of a nuclear installation, the local construction authority must seek obligatory statement of ÚJD which may contain provisions.

3.1.2.3 Draft Legislation

In the meantime, works are pursued on revision of the Atomic Act based on the results and suggestions from application experience. The amendment should harmonize particular provisions of the Atomic Act so as to remove ambiguity or inhomogeneity of the provisions that was discovered by application experience. At the same time, works are conducted on a governmental ordinance, that will transpose new Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent furl. The submission of the proposal for amendment of the Atomic Act is planned in 2008.

3.1.3 State Regulation in the field of Nuclear Safety

Key legal act in the field of nuclear safety is the Act No. 541/2004 Coll. as amended. Base on this act regulations and decisions of ÚJD are elaborated and issued. Besides generally binding legal provisions, ÚJD also issues safety guidelines to help operators meet the generally binding legal acts (see chapter 6.2). In the authorization procedure related to nuclear installation, standards and recommendations of the International Atomic Energy Agency are used and applied. Documents of OECD/NEA and EU are used as well.

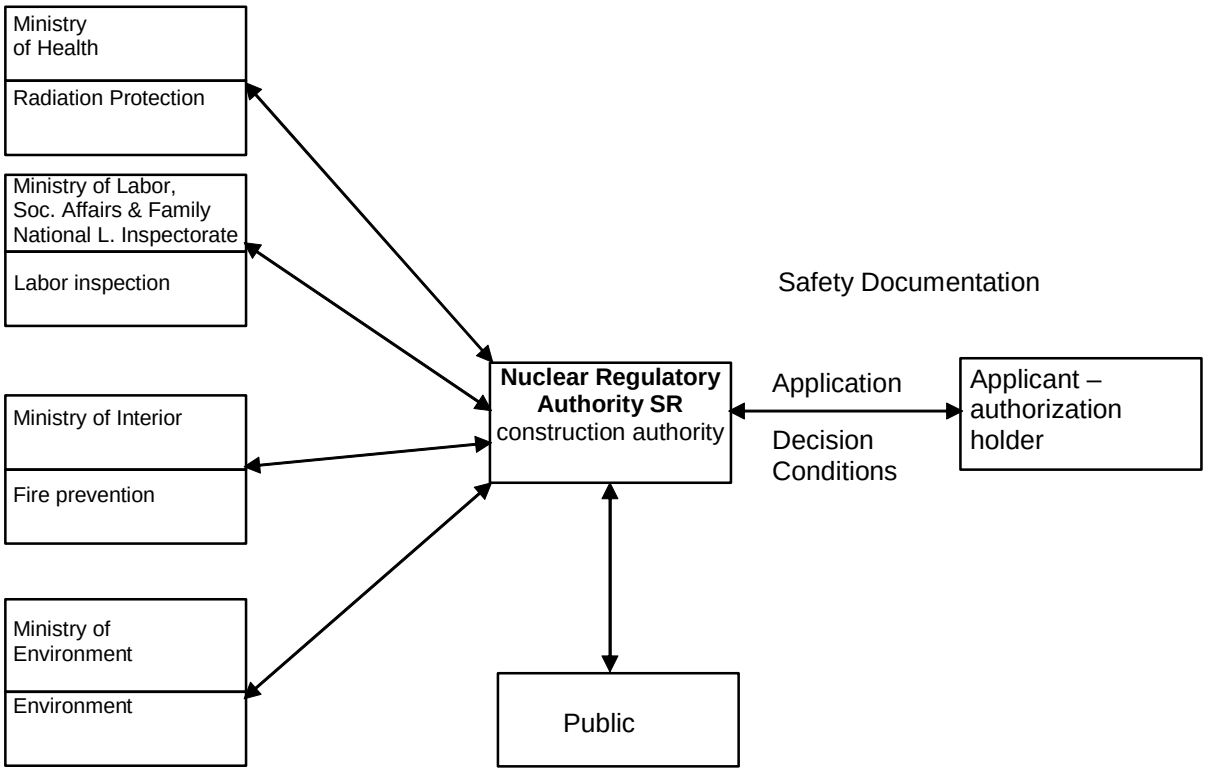
Decisions can generally be characterized as acts of law application. This implies that this is the application of rights and obligations laid down in a generally binding legal provision in a particular case to a particular subject. Decisions issued by administration authorities are also referred to as individual administrative acts. The obligations imposed by a decision are enforceable and the failure to perform them can be sanctioned. Decisions are in principle subject to the possibility of placing them before court for judicial review. However the court does not review decisions excluded from its jurisdiction by course of the Code of Civil Procedures.

ÚJD issues various types of decisions: on approval, on permission, on authorization, on sanction or measure imposition, on determination of new permission holder, on verification of professional competency, on documentation review and others.

The competence of ÚJD is implied by § 4 of the Atomic Act.

3.1.3.1 Nuclear Installation Authorization Procedure

The authorization procedure for nuclear installation consists of 5 major stages: siting, construction, commissioning, operation and decommissioning. Before granting an authorization for operation, the regulatory authority are carried out under an approved schedule of particular stages of nuclear installation commissioning (testing, fuel loading, physical start up, energetic start up, trial operation) The main regulatory authorities and the authorization procedure for operation are depicted in Pict. 3.1.2.



Pict. 3.1.2 Authorization procedure

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 fulfillment 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 and of other regulatory authorities (Public Health Care Office of SR, labor 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 already as a construction authority. ÚJD 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 Labor Inspectorate, Labor Inspectorate (labor inspection and safety and health protection at work) and other bodies and organizations of state administration (fire prevention, civil defense).

Documentation, attached to the application for issuance of certain decisions of ÚJD and essential for submission, is listed in annexes No. 1 and 2. of the Atomic Act. Details concerning the scope, content and method of preparation of nuclear installation documentation needed for certain decisions are defined in the ÚJD Decree No. 58/2006 Coll.

3.1.3.2 Regulatory Authority – ÚJD

ÚJD is the successor of former Czechoslovakian Commission for Atomic Energy (ČSKAE). It was established on the 1. of January 1993 a its competencies arouse originally from the Act No. 2/1993 Coll.; in the present time it is the Act No. 575/2001 Coll., as altered and amended. ÚJD is an independent state regulatory authority that reports directly to the Government and is headed by a Chairman appointed by the Government. The regulatory authority's independence of any other authority or organization engaged in the development and utilization of nuclear energy applies in all relevant areas (legislation, human and financial resources, technical support, international cooperation, enforcement instruments). Pursuant to the Act No. 541/2004 Coll., ÚJD is authorized to draft generally binding legal provisions in the field of nuclear safety (acts, decrees). Besides that, ÚJD issues safety guidelines. ÚJD´s budget comprises a part of the state's budget. ÚJD has financial and human resources capacities for independent safety analyses and technical support.

As of 1 May 2007, ÚJD has employed 82 employees.

The Annual Reports are on the website: www.ujd.gov.sk

3.1.3.3 Role of the Regulatory Authority (ÚJD)

Pursuant to § 29 of Act No. 575/2001 Coll., ÚJD provides for the exercise of state regulation for nuclear safety of nuclear installations, including regulation of the management of radioactive waste, spent fuel and other parts of the fuel cycle, as well as of nuclear material, including their control and record keeping system. It ensures assessment of goals of nuclear energy use program and of quality of classified equipments and nuclear technology equipments, as well as of commitments of the Slovak Republic under international agreements and treaties concerning nuclear safety of nuclear installations and management of nuclear materials (see chapters 4.5, 4.7 and 5).

Pursuant to the Act No. 541/2004 Coll., ÚJD performs the state regulation of nuclear safety of nuclear installations; in particular it:

- carries out inspections of workplaces, operations and premises of nuclear facilities, operations and premises of approval or authorization holders; checks the fulfillment of obligations pursuant to this Act, generally binding legal provisions issued on its basis, operational procedures issued by the authorization holder, whether limits and conditions of safe operation and safe decommissioning, quality assurance system, as well as of duties arising from decisions, measures or orders issued pursuant to the Atomic Act, are being observed (see chapter 3.2.2.1),
- inspects fulfillment of commitments under international agreements and treaties signed by the Slovak Republic in respect of ÚJD competency,
- inspects the system of professional training of employees, training programs of employees with professional competency, training programs of licensed employees of authorization holders, and inspects professional competency as well as special professional competency of authorization holder employees,
- investigates in situ the status, causes and consequences of selected failures, incidents and accidents at nuclear installation or events during transport of radioactive materials,

- controls, in-service inspections and in-service testing of classified equipment important to the nuclear safety,
- imposes elimination of deficiencies relevant to nuclear safety, physical protection, emergency preparedness,
- assesses nuclear safety, physical protection, emergency preparedness independently from the permission holders,
- checks the contents, updates and tests of emergency plans, and the associated trainings,
- conducts in situ reviews at workplaces, operations and premises of applicants for approval or permission and approval or permission holders, including observation of quality assurance system.

ÚJD issues annual reports on the status of nuclear safety of nuclear installations and on its activities in the previous year. It presents the report once a year, always by 30 April, to the Government of the Slovak Republic and subsequently to the National Council of the Slovak Republic.

Quality management system of ÚJD

The quality management was since the establishment of ÚJD in the centre of attention of the Authority's management. In the first stage of the Authority's existence, it was implemented especially through the usage of experience of Authority's decisive employees, foreign technical support aimed at employees´ training and direct assessment of the most significant problems of nuclear safety.

The expansion of Authority's competencies and the need for efficient and effective fulfillment of its mission has required to create a more sophisticated management system that would enable permanent and high quality fulfillment of given tasks. Due to this, the Authority's management has obliged itself to create a quality management system, which would be known to all Authority's employees and which would bind them to participate in its development and implementation.

In collaboration with an external organization, works on an internal quality management system were conducted in 1999. In years 2000 - 2001, the preceding system of Authority's acts and its use for quality management system was being analyzed. A quality handbook was developed with structure in line with the requirements of ISO 9001:2000 standard, applicable for organization of state administration, in which a Quality Policy was formulated. Network diagrams of main and important support activities (procedures) included in the quality management system were devised by an uniform methodology. Quality directives for these activities, uniformly prepared in order to perform the state regulation of nuclear safety of nuclear installations, were elaborated until the end of 2002. Work procedures for all key regulatory activities, especially for inspections, were designed as a part of quality management system documentation.

In 2003, a detailed internal audit of the quality system was done, which has uncovered some deficiencies and remedial measures have been implemented. The improvement of the system based on internal audits proceeded, especially in the direction of particular quality directives development, improvement and thorough keeping of quality records.

In relation to the new ISO 9001:2001 standard and based on inputs from assessment of quality system implementation, the Authority's management re-evaluated in 2006 the used management system and established a new Quality Management System, complying with current tasks of the Authority and with

requirements for quality assurance. The management of activities related with quality management system is performed by Authority's Council for Quality, led by the Authority's Chairman. In 2006, the Quality Policy, of ÚJD was amended and a new Quality Handbook was issued, processed on the base of requirements of ISO 9001:2001 standard, which consistently respect the procedural approach to quality management. All main procedures, their interactions as well as interactions with support procedures were set and analyzed. Gradually, quality directives for procedures, which have not been so far covered by the management system, are being finished and the need to include also administrative activities in the system is being assessed. Goals and quality criteria are set and evaluated for particular divisions; their formation and assessment is the objective of internal audits, annually planned and approved by the management of the Authority.

Assessment of quality management system of ÚJD was performed in 2006 line with the requirements of ISO 9001:2001 standard, which critically evaluated the advancement by using ÚJD´s management system and traced strategic tasks of its further development as well as requirements for removal of identified deficiencies. The main strategic tasks include performance of internal audit, preparation of the system for its potential certification and implementation of amendments of the Atomic Act.

3.1.3.4 International Cooperation

Cooperation with the International Atomic Energy Agency (IAEA)

Cooperation with the IAEA on technical projects is an extraordinary success. While handling them, expert missions take place with the focus on nuclear safety review.

A significant part of regional projects was concerned with the nuclear safety issues. Internships of foreign experts, seminars, workshops and training courses with wide international participation are being organized under the regional projects in SR.

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

ÚJD representatives have participated among others in the Group of Government Experts meetings on third party nuclear liability, at government representatives meetings of the Committee on Safety of Nuclear Installations (CSNI) and of the Committee for Nuclear Regulatory Activities, of the Committee on Radioactive Wastes, and of other committees and working groups.

Cooperation with the European Commission and European Union countries

ÚJD representatives have attended on a regular basis meetings of expert groups of EU Council and European Commission with the aim to exchange knowledge on reviews of the level of nuclear safety of nuclear installations in Europe and participate on the constitution of EU legislation in certain fields.

Bilateral cooperation

Formal (under international treaties) and informal cooperation take place with all of the neighbouring countries (Czech Republic, Poland, Ukraine, Hungary, Austria) as well as other countries (such as Armenia, Bulgaria, Germany, France, Finland, Spain, Slovenia, the UK, the USA, Japan). The

cooperation is focused on the exchange of experience in fields of peaceful use of nuclear energy, emergency preparedness, safety analyses, and so on.

Forum of State Nuclear Safety Authorities of Countries Operating WWER-type NPP´s

Forum of State Nuclear Safety Authorities of Countries Operating WWER-type NPP´s was established for the purpose of mutual exchange of experience on construction and operation WWER type power plants. Ad hoc working groups have been set up within the Forum dealing with the current issues of nuclear safety and state regulation.

Network of Nuclear Regulatory Bodies of Countries with small Nuclear Program

Network of Countries with Small Nuclear Programs (NERS) was established in 1998 at the initiative of the Swiss Regulator (HSK) to strengthen cooperation and exchange of experience among countries with small sized nuclear programs. ÚJD has been taking regular and active part in NERS activities.

3.1.4 State Regulation in the field of Health Protection Against Radiation

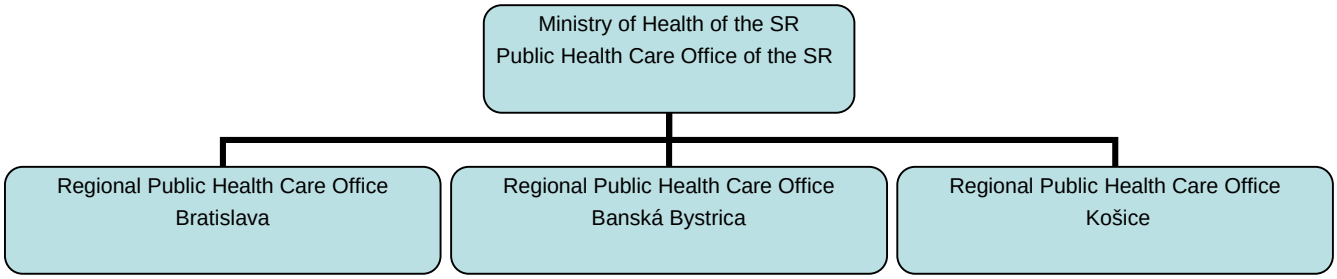
The Ministry of Health is a central state administration authority for health care, health protection and other activities in the health care sector. State administration in the field of health protection is executed by the Ministry of Health and the Public Health Care Office of the Slovak Republic. The Ministry's competencies include establishing radiation limits and the conditions for treatment and disposal of radioactive wastes in terms of potential impacts on health. The Public Health Care Office methodologically directs the health protection against ionizing radiation effects and licenses activities leading to exposure and activities with relevance to radiation protection, performs the state health supervision at nuclear installations and is a point of contact for the EU in the field of health protection against radiation (radiation protection) and represents SR in OECD/NEA in the Steering Committee for protection of public health against ionizing radiation.

The regulation of radiation protection at nuclear installations is carried out by the Department for Health Protection against Radiation at the Public Health Care Office of the Slovak Republic. This Department conducts inspections for radiation protection of nuclear installation's employees and also of the population in their vicinity.

The fundamental requirements for health protection against radiation are laid down in the legal provisions referred to in the part Legislation in the field of radiation protection.

Since, in the end-effect, the regulation of nuclear safety by determining safety requirements on technological equipment and operation of nuclear installations is based on the requirements related to health protection and vice versa, the cooperation of ÚJD and the Ministry of Health of SR is important, as they are complementary. ÚJD and MZ SR made an agreement whose objective is the coordination of regulatory activities and provisions for the complementarity of regulation. A joint commission on issues of common interest was established under this agreement.

The regulation of health protection against radiation in the Slovak Republic is provided by state health regulation by course of the Act No. 126/2006 Coll. on Public Health Care as altered and amended. The state health regulatory authority at workplaces with ionizing radiation sources and in nuclear installations is the Public Health Care Office of the Slovak Republic.



Pict. 3.1.3 Structure of state regulation in the field of health protection against radiation

The competency of ÚVZ SR is set by the Act No. 126/2006 Coll.

The permission of ÚVZ SR for activities leading to radiation in relation to nuclear installations is not the final authorization grant, yet it is a condition for authorization issued by local state administration body.

3.1.4.1 Permission Procedure

Permitting of activities leading to radiation follows the Act No. 71/1967 Coll. on Administrative Proceeding as amended. The Act No. 126/2006Coll. on Public Health Care as amended determines detailed criteria for granting a permission.

The Act further lays down essentials of a permission and conditions for its modification, its cancellation or its extinction.

The obligatory documentation to be attached to the application for permission of activities leading to radiation is divided into documentation to be approved and other documentation.

The other documentation includes a list of basic documents used by the applicant to prove compliance with requirements concerning radiation protection and safe operation of the installation.

3.1.4.2 Execution of State Regulation

The cited Act regulates the obligations of the permission holder to submit information and to enable the execution of state regulation. Details are described in part 4.6.

3.1.5 State Regulation in the field of Labor Inspection

The state administration on labor inspection is exercised by:

a) Ministry of Labor, Social Affairs and Family of the Slovak Republic
b) National Labor Inspectorate
c) Labor inspectorates

Labor inspection is:

a) supervision over observance of

1. labor-law provisions
2. legal provisions and other provisions for securing safety and health protection at work including provisions which govern factors of the working environment
3. legal provisions governing prohibition of illegal work and illegal employment
4. obligations arising from collective agreements (with trade unions)

b) deducing accountability for violation of provisions referred to a),

c) provision of free consultations within the extent of elementary professional knowledge and advice concerning methods how to observe stipulated provisions in the most effective way.

The obligations of nuclear installations operator, legal and natural entities with respect to labor inspection authorities result from the Act No. 124/2006 Coll., Act No. 125/2006 Coll. and implementary provisions to these acts (point 6.2 Selected generally binding legal provisions and safety guidelines concerning nuclear, radiation and technical safety, safety and health protection at work).

3.1.5.1 Activity of Labor Inspectorate

The labor inspectorate performs besides the „classical mode“ activity also labor inspections by so-called „**enhanced mode**“ (pursuant to inspectorate's internal provisions), that is applied especially at pressurised components of primary circuit and other selected nuclear equipments.

Following equipments are subject to the enhanced mode of labor inspection, i.e.: pressure vessels and steam generators, materials having their highest operating pressure in excess of 0.07 MPa and capacity in excess of 10 liters; pumps, pipelines, distributors, pipe collectors and valves having their highest operating pressure in excess of 0.07 MPa and inner diameter over DN 70 of nuclear reactor cooling systems, filling systems, etc.

The following are also assigned to the enhanced mode: base and additive materials and parts (jointing elements, semi-products, piping sections, bends, tubes, forgings, bushings, covers, doors, etc.) of the above equipment, insofar as their quality may affect the technical safety of equipment.

3.1.5.2 Methods of Labor Inspection Authority

Labor inspection authority is upon performance of labor inspection authorized:

- to perform control, test, investigation and other activities with the view to ascertain whether provisions on safety and health protection at work are observed,
- to request basic documents, information and explanations concerning the application of provisions on safety and health protection at work,
- to request presentation of documentation, records or other documents necessary for performance of labor inspection,
- to take necessary quantities of samples of materials and substances which are used or handled for analytical proposes.

3.2 Responsibility of the Operator

3.2.1 Act No. 541/2004 Coll. as amended - Obligations of the Operator with respect to 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 authorization holder (operator) is responsible for nuclear safety. 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 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 obligations of the operator are given first of all by provisions of the Act No. 541/2004 Coll. in the areas:

- construction of nuclear installation (hereinafter only referred to as „building permission”) (§ 5, § 18, § 25)
- nuclear installation commissioning (§ 5, § 10, § 19, § 24, § 25, § 26, § 27)
- nuclear installation operation (§ 5, § 7, § 10, § 19, § 23, § 24, § 25, § 26, § 27)
- decommissioning stage (§ 5, § 10, § 20, § 23, § 24, § 25, § 26, § 27)
- repository closure (§ 5, § 10, § 22, § 24, § 25, § 26, § 27)
- radioactive waste and spent nuclear fuel management (§ 5, § 21, § 24, § 25, § 26, § 27)
- management of nuclear materials at nuclear installation (§ 5, § 12, § 13, § 24, § 25,§ 26, § 27)
- import and export of nuclear materials (§ 5, § 14)
- import and export of dual use goods and materials (§ 5, § 11, § 14)
- transport of radioactive materials including international transport (§ 5, § 15, § 24, § 25, § 26, § 27)
- expert training of authorization holder’s employees (§ 5, § 25)
- transport of radioactive waste (§ 5, § 15, § 16, § 21, § 26, § 27)
- import of radioactive waste (§ 5, § 21, § 26)
- management of nuclear materials out of nuclear installation (§ 5, § 12, § 13, § 26, § 27)
- informing the public about the status of nuclear safety (§ 10)
- to forward data required by the Act to the Authority and to the European Commission or another body of the European Union required by special provisions (§ 10, § 13),

- emergency planning (§ 28),
- liability for nuclear damage (§ 29, § 30).

Verification and assessment

The operator of the nuclear installation is obliged to provide in certain periods of time especially the following information to the Authority:

without any delay:

- radiation incident or accident or their threat,
- exceeding of the exposure limits for employees,
- exceeding of discharge limits.

in certain period of time:

- daily information on operation,
- individual doses of the employees, personnel and contracted employees during particular periods of monitoring,
- analyses of dose loads during reactor outages,
- annual review of dose loads of personnel and of contracted employees,
- quarterly and annual balance of radioactive releases into environment,
- annual report on results of environmental radioactivity monitoring in the surrounding of nuclear installation,
- annual report on results of model of discharge impact assessment on population radiation.

3.2.2 Regulatory Methods of ÚJD on Verification of Operator's Compliance with Authorization Conditions

3.2.2.1 Inspections

The tasks in the field of state regulation are fulfilled by ÚJD´s nuclear safety inspectors. The nuclear safety inspectors by fulfilling their tasks in the field of state regulation follow ÚJD´s internal directive "Inspection Activities of ÚJD". The Directive sets a uniform procedure for inspections, for processing and evaluation of annual inspection plans, for management of ÚJD´s inspection program, for processing of documentation of inspection activities, and for analysis of ÚJD´s inspection activities.

Inspection plan is a tool for continuous and systemic evaluation of inspection activities at nuclear installations and during transports and controls of nuclear materials. As a rule, such plans are developed for the period of one year.

The plan is divided into the following fields of inspection activities: quality assurance, qualification and personnel training, commissioning, operation, maintenance of equipments, technical support, emergency planning, fire protection, physical protection, control of RAW management, control of storage of ČP and VJP, control during transport of nuclear materials, nuclear materials inspection and record keeping, special aviation activity in vicinity of nuclear installations and decommissioning.

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

Types of Inspections

In general, planned and non-planned inspections are distinguished; this represents the first level of classification. The second level recognizes routine, special and team inspections for both planned and non-planned ones.

Planned inspections:

Routine inspections are intended to verify the provisions for the compliance with requirements and conditions of nuclear safety, condition of the NI, compliance with approved limits and conditions and with selected operating provisions. Routine inspections are performed mainly by site inspectors at the corresponding NI. In case of inspection whose focus exceeds the professional competencies of the site inspector, inspection is performed by nuclear safety inspectors from Department of Safety Evaluation and Inspection Activities and Department of Regulatory Activities and International Relations of ÚJD. Routine inspections follow the procedures contained in the Inspection Manual.

Special inspections are performed by nuclear safety inspector in accordance with the basic inspection plan. Special inspections focus on specific areas, in particular on the verification of the compliance with requirements and conditions of regulation pursuant to § 32 of the Act No. 130/1998 Coll.

Special inspections normally follow procedures contained in the Inspection Manual.

Team inspections focus on the verification of compliance with requirements and conditions of regulation pursuant to § 4 of Act No. 541/2004 Coll., normally within several areas in parallel. Team inspections are planned for areas selected on the base of long-term assessment of operator's results emerging from inspection activities analysis. A team inspection is according to this directive an inspection, on which several departments participate.

Non-planned inspections:

Non-planned inspections are performed by nuclear safety inspectors as routine, special or team inspections. Such inspections are evoked by conditions prevailing at the NI (e.g. start up stages of NI) or by events at the NI. ÚJD uses them to respond to situations occurred at the NI.

Rules valid for all types of inspections

Principally, inspections are announced in advance to the subject of supervision. However, they can be also unannounced, if their focus and nature requires to do so.

The corresponding site inspector is notified in advance of the inspection of NI. Generally, the site inspector participates in the inspection.

Any inspection performed by more than a single inspector has a head of inspection team appointed.

When the result of an inspection in the controlled area becomes a finding, a protocol is elaborated. Measures to be taken to eliminate deficiencies (negative findings) are included in the protocol. They must be formulated clearly so as to impose the responsibility to eliminate detected deficiencies, and must be comprehensible with unambiguously set deadlines of their fulfillment.

Analysis of inspection activities comprises statistical evaluation of the findings. The objective of the statistical evaluation is to determine the distribution and the frequencies of inspection findings. Based on the evaluation of the developmental trends of the inspection findings, it is possible to modify inspection plan for the upcoming period, in particular in those areas where the most deficiencies have been identified concerning the supervised subject.

4. General Safety Aspects

4.1 Safety Priority

4.1.1 Principles and Definition of Nuclear Safety

Nuclear safety according to the Act No. 541/2004 Coll. means the status and the ability of nuclear installation or transporting equipment and operating personnel thereof to prevent uncontrolled development of fission chain reaction or unauthorized release of radioactive substances or ionizing radiation into the working environment or the environment and to mitigate consequences of incidents and accidents at nuclear installations or consequences of events upon transport of nuclear materials.

Nuclear energy may only be used for peaceful purposes and in accordance with the international agreements.

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.

4.1.2 Concept of Nuclear and Radiation Safety

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

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

The observance and fulfillment of safety by all employees belong among main priorities and tasks; safety is an inseparable part of all activities.

Main safety requirements, fundamentals and principles of nuclear safety and radiation protection, are the following:

- Nuclear safety and radiation protection is overriding and superior over any other interests of the company
- Nuclear safety and radiation protection are the responsibility of each employee in the scope of his competencies, responsibilities and duties
- The principles of safety culture apply in all activities relating to nuclear installations

- Principles of strategy for defense in-depth: multi-level, mutually overlapping measures, focused mainly at prevention, but also at accident mitigation, are applied in nuclear installation designs and activities related to the operation of nuclear installations
- Systems and components of relevance to safety are periodically tested with the aim to verify their functionality and serviceability
- Safety audits of the respective safety systems are conducted on a periodical basis
- The quality management system is developed in line with the requirements of the Slovak legal order, of regulatory authorities, of IAEA recommendations and of the requirements of ISO 9001:2001 standards
- The latest knowledge and experience from operation of nuclear installations in the country and outside the country are permanently utilized
- International assessments and reviews are regularly used for independent assessment of nuclear safety and radiation protection level
- An open dialogue with the public, local and regional state administration and self-governing authorities is applied
- Currently occurring safety risks concerning nuclear safety and radiation protection are identified, analyzed, classified, and managed across all management levels. More serious hazards are submitted to the Nuclear Safety Committee, an advisory body of the top management of the operator
- Operators invest adequate material and financial means to deliver the safety goals and meet the safety requirements, fundamentals and principles, and improve staff education and skills

The primary responsibility for nuclear and radiation safety lies within the Boards of Directors of the operator, which determine and pursue the application of main goals, requirements, fundamentals and principles of nuclear and radiation safety in all activities related to the nuclear installations, from their siting, design, construction, commissioning, operation until decommissioning, including management of spent nuclear fuel and radioactive wastes.

The obligations following the primary responsibility are delegated to the executive management.

4.1.3 The Task of the Regulatory Authority for Nuclear Safety

Pursuant to § 4 (d) of Act No. 541/2004 Coll. as altered and amended, ÚJD is authorized to issue permission or authorization to natural or legal persons to use nuclear energy in accordance with § 5, sec. 2 and 3. Paragraph 7 of the Atomic Act defines general and specific conditions to be met by the applicant for issuance of permission or authorization. The general conditions stated in § 7, sec. 1, are the following: capacity to enter into legal obligations, unblemished reputation of the person who is the statutory body or member of the statutory body, evidence of a functional technical equipment for requested activity and evidence of an adequate permanent staffing with requested professional competency. Based on this provision, ÚJD requires for the issuance of permission or authorization the following:

1. to take respective steps by the operator's management to ensure that all organizational units involved in activities directly connected with the nuclear installation comply with the policy deeming nuclear safety a priority,
2. to respect division of the competencies so that the authorization holder has the primary responsibility for safety,
3. to provide the coordination of tasks of nuclear safety in a separate nuclear safety department within the authorization holder's organizational structure. The scope of the department's activities must be submitted to ÚJD. ÚJD must be informed about the appointment of the head of such a department as well as on any changes in the scope of its activities, at least one month prior to such changes or appointment taking effect.

Concerning the area of professional competency, the Act No. 541/2004 Coll. stipulates the applicant's obligation to evidence adequate permanent staffing with requested professional competency. The adequate number of permanent staffing and their requested professionalism is determined by the authorization holder himself in the quality system documentation approved by ÚJD.

With respect to professional competency, one provision of a different act is interesting - § 6 sec. 2 (b) Act No. 656/2004 Coll. on Energy. This provision requires that, in case of making business in the energy where permission for production of electric energy from nuclear fuel is required, the criteria for issuance of such permission are the following: professional competency of the applicant for performance of requested activities evidenced by a certificate and finished second degree university education of technical orientation. Concerning a natural person, the professional competency is evidenced by the applicant or his liable representative; when the applicant is a legal entity, it is evidenced by any member of the statutory body. Even though the authorization itself is issued by the Regulatory Office for Network Industries, a precondition for its issuance is the approval of ÚJD.

4.1.4 Safety of Technical Equipments

Labor inspection is carried out by the National Labor Inspectorate through labor inspectorates. It is focused mainly on observance of legal provisions and other provisions to ensure safety and health protection at work including corresponding consulting. Yet, an inseparable part of safety and health protection at work is the safety of technical equipments. It is characterized by physical status of the respective equipment securing their resistance, tightness, reliability and functionality in the extent of designed operating conditions throughout their whole operation life. Its integral part is the processing of technical documentation and technical and organizational measures leading to operation reliability without posing a risk to individuals or property.

4.2 Financial and Human Resources

4.2.1 Financing of Operational and Safety Improvement Programs

One of the principles of nuclear and radiation safety of operators is the commitment to spend necessary financial means to meet nuclear and radiation safety and to provide for continuous training and improvement of qualification of the staff. In order to fulfill this commitment, financial strategies of

companies were developed that would enable, among the tasks mentioned, also fulfillment of the program for production and technological development.

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

4.2.2 Financial Sources for RAW Decommissioning and Treatment Programs

The National Council has passed on the 16th of March 2006 the Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Facilities and Management of Spent Nuclear Fuel and Radioactive Wastes (Act on Nuclear Fund), which sets new rules for management, contributions and the scope of activity of the Fund. Pursuant to the Act on Nuclear Fund, the name of the fund has been changed to National Nuclear Fund (NNF).

The Fund comprises of the following resources:

a) obligatory contributions of the holders of authorization for operation of nuclear installations,
b) penalties imposed by ÚJD according to a specific provision,
c) interests (revenues) from deposits on nuclear fund accounts,
d) voluntary contributions from natural and legal entities,
e) subsides and contributions from EU funds and other international organizations, financial institutions and funds provided to cover the expenses of final part of nuclear energy,
f) subsides from state budget,
g) revenues from financial operations,
h) other resources, when laid down in a specific provision.

The core (major) resource of the fund comes from the obligatory contributions of nuclear installations operators.

In accordance with the provisions of the Act, the authorization holder for operation of a nuclear installation is obliged to pay a sum of SKK 350,000 a year to the NNF´s account for every megawatt of installed electricity capacity of the operated nuclear installation and 5.95 % of the purchase price of electricity generated at that nuclear installation in the passed year.

The details on the method of collecting and paying the obligatory contribution to the NFF are laid down by a Government in its ordinance.

Slovenské elektrárne, a. s. and Jadrová a vyraďovacia spoločnosť, a. s. (JAVYS, a. s.) are currently the only owners of nuclear power generating installations in the Slovak Republic and thus the only contributors to the National Nuclear Fund. In years 2005 – 2006 Slovenské elektrárne has paid contributions in total sum of SKK 4,111 billions to the fund.

As a consequence of privatisation of SE, a. s., all available resources accumulated in the National Nuclear Fund were divided among all existing nuclear power generating installations following the criteria of energy produced by every single installation in the preceding periods.

Financial means of NNF can be used for:

a) termination of operation of nuclear installation,

b) decommissioning of nuclear installations including management of radioactive waste from decommissioning,
c) management of spent nuclear fuel and radioactive waste after nuclear installation's operation termination,
d) management of nuclear materials whose originator is unknown,
e) purchase of land to set up a spent fuel and radioactive waste repository,
f) siting, geological survey, preparation, design, construction, commissioning, operation and closure of repository,
g) activities related to the administration of NFF.

The Slovak Government decided to shutdown NPP V-1 units in 2006 and 2008. Under the "Concept Plan for V-1 Decommissioning" and "Report on assessment of impact of NPP V-1 decommissioning on environment", the Ministry of Environment recommended the variant of immediate decommissioning out of the alternatives assessed. Decommissioning of NPP A1 and NPP V-1, as well as the responsibility for their decommissioning, is since the year 2006 fully in competency of company JAVYS, a. s. Part of the costs related to the operation termination of NPP V-1 operation is financed on the basis of an approved project from the means of EU (BIDSF).

A condition for granting financial resources from NFF is that the activities are in compliance with safety of the final part (back end) of nuclear energy and that these activities will not cause instability of the energy system in SR or threat or deterioration of environment and of public protection.

Financial resources from NNF are granted upon applications for granting of financial means, which are reviewed by the Board of Trustees. After their approval, the resources from NFF are granted upon contracts on granting means from NFF.

4.2.3 Human Resources

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

- employees which have direct impact on nuclear safety – selected employees whose special professional competency has been verified by an exam (written exam, oral exam and exam of competency on a representative full-scale simulator) and a practical test for selected employees by Examination Commission for selected employees, established by ÚJD, which issues the *License of Special Professional Competency,*
- employees which have impact on nuclear safety – professionally competent employees whose professional competency has been verified by a professional commission established by the operator of a specialized facility, by written and oral exam, and to whom the *Certificate of Professional Competency* has been issued.

Special professional competency of employees means according to the Act No. 541/2004 Coll. on peaceful use of nuclear energy sum of technical knowledge, practical experience, principal attitudes

and knowledge of generally binding legal provisions and operating procedures issued by the authorization holder to ensure the nuclear safety, needed to perform working activities with direct impact on nuclear safety.

Professional competency is the sum of technical knowledge, practical experience, knowledge of generally binding legal provisions and operating procedures issued by the authorization holder, needed to perform the working activities of authorization holder employee. Professional competency is acquired through successful completion of professional training at a specialized facility.

The general (professional, health and mental) competency of staff to carry out working activities at nuclear installations is the responsibility of the authorization holder. The authorization holder authorizes his personnel to perform working activities. An “Authorization to Perform Working Activities” as a part of the integrated system of quality assurance management of nuclear installation - of authorization holder - is issued to every selected and professionally competent employee. The Authorization to Perform Working Activities is issued for a given position and specific nuclear installation only for those selected and professionally competent employees of the authorization holder, who have valid Licenses of Special Professional Competency or Certificates of Professional Competency. The authorization is an evidence of working competency of an employee in relation to regulatory authorities.

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

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

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

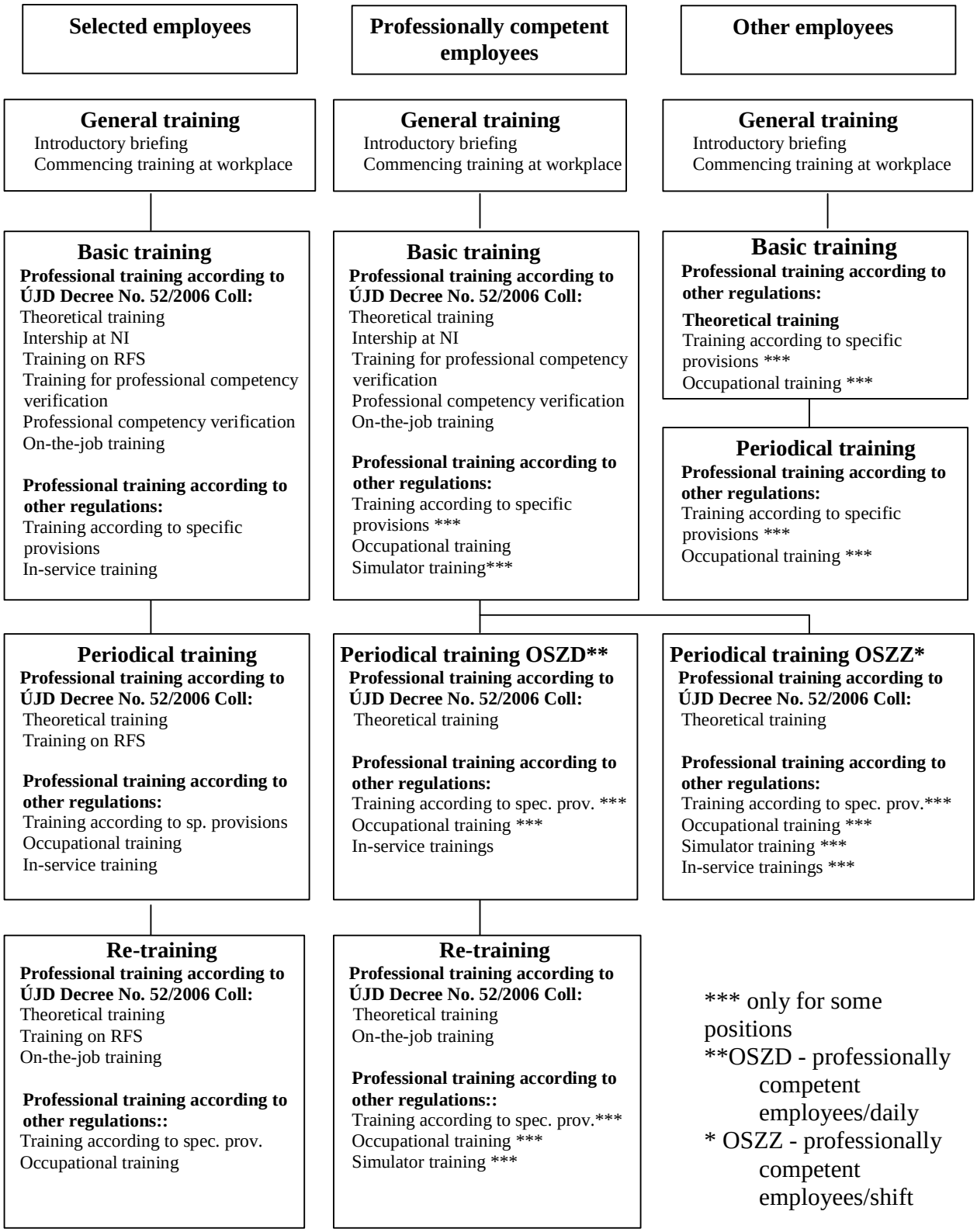
- generally binding legal provisions applicable in the Slovak Republic,
- IAEA standards, recommendations and guidelines,
- STN EN ISO 9001:2001 and 14001:2004 series standards,
- documentation of management within Quality System.

The management documents for the area of human resources, including the professional training and development of employees and management, set procedures and responsibilities for:

- selection and allocation of employees for positions,
- determination of the types and phases of professional training, education and development of employees,
- acquisition, maintenance and improvement of qualification – professional competence of the employees,
- staff development,

- acquisition and maintenance of general competencies of contractor's employees
- staff re-training.

The scheme of the professional training system is in Pict. 4.2.1.



Pict. 4.2.1 The scheme of the professional training system of employees

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

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

category 2 – technical and economical professionally competent employees of operation, maintenance and technical support departments with university education or secondary education

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

category 4 – professionally competent maintenance employees (with the exception of engineers) – employees involved in maintenance activities at technological facility with impact on nuclear safety.

category 5 – professionally competent employees in charge of NI decommissioning and handling RAW and spent nuclear fuel with impact on nuclear safety.

category 6 – other employees assigned to professional training on NI

Facilities for staff training

Professional training of employees of authorization holder, as well as of employees of contractors, is carried out at an operator of a specialized facility, who is the holder of authorization for professional training issued by ÚJD upon written application after reviewing the technical equipment used during the training and professional competency of applicant employees. Professional training is carried out in accordance with the approved system of training according to the training programs.

A part of the technical equipment of an operator of a specialized facility can be also RFS, which represents a control room in reality. Training on RFS for selected employees of authorization holder is conducted by employees of the operator of a specialized facility – lecturers, whose professional competency is verified by examination commission for lecturers, established by the Authority. The members of the examination commission are appointed and withdrawn by the Chairman of ÚJD and the examination commission's activity is governed by a Statute of Examination Commission for Lecturers, devised by the Authority. Verification of professional competency of lecturers is composed by an oral exam and after its successful passing, ÚJD issues a License of Professional Competency with 5 years validity to the lecturer.

The operator of a specialized facility must perform once a year reference exams on RFS, to prove accordance with real nuclear installation. During the assessment of functionality of RFS, parameters and runnings of entered magnitudes are verified and random simulation of technological process according to chosen scenario is controlled. The documentation of all RFS modifications is reviewed; modifications, which were caused by test results on RFS, or by implementation of technical solutions of unit's design changes, are reviewed. Also technical and organizational provision for training on RFS is controlled in the scope of such inspection, as well as the professional competency of lecturers of training on RFS.

A significant component to improve of staff qualification is the cooperation with universities, especially through the form of a postgradual and distance study at the Slovak Technical University, University of Economy and University of Comenius in Bratislava. To train control physicists at research and school reactors, the cooperation with foreign research and educational institutes in Czech Republic, Hungary and Austria is put in use.

4.2.4 Role of the Regulatory Authority

Pursuant to Act No. 541/2004 Coll., working activities having direct impacts on nuclear safety may only be performed by professionally competent and special professionally competent employees - the selected employees of the authorization holder. Working activities with direct impact on nuclear safety are performed by selected employees, who have second degree university education, successfully completed professional training at a specialized facility, have mental and health-related competence and their special professional competency has been verified by examination commission, established by ÚJD, which issues the License of Special Professional Competency. Professional training of professionally competent employees and selected employees is performed by the operator of a specialized facility upon authorization, issued by ÚJD.

Working activities, which can be performed only by professionally competent staff or selected employees, training of professionally competent and selected employees, establishment of professional commission and examination commission, method of verification of professional and special professional competency of authorization holder employees, are regulated by ÚJD Decree No. 52/2006 Coll. on professional competency.

ÚJD is empowered to approve the system of professional training of authorization holder employees, programs of training of selected employees, and to review the programs of training of professionally competent employees and technical equipment of the specialized facility (see also 4.2.3).

Special professional competency is verified by examination commission for selected employees, established by ÚJD. The members of examination commission for selected employees are appointed and withdrawn by the Chairman of the Authority. Activity of the examination commission is governed by Statute of Examination Commission for Selected Employees, devised by the Authority.

The authorization holder requests for verification of special professional competency upon an application. The verification of special professional competency consists of an exam and a practical test. Exam has 3 parts: written, oral and verification of competencies on a representative full-scale simulator (further referred to only as „RFS“). After successful verification of special professional competency ÚJD issues to the applicant a License of Special Professional Competency with 3 years validity. ÚJD keeps records of issued Licenses of Special Professional Competency.

Professional competency of authorization holder employees is verified by professional commission, established by the operator of a specialized facility. The activity of the professional commission is governed by Statute of professional commission, devised by the operator of a specialized facility. The exam of the applicant consists of a written and an oral part and after successful passing of the

examination the operator of a specialized facility issues a Certificate of Professional Competency to the applicant.

The regulatory activity resulting from the Act No. 541/2004 Coll. is conducted in the field of training of nuclear installations staff by periodical inspections. The objective of the inspection is the performance of professional training system of the authorization holder employees, inspection of documentation of quality system used for professional training of authorization holder employees, inspection of performance of programs for selected employees and for professionally competent employees, review of technical equipment of specialized facility, inspection of performance of removal of identified deficiencies from preceding protocols and inspection of fulfillment of tasks to be performed by the operator of a specialized facility, who is also a holder of an authorization for professional training of authorization holder employees. A part of the inspection is also an inspection of archiving of documents concerning the professional training of employees, such as theoretical training of employees, internship at the nuclear installation, training on RFS, on-the-job training and also an inspection of archiving of certificates of professional competencies, licenses of special professional competencies and authorizations for performance of working activities. Documents must be archived after completion of every type of training: basic training, periodical training and re-training.

ÚJD inspectors are authorized to verify special professional competency of selected employees and professional competency of employees and to withdraw the license of special professional competency from a selected employee and to withdraw the certificate of professional competency from a lecturer, when serious deficiencies are identified.

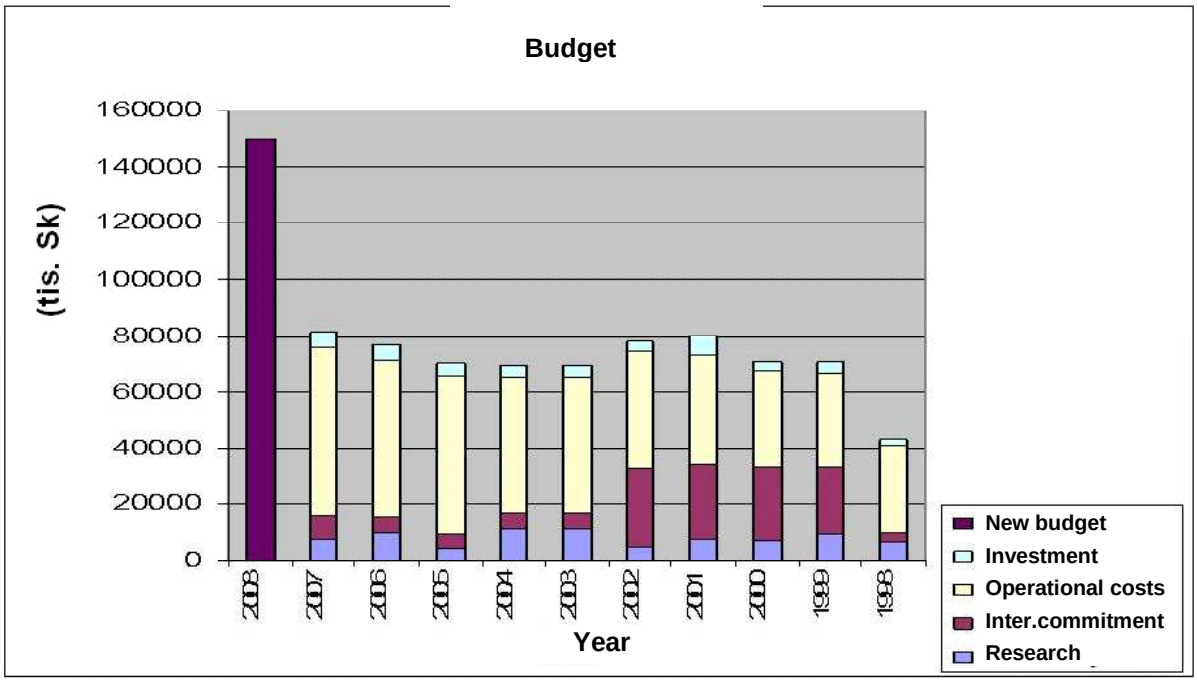
ÚJD also performs inspections of the operator of a specialized facility, who is a holder of authorization of professional training of authorization holder employees pursuant to § 5 sec. 3 (k) of Act No. 541/2004 Coll. ÚJD issues an authorization for professional training of authorization holder employees to the operator of a specialized facility based on a written application after reviewing the technical equipment used during the training and the professional competency of the applicant employees.

The objective of the inspection is to check the quality system documentation used for professional training of authorization holder employees, to review the technical equipment of a specialized facility, to examine the lecturers authorized for professional training of selected personnel, to control the performance of programs of professional training of professionally competent authorization holder employees, to control performance of system of professional training of authorization holder employees and to inspect the fulfillment of tasks, which must be met by the operator of a specialized facility for professional training of authorization holder employees, as well as to control the removal of identified deficiencies from preceding protocols.

4.2.5 Financial and Human Resources of the Regulatory Authority – ÚJD

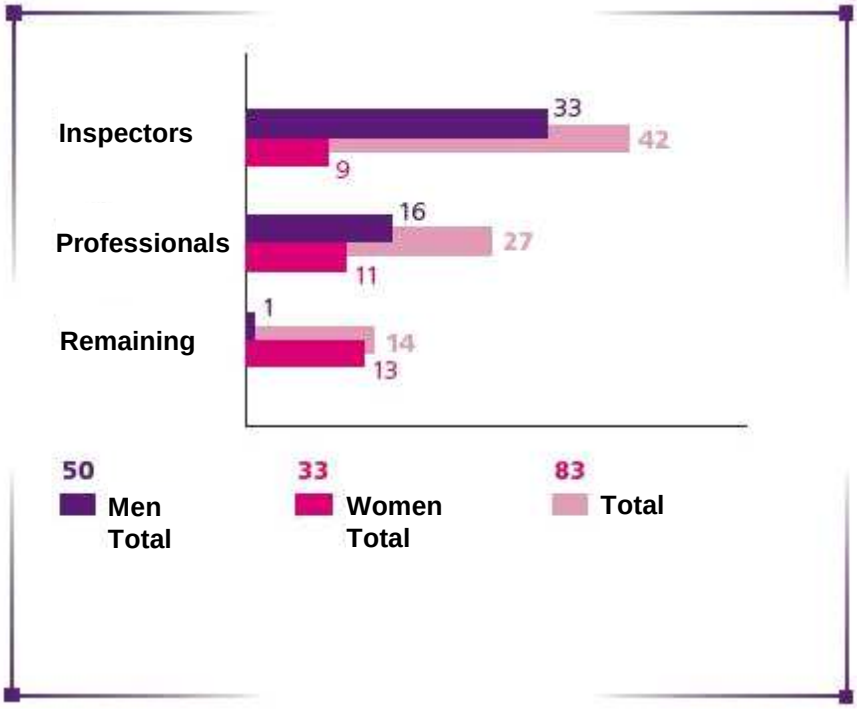
ÚJD is by its receipts and expenditures connected to the state budget. „Draft model of alternative financing of the Nuclear Regulatory Authority of the Slovak Republic involving partial use of sources other than the state budget“ was submitted to the Slovak Government and was approved by the Slovak Government on the 1st of March 2006 by its Resolution No. 204/2006. The Act on Alternative

Financing was passed by National Council of SR on 7. 2. 2007 and will come to effect on 1. 1. 2008. The merit of the proposal is that the holders of authorizations, issued according to the Atomic Act, pay prescribed contributions to the state budget, which will be within the activity of ÚJD divided for purposes of the regulation execution. The sum of annual contribution is dependant upon the type of nuclear facility and type of issued authorization.



For assurance of high-quality performances and fulfillment of challenging tasks, that result for ÚJD from the Act on Organization of Governmental Activities and of Central State Administration, as well as from the Atomic Act, the selection of high-quality and highly professionally competent employees, their education, stabilization and care is an important factor of its high performance.

ÚJD had a total number of 89 employees determined for the year 2006 by a break-down of the budget - 72 civil servants and 17 employees work in the public interest. Occupational structure of employees of ÚJD as of 31. 12. 2006 is in Pict. 4.2.2.



Pict. 4.2.2 Occupational structure of staff by 31. 12. 2006

4.3 Human Factor

4.3.1 Management and Organizational Measures

Management Documentation Related to Human Factor Influence

The human factor is determining the safe and reliable operation of nuclear installations. Special attention is therefore paid to human factor issues within the quality assurance system. Several quality system documents listed below are relevant from this viewpoint:

- Management of Events at Nuclear Installations,
- Survey Control by Enterprise Management,
- Survey Controls by Division Management,
- Survey Controls by Divisions,
- Survey Controls by Shift Crew,
- Labeling of Technical Equipment Based on S-order, with deficiency, Short-term Adjustment and Temporary Modification,
- Organization of Periodical Tests of Systems and Equipment,
- Working Competency, Organization and Realization of Training of Employees and Third Persons (Contractors),
- Contents and Form of Documentation and Instructions for their Preparation,
- Organization of Safe Work and Shift Operation Rules,
- Independent Verification.

The activities of operators of nuclear installations aiming at the minimalization of negative influences of human factor are focused at:

a) high-quality of staff training,
b) observance of principles of safety culture,
c) ergonomics of control rooms and emergency management centers,
d) influence of human factor on the risk of nuclear fuel damage and leakage of radioactive materials into environment
e) working environment of staff

4.3.2 Methods of Human Failure Prevention

Several methods and systems to prevent human failure are applied. The most important of them include:

- staff training (described in detail in Chap. 4.2.3.),
- high-quality documentation,
- application of system of rules for work performance on an equipment,
- testing of systems and equipments according to "Surveillance Programs",
- comprehensive labeling of installation
- control and surveying activities.

Operating and maintenance staff performs activities according to the approved documentation, which is continuously maintained, updated and amended pursuant to the requirements defined by the corresponding quality assurance standards (for details, see Chap. 5.3.3.).

Manipulations, activities and procedures not described in the valid operating documentation may only be performed on the base of a special program developed and approved in advance.

A significant reduction of the probability of errors committed by the staff upon accident and emergency events and thus the improved defense in-depth is achieved by implementation of symptom-oriented operating procedures. The provisions are subject to a validation process and an operating staff training on their use, and they are expected to come into force in the near future at the NPP Bohunice V-2. Similar procedures are at the same time also prepared for Mochovce and Bohunice V-1.

A system defining rules of work performance at NPP equipment is implemented and described in QA standards to prevent errors committed by the staff during repair, maintenance works, reconstruction and design change implementation at technological equipment. The system includes the following types of permits:

- **S-order**, a written order to secure equipment prior to its repair to enable safe performance of repair works; it specifies the type of work, place, time and conditions of their performance. It further specifies the responsibility for safe securing of the equipment to be repaired, the necessary safety measures to be taken and conditions of the takeover of the equipment for further operation. The order is issued by the installation administrator, and is approved by the Shift Supervisor. Z-order does not replace R and B orders if such orders are needed for the performance of the works in accordance with the respective regulations.

- **M-order**, for works at NPP technology to be performed under full operation and which bear the risk of reduced output or complete termination of TG, reactor or breaking of limits and conditions. The order is principally issued by the reactor unit supervisor of the respective unit on which works should be performed, after consultation with supervisor of the works. The supervisor of works must perform the manipulations exactly as defined in the M-order, he must not perform any other manipulation or change the order of manipulations. After the completion of the works, the supervisor of works is obliged to close the M order, i.e. to hand over the equipment on which manipulation had been performed, to the unit supervisor, the latter taking it over for further operation.
- **R-order** is issued in addition to Z-order to perform works in conditions of increased radiation risk; it specifies place, time and conditions of work performance, necessary measures and means for radiation safety provision, composition of the work team and the persons responsible for observing the "Radiation Safety Rules".
- **B-order** is issued in addition to S-order for work on electrical equipment of high and extra-high voltage. It is issued and closed by Shift Operation Foreman of the electric part.

Any works within the technological premises of a nuclear installation may only be performed with one of the above mentioned orders. Any work performed by the daily staff must not be started, interrupted or terminated without being known to and approved by Shift Foreman and the equipment service crew.

Performance of Equipment Testing

A significant reduction of the probability of errors committed by the staff during the testing of equipment is achieved by the application of an extensive "Surveillance Program" system (for details, see Chap. 5.3.3.).

Control and Surveying Activities

The system of control and surveying activities is described in detail in the Quality System documentation. It is hierarchically subdivided into:

- "Survey Controls by the Shift Crew" - The documents define the obligations of the staff during performance of controls and the procedure of reporting identified deficiencies. Survey Control Sheet has been elaborated for each shift position with control route and its frequency. The objective of this activity is to identify deficiencies on equipment so as to prevent with a high probability, by its periodic performance according to the instructions, failure to detect important facts due to the failure of the human factor.
- "Control and Surveying Activities of Managers" - is described in the Chap. 4.3.1.

Other Measures Taken by the Operator to Prevent Human Failure

- color distinguishment of documentation according to units at the site, what prevents occurrence of errors due to possible confusion of the units,
- system of labeling of technological equipment under repair and/or with failure; by tags and labels, what assures permanent visual control and overview of equipment in operation, under maintenance or repair,

- system of control sheets for handing over or taking over shifts by control room staff; the control sheets are used to check and record the conditions of the equipment, deficiencies, failures etc. to prevent potential errors made by the staff due to non-conveying important information between shifts,
- system of control sheets to take over safety systems from repair; it serves to eliminate staff errors during inconsistent induction of the respective equipment into the corresponding state,
- independent check of correct manipulations and of correct position of elements of equipments and systems important for safety; the aim is to prevent failure or false implementation of systems important for power plant safety due to human failure. It is performed by a person different from the one who performed or supervised the activity.

4.3.3 Methods of Detection and Remedy of Human Failure

Detection of human failure and taking of measures to prevent their repetition is an integral part of the system of investigations of events at nuclear installations and their root causes, for which feedback teams have been established in nuclear installation safety divisions. Details of the investigation procedures of events occurring at nuclear installations are described in Chapter 5.3.5. Below are only certain human factor-related aspects mentioned.

One of the effective methods used in detection and following remedy of human failure is the HPES method (Human Performance Enhancement System). This method has been developed in the U.S.A and later adopted as a general guideline for analysis of operation events in nuclear power plants.

The Event Investigation Procedure with the help of HPES

System HPES includes three main areas of assessment:

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

Method HPES utilizes various analysis techniques as an instrument for detection of causes of situations influencing the human performance. These techniques are applied by operators in dependence with the operational event type.

Feedback

The investigation result of an accident is the identification of root cause of its occurrence and following taking of measures for its repetition elimination. The efficiency of this process is periodically assessed and analyzed by employees of a feedback team. The results together with other measures and recommendations are included into an annual report, which is submitted to the power plant management for approval.

Power plant staff is regularly trained on the investigation results and their analyses. In addition, this information is also available in corporate computer networks.

To improve safety culture and self-assessment, the so-called safety culture action plans are developed by operators, which are annually evaluated and submitted to the company's management for approval.

The action plan is generally binding within the plant. Safety culture indicators have been defined for assessment.

4.4 Quality System of the Operator

4.4.1 History of Quality Systems Formation

There are currently two operators of nuclear installations - SE, a. s. and JAVYS, a. s. The formation of their quality systems is a continual process, which took place until the year 2006 jointly within SE, a. s., that's why the initial and current status in both organizations is similar and will be described in common.

The quality system observes always the actual national and international requirements and is based on:

- meeting requirements of legal provisions,
- meeting IAEA standards and recommendations,
- meeting international ISO 9001; ISO 14001 a OHSAS 18001 standards,
- implementation of internal social needs during formation of effective management system.

Act No. 541/2004 Coll. says:
A specific condition for issuance of authorization or permission for construction of nuclear installation, its commissioning, operation, decommissioning, nuclear material management and other activities mentioned in the Act is an approval of the documentation of quality assurance system.
The operator is obliged to create necessary organizational structure, procedures and resources for nuclear installation quality assurance (further referred to as „ quality system"").

ÚJD Decree No. 56/2006 Coll. of January 12th 2006, in reference to the Act No. 541/2004 Coll., regulates requirements for quality system documentation, as well as details concerning quality requirements for nuclear installations, details concerning quality requirements for classified equipment and details concerning the scope of their approval.

Pursuant to the Decree, the quality system documentation comprises documentation of quality management system, requirements of nuclear installation quality assurance and requirements for classified equipments quality assurance.

Quality management system documentation respects the STN EN ISO 9001: 2001 standard and further specific requirements defined in Annex No. 1 to Decree No. 56/2006 Coll.

The requirements for nuclear installation quality assurance are contained in programs of quality assurance; their content is defined in the annex No. 2 to the Decree and they are divided into:

- Preliminary program of nuclear installation quality assurance, which includes basic requirements for quality assurance for all stages of nuclear installation existence,
- Stage program of nuclear installation quality assurance, which includes requirements for quality assurance only for a concrete stage of nuclear installation existence (from designing to decommissioning).

The requirements for nuclear installation quality assurance are determined in quality plans of classified equipment; their content is defined in the Annex No. 3 to the Decree.

Decree No. 56/2006 Coll. lays down detailed requirements for all aforementioned documents and details on the scope of their approval.

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

4.4.2 Policies Declared and Implemented by Operators

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

The declared policies take account of material legal framework, international standards, international organizations´ recommendations and internal needs of the company.

The policies are:

- Quality policy,
- Environmental policy,
- Policy of safety and health protection at work and of technical safety,
- Nuclear safety and radiation protection policy,
- Security policy,
- Professional training policy.

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

They are defined so as to be:

- time-limited, measurable and can be evaluated,
- really achievable,
- comprehensive,
- economically justifiable.

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

The basic instrument to meet policies and goals is the maintenance and improvement of the ISM.

ISM primary principles are:

- every employee is responsible for the quality of his work,
- any quality-affecting activities are carried out in accordance with valid provisions,
- ISM is linked to good experience in the area of management system as well as the best national and international experience,
- management is responsible for elaboration, implementation, permanent monitoring and efficiency assessment and further development of ISM system including staff training

- ISM is built as a uniform management system that contains all implemented activities and procedures significant in respect to goal achievement and organization.

All activities in the identified ISM processes are managed so as to minimize negative impacts on environment, health and safety of the public and to be in line with valid legal order and permissions and resolutions issued by respective state regulatory authorities.

4.4.3 Formation of Integrated Management System on the base of Quality Management System

Elaboration and implementation of integrated management system (including quality system) is conducted in terms of valid Slovak legislation, international ISO 9001; ISO 14001 and OHSAS 18001 standards as well as IAEA documents (e.g. GS-R-3). The integrated management systems of operators are procedurally oriented.

4.4.4 Verification of ISM Efficiency

The efficiency of integrated management system, including quality system, is reviewed through:

- internal audits conducted within ISM by individual operators in fields of safety, quality, environmental protection in a form of autonomous or combined internal audits
- audits performed by external companies that certifying the environmental management system and/or safety management system (OHSAS)
- inspections conducted by ÚJD.

Any findings identified during the audits, inspections and reviews are subject to analysis at the corresponding level of the management. Based on analyses, remedial and preventive measures are taken; their implementation is controlled. In this way, continuous improvement of ISM, including quality system, is achieved.

Audits of contractor's quality management systems

Operators conduct audits of quality management systems of the contractors having influence on nuclear safety, checking upon the efficiency of the application of quality system requirements according to ISO 9001 standard and specific nuclear requirements resulting from legal provisions and IAEA recommendations. The purpose of such audits is to ensure high quality performance and reliability of contractors for safe, reliable, environmentally-friendly and efficient generation of electric energy.

4.4.5 Role of Regulatory Authorities

Activities and tasks of ÚJD with respect to state regulation of nuclear safety of nuclear installations are in the field of quality assurance laid down by the Act No. 541/2004 Coll. as well as by the Decrees No. 50/2006 Coll. and No. 56/2006 Coll. The Decree No. 50/2006 Coll. which lays down details concerning requirements for nuclear safety in respect of siting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorization of classified equipment into safety classes, sets requirements for categorization of classified equipment into safety classes I through IV according to the type of safety function they fulfill. This Decree also lays down

requirements for the lists of classified equipments, consequently approved by ÚJD. The Decree No. 56/2006 Coll. lays down details on requirements for quality system documentation of the operator, as well as details concerning quality requirements of nuclear installations, details concerning quality requirements for classified equipment and details concerning the scope of their approval. The Decree determines the basic quality requirements of nuclear installation and classified equipments, as well the request for elaboration of quality system documentation of authorization holder pursuant to § 5 sec. 3 of Atomic Act and to programs of quality assurance. ÚJD supervises the compliance of responsible organizations with requirements and conditions of quality assurance of nuclear installations and classified equipments mentioned in the Decree and how they implement them.

ÚJD´s philosophy in this area is based on the fact that, besides design of nuclear installations, nuclear safety of nuclear installation is also achieved by required quality of nuclear installations, classified equipments and corresponding activities. A quality system described in the quality assurance documentation of the operator serves as a bases to maintain and develop the quality.

In exercising the regulatory role in the field of quality assurance, ÚJD has been focusing on four principal activities:

1. *Review and approval of quality system documentation*
2. *Review and approval of quality requirements*
3. *Review and approval of changes in quality system documentation and quality requirements of nuclear installations and classified equipments*
4. *Inspections of implementation of quality system documentation and quality requirements*

Any identified deficiencies concerning the selected equipments, activities or documentation, may be followed by measures imposed by the inspector to eliminate them. Inspections are performed according to approved program, they have their objectives and set forms of documentation.

Inspection activity of labor inspectorates focusing on the issue of Quality assurance systems consists in control of legal and natural entities, who perform certain activities (i.e. production, assembly, repair, reconstruction, examinations, tests, maintenance, import ...) on equipments subject to the enhanced mode of labor inspection (para 3.1.5.1 Activity of Technical Inspection).

The quality assurance system, or its documentation, records and physical state of legal and natural entities is also examined by verification of professional competency.

The labor inspection authorities revise by a verification of professional competency especially the following:

- Extract from the Companies Register
- Organizational provision of activity
- Personal provision of activity
- Material and technical provision of activity
- References
- Others (according to the requirements of labor inspection authorities)

4.5 Safety Assessment and Verification

4.5.1 Characteristics of Operated Nuclear Power Plants

Nuclear power plants are operating at sites of Bohunice and Mochovce.

At Bohunice site, there are two reactors of WWER 440/V230 (NPP V-1) type and two reactors of WWER 440/V213 (NPP V-2) type.

The project design of NPP V-1 Units was in the scope of an extensive and expensive reconstruction vividly renewed and improved, so that in the present time these units can be considered an advanced type of the original project. During accession negotiations of Slovakia to EU it was agreed to terminate the NPP V-1 operation. The first Unit of NPP V-1 was shutdown in December 2006, the second will be shutdown at the end of 2008.

At NPP V-2, there are 2 units with WWER-440 type V-213 reactors. After twenty years of successful and safe operation, in the current time their modernization takes place, with the aim to improve their safety, reliability and seismic resistance. The goal of modernization is also the improvement of technical and economical parameters (lifetime extension, output increase, etc.).

At the nuclear power plant Mochovce, there are two units with reactors of WWER 440/V213 type. During the process of NPP Mochovce construction, it has come to a safety re-evaluation of the original project. Due to this, during the preparation of commissioning and operation of Units 1. and 2. of NPP Mochovce a number of safety measures and improvements have been carried out and resulted in further significant increase of reliability and safety of the units. Unit 1. of NPP Mochovce was commissioned in 1998, Unit 2. in March 2000.

Unit 3. and 4. of NPP Mochovce are in construction. Their construction was in the middle of 90ties terminated and their equipments were conservated. In years 2003-2005 a safety concept was devised in relation to completion of Units 3. and 4., with the effort to reflect the measures for project safety, performed at Unit 1. and 2. The new major owner of SE, a. s. is currently working on an assignment targeted at: detailed elaboration of requirements for safety improvement, drafting of modifications of the initial project and updating the Preliminary safety report. In March 2007, a resolution on completion of Units 3. and 4. of NPP Mochovce with time horizon until 2012 has been passed.

A detailed description of these installations is in the Chapter No. 2.

4.5.2 Safety Assessment of Nuclear Power Plants by ÚJD

ÚJD 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 mission of the assessment is to uncover weak places in the project. Safety report contains description of the power plant, which is sufficient for an independent assessment of safety characteristics. The review of the safety report by ÚJD forms the foundation for issuance of authorization for construction and operation and proves that all safety-related questions 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 method. 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.

A significant role in the process of safety assessment was accomplished by IAEA, that conducted in the years 1991 – 1997 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.

ÚJD 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. The Authority also uses experience from events on international level (IRS/IAEA / NEA/OECD).

ÚJD´s Requirements for periodical assessment are specified in detail in chap. 4.5.7.

ÚJD 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.

4.5.3 Basic Principles for Issuance of ÚJD Decisions on Safety Improvement of Operated Nuclear Power Plants

Similarly as in many countries, neither Slovakia has officially codified rules or requirements with respect to safety upgrading of nuclear reactors. Consequently, requirements of the regulator are specified for individual types of nuclear reactors. Safety improvement programs are developed by the nuclear power plant operator, who bears responsibility for nuclear safety.

In Slovakia, the nuclear power plants safety concept has been based on so-called "strategy of defense in-depth ", a strategy used generally world-wide in designing and operating nuclear power plants. By NPP safety assessment, ÚJD assesses the ability of the installation to fulfill safety-related functions in line with the project so as to ensure the required level of defense in-depth.

The safety improvement programmes are performed in accordance with the current international safety standards, provisions, and IAEA safety standards (NS-G-2.3 Modification of NPP).

Certain specific measures were set based on a comparison of selected national standards with those applied in other countries. As a rule, safety improvement measures for WWER 440 reactors have generally been oriented towards improving reliability, redundancy, physical, electrical separation of safety systems.

The list of safety-related deficiencies, management of which is contained in the safety improvement programs for specific reactor types, has been the result of the 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 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 Decree No. 49/2006 Coll. on periodical nuclear safety review.

4.5.4 ÚJD Requirements for NPP V-1 WWER-440/V-230 Safety Improvement

In relation to the cession of nuclear installation NPP V-1 from the ownership of Slovenské elektrárne, a. s. to ownership of company JAVYS, a. s. and upon the application of JAVYS, a. s. ÚJD issued in 2006 Decision No. 124/2006. Upon this Decision, after meeting specific conditions for authorization issuance by applicant pursuant to the Act, company JAVYS, a. s. (former GovCo, a. s.) has obtained the authorization:

- for operation of nuclear installation of Unit 1. and 2. of nuclear power plant V-1 in Jaslovské Bohunice
- for radioactive waste management in nuclear installation NPP V-1 in the scope of the plan for radioactive waste management in nuclear installation NPP V-1 including their transport
- for spent nuclear fuel management in the scope of the plan for spent nuclear fuel management in nuclear installation NPP V-1
- for nuclear materials management in nuclear installation NPP V-1

ÚJD bound its decision on fulfillment of conditions determined in Decision No. 124/2006, related to nuclear safety.

The project of NPPV-1 safety improvement was realized in 1996 - 2000 in the scope of gradual reconstruction.

Due to termination of NPP V-1 operation in 2006 and 2008, ÚJD has not set any new requirements for safety improvement.

4.5.5 ÚJD Requirements for NPP V-2 WWER-440/V-213 Safety Improvement

In 2001, ÚJD reviewed and approved in its Decision No. 250/2001 the „Safety Concept of Upgrading and Safety Improvement for NPP V-2“ presented by SE, a. s., the operator of the power plant. The approved material contains a time table of measures implementation, divided into categories in order to be completed by 2008.

The implementation of were into the following groups:

1. Safety measures, implemented by 31. 12. 2006 are 34.
2. Safety measures, which do not impact defense in-depth will be implemented according to planned activities. There are 4 safety measures in this group.
3. Safety measures, whose provision and completion was chosen in the context of functionality of particular systems according to the upgrading process. There are 14 safety measures in the group, whose implementation will be finished in 2007 and 1 safety measure in 2008.

4.5.6 ÚJD Requirements for NPP Mochovce WWER 440/V213 Safety Improvement

In meeting ÚJD requirements, NPP Mochovce unit 1 was commissioned in 1998, and unit 2 of NPP Mochovce was commissioned in 1999-2000 while complying with start up stages and enhanced emphasis on the implementation of safety measures.

The extent and the time schedule of the implementation of safety measures at NPP Mochovce were presented to ÚJD for review on 29 November, 1999. In December, ÚJD issued Decision No. 433/99 that set new dates for, and the extent of the implementation of safety measures.

Approval of NPP Mochovce unit 2 operation was granted by ÚJD by Decision No. 84/2000 setting, a. o. requirements on dates and the method of implementation of safety measures that had not been completed at the time of the unit start up. The current status of the implementation of safety measures is described in Chapter 2.3.3.3.

4.5.7 ÚJD Requirement for Periodic Safety Assessment

ÚJD requirements for periodical safety assessment are upon authorization in § 23 sec. 7 of the Atomic Act No. 541/2004 Coll. formulated in ÚJD Decree No. 49/2006 Coll. on periodical safety assessment. This decree regulates intervals and scope of the periodical assessment, during operation of nuclear installations as well as during their decommissioning and is in line with the current international good practices.

Periodical safety assessment is conducted every 10 years. During decommissioning, periodical assessment is performed always after completion of particular stages of decommissioning. Upon meeting conditions of periodical assessment ÚJD issues repeated authorization for operation or for another stage of decommissioning of nuclear installation.

The following are preformed within the periodical safety assessment:

- comparison of nuclear installation with current internationally accepted requirements and with good practices,

- verification of cumulative effects of installation ageing, impacts of performed and considered modifications on nuclear installation, impacts of operational experience and technical development in nuclear safety,
- determination and implementation of changes targeted at maintenance and gradual improvement of nuclear safety,
- proving that required safety level is secured until the new periodical assessment or until the time of expiry of authorization for operation.

In accordance with Decree No. 49/2006 Coll. it is required to verify the following areas: nuclear installation design, actual conditions of nuclear installation, qualification of installation, controlled ageing, safety analyses, operational safety of nuclear installation, utilization of experience from other nuclear installations and research results, organization and administration, quality assurance, operational procedures, human factor, emergency planning and impacts of nuclear installation operation on the environment.

4.5.8 NPP Operational Safety Assessment by Operator

Under ÚJD Decree No. 50/2006 Coll., the operator of a nuclear installation is obliged to elaborate an annual operational safety assessment pursuant to the established contents using the document IAEA TECDOC-1141 „Operational safety performance indicators for nuclear power plants“ and TECDOC-1125 „Self assessment of operational safety for nuclear power plants“. The assessment is presented by a set of indicators and structured into four levels. Top level is the safe operation of nuclear installation characterized by three principal attributes:

- smooth operation,
- positive approach to safety,
- minimum risk operation.

The attributes are not directly measurable and therefore the structure is extended to another three levels. Level 4 represents specific indicators, which are directly measurable.

In 2003, uniform safety performance indicators common to all nuclear installations were developed on the recommendations of the document IAEA TECDOC-1141.

In 2004, trial operation of a new safety assessment system was completed at SE, a. s. The system is supported by the database software PPRC (Power Plant Risk Control). After generation and incorporation of a complex list of operational safety performance indicators into PPRC, collection, registration, evaluation of the indicators can be done using the software. Based on the real values and the set evaluation criteria, the software comprehensively evaluates the status of NI safety. The assessment of the indicators is four-leveled and at the same time presented in four color zones. Furthermore, the software makes it possible to archive data, track trends in the indicators, make uniform reports and compare achieved results.

The assessment results are processed on a quarterly and annual basis and presented in the form of a report on operational safety status.

In case that degradation of any of the safety areas under assessment is indicated, remedial action is taken at the plant management level with a target to prevent further degradation of operational safety.

4.6 Radiation Protection

4.6.1 Legislation in the field of Radiation Protection and Its Implementation

The issues of health protection against ionizing radiation are regulated in the Act No. 126/2006 Coll. on Public Health Care. 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 governmental ordinances are listed in 6.2 (including those implementing Act No. 126/2006 Coll.).

4.6.2 Radioactivity Monitoring by the Operator

Every natural and legal entity performing activity related to occurrence of factors harmful to health is obliged in the sense of § 25 sec. 20 (b) and § 35 sec 1 (e) of the Act No. 126/2006 Coll. to provide for their quality and quantity identification at the workplace and its surrounding. Details on requirements for ionizing radiation monitoring in relation to ionizing radiation are set in the Governmental Ordinance No. 345/2006 Coll. (§ 30 to 32).

The operator of a NI have to establish a monitoring network and provide for its maintenance. The monitoring is performed on continual, periodical or operational basis. The monitoring plan contains according to the type of performed activity: the monitoring during usual operation, during foreseeable deviations from usual operation, during radiation incidents and accidents. The plan is structured into parts regulating the monitoring of:

a) workplace with ionizing radiation sources,
b) workplace surroundings with ionizing radiation sources,
c) individuals,
d) release of radioactive materials from workplace with ionizing radiation sources into environment

Monitoring plan must contain:

a) magnitudes important with respect to radiation protection, which will 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 upon their exceeding,
d) specification of measurement method,
e) specification of parameters of used types of measurement instruments and tools.

Monitoring plan must enable the management of radiation protection, observance of irradiation limits and early identification of deviations from usual operation and prove that the radiation protection is optimized. The monitoring results must be recorded by the operator so as to enable their use in case of need for personal doses estimation.

The identification of personal doses is secured by individual monitoring. Individual monitoring shall be systematic for category A workers. When suspecting based on the monitoring or calculation that limits of irradiation of workers with sources of ionizing radiation can be exceeded, then the determination of personal doses also takes into account the conditions and circumstances of irradiation. Individual monitoring can be performed by authorized dosimetry service according to a specific legal act.

Personal dosimeter must enable the measurement of all types of radiation participating in the external irradiation of employees by activities leading to exposure. When the personal dosimeter does not enable such measurements, further personal dosimeters are used; this is not the case, when it is technically not possible to use the personal dosimeter. In such cases, the estimation of doses is provided through results from monitoring of workplace or by calculation.

At workplaces with open radioactive sources, where internal exposure of employees can occur, also internal irradiation must be evaluated. Intake of radionuclides and commitments of effective dose are detected by measurement of radionuclides activity in employee's body or his secretions, by measurement of concentration of radionuclides in atmosphere, by measurement of workplace contamination and re-calculation to intake of radionuclides with the help of corresponding coefficients and models of respiratory and digestive tract.

The operator is obliged to send regularly reports on monitoring results to the state administration bodies according to the conditions set in the authorization and provide them to inspectors.

Gaseous and Liquid Discharges

The release of liquid and gaseous discharges from nuclear installation is managed by three kinds of legislative provisions:

- provisions on health protection,
- indirectly also by provisions of the Atomic Act – in the scope of limits and conditions of operation and decommissioning,
- liquid discharges are referred to in the Governmental Ordinance No. 296/2005 Coll. which sets requirements on limit values of pollution of surface water.

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

„It is allowed to release radioactive substances from a nuclear installation into atmosphere and surface waters, when assured that the effective doses as a consequence of such release in respective critical group of population will not annually exceed 250 μSv. This value is considered to be the limit dose for designing and construction of nuclear installation. When there are more nuclear installations in one site, which influence the dose of population in the same critical group, this value also refers to the total irradiation from all nuclear installations in the site or the region".

The value of 250 μSv is divided into 200 μSv of gaseous discharges and 50 μSv of liquid discharges; this is generally in line with approaches in other countries operating nuclear power plants.

Gaseous Discharges

The limits distinguish between two types:

- balance values, set up in magnitudes of annual discharges. These magnitudes are monitored by so-called balance monitoring; its main task is to provide real data for annually repeated calculations of real annual commitment of effective equivalent dose for an individual from a critical group of population.
- reference levels, which do not have direct relation to the mentioned radiological limit. They serve as the background for identification and investigation of potential event and potential intervention at the source, where the discharge originates. They are magnitudes of radionuclide activity in a time unit (in the case of gaseous discharges - a day or a week) or volume activities. There are three reference levels: recording, investigation and intervention. Own magnitude values were created by expert assessment of the respective balance values fractions while taking into consideration the kind of nuclear installation as well as the possibilities of devices used in such case for so-called signal monitoring.

The Public Health Care Office (ÚVZ SR) of has set up in its authorization the following annual limits of gaseous discharges for a whole site:

- rare gases 4000 TBq
- ^{131}I (gaseous and aerosol form) 0,13 TBq
- mixture of radionuclides with long half-life in aerosols 0,16 TBq
- ^{89}Sr and ^{90}Sr in aerosols 0,3 GBq
- mixture of selected transurans emitting α-radiation 0,05 GBq.

It is obvious from this principle that the two first limits can be related only to operated nuclear units, the other three should be common for all nuclear facilities of the site.

Reference levels of gaseous discharges are set for the whole site as the following:

	recording level	investigation level	intervention level
rare gases [Bq.day^{-1}]	1,1.10^{12}	3,3.10^{12}	5,5.10^{13}
^{131}I (gaseous form) [Bq.day^{-1}]	3,6.10^{7}	1,07.10^{8}	1,8.10^{9}
mixture of radionuclides with long half-life in aerosols [Bq.day^{-1}]	4,4.10^{7}	1,32.10^{8}	2,2.10^{9}

Concerning the restraining and related monitoring of gaseous discharges from EMO, the approach is basically the same as in the case of Bohunice site. Numerical values of annual limits of gaseous discharges are i.e. the following:

Kind	Rare gases	^{131}I (gaseous and aerosol form)	Mixture of radionuclides with long half-life in aerosols
Limit	4100 TBq	0,067 TBq	0,17 TBq

The monitoring of gaseous discharges proved the observance of these limits. However, a corresponding ÚVZ SR decision contains a requirement for annual evaluation of discharge impacts on dose load of population, that is why it furthermore explicitly requests:

- to determine the amount of releases,
- to determine activity in aerosols by gamma-spectrometric analysis, from operated nuclear power plants, ^{238}Pu, $^{239+240}$Pu, ^{241}Am activity by alpha-spectrometric analysis, activity of tritium, activity of ^{14}C,
- to determine radionuclides activity in aerosols by gamma-spectrometric analysis, from other installations of JAVYS, a. s ., ^{238}Pu, $^{239+240}$Pu, ^{241}Am activity by alpha-spectrometric analysis.

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

Liquid Discharges

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

It is required to perform further measurements in the representative samples of released waters so as to be able to determine the annual commitment of effective dose for an individual from critical group of population (what does not have to be the same individual as in the case of gaseous discharges).

An extraordinary case is the monitoring of liquid discharges from RAW repository at Mochovce. These discharges unlike the discharges from EMO are not released into Hron, but to a close Telinský potok, outfall of which is approximately after 2 km into Čifársky rybník. The legislative conditions are rendered by restraning balance and also volume activity of tritium, ^{137}Cs, ^{90}Sr, ^{60}Co and ^{239}Pu, but on its own it does not have any material justification: gathered rain waters are relased from concrete water head tanks in the front part of the area and also surface waters are released from under clay seals of disposal structures (rain waters seepages from the area outside of clay basins of disposal structures, so-called monitored drainage). The waters are measured prior to such release.

4.6.3 Regulatory Activities in Radiation Protection

Pursuant to the Act No. 126/2006 Coll., the responsible authority in the field of radiation protection is the Public Health Care Office (ÚVZ SR) and Regional Public Heath Care Offices (RÚVZ).

State health regulation is the inspection of observance of provisions of this Act, generally binding legal provisions issued for its execution and other generally binding legal provisions regulating protection of the public health by ÚVZ SR and regional offices.

The person exercising the state regulation is inter alia authorized to enter grounds, objects, installations and operations and other premises of inspected subjects, ask for necessary accompanying, take samples in amount and scope needed for investigation, request necessary information, records, data and explanations, attached documents, technical and other documentation, impose measures for removal of identified deficiencies and penalties.

The person executing the state regulation can take the following measure:

- prohibit the use of devices and equipment, which imminently endanger health,
- order the operation termination or its part, when hazard of health damage is detected,
- order measure implementation for limitation of irradiation of employees and population,
- order safe removal of unused or damaged sources of ionizing radiation, radioactive wastes or radioactive substances,
- order elaboration of special operational orders, working procedures and methodic for performance of activity leading to irradiation,
- prohibit activities or operations,
- order performance of special measurements, analyses or investigations for purposes of evaluation of health-harming factors and their impacts on health

Regulation of radiation protection during activities leading to irradiation is performed during the stage of its authorization and afterwards continuously, according to the character of the hazard it represents.

The inspection of the radiation protection is secured by:

- conditions set in the authorization, which inter alia contain requirements for systematic continuous reporting on performed activity, radiation protection, results of monitoring of events and changes in the operational documentation
- on-site inspections, by which the observance of requirements and conditions set by law, actual status of radiation protection, documentation, equipments, observance of regime and monitoring systems etc. is inspected.

On-site inspections are often connected with performance of control measurements of radiation situation and control sampling by the inspectors.

The inspections are mainly focused at a specific area important in respect to the radiation protection.

4.7 Emergency Preparedness

4.7.1 Legislation in the field of Emergency Preparedness

The basic legislation in the field of emergency preparedness is in the present time made up from legal acts and resort decrees, which have the largest share on the emergency preparedness and emergency planning, namely the following:

- Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to certain acts as amended,
- Act No. 126/2006 Coll. on Public Health Care,
- Act No. 444/2006 Coll. on Civil Protection of Population (full wording of Act No. 42/1994 Coll. on Civil Protection of Population as amended),
- ÚJD Decree No. 55/2006 Coll. on Details Concerning Emergency Planning in case of Nuclear Incident or Accident,

- Regulation of MoIA SR No. 533/2006 Coll. on Details Concerning Protection of Population Against Effects of Dangerous Substances,
- Governmental Ordinance No. 345/2006 Coll. on Basic Safety Requirements for Health Protection of Workers and Population Against Ionizing Radiation,
- Act No. 124/2006 Coll. on Safety and Health Protection at Work and alternations and amendments of certain acts

These basic acts are supplemented by other acts from the field of crisis management and partially also emergency planning:

- Constitutional Act No 227/2002 Coll. on State Safety At The Time Of War, War Status, State Of Crisis And State Of Emergency, which is inter alia concerned with management of situations related to terrorist and violent criminal acts
- Act No. 387/2002 Coll. on State Control in Crisis Situations Others than the Time of War and War Status,
- Act No. 129/2002 Coll. on Integrated Rescue System,
- Act No. 261/2002 Coll. on Prevention of Major Industry Accidents.

All aforementioned documents respect in the field of emergency preparedness relevant European Union directives and IAEA recommendations, such as the following:

EU:

- 82/501/EHS: Council Directive of 24 June 1982 on the major-accident hazards of certain industrial activities,
- 87/600/Euratom: Council Decision of 14 December 1987 on Community's arrangement for the early exchange of information in the event of a radiological emergency
- 89/618/Euratom: Council Directive of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency

IAEA:

- Safety Series GS-R-2 Preparedness and Response to a Nuclear or Radiological Accident – Safety Requirements,
- Safety Series 50-SG-06: Preparedness of the Operating Organization to Emergencies in NPP,
- Safety Series 50-SG-66: Preparedness of the Public Administration Bodies to Emergencies in NPP,
- Safety Series 55: Emergency Response Planning In NF Surroundings In Case Of A Radiation Accident In NPP,
- Safety Series 72. Rev. 1: Protection In Uncontrolled Radioactivity Source Accidents,
- TEC DOC 953 - Methods of emergency preparation of response to nuclear and radiological accidents,
- TEC DOC 955 - Basic assessment procedures to determine protective measures during reactor accident.

4.7.2 Implementation of Legislation in the field of Emergency Preparedness

4.7.2.1 National Organization of Emergency Preparedness

The Slovak Government in accordance with the Act No. 387/2002 Coll. established the Central Crisis Staff (further referred to as CCS) as its executive body. All resort ministries and other central bodies of state administration are represented in CCS. CCS coordinates the activity of state administration, self-administration and other components during handling a crisis situation, that is – in connection to ÚJD also during management of incident or accident of nuclear installation or during transport. At the same time, however, parallel with this executive body of the Slovak Government, also the Commission for Radiological Accidents of the Slovak Government (further referred to as CRA SR) exists; based on its Statute approved by the governmental resolution it is an advisory and coordinate body for uniform preparation and implementation of measures on population and environment protection against consequences of emergency events with radiological effects in case of their occurrence or possibility of their occurrence in the territory of the Slovak Republic and abroad, too.

To ensure necessary measures to cope with a nuclear facility emergency and measures to protect the population and economy during events with environmental impacts, the national emergency preparedness organization (Pict. 4.7.1) is structured into three levels.

The first level is formed by emergency committees of nuclear facilities with the prime function made of management of works and measures on 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 is formed by crisis staffs of local state administration and corresponding radiation accident committees, whose territory stretches to the area at risk, where danger can be posed to life, health, or property, and where the public protection measures are planned. This territory is determined by a radius of 25 km around NPP V-1 Jaslovské Bohunice, 30 km around NPP V-2 Jaslovské Bohunice and 20 km around NPP Mochovce.

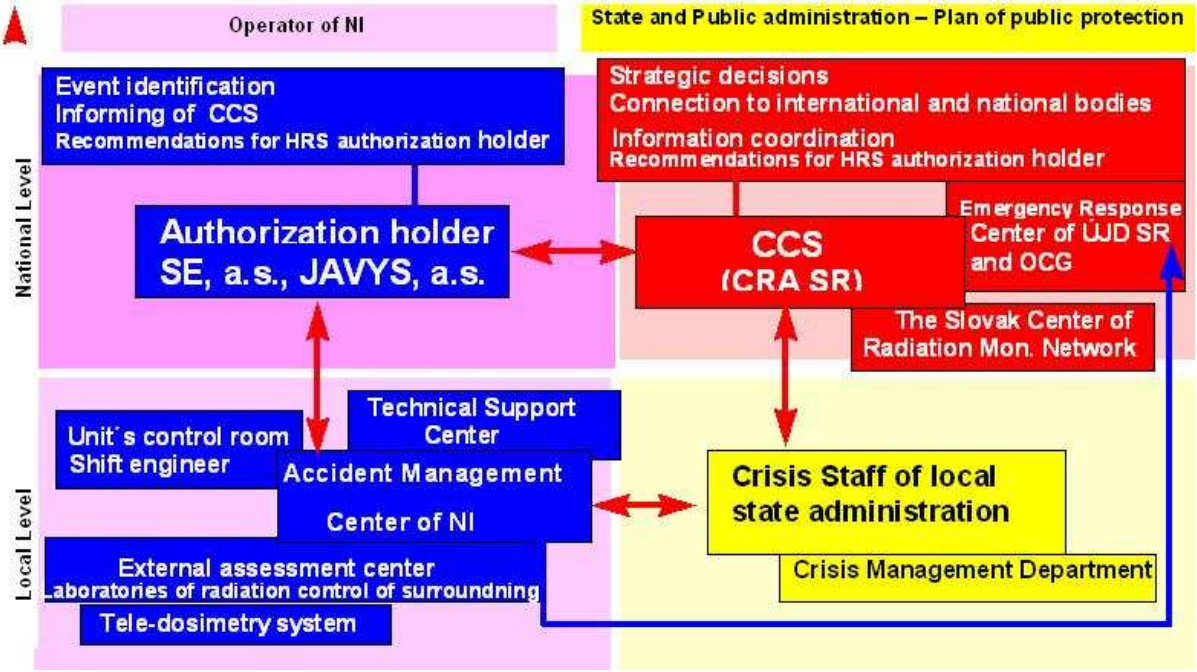
The third level is formed on the national (state-wide) level by the CCS with its support components (i. e. Emergency Response Center of ÚJD – ERC, Operation Control Group - OCG and The Slovak Center of Radiation Monitoring Network - SCRMN). The task of CCS is to manage the emergency situation, when its range extends beyond the territory of the district. In the present day also CRA SR exists, whose task is especially to coordinate and manage preparation of measures focusing on protection against consequences of radiological event, when the possibilities on the level of local state administration are trespassed.

A part of this level are Failure commissions of operator of nuclear installation, which closely cooperate with ERC of ÚJD, but also with local state administration. The main task of Failure commission is

mainly to organize and coordinate quick liquidation of major and emergency events in corresponding production and distribution facilities.

4.7.2.2 Professional and technical instruments of CCS and CRA SR

- Emergency Response Center (ERC) of ÚJD is a technical support instrument of ÚJD for monitoring of NI operation and assessment of technical conditions and radiation situation in case of a nuclear or radiation emergency, and for prognosis making of the emergency development and consequences according to the Act No. 541/2004 Coll. It is also a technical support instrument for CCS and OCG, originally established as a part of CRA SR.
- Operation control group (OCG) is a specialized consulting body established on the base of CRA's statute and decision. OCG's task – based on a situation assessment in case of a NI incident or accident - is to process data and submit one joint recommendation of the involved resorts for decision-making on measures to protect the public on the state level. When making these recommendations, it closely co-operates with ERC of ÚJD aiming at formation of one unified recommendation for decision-making on the state level – CCS, or eventually CRA SR.
- The Slovak Center of Radiation Monitoring Network (SCRMN) is a technical support body established by Ministry of Health of SR, where data from all radiation monitoring systems in the whole territory of Slovakia are centralized and assessed.



Pict. 4.7.1 National organization of SR emergency preparedness – basic prinicple

Operator of nuclear installations has on-site emergency plans elaborated, setting the organization of emergency response and its implementation concerning the management of emergency situations and staff protection, including protection of health of employees laid down in traumatological plan. Besides that, operating instructions are in place to enable identification and classification of emergency event according to international recommendations.

Plans for public protection in the endangered area are developed on the regional level, that include measures on protection of public, health, property and environment and are linked to internal emergency plan.

So-called National Emergency Plan is developed on the national level, that includes all procedures and measures of the individual members of still existing CRA SR, which approved it on 29 November 2001. Besides this, there are ERC of ÚJD emergency procedures and plans of action developed on the national level.

All the above mentioned plans fully apply the provisions of the national legislation as well as international recommendations by IAEA and European Union Directives mentioned in section 4.7.1.

4.7.3 On-site Emergency Plans

On-site emergency plans and the related documents are developed so as to provide for the protection and preparation of the staff in the case of occurrence of a significant leakage of radioactive substances into the working environment or its surroundings and the need for taking measures to protect health of the people at the nuclear installation or of the population in close surrounding.

The aim of the on-site emergency plan is to provide for the preparation of NI employees for planned measures implementation in case of event occurrence at NI, emphasizing performance of the following aims:

- to mitigate risk and consequences of the event at NI on equipment, employees and population in the surrounding of NI at its source
- to prevent serious health detriment (i.e. death or serious injury),
- to mitigate the risk of possibility of occurrence of stochastic effects on heath (i.e. cancer and serious heritable phenomenon).

The aim of the on-site emergency plan is to provide for the activity of the Emergency Response Organization (ERO), i.e. planning and preparation of organizational, staff, material and technical means and measures to successfully manage crisis and emergency situations according to the classification of the event. ERO comprises by the authorization holders the following units:

- Emergency Control Center (ECC)
- Technical Support Center (TPS)
- Operating Support Center (OSC),
- External Evaluation Center (EEC)
- Information Center (IC).

The information flow starts as early as the occurrence of an event (Act No. 541/2004 Coll.), which the authorization holder notifies to ÚJD, the Slovak Energy Control Center (SECC) and subsequently the emergency service.

Information during the emergency has to be provided to the regulatory bodies (ÚJD, SHI), Headquarters of the operator, Slovak Center of the Radiation Monitoring Network (SCRMN) and emergency commissions at the regional level of local state administration. Information flow between

NPP and ERC of ÚJD on the conditions of the technological equipment and critical safety-relevant functions takes place on-line, pursuant to the Act No. 541/2004 Coll.

4.7.4 Public Protection Plans (Off-site Emergency Plans)

Public protection plans in case of nuclear incident or accident of a nuclear installation (further referred to as „Off-site emergency plans") are developed by local state administration bodies and municipalities, whose territory is located within the region at risk, defined as an area of 25 km in radius for NPP V-1 Bohunice, 30 km for NPP V-2 Bohunice and 20 km for NPP Mochovce. The mentioned off-site emergency plans are linked to internal emergency plan of NI operator who is liable to present ground documents concerning the hazards expected to occur upon an incident or an accidento to the developers of site emergency plans.

Off-site emergency plans are being developed under coordination of OCP of MoI SR and after review by ÚJD and other state administration authorities and approval by respective head of the local state administration authority, are being approved by OCP of MoI SR.

Upon the occurrence of an emergency situation that is of the nature of a radiation event in nuclear installation, local state administration bodies take care of measures resulting from off-site emergency plans. This activity is done by respective crisis staffs, that cooperate with CCS. Regional or District Commissions for Radiation Accidents that have the status of an advisory, coordinating and steering body to the Head of the corresponding Regional or District Office on matters of standard provision for the development and implementation of measures to protect the population and the economy upon the occurrence of a radiation event are established on the level of local state administration bodies. The activities of the said commissions are covered by CRA SR, which is a steering, advisory and coordinating body of the Slovak government. To prevent the risk of delays in fulfilling tasks connected with protection of the population, the respective commissions are part of the national emergency response organization (hereinafter „ERO“).

Upon the occurrence of a radiation event associated with leakage of radioactive substances, NI authorization holder in accordance with on-site and off-site emergency plans and based on evaluation of the situation concerning the technology, identification of the source, values measured by the tele-dosimetry system, first measurements of the radiation situation in the NI environment and the meteorological situation, provides for warning of the population without any delay in case of 3. degree event and for notification of corresponding bodies and organizations in the territory at risk in case of 2. and 3. degree event. Afterwards, the state administration bodies, local state administration bodies and municipalities take care of further unavoidable and subsequent measures consisting mainly of iodine prophylaxis, hiding and/or evacuation, and so on. These measures are to be implemented in the territories affected by consequences of the radiation event, including territories, where the consequences of emergency may spread as suggested by prognosis.

Draft measures to protect the population are prepared and secured on all levels of state administration management and of the involved resorts.

When the range of the radiation event extends beyond the territory of a single district, in which the activity has so far been ensured by local state administration, the activity passes over to the state level

and it is provided by CCS. For this purpose, CCS uses conclusions and recommendations by expert and support units (such as ORS, ERC of ÚJD, SCRMN) that normally closely cooperate also with corresponding local state administration bodies and other involved resorts.

4.7.4.1 Emergency Transport Order

For the purposes of transport of fresh and spent nuclear fuel, nuclear materials and radioactive wastes, the holder of authorization for transport pursuant to Act No. 541/2004 Coll. and ÚJD Decree No. 55/2006 Coll. develops emergency transporting order (ETO). The purpose of such ETO is to provide for preventive and protective measures for the case of an accident or incident during the transport. The holder of authorization for NI operation develops ETO for the transport of mentioned materials on roads and railroads under his administration. After review of ETO by ÚJD and other bodies involved, ETO is approved by Ministry of Transport, Posts and Telecommunications of the Slovak Republic.

4.7.5 Warning and Notification Systems of Population and Personnel

The population warning and authorities, organizations and personnel notification is performed in line with the Act No. 42/1994 Coll. on Civil Defense of the Population as amended. Technical assurance of population warning and authorities, organizations and personnel notification in the sites is the following:

a) Bohunice in the radius of 30 km:

for population, authorities and organizations

1. external system of warning in the area at risk is composed of a system of mass remote-control through power grid elements (HDO). Control receivers HERKUL-S are used to warn the population – they are used to control 431 rotator sirens located within the zone of 30 km. Sirens can be controlled by sectors. Additional information for population after the siren sound warning will be broadcasted by electronic mass communication means.
2. external system of person notification uses HADOS receivers. Mayors of municipalities, large enterprises, other institutions and all CRA SR members are equipped with such receivers. The authorities and organizations notification is besides the HDO system safeguarded by public telephone networks. A computer equipment of automatic telephone person notification ZUZANA V-1, V-2 is used for speed-up and automation of notification.

for personnel:

1. internal system of warning consists of 3 transmitters, 105 pcs of small electronic sirens, 7 pcs of electrical sirens and 103 pcs of watch lightes.
2. internal system of personnel notification uses the enterprise radio, radio-network and notification equipment ZU 1619 APC ZUZANA. For notification of emergency commission members, a paging system Multitone is built.

The shift engineer of the unit in accident decides upon the initiation of population warning and authorities, organizations and personnel notification. Regular testing of notification with HADOS receivers is done 4 times a year. Acoustic testing of warning with sirens is done once a month.

In regard to legislative standards laid down in MoI SR Regulation No. 388/2006 Coll. on details for securing technical and operational conditions of informative system of civil protection, the warning system Bohunice meets technical conditions only until 31. 1. 2008. After this term, the system should comply with technical conditions according to § 3 of MoI SR Regulation No. 388/2006 Coll.

b) Mochovce in the radious of 20 km

for population, authorities, organizations and personnel

1. warning system based on radio controlled electronic sirens. The system is able to work 72 hours without connection to electricity grid and enables selection control of sirens, transmission of audio information and continuous control of conditions and serviceability of particular sirens.
2. notification system based on paging radio network. Members of OHO - EMO in emergency, mayors of municipalities and members of accident committees and staffs are equipped with these receivers.

Both systems are controlled from NPP Mochovce control center VYR-VAR or reserve control center VYR-VAR. The responsibility for their triggering lies with the shift engineer or HRS supervisor. The systems are regularly tested and maintained in permanent operative state.

4.7.6 Maintenance Systems of Emergency Preparedness

The personnel in sites Bohunice a Mochovce are classified into 4 categories depending on the extent of emergency training:

category I - personnel with a short-term stay in NI (visitors, excursions, etc.);
category II - personnel permanently working in NI;
category III - personnel involved in ERO;
category IV – mayors of municipalities within the emergency planning zone.

The training includes two parts:

- theoretical training,
- practical training.

Emergency training of the power plant personnel is conducted according to particular categories in a form of a presentation, interpretation, group seminar, practical display and practical training - drill. Emergency training of shift personnel represents a separate part of the training. In both sites of authorization holders (SE, a. s. and JAVYS, a. s.), shift drills are performed twice a year, whole-site emergency drills with participation of all company's employees are done once a year and a collaboration emergency drill, organized in collaboration with local state administration authorities, CCS, CRA SR, ERC of ÚJD, perhaps other ERO branches (fire brigades, heath care, army etc.) is performed once every three years. NPP V-1 EBO and V-2 EBO collaboration drill with participation of ERC of ÚJD and local state administration authorities in the radius of 30 km from the area at risk was recently done in October 2006; NPP EMO in the radius of 20 km from the area at risk was recently done in April 2006.

After the drill completion, their course is being evaluated by observers and jury, and measures are taken to improve the activities of the individual ERO components. Such measures are subsequently reviewed and the company's management takes care of their implementation.

4.7.6.1 Equipments and Means of Emergency Preparedness

They consist of the units referred to in Chapter 4.7.3 and are supplemented with the following equipment:

- Backup emergency center (BEC) serves as a substitute workplace of emergency commission in case of an extremely severe radiation situation at SE-EBO. BEC is a newly-established center at the off-site dosimeter premises in sites Bohunice and Mochovce.
- Civil protection shelters are used as 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 and other persons staying at plant territory assembly. Thanks to their equipment, they create conditions for a short term stay of personnel using individual protection means (IPM).
- In-house medical centre (IHMC) is intended for basic medical provision, giving pre-medical and medical aid and preparation for transfer of the injured persons to specialized medical centers. A part of IHMC is also a decontamination node and workplaces for internal individual contamination measurement.
- Communications facilities and equipment installed at NI territory:
  a) Slovak Telecom's public telephone network,
  b) energy telephone network,
  c) mobile telephone devices,
  d) Motorola special purpose radio network,
  e) Multitone paging network,
  f) in-house radio and operational (unit) radios.

4.7.7 International Treaties and Conventions

4.7.7.1 European Union Information System - ECURIE

On 1 May 2004, the Slovak Republic became a Member State of the European Union. This means that the SR must observe EU regulations, directives and decisions in the relevant areas. In the area of emergency preparedness this involves in particular the Council Decision No. 87/600/EURATOM on Community arrangements for the early exchange of information in the event of a radiological emergency. Under this Decision, European Community Urgent Radiological Information Exchange (ECURIE) has been set up in EU. As of 1 May 2004, the SR has become integrated in this system through ÚJD together with the other new Member States. ÚJD is in the system a contact point with a 24-hour permanent service. The ECURIE contact point is identical to that of the IAEA Convention on early notification of a nuclear accident according to 4.7.8.2. A concurrence place for ECURIE system is backed-up by a contact point – the permanent service of OCP of MoI SR. A national coordinator and his deputy have been appointed for ECURIE.

4.7.7.2 Conventions in deposit 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 measures provision 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). An expert garantor for the performance of the Convention provisions is ÚJD, which is at the same time the Slovak Republic's contact point for early notification of a nuclear accident. The Slovak Republic takes part on a regular basis through ÚJD 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 of the 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 cooperation 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 coordinators 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 cooperation and exchange of information in areas of common interest in connection with peaceful uses of nuclear energy and protection against radiation.

4.7.7.4 Participation of SR in International Drills

A set of drills utilizing the international system RODOS has been performed in the preceding period; the system serves for support of real time decision-making of public protection measures. The aim of the drills was to review modifications and practical utilization of this system in case of nuclear or radiation accident. In cooperation with VUJE, a. s. ÚJD participated on the adoption of guideline for restoration of contaminated territory in case of radioactive substances leakage after incident or accident of nuclear installation. This guideline has been re-adjusted to Slovak conditions and after several work meetings was presented to representatives of state administration authorities, who appreciated its practical utilization for removal of consequences after radioactive substances leakage in case of nuclear or radiation incidents or accidents.

Nuclear Energy Agency OECD (OECD NEA) has organized in year 2005 a drill called INEX 3. It prepared an initial scenario for this drill, which every participated country could adapt according to its specific needs and possibilities, however with a common aim - exercise procedures in decision-making

and taking of optimal measures for population protection in a late stage of NI accident and measures in the area of agriculture and forests. Regarding the specific regional similarity of Slovak and Czech Republic, ÚJD and State Office for Nuclear Safety of the Czech Republic decided to perform during 12. – 15. September 2005 a common drill with the target to exercise mobile monitoring groups and exercise of emergency staffs by management of consequences in the last stage of nuclear installation accident.

An ECURIE drill of 3. level took place on 4. 10. 2006. The initial event was a fictive accident in a nuclear installation in Sweden. National Regulatory Authority participated on this drill through a contact point. At the same time, system EURDEP was put in motion and consequently also integrated in the drill; the system's administrator is Slovak Hydrometeorological Institute and it provides exchange of information within EU monitoring systems. Besides this drill, ÚJD regularly attends ECURIE drills of level 1. and 2.

CONVEX drills are organized under supervision of IAEA residing in Wien. Their aim is to verify the system of warning and notification of member states IAEA - ENAC (Emergency Notification and Assistance Convention). The most of the member states IAEA have acceded to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or a Radiological Emergency. Just as these conventions require, the Authority is a contact point and at the same time a competent authority to represent the Slovak Republic. The Office of Civil Protection of Ministry of Interior of SR provides 24-hour service of national warning place for the needs of the contact point SR (ÚJD). In 2006, besides the usual CONVEX drills of 1. level two CONVEX drills of 2. level took place. The first drill was a CONVEX drill – 2a level and the second once CONVEX drill – 2c level (on 16.11.2006). Also the Slovak Hydrometeorological Institute participated in this drill. All methods of information exchanges between ÚJD and SHI were verified during the drill.

In the meantime, preparations for an international drill take place; the drill will happen in Autumn of 2007. The drill participants besides ÚJD will be also the State Office for Nuclear Safety of the Czech Republic and JAVYS, a. s. Furthermore, representatives from Hungary and Austria will attend the drill. The purpose will be to evaluate consequences of radioactive substance leakage during a fictive accident of NPP V-1 Bohunice. The scenario of the drill will be set to extend to the territory of the Czech Republic. The main mission of the drill will be the verification of informative flows between particular subjects involved in the drill, of sending technological data, of draft and implemented measures.

4.8 Public Relations

The right for information in Slovakia has been guaranteed by the Constitution and other documents on human rights since the early 1990´s. The passing of the Act No. 211/2000 Coll. provide the citizens with a statutory way of obtaining necessary information. This Act along with the Act No. 541/2004 Coll. constitutes a legislative framework for public relations in the field of nuclear energy. The operator of nuclear installations is liable pursuant to the Act No. 541/2004 Coll. (§ 27 sec. 4) to notify ÚJD of events at operated installations and, in case of incidents and accidents, also to inform the public.

The operators organize presentations and excursions in their information centers located directly in the nuclear installations. Annually, the premises of NPP Bohunice and NPP Mochovce are visited by 12 to 15 thousands visitors from the whole Slovakia and abroad. Safety improvement at NPP Bohunice and Mochovce vividly influenced the life in the regions, thus at the same time contributing towards an appropriate bilateral communication with the vicinity. Apart from the monthly „Spravodajstvo SE, a. s.“ (SE, a. s.´s News), also regional monthlies „Bohunice“ and „Mochovce“ and other informative press publications assist the forthcoming and transparent communication; they are distributed free of charge in the area. A significant place in the sites of power plants Bohunice and Mochovce have the mobile photograph exhibitions on history of the nuclear energy and safety improvement of nuclear energy. This information processed in an accessible and comprehensive form continuously offers an open informing of the widest public about recent works on safety improvement in nuclear power plant and on nuclear energy in general. In addition to spreading information in the regions, NPPs also make a general contribution towards the infrastructure of the regions, including support of the health care sector, sector of education, social institutions, culture and sports.

ÚJD as the central authority of state administration in the field of its competency provides information upon request and enables the public and the media to verify the data and information on nuclear installations. The authority holds competencies in respect to keeping the public informed on nuclear safety matters and monitors other media sources with a view to get the necessary overview of information policy on a given subject. It is a regulatory authority, which independently from nuclear installation operators, provides information on nuclear safety of nuclear installations, including information on the management of radioactive wastes, spent nuclear fuel.

ÚJD annually sends 60 to 70 contributions on its domestic and international activities to the Slovakia’s press agencies, dailies and electronic media. ÚJD is the publisher, along with the State Office for Nuclear Safety of the Czech Republic (SONS), of the scientific journal “Safety of the Nuclear Energy Sector“.

5. Safety of Nuclear Installations in Slovakia

5.1 Siting

5.1.1 Legislation in the field of Siting

ÚJD has issued the Decree No. 50/2006 Coll. on details concerning the nuclear safety requirements for nuclear installations, which determines requirements for siting of nuclear installations.

5.1.2 Meeting Criteria in the sites of Bohunice and Mochovce – Historical Overview

Criteria for the siting of nuclear installations for WWER-440/230 units corresponded to the then applicable Soviet standards and approaches, with radiation protection of the public provided for by distance (this also corresponded to the approaches in the world during the 50s). The principle of a three kms wide protection zone with no permanent settlements was applied during siting.

During the time of the siting, designing and construction of NPP BOHUNICE, no standards providing for the construction of NPP in a seismic area existed either in Czechoslovakia or in other countries. The Czechoslovak standard "Seismic Load for Constructions" was used. This standard took account of earthquakes with a probability of once in 200 years and an intensity value of 6.4^{o} MCS at the Jaslovské Bohunice site. No earthquake with an intensity of 8^{o} MCS as recorded in 1906 as the strongest earthquake in the area, with the epicenter at a distance of 17 kms in the area of the Little Carpathian mountains, has been considered for the NPP site, mainly because of the relief and the slope of the area.

Re-assessment of seismic load of the Jaslovské Bohunice site was included into the safety improvement projects of NPP Bohunice units. The resulting seismic impact was calculated and confirmed, later on, by IAEA missions (see Section 2.1.1); it is as follows:

- for SSE (Safe Shut-down Earthquake) earthquake (with a probability of 10^{-4} years), intensity 8 of the MSK 64 scale - with maximal horizontal acceleration of 0.25 $m.s^{-2}$ and a maximal vertical acceleration of 0.13 $m.s^{-2}$.
- for design earthquake value (with a probability of 10^{-2} years), intensity 7 of the MSK 64 scale, with half values of the SSE acceleration.

The calculations and analyses supported the necessity to raise the seismic resistance of buildings and constructions category 1, which have to withstand SSE earthquake without any damage. This category includes buildings and constructions, the failure of which may cause damage to components or systems needed for safe shut-down and post-cooling of the reactor or the failure of which may cause radioactivity leakages. The list of such buildings and structures was approved by IAEA.

Background materials for the siting of MOCHOVCE construction site were developed in 1979, in line with the valid legislation. The general designer prepared and submitted a structure series study (SSS) to the investor on January 31, 1980. This study has been elaborated beyond the scope of the then valid legislation on Documentation of Buildings. SSS was developed at a time when basic problems concerning the general construction scheme of the power plant by Soviet designer have not yet been

resolved - the issues concerning the general construction scheme could not be discussed since the seismicity level of the NPP site was not known. A more detailed geological survey was conducted in 1980.

Adverse research results have necessitated the shifting of the construction site of main production units to meet the requirements concerning siting of objects of seismic resistance category I with respect to the then valid Soviet standards (VSN 15-78). The construction site general scheme was completed in 03/81. The commission selection of the construction site took place in 11/79.

A territorial proceeding started at ONV Levice on September 18, 1980, and a territorial decision and its addendum were issued in 06/81 regarding the resolution of NPP Mochovce siting from the viewpoint of seismicity issues. Subsequently, the general designer started developing the "Project" according to the Decree No. 163/1973 Coll. on Documentation of Buildings, and the preparatory works at the Mochovce site have commenced.

The original project of NPP Mochovce was developed based on the knowledge concerning the seismic hazards of the site from the preparatory and design period of the NPP Mochovce construction in the 80s, considering earthquake of MSK grade VI for safe shutdown of the reactor during earthquake and horizontal acceleration value of PGA = 0.06 g. Legislative development presented by IAEA recommendation 50-SG-D15 advises for nuclear power plants the lowest acceleration value in horizontal direction of 0.1 g.

Based on this, seismic re-assessment of "Selected Buildings and Technological Systems" was performed in the framework of the SE-EMO Unit 1. safety improvement program, and improvements of building structures are gradually being implemented.

In the current time, no construction of nuclear installation at other than Bohunice and Mochovce site is planned in Slovakia.

International agreements of ÚJD

Based on bilateral agreements signed with neighbouring countries these agreements, Slovakia is obliged to notify the neighbouring countries of planned nuclear installations and of the expected period for commissioning of nuclear installations.

As far as multilateral agreements are concerned, Slovakia is signatory to the following international agreements:

- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo)
- Convention of the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel)

5.1.3 International Aspects

The Convention on Environmental Impact Assessment in a Transboundary Context - Espoo Convention lays down that the parties should either independently or jointly take all appropriate and effective measures to prevent, mitigate and control considerably severe environmental transboundary impacts, which were caused by the proposed activity.

The Act No. 24/2006 Coll. of 14. December 2005 Coll. on Environmental Impacts Assessment and alternations and amendments of certain acts regulates the procedure of expert and public assessment of presumed environmental impact.

5.2 Design and Construction

5.2.1 Legislation in the field of Designing and Construction

ÚJD has issued as an implementary legal provision to the Atomic Act No. 541/2004 Coll. the Decree No. 50/2006 Coll. on details concerning the nuclear safety requirements for nuclear installations in respect of their siting, design, construction, commissioning, operation, decommissioning and closure of repository.

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

Control systems must be equipped so as to monitor, measure, register, and manage systems important in terms of nuclear safety.

Protection systems must be able to automatically start up reactor protection systems, while operating personnel have the possibility to start up these systems manually. Protection systems must be redundant and must enable to perform functional tests.

Design principles of the primary circuit require to provide for sufficient firmness under normal and abnormal operation so as to prevent loss of coolant, and to enable, throughout the whole operation, periodical or continuous monitoring of the primary circuit status and to allow tests necessary to verify the nuclear safety.

Nuclear installation must be equipped with a protective confinement, which would under LOCA provide for reduction of the leakages into environment in order to keep them below limit values (if this function is not provided by other technical means). Building structures, technological systems and components important to nuclear safety of the nuclear installation shall be designed, manufactured, assembled, and tested so as to ensure their reliable function. Investor – the holder of authorization for nuclear installation construction must secure that the manufacturers and suppliers of the classified equipments (equipments important in terms of nuclear safety), their materials and accessories are obliged to present results of selected quality production inspections and tests of properties of components, equipments, base material, welded joints and weld deposits, material properties and composition as well as indications and removed material deficiencies identified by an inspection (Decree No. 56/2006 Coll.) in the supply quality documentation. In cases when special technological procedures may influence resulting properties of used materials and products, performance of additional tests must be ensured in advance (e. g. keeping evidence samples).

Control systems must enable monitoring, measurement, registration, and management of values and systems important in terms of nuclear safety. Devices and controls shall be designed and arranged so as to allow that maintenance personnel has constantly sufficient information on operation of the nuclear installation (Decree No. 56/2006 Coll.). The control room shall enable safe and reliable control of the operation.

Construction of nuclear installation is governed by Act No. 50/1976 Coll. on Spatial Planning and Construction (so called Construction Act) under which the following documents are approved: preliminary program of quality assurance, program of quality assurance for construction and requirements for quality assurance of classified equipments during their assembly and post-assembly tests.

5.2.2 Design Preparation of NPP in the site of Mochovce Units 3. and 4.

Constructional and technological part of Units 3. and 4. of NPP Mochovce is currently conservated.

5.3 Operation

5.3.1 Process of Obtaining Authorization by the Operator

The Act No. 541/2004 Coll. defines conditions for issuance of authorization for particular stages of nuclear installation and thus also for its commissioning and operation. The primary responsibility for nuclear safety lies with the operator.

The Decree No. 50/2006 Coll. sets detailed requirements on nuclear safety during commissioning and operation of nuclear installations.

The operator is according to Act No. 541/2004 Coll. obliged to attach to the application for authorization by ÚJD - inter alia - the following documentation:

- limits and conditions of safe operation
- program of NI commissioning, structured into stages
- quality system documentation
- internal emergency plan
- pre-operational safety report
- physical protection plan
- radioactive waste and spent nuclear fuel management system
- conceptual NI decommissioning plan
- program of operational equipment inspections (components and systems)
- selected operational procedures according to ÚJD´s requirements
- program of testing of equipment and systems important in regard to nuclear safety
- documents on professional competency of employees
- documents on preparedness of NI commissioning
- documents on insurance (or other financial guarantee) “liabilities”

Besides ÚJD, also other state authorities enter the process of authorization issuance (see also Chapt. 3.1.3.1):

- Ministry of Health of SR – in the field of radiation protection
- Ministry of Interior of SR – in the field of fire protection and public protection
- Ministry of Environment of SR – in the field of environmental impacts
- National Labor Inspectorate – in the field of industrial safety

The operator is liable to observe obligatory and approved documentation during the commissioning of nuclear installation and its operation. Eventual derogation from it is possible only based on the preceding approval by ÚJD.

The authorization for nuclear installation operation is issued by ÚJD after submission of operator's application with an attached report on evaluation of status of nuclear installation commissioning.

ÚJD issues the decision on construction approval of nuclear installation like any other construction authority.

5.3.2 Limits and Conditions (L&C) for Operation

In April 2006, an amendment of L&C of both units of NPP V-1 was elaborated in relation to the change of the holder of authorization for NI operation. In November 2006, L&C documentation for the operation of NPP´s Unit 1. was updated regarding the preparatory stage for the shut-down of NPP V–1. units.

L&C are developed on NPP V–2 units independently for each unit, in form and content resulting from IAEA guideline and US NRC guideline of 1998, which contain changes and amendments resulting from gradual upgrading of the units.

L&C are elaborated on NPP Mochovce unit in form required by the Slovak legislation and with content similar to the L&C elaborated for NPP V-2 units.

A common project of NPP Bohunice and NPP Mochovce on „Unification and Conversion of L&C according to NUREG 1431" is being implemented since 2002. Amended L&C according to NUREG 1431 are in the stage of assessment by the ÚJD.

L&C documentation for units of NPP EMO 3, 4 is being prepared in line with the project of L&C amendments according to NUREG 1431.

5.3.3 Management and Operational Documentation for Operation, Maintenance, Testing of NI

Operation, maintenance and testing of systems and the procedures in case of transient and emergency conditions of nuclear installations are laid down in the management and operating documentation as required by the Act No. 541/2004 Coll.

Conducting of management documentation is a part of the Quality system management, which is covered in the integrated management system (IMS) of operators. Management documentation complies with requirements placed upon it by the Act No. 514/2004 Coll. (Atomic Act), implementary ÚJD Decree No. 56/2006 Coll., and ISO 9001:2000 standard using the IAEA documents GS-R-3 and GS-G-3.1 (for details see Chapter 4.4).

Specialized departments are constituted in the power plants for management in the field of operational documentation. Their main tasks include the following:

- to conduct uniform documentation system, that will include an uniform system of documentation labeling, rules for work with documentation and an uniform system of operational documentation filing,
- to organize operational documentation approval,
- to issue distribute and update operational documentation according to the requirements of divisions,
- to conduct regular review of operational documentation accuracy in 3-year periods,
- to provide for approval and issuance of revisions and alternations of operational documentations and their distribution in line with a set procedure,
- to keep an original of the operational documentation with original signatures in paper form and to keep an original of operational documentation in electronic form,
- to develop and to upgrade a distribution list of managed documents of operational documentation,
- to notify about issuance of new and abolishment of void documents,
- to keep and to deposit history of operational documentation,
- to elaborate and access valid operational documentation and information about it to users in electronic form,
- to liquidate void documents.

The following basic types of used documentation are described bellow:

- Operational Documentation,
- Documentation on Equipment Verifications and Tests,
- Technological Procedures of Maintenance.

5.3.3.1 Operational Documentation

This type of documentation means a set of documents developed to set forth method of organization, management and control of operation, method of technological equipment maintenance under nominal stabilized and transient conditions, as well as under abnormal and emergency conditions. It also defines procedures for the performance of certain activities directly connected with operation, documentation of equipment quality, determination of position-related responsibilities of maintenance staff, list of documentation on the position of shift maintenance staff, assurance of fire protection of operational workplaces, and for documentation of operation course and related issues.

Types of operational documentation:

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

Organizational and operational documentation which deals with the organization of the operation and the operation of units itself under nominal and non-nominal conditions. It comprises i. e.:

- Operational provisions
- Technological provisions for abnormal operation
- Symptom oriented provisions for emergency conditions
- Other operational documentation
- Fire regulations of workplaces, etc.

5.3.3.2 Documentation For Equipment Verification and Tests

"Surveillance program" is a written program for testing of respective systems or equipments. The staff follows it step by step and records the course of the test, thus significantly reducing the possibility of failure. The IAEA safety guide SG 50-O8 was used as a basis for its development. It is not allowed to skip individual points or to alter the program. Certain programs also require independent checks. The program specifies: the supervisor of the test, objective and purpose of program, safety measures, initial conditions and preparatory works, test procedure, success criteria and test evaluation.

Operators´ nuclear safety divisions manage the entire process of uniform development of "Surveillance Programs", records keeping and test evaluations.

Documentation of performed controls is used to conduct in-service inspections, and serves***:***

- to record important magnitudes, tolerances and settings at repairs important for the evaluation and further maintenance planning,
- to verify and evaluate required quality of repair works and used materials to assess operation preparedness.

Control documentation includes the following documents:

- attest slips for used materials,
- list of weldings and x-ray scans with their assessment,
- measurement record, setting protocol,
- record on performed non-destructive control,
- record on visual control.

5.3.3.3 Technical And Working Procedures for Maintenance

Ensuring of clear structure of procedures, their content and classification of quality checkpoints is dealt with in the internal documents of operators „Formation of technological procedures“. It contains technological procedures for operations and for performance of maintenance.

All technological procedures for classified equipment include "Checklist of Performed Operations" with set points to interrupt works to prevent discrepancies from occurring, as well as to improve nuclear and industrial safety.

Development and use of reference procedures creates protection against discrepancies during development of technological procedures and defines their unambiguity. Reference procedures are the first approved prints, serving the comparison purposes of their equivalence with copies upon their authorization for routine uses.

Authorized copies of reference procedures are used for the work performance.

The obligatory use of base reference - the numbers of the work command on maintenance documents - provides for a good identification and monitoring of these documents and thus their correct use.

As a part of the quality assurance program, a fixed review and development schedule is set up for all maintenance regulations. Monitoring of maintenance actions are part of the planned care for basic means within the information systems of operators "Care for Equipment", which also contains annual schedule of repairs elaborated into monthly and weekly repair plans.

5.3.3.4 Severe Accident Management Guidelines

A project on the development of severe accident management guidelines (SAMG´s) has been developed over 2002 - 2004 in cooperation with Westinghouse Electric Belgium with the aim to ensure the utmost consistence with the provisions for emergency conditions and to continuously cover the area of management of accidents of all severities. SAMG are to be used in the Technical Support Centre and in the unit control room at NPP´s V-2 and Mochovce after the implementation of a group of hardware modifications ensuring higher probability of the success of the used strategies. For this reason, implementing SAMG into practice is linked to the performance of hardware modifications.

The preparation of activities to put the management of severe accidents into practice is currently taking place.

NPP V-1 is no longer counting with development of SAMG. This is due to the terms of Units 1. and 2. shutdown in 2006 and 2008 respectively.

5.3.4 Technical Support of Operation

Technical support and safety divisions are a part of operator's organizational departments. Their main tasks include:

1. Organization of measures to protect health of employees and the public in NPP surrounding against ionizing radiation by applying the ALARA principle upon work with ionizing radiation,
2. Organization of external and internal radiation control, personal dosimetry monitoring and supervising observance of radiation safety rules,
3. Assurance of technical support in meeting requirements for safe and reliable operation in the following fields:

    A. Concept of management of technical changes within NPP and activities of Technical Committee in the scope of :
    - general management process of changes and modifications of systems, constructions and components in NPP in line with the requirements of nuclear safety, quality assurance and maintenance of NPP project integrity
    - supervision of qualification and classification of systems, constructions and components
    - seismic reevaluation of systems, constructions and components
    - management and coordination of assessment programs of remaining service life and controlled ageing of NPP systems, constructions and components

- monitoring of seismic activity of enterprise surrounding by seismic monitoring network
- management and coordination of decommissioning program of enterprise nuclear energy facilities
- care for technical documentation including provision of conditions for long-term and safe deposit of technical documentation

B. Concept of controls of technical conditions of equipment in line with valid legislation (residual life cycle evaluation)

C. Securing conditions and performance of activities in the are of controls of technical conditions of equipment

D. Concept of normalization activity in NPP

4. Organization of development of operation procedures for normal and emergency operation and of other operational documentation and their continuous updating

5. Supervision of compliance with nuclear safety rules during the operation, and reviews of all design changes in equipment and operational regimes from the aspect of nuclear safety

6. Organization of analyses of events at nuclear installations, preparation of analyses and overall organization of feedback from own and foreign nuclear installations

7. Probabilistic safety analysis (PSA) and its application

8. Design of program of periodical tests of equipments and systems important from the view of nuclear safety

9. Keeping records of nuclear materials, calculations of fuel loading and fuel cycle strategy, regulation of nuclear safety during refueling and physical start-up

10. Organization and provision of safety emergency analyses

11. Management of technically oriented projects of international cooperation

12. Provision of fire protection

13. Organization and coordination of communication between divisions and regulatory authorities in the field of nuclear and industrial safety

14. Management and organization of the entire area of emergency planning

When taking care of the above mentioned tasks, the operator cooperates with external supporting organizations such as:

- various research institutes, project and analytical organizations - VUJE, a. s. Trnava, a. s., RELKO, s. r. o. Bratislava,
- the Slovak Hydrometeorological Institute
- universities and colleges
- Slovak Academy of Science
- domestic commercial contractors and from abroad – i.e. Areva, VÚEZ Tlmače, a. s., ÚJV Řež, a. s.

Nuclear Safety Committee and Technical Committee are advisory bodies of the management in the operator's individual organizational divisions. Their main task is to evaluate the level of nuclear safety, suggest and approve solutions of changes and modifications concerning safety and other issues in nuclear installations.

5.3.5 Event Analysis at Nuclear Installations

The definition of operational events, their classification (failures, incidents, accidents), requirements for their management and notification are defined in § 27 of the Act No. 541/2004 Coll. A detailed method and scope of notification of operational events is laid down in the ÚJD Decree No. 48/2006 Coll.

Legislative requirements reflect into operator's internal provisions for feedback of operational events and their precursors; the provisions set procedures and responsibilities for notification and management of the events.

5.3.5.1 Definition and Classification of Operational Events at Nuclear Installations

Operational events at nuclear installation and events during transport of radioactive materials are defined by the Act No. 541/2004 Coll. in the following way:

1. Operational event means an even, in case of which threat or violation of nuclear safety has occurred at a nuclear installation during the commissioning of the nuclear installation, during its operation, during the decommissioning stage or during the closure of repository.
2. An event during the transport means an event during the transport of radioactive materials, which caused non-compliance with the requirements on nuclear safety during the transport of radioactive materials.
3. Operational events and events during the transport are divided to:

   a) failure, which

   - jeopardized nuclear safety without direct threatening of fulfillment of safety functions,
   - disturbed safety barriers or other safety measures without direct consequences,
   - induced the lapse of limits and conditions of safe operation and safe decommissioning,
   - caused the violation of limits and conditions without direct consequences on fulfilling the safety functions,
   - triggered safety systems or triggered them due to actual reasons, but without direct consequences,
   - caused violation of technical conditions or transport regulations during the transport without direct consequences,
   - caused other violation of reliability of equipment requiring remedial measures to be implemented to eliminate consequences,

- caused release of radioactive substances or ionizing radiation without exceeding radiation limits,

b) incident, which caused

- threat or violation of fulfillment of safety functions,
- failure of safety systems or triggering of safety systems due to actual reasons requiring measures to be taken to eliminate consequences,
- significant violation or failure of safety barriers,
- release of radioactive substances or ionizing radiation with exceeding radiation limits,

c) accident, which caused release of radioactive substances requiring implementation of measures to protect the population.

5.3.5.2 Documentation and Analysis of Operational Events (OE) at Nuclear Installations

The aim of the management of operational events and their precursors (low level events and near miss events – see below) is not to identify the guilty, but to find out what has happened, how it has happened and why it has happened, in order to define necessary remedial measures to eliminate repetition of the events, or mitigate their consequences.

The scheme of event analysis development including the method of notification of a regulatory authority is described in a respective operator's directive for feedback of operational events and their precursors. In case that operational events comply with criteria for their notification to regulatory authorities, the shift engineer fills in a prescribed form of an announcement on the event and attaches the statements of competent staff to it. In case of an operational event precursor (low level events and near miss events), any employee of the operator is authorized to issue the announcement on the event.

The issued announcement on the event is delivered to the feedback team (FT), which provides an analysis of the OE based on the statements of expert divisions and own analyses or conclusions of working groups.

FT in cooperation with relevant divisions performs investigation of root cause, using the Human Performance Enhancement System, which was created in INPO, USA. The system describes working techniques (methods) for analysis of problems connected with operation and human performance, for identification of root causes of such problems and for determination of remedial measures to prevent repetition of similar problems.

The OE analysis, subject to notification to regulatory authorities, ends when a report on the operational event is devised; the report is submitted to the Failure Commissions, which are collective advisory bodies to the power plants´ directors. Failure commission holds session once a month, approves conclusions and analyses and addressly imposes implementation of remedial measures, which are binding for all employees. Reports on OE are sent to the regulatory authorities.

Precursors of operational events – low level events (so-called evidované events) or near miss events that do not meet the notification criteria in line with the Act No. 541/2004 Coll. are analyzed in a similar way; the analysis extent is given by a potential risk of the precursor and frequency of its occurrence. Based on the results of precursor analyses, Failure Commission may take remedial measures to this events.

An analysis of operational events and their precursors trends is conducted on regular basis. The result of the trend analysis is determination of area to be improved. Based on these identified areas for improvement, the operator takes necessary remedial measures.

Implementation of remedial measures is documented in written form and by computer network by the relevant competent department.

The status of compliance is regularly evaluated by Failure commission.

Extraordinary Failure commission

Extraordinary Failure Commission (EFC) is convoked by the Manger of the Safety Department immediately after obtaining information from the shift supervaisor about the occurrence of operational event that meets criteria for convocation of EFC according to the corresponding directive. In case of occurrence of incident or accident, the EFC convocation is coordinated with ERO activity (the procedure is described in the corresponding directive). The task of EFC is to identify the direct cause of the event, define immediate remedial measures and decide upon further operation of the unit.

Protocol from the EFC, convoked with the view to immediately discuss the occurred operational event, is submitted to ÚJD. Protocol from the EFC is a preliminary report on the operational event. Final analysis, including the analysis of root cause, is elaborated by a feedback team as a standard report on operational event and is approved together with the remedial measures by regular Failure Commission.

Event Occurrence Notification

The operator notifies ÚJD of operational events of category “failure” according to Decree No. 48/2006 Coll. by submitting written reports on failures summarily for a relevant calendar month until the 20th day of the following calendar month.

The operator is responsible to deliver primary information on the incident or accident at the latest within 45 minutes from its identification by fax, electronic form or personally according to the time of incident or accident occurrence so that the information will be demonstrably notified to ÚJD. The information has to contain preliminary assessment of OE according to the INES scale. The notification obligation is performed in line with the ÚJD Decrees No. 55/2006 Coll. and No. 48/2006 Coll. and is described in the relevant documentation of the operator. The final report on operational event of category “incident” or “accident” is submitted by the operator within 30 days form its identification.

Notification of Incident or Accident during Transport

The operator notifies the occurrence of incident or accident during transport to ÚJD by telephone without any delay.

The authorization holder delivers written information about incident or accident during transport in a form according to the emergency transport order at the latest within 45 minutes from its identification by fax, electronic form or personally according to the time of the event occurrence so that the information will be demonstrably notified to the Authority.

The authorization holder informs the public at the latest within 30 minutes, when the incident or the accident during transport was evaluated on the INES scale by degree 2 or higher in line with the requirements of specific provisions.

Provision of Feedback Including Events 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 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.

Evaluation of Effectiveness of Implemented Remedial Measures

The feedback team (FT) prepares once a year a summary statistical evaluation of operational events and their precursors in order to identify areas for improvement based on the negative trends in feedback indicators (i.e. event repetition trend). The report is discussed at the meeting of the company director, who decides upon corresponding remedial measures on the basis of identified areas for improvement.

In the system of operational indicators of safety (SPUB) are selected indicators of feedback evaluated quarterly and annually. Evaluation results of trends of selected indicators are processed in the report on safety, on which base are the RM also taken.

Moreover, evaluation of effectiveness of remedial measures is conducted also continuously during the year at sessions of failure commissions, during discussions about the event evaluated on the base of analysis results as a repeated one.

Precursors of Operational Events – Events without Consequences

Aiming at preventing severe events as well as a measure to improve the safety culture, operator introduced a system of management of operational events precursors. Precursors are low level events and near miss events. Definitions:

a) Low level events (so-called registered events) – are events (undesirable deviations) with minimal consequences, not falling under the Act No. 541/2004 Coll.

b) Near miss events - are such precursors, by which the development of deviation into potential safety-related significant event with negative consequence was avoided.

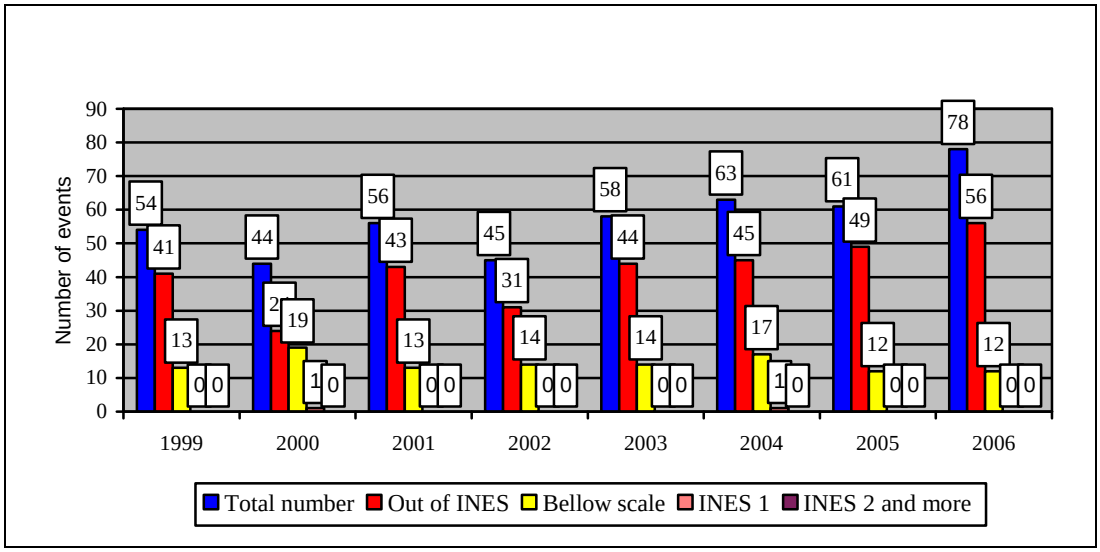
Note: To avoid the development of deviation can be evoked either by an appropriate circumstance (luck) or by targeted staff activity (remedy), which can be planned in advance (provision, equipment protection, such as safety valves), or the remedy can be performed by the staff intuitively at the time of deviation development.

The result of notification and analyzing of low level events and near miss events is to keep awareness of potential operational events risk. By this instrument, the operator proactively manages known internal factors related to the project, equipment, drill, maintenance, provisions, communication, goals, and so on, which are present during the activity performance and are evaluated as hazardous.

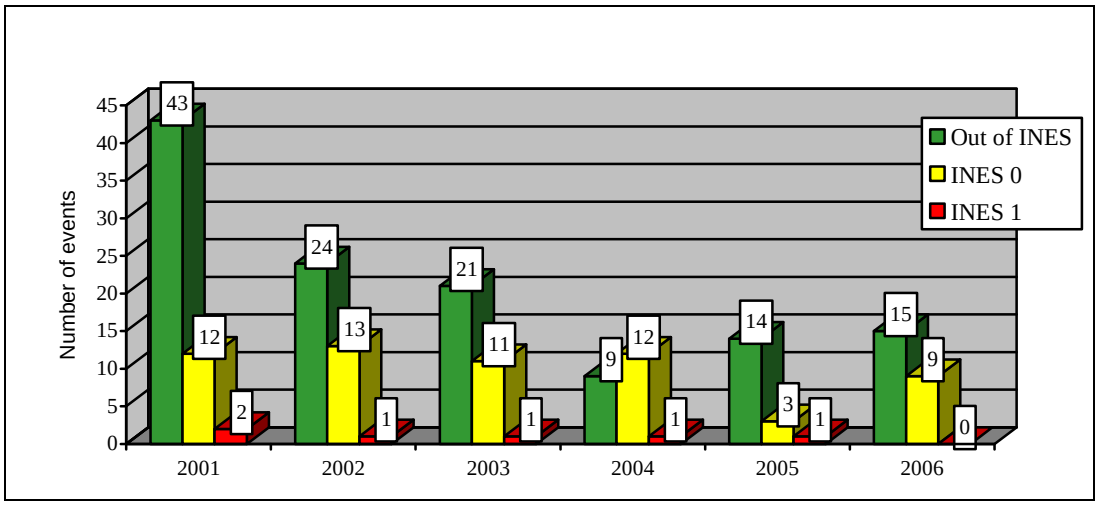
In year 2004-2005, projects were carried out in collaboration with DTI (Department of Trade and Industry – United Kingdom) for evaluation and improvement of effectiveness of the existing system of management of near miss events and safety culture.

5.3.5.3 Statistical Evaluation Of Events At Nuclear Installation, Development Trends

The evaluation of events according to the INES scale in sites Bohunice (V-1 and V-2) and Mochovce is in Pict. 5.3.1 and Pict. 5.3.2.



Pict. 5.3.1 Event evaluation according to the INES scale in site of Bohunice (V-1 and V-2)



Pict. 5.3.2 Event evaluation according to the INES scale in site of Mochovce

The most frequent causes of operational events occurrence are failures of equipments and staff errors. Based on the identified causes, failure commission takes remedial measures for their removal and elimination of event repetition.

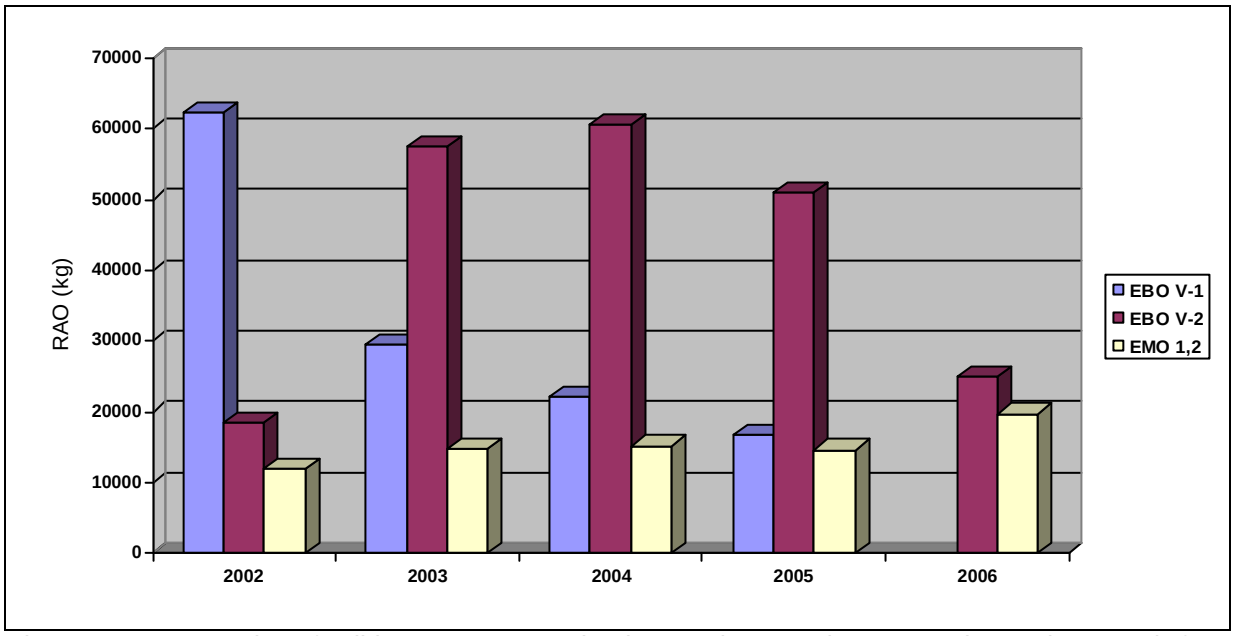
During 4. - 20. 09.2006, an OSART mission – verification of operational safety organized by IAEA took place in NPP Mochovce. One of the verified areas was also the feedback program –area identified for improvement in regard to relatively low number of notified near miss events by maintenance staff. The improvement of notification of near miss events by EMO staff is a permanent task since the introduction of the program of near miss events management (2000). Regular retraining of the staff is carried out under this program.

5.3.6 Generation of RAW

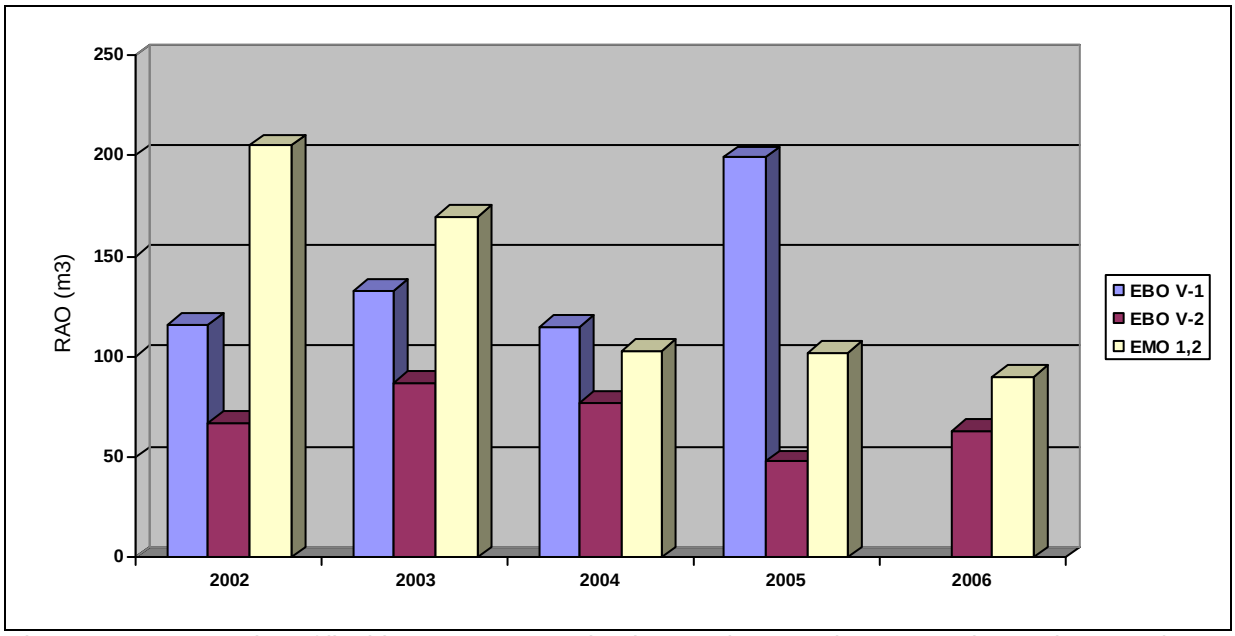
The amount of produced solid and liquid radioactive wastes is monitored with the aim to reduce their production. The reduction of waste volume will reduce demands for their storage, transport, disposal and their impacts on environment.

The amounts of produced RAW from operation of nuclear power plants in sites Bohunice and Mochovce are depicted in Pict. 5.3.3 and Pict. 5.3.

A total volume of liquid RAW (concentrates), which arised during the operation of units of nuclear power plant in a certain period of time recalculated to salinity 120 g H_3BO_3/kg, is recorded in m^3.



Pict. 5.3.3 Generation of solid RAW at NPP Bohunice V-2 (EBO V-2), NPP Mochovce (EMO 1,2); for NPP Bohunice V-1 (EBO V-1) we present data only until 2005 (including)



Pict. 5.3.4 Generation of liquid RAW at NPP Bohunice V-2 (EBO V-2), NPP Mochovce (EMO 1,2); for NPP Bohunice V-1 (EBO V-1) we present data only until 2005 (including)

5.4 Planned Activities to Improve Safety

After implementation of safety improvement programs for NPP V-1 units and NPP Mochovce units, the most important long-term project is the „Program of modernization and safety improvement of NPP V-2 units “, which is described in the Chapter 2.2.

Safety improvement is understood as a continuous process and the measures resulting from operator’s self-assessment and analysis of operational events are continuosly drafted and implemented.

At the moment, no other long-term project of safety improvement is planned at operated nuclear installation.

6. Annexes

6.1 List of nuclear installations and technical and economical parameters

6.1.1 List of Nuclear Installations

In terms of the Art. 2 of the Convention, the following nuclear installations are being operated in Slovakia:

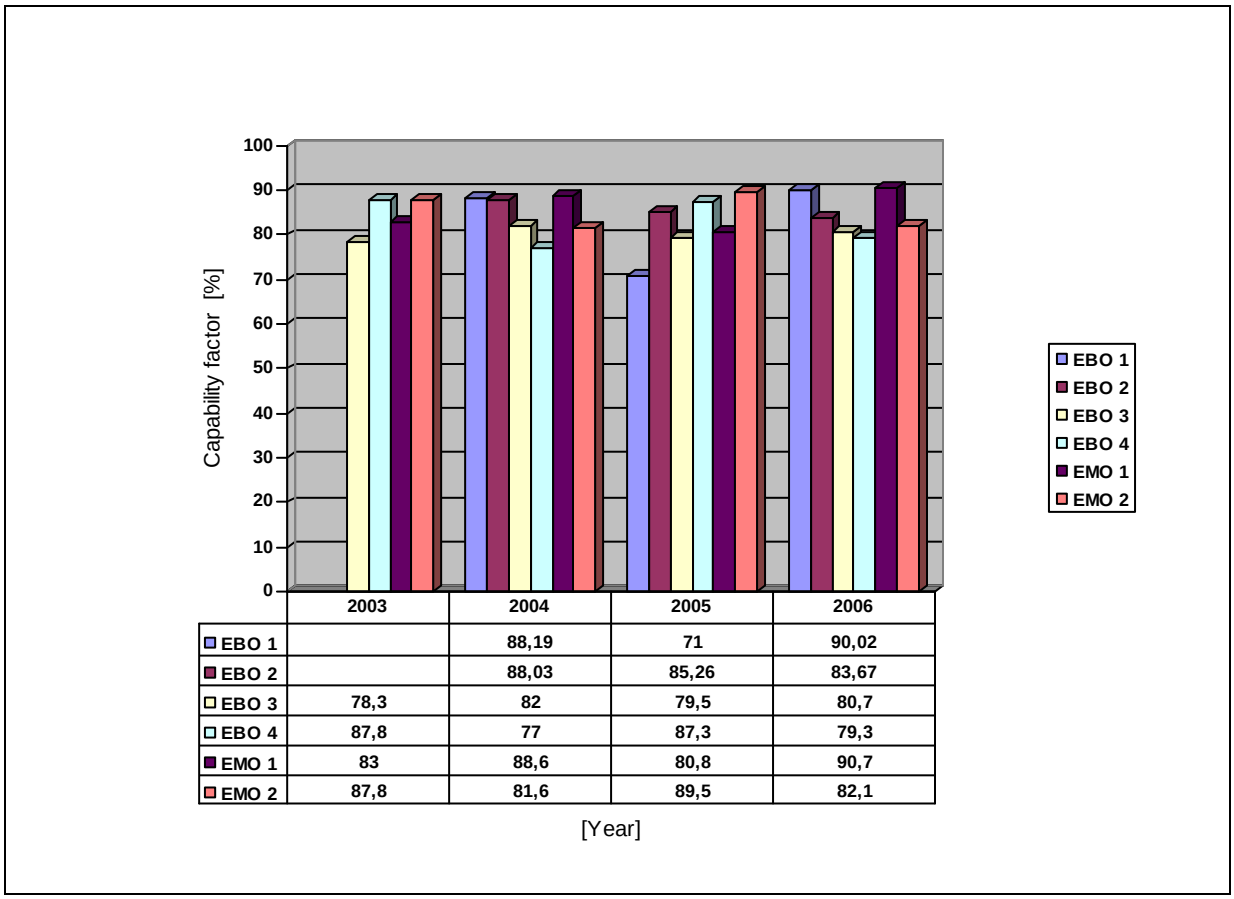
- Nuclear Power Plant Bohunice, branch plant - units V-1
- Nuclear Power Plant Bohunice, branch plant - units V-2
- Nuclear Power Plant Mochovce, branch plant – units 1 and 2
- Interim Spent Fuel Storage Facility (ISFSF)
- Technologies for RAW Processing and Treatment
- National RAW Repository

6.1.2 Technical and Economical Parameters

This section presents selected technical and economic parameters of NPP Bohunice and NPP Mochovce.

Unit Capability Factor

Unit Capability Factor - UCF is a WANO parameter that expresses percentual ratio of actually generated electricity on unit and energy the unit would be able to generate within the given time, taking into account external limiting influences (power regulation by control centre, etc.).

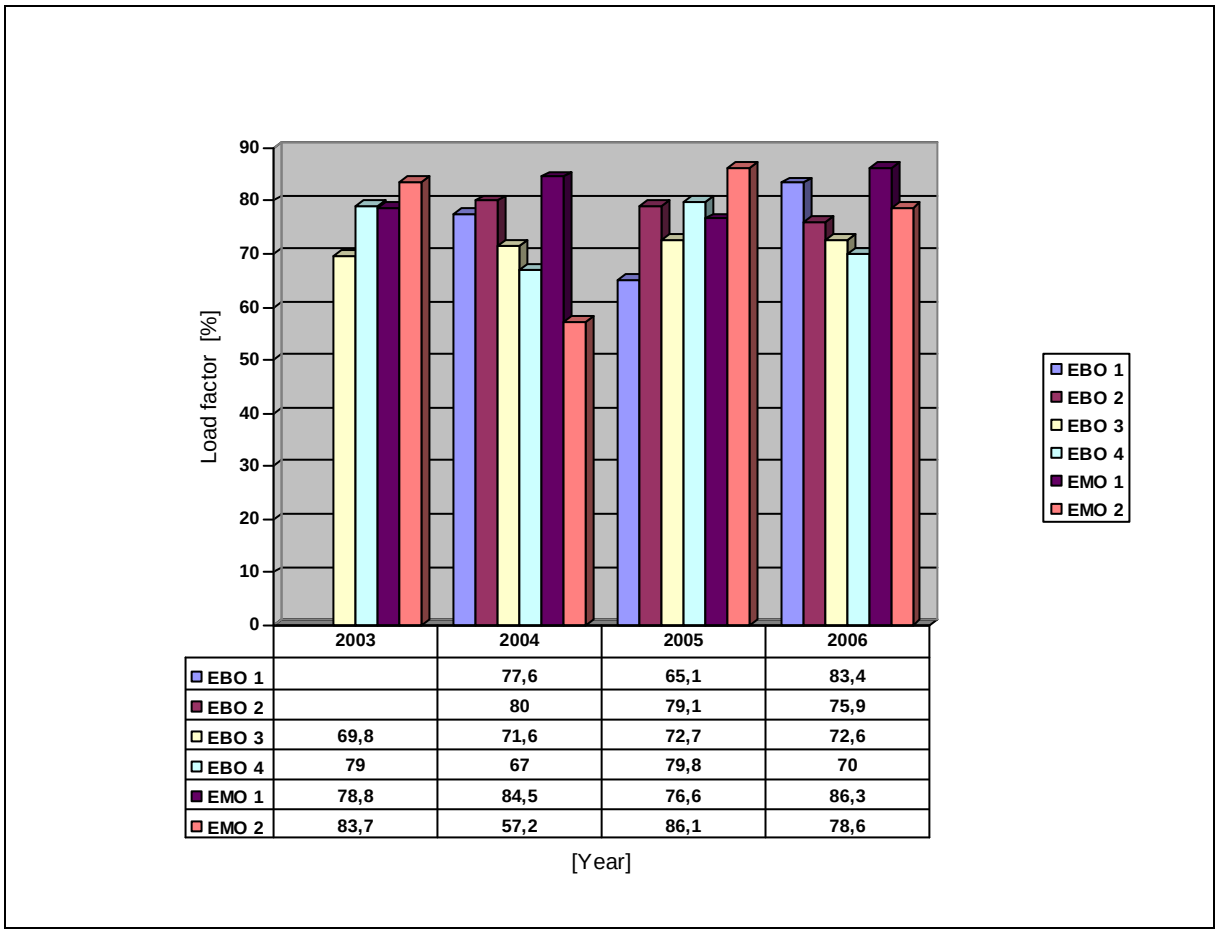


	2003	2004	2005	2006
EBO 1		88,19	71	90,02
EBO 2		88,03	85,26	83,67
EBO 3	78,3	82	79,5	80,7
EBO 4	87,8	77	87,3	79,3
EMO 1	83	88,6	80,8	90,7
EMO 2	87,8	81,6	89,5	82,1

Obr. 6.1.1 Unit capability factor

Load Factor

The load factor is WANO and IAEA parameter that is defined as a ratio of actually supplied electricity into electricity supply system (generation limitation caused by control system management due to support services supply is not considered during generation) to reference supply of electricity, the one, that could be supplied to electricity supply system at uninterrupted unit operation at reference (nominal) output during a monitored time period – expressed in %. By the end of 2005, the average „world“ value (lifetime) of LF of units PWR (pressure water reactors, also units WWER belong to this group) was according to the magazine Nuclear Engineering International of May 2006 73,1%. That means that LF of NPP V-1 units except for Unit 1. (generation breakdown due to unplanned extension of GR) is in 2005 above this value. Values of LF - see Pict. 6.1.2.

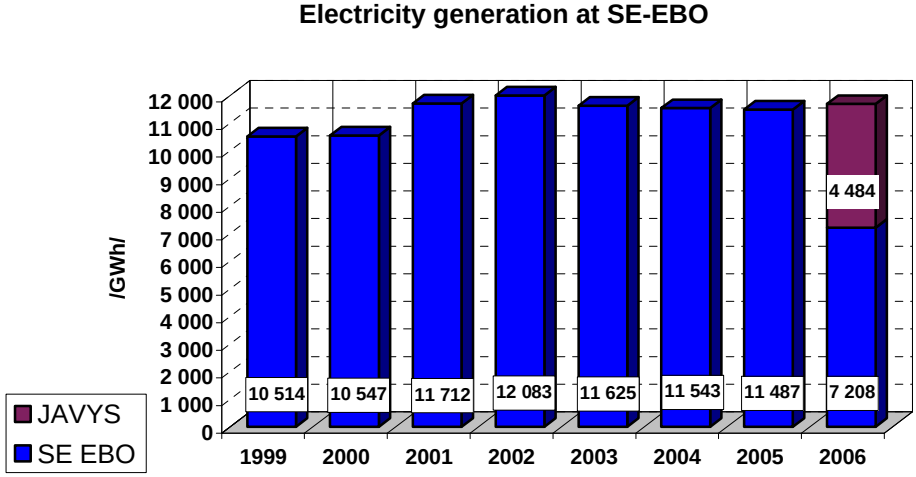


	2003	2004	2005	2006
EBO 1		77,6	65,1	83,4
EBO 2		80	79,1	75,9
EBO 3	69,8	71,6	72,7	72,6
EBO 4	79	67	79,8	70
EMO 1	78,8	84,5	76,6	86,3
EMO 2	83,7	57,2	86,1	78,6

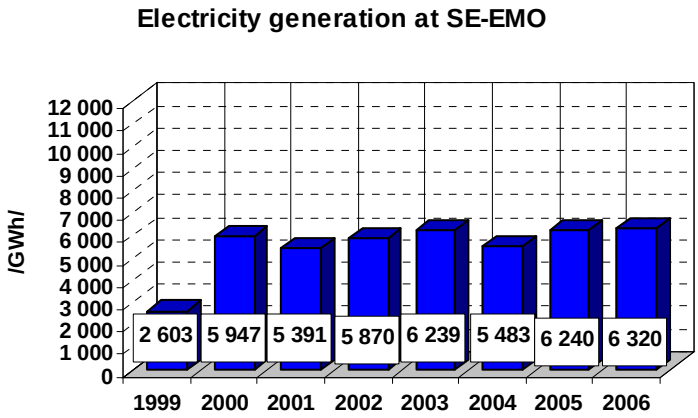
Pict. 6.1.2 Units SE-EBO and SE-EMO load factor

Electricity generation

In 2006, the NPP Bohunice units generated a total of 7 208 GWh of electricity and V1 units during the term 1. 4. - 31. 12. 2006 as an independent company JAVYS 4 484 GWh of electricity. The NPP Jaslovské Bohunice units generated in total 11 692 GWh, what represents an increase to year 2005 (11 487 GWh). NPP Mochovce units generated in total 6 320 GWh of electricity, what represents an increase to year 2005 (6 240 GWh).



Pict. 6.1.3 Electricity generation at SE-EBO



Pict. 6.1.4 Electricity generation at SE-EMO

6.2 Selected Generally Binding Legal Provisions and Safety Guidelines Concerning Nuclear and Radiation Safety

- Act No. 575/2001 Coll. on Organization of Governmental Activities and of Central State Administration - last amendment by Act No. 103/2007 Coll.
- Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to certain acts - last amendment by Act No. 94/2007 Coll.
- Act No. 50/1976 Coll. on Territorial Planning and Construction Order (so called Construction Act) - last amendment by Act No. 24/2006 Coll.
- Act No. 656/2004 Coll. on Energy and alternations of certain acts – last amendment by Act No. 107/2007 Coll.
- Act No. 276/2001 Coll. on Regulation in Network Industries and alternations and amendments of certain acts - last amendment by Act No. 107/2007 Coll.
- Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Facilities and Management of Spent Nuclear Fuel and Radioactive Wastes (Act on Nuclear Fund) and alternations and amendments of certain acts – last amendment by Act No. 94/2007 Coll.
- Act No. 24/2006 Coll. on Environmental Impacts Assessment and alternations and amendments of certain acts
- Act No. 126/2006 Coll. on Public Health Care and alternations and amendments of certain acts
- Act No. 42/1994 Coll. on Civil Protection - last amendment by Act No. 568/2005 Coll.
- Act No. 125/2006 Coll. on Labor Inspection and alternations and amendments of Act No. 82/2005 Coll. on Illegal Work and Illegal Employment and alternations and amendments of certain acts
- Act No. 124/2006 Coll. on Safety and Health Protection at Work and alternations and amendments of certain acts
- Act No. 264/1999 Coll. on technical requirements for products and on conformity assessment and alternations and amendments of certain acts - last amendment by Act No. 254/2003 Coll.
- Act No. 90/1998 Coll. on Building Products - last amendment by Act No. 134/2004 Coll.

- Governmental Ordinance No. 310/2004 Coll. on details for technical requirements and procedures of conformity assessment applicable to machinery
- Governmental Ordinance No. 308/2004 Coll. on details for technical requirements and procedures of conformity assessment applicable to technical devices used at a certain range of voltage
- Governmental Ordinance No. 194/2005 Coll. on electromagnetic compatibility
- Governmental Ordinance No. 29/2001 Coll. on details for technical requirements and procedures of conformity assessment applicable to personal protective equipment as amended by Governmental Ordinance No. 323/2002 Coll.
- Governmental Ordinance No. 117/2001 Coll. on details for technical requirements and procedures of conformity assessment applicable to equipments and protective systems intended for use in potentially explosive atmospheres as amended by Governmental Ordinance No. 296/2002 Coll.
- Governmental Ordinance No. 392/2006 Coll. on Minimal Safety and Health Requirements at Using Work Instruments
- Governmental Ordinance No. 391/2006 Coll. on Minimal Safety and Health Requirements for Workplace
- Governmental Ordinance No. 276/2006 Coll. on Minimal Safety and Health Requirements for Work with Display Screen Equipment
- Governmental Ordinance No. 387/2006 Coll. on requirements for assurance of safety and health labeling at Work
- Governmental Ordinance No. 396/2006 Coll. on Minimal Safety and Health Requirements for Construction Site
- Governmental Ordinance No. 513/2001 Coll. on details for technical requirements and procedures of conformity assessment applicable to simple pressure vessels as amended by Governmental Ordinance No. 328/2003 Coll.
- Governmental Ordinance No. 176/2003 Coll. on details for technical requirements and procedures of conformity assessment applicable to Transportable Pressure Equipment
- Governmental Ordinance No. 576/2002 Coll. on details for technical requirements and procedures of conformity assessment applicable to Pressure Equipment as amended by Governmental Ordinance No. 329/2003 Coll.
- Governmental Ordinance No. 393/2006 Coll. on minimal requirements for assurance of safety and health protection at work in potentially explosive atmospheres
- Governmental Ordinance No. 395/2006 Coll. on minimal requirements for providing and using personal protective equipments at work
- Governmental Ordinance No. 334/2006 Coll. on Details Concerning Institutional Radioactive Wastes Management
- Governmental Ordinance No. 345/2006 Coll. on Basic Safety Requirements for Health Protection of Workers and Population Against Ionizing Radiation (transposition of Council Directive 96/29/Euratom)
- Governmental 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 Directive 1990/641/Euratom of the Council)

- Governmental Ordinance No. 348/2006 Coll. on requirements for control of high-activity sealed radioactive sources and orphan sources (transposition of Directive ES 2003/122/Euratom of the Council)
- Governmental Ordinance No. 349/2006 Coll. on details concerning requirements for radiation protection in the transport of radioactive sources and radioactive substances.
- ÚJD Decree No. 46/2006 Coll. on dual-use goods (special materials and equipments), which are under the ÚJD regulation
- ÚJD Decree No. 47/2006 Coll. on details concerning maximum limits of small quantities of nuclear material and radioactive wastes in respect of which no nuclear damage is expected
- ÚJD Decree No. 48/2006 Coll. on details of notification of operational events and events during transport, as well as details of investigation of their reasons
- ÚJD Decree No. 49/2006 Coll. on periodic nuclear safety review
- ÚJD Decree No. 50/2006 Coll. on details concerning the nuclear safety requirements for nuclear installations in respect of their siting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorization of classified equipment into safety classes
- ÚJD Decree No. 51/2006 Coll. on details concerning requirements for provision of physical protection
- ÚJD Decree No. 52/2006 Coll. on professional competency
- ÚJD Decree No. 53/2006 Coll. on details concerning requirements for management of nuclear material, radioactive waste and spent fuel
- ÚJD Decree No. 54/2006 Coll. on record keeping and control of nuclear material as well as notification of selected activities
- ÚJD Decree No. 55/2006 Coll. on details concerning emergency planning in case of nuclear incident or accident
- ÚJD Decree No. 56/2006 Coll. on details concerning requirements for quality system documentation of authorization holder, as well as details concerning quality requirements for nuclear installations, details concerning quality requirements for classified equipment and details concerning the scope of their approval
- ÚJD Decree No. 57/2006 Coll. on details concerning the requirements for transport of radioactive material
- ÚJD Decree No. 58/2006 Coll. on details concerning the scope, content and method of preparation of nuclear installation documentation necessary for particular decisions
- Ministry of Environment SR Decree No. 453/2000 Coll. implementing some provisions of the building act
- Ministry of Environment SR Decree No. 55/2001 Coll. on Territorial Planning Materials and Territorial Planning Documentation
- MPSVR SR Decree No. 718/2002 Coll. on assurance of safety and heath protection at work of technical equipment.
- SÚBP Decree No. 59/1982 Coll. stipulating basic requirements for assurance of safety of work and technical equipment as amended by SÚBP Decree No. 484/1990 Coll.

- SÚBP Decree No. 374/1990 Coll. on Safety of Work and Technical Equipment in Construction Activities
- SÚBP Decree No. 208/1991 Coll. on safety of work and technical equipment upon operation, maintenance and repair of carriages
- SÚBP Decree No. 25/1984 Coll. on assurance of safety of work in low-pressure boilers
- MVRR SR Decree No. 158/2004 Coll. laying down groups of construction products with set systems for demonstrating conformity and details on the use of conformity markings as amended by Decree No. 119/2006 Coll.
- Treaty on European Atomic Energy Community (1957),
- COUNCIL REGULATION (EURATOM) No. 3954/87 of 22 December 1987 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency as amended by Council regulation No. 89/2218/Euratom of 18 July 1989
- COMMISSION REGULATION (EURATOM) No. 770/90 of 29 March 1990 laying down maximum permitted levels of radioactive contamination of feedingstuffs following a nuclear accident or any other case of radiological emergency
- COUNCIL REGULATION (EURATOM) No. 1493/93 of 8 June 1993 on transports of radioactive substances between Member States as amended,
- 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
- Commission Regulation (EC) 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,
- Council Regulation No. 1334/2000/EC setting up a Community regime for control of exports and dual-use items and technologies as amended by Council Regulation No. 394/2006,
- Commission Regulation (Euratom) No. 302/2005 of 8 February 2005 on application of Euratom safeguards reporting requirements,
- Commission Regulation (Euratom) No. 66/2006. of 16 January 2006. exempting the transfer of small quantities of ores, source materials and special fissile materials from the rules of the chapter on supplies
- Directive No. 62/302/ECC of 5 March 1962 on free employment of experts in nuclear energy
- Council Directive No. 89/618/Euratom of 27 November 1989 on informing the general public on health protection measures to be applied and steps to be taken in event of a radiological emergency
- Council Directive No. 90/641/Euratom of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionizing radiation during activities in controlled areas
- Council Directive No. 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of health of the workers and the general public against the dangers arising from ionizing radiation.

ÚJD Safety guides:

BNS I.12.1/1995	Requirements to assure quality of computers information software
BNS I.4.1/1999	Single failure criterion
BNS I.11.2/1999	Requirements for performance of safety analyses for ATWS
BNS III.4.1/2000	Requirements on ÚJD permission issue for fuel use in WWER 440 reactors
BNS III.4.3/2000	Requirements on assessment of fuel loading for WWER 440 reactors
BNS I.6.2/2000	ÚJD requirements for chapt. 4 of Safety Analysis Report “Core design”
BNS II.3.1/2000	Evaluation of acceptability of faults detected during the in-service operation of nuclear installation selected equipment
BNS I.9.2/2001	Ageing management of nuclear power plants - Requirements
BNS II.5.1/2003	Welding at nuclear power installations. Basic requirements and rules (issued as reprint of II.5.1/2002)
BNS II.5.2/2003	Supervision of welding and quality of welded joints at nuclear power Installations - Requirements (issued as reprint of II.5.2/2002)
BNS II.5.3/2003	Welding materials for welding at nuclear power installations. Technical requirements and rules of choice (issued as reprint of II.5.3/2002)
BNS I.9.1/2003	Safety of nuclear facilities during decommissioning (issued as reprint of I.9./1999)
BNS I.11.2/2003	Requirements for performance of safety analyses for ATWS (issued as reprint of I.11.2/1999)
BNS I.12.1/2003	Requirements to assure quality of computers information software (issued as reprint of I.12.1/1995)
BNS II.3.3/2004	Metallurgical products and spare parts for nuclear power plants
BNS III.4.4/2004	Requirements for realization and evaluation of results of physical tests in start-up process
BNS II.5.4/2004	Qualification of the systems for non-destructive testing in a nuclear power generating field. Requirements and guides
BNS I.8.1/2005	Specification on the scope of Preliminary Plan of Physical Protection and Plan of Physical protection in line with Decree wording on details concerning physical protection assurance of NI, NM and RAW
BNS IV.1.3/2005	Requirements for Design and Operation of Nuclear Spent Fuel Storage Facility
BNS I.2.5/2005	ÚJD requirements on chapt. 16 of Preliminary safety analysis report "Limits and Conditions"

BNS I.11.1/2006	Requirements on safety analysis design
BNS II.3.4/2006	Rules for design, production and operation of systems for monitoring degradation of safety significant components of nuclear facilities. Part 1. Corrosion monitoring.
BNS I.4.2/2006	Requirements for Elaboration of Probabilistic Safety Analyses and Studies
BNS II.2.1/2007	Requirements on Fire Protection Assurance of Nuclear Power Plants in view of Nuclear Safety

6.3 List of Selected National and International Documents Related to Nuclear Installation Safety

1.	Safety report of NPP V-1 after gradual reconstruction	5/2001
2.	Preliminary safety report for RAW republic repository	4/1999
3.	Preliminary safety report – transport of solid RAW in ISO containers	1/2000
4.	Preliminary safety report – requalified fragmentation workplace for treatment of solid RAW with surface contamination to 3000 Bq/cm2	4/2001
5.	Preliminary safety report for MSVP	9/1998
6.	WENRA: Nuclear Safety in EU Candidate Countries	10/2000
7.	IAEA: Review of Results of the Gradual Upgrading at Bohunice WWER-440/230 NPP Units 1 and 2	11/2000
8.	Licensing Related Assessment of Design and Operational Safety for WWER 213 (PHARE/SK/TSO/WWER03)	12/1999
9.	Report on Nuclear Safety in the Context of Enlargement (9181/01)	5/2001
10.	International Conference on the Strengthening of Nuclear Safety in Eastern Europe – IAEA Report	6/1999
11.	Final Report of the IAEA EBP and other Related IAEA Activities on the Safety of WWER and RBMK NPPs	1998
12.	Report on periodical nuclear safety review of NPP V-2 (PSRV2/OO/V01-6706/2007)	2007

6.4 Limits of Radioactive Discharges

The limit values for activity of gaseous and liquid discharges are part of L&C approved by regulatory authorities.

Annual Limits of Discharges						
	Ventilation chimney				Liquid discharges	
	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/year	Bq/year	Bq/year	Bq/year	Bq/year	Bq/year
Bohunice EBO V-1	2.10^{15}	$6{,}5.10^{10}$	8.10^{10}	$1{,}4.10^{8}$	20 000 GBq	13 000 MBq
Bohunice EBO V-2	2.10^{15}	$6{,}5.10^{10}$	8.10^{10}	$1{,}4.10^{8}$	2.10^{13} Váh	$1{,}3.10^{10}$ Váh
Bohunice EBO V-2	-	-	-		2.10^{11} Dudváh	$1{,}3.10^{8}$ Dudváh
Mochovce 1,2	$4{,}1.10^{15}$	$6{,}7.10^{10}$	$1{,}7.10^{11}$	unlimited	$1{,}2.10^{13}$	$1{,}1.10^{9}$
	Daily Limits of Discharges				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]
Bohunice EBO V-2	$2{,}7.10^{13}$	$8{,}9.10^{8}$	$1{,}21.10^{9}$	unlimited	$1{,}95.10^{8}$	$3{,}7.10^{4}$
NPP Mochovce 1,2	$5{,}5.10^{13}$	$9{,}0.10^{8}$	$2{,}5.10^{9}$	unlimited	$1{,}0.10^{8}$	4.10^{4}

Sheet No. 6.4.1 Limits of radioactive material discharges of SE, a. s. from NPP Bohunice (V-1, V-2) and Mochovce

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