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NATIONAL REPORT OF THE SLOVAK REPUBLIC

COMPILED IN TERMS OF THE CONVENTION ON NUCLEAR SAFETY

SEPTEMBER 2004

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Abbreviations used

AKOBOJE	Automated complex of nuclear power plant security protection
ALARA	As Low as Reasonably Achievable
BDBA	Beyond Design Basic Accident
BEC	Backup Emergency Centre
BSC	Bohunice Processing Centre
CCJS	Central Crisis Joint Staff
CDF	Core damage frequency
CED	Collective effective dose
CI	Classified equipments
CP	Civilian protection
CPA	Slovak Ministry of Interior - Civil Protection Authority
CR	Current repair
ČSFR	Czech and Slovak Federal Republic
ČSKAE	Czechoslovak Atomic Energy Commission
ČSSR	Czechoslovak Socialist Republic
CTE	Classified technical equipment
DBA	Design Basic Accident
EBO	Nuclear power plant Bohunice
EdF	Electricité de France
EFC	Extraordinary Failure Commission
EFW	Emergency feed water safety system
EMC	Emergency management centre
EOP	Emergency Operating Procedures
ERC	UJD´s Crisis and Coordination Centre
ERO	Emergency Response Organisation
ESFAS	Engineering Safety Features Actuation System
ETR	Emergency transport regulation
FCC	Fibre-concrete container
GO	General overhaul
HZ	Hermetic zone
I&C	Instrumentation and control system
IAEA	International Atomic Energy Agency
ICRP	International Commission for Radiation Protection
IDE	Individual Dose Equivalent

INES	International Nuclear Events Scale
INSAG	International Nuclear Safety Advisory Group
IPD	Individual protective devices
ISFSF	Interim Spent Fuel Storage Facility
KKRH	Regional Commission for Radiation Accidents
KRH	Slovak Government's Commission for Radiation Accidents
L&C	Operational limits and conditions
LBB	Leak Before Break
LOCA	Loss of Coolant Accident
MFP	Main Feeding Pump
MGU	Main Generating Unit
MO-ASR	Ministry of Defence – Army of the Slovak Republic
MOD V-2	Upgrading of NPP V-2
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
MRC	Mass remote control
MSK-64	Medvedev Sponhauer Karnik scale for the evaluation of seismic events
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
NECI	Nuclear energy classified equipments
NEP	National emergency plan
NI	Nuclear installation
NIE/OE	Event at nuclear installation / operating event
NLI	National Labour Inspectorate
NPP	Nuclear Power Plant
NPP A-1	Nuclear Power Plant Bohunice A –1
NPP Mochovce	Nuclear Power Plant Mochovce
NPP V-1	Nuclear Power Plant V –1 Jaslovské Bohunice (units 1 and 2)
NPP V-2	Nuclear Power Plant V – 2 Jaslovské Bohunice (units 3 and 4)
NUSS	Nuclear Safety Standards
OA	Occupational accident
OCG	Operative-Control Group
PC	Primary circuit
PHARE	EU initiative for economic integration of Central and Eastern European countries
POSAR	Pre-operation Safety Analysis Report
PPD	Personal Protective Devices

PSA	Probabilistic Safety Assessment
QA	Quality Assurance
QS	Quality System
RAW	Radioactive wastes
RC	Reactor core
RÚ RAO	National RAW Repository
SAMG	Severe Accident Management Guidelines
SAR	Safety Analysis Report
SBEOP	Symptom-based Emergency Operating Procedures
SE, a.s.	Slovenské elektrárne, Joint Stock Company
SE-EBO	Nuclear Power Plants Jaslovské Bohunice, branch plant of SE, a.s.
SE-EMO	Nuclear Power Plants Mochovce, branch plant of SE, a.s.
SE-VYZ	Decommissioning and RAW and Spent Fuel Treatment, branch plant of SE, a.s.
SG	Steam generator
SHMÚ	Slovak Institute of Hydrometeorology
SIRM	Safety Improvement of Mochovce NPP Project Review Mission - conclusions of the IAEA June 1994 Mission to Mochovce
SM	Safety measures
SNIDF	State Fund for the Decommissioning of Nuclear Power Generating Facilities and for Spent Fuel and Radioactive Wastes Treatment
SPSA	Low-power and shutdown PSA
SR	Slovak Republic
STN	Slovak Technical Standard
SÚRMS	Slovak Radiation Network Monitoring Centre
ÚVZ	Public Health Office
SW	Service water
TSMS	Technical Safety Measure Specification
ÚBP SR	Slovak Labour Safety Office
UCF	Unit capability factor
UJD	Nuclear Regulatory Authority of the Slovak Republic
US NRC	United States Nuclear Regulatory Commission
VÚJE, a.s.	Nuclear Power Plant Research Institute
WANO	World Association of Nuclear Operators

Reference index

Convention on Nuclear Safety (Article)	**National Report** (Chapter)
Article 6	Chapter 2
Article 7	Chapter 3
Article 8	Chapter 3.1.3
Article 9	Chapter 3.2
Article 10	Chapter 4.1
Article 11	Chapter 4.2
Article 12	Chapter 4.3
Article 13	Chapter 4.4
Article 14	Chapter 4.5
Article 15	Chapter 4.6
Article 16	Chapter 4.7
Article 17	Chapter 5.1
Article 18	Chapter 5.2
Article 19	Chapter 5.3
List of nuclear installations and technical and economical indicators	Annex 6.1
Selected generally binding legal regulations	Annex 6.2
Limits of radioactive discharges	Annex 6.3

1. Introduction

1.1 Purpose of the Report

Slovakia was the first country operating a nuclear installation, which ratified the Convention on Nuclear Safety (hereinafter referred to as the Convention). By taking this step Slovakia declared its willingness and preparedness to become actively involved in the fulfilment of the provisions of the Convention. The first National Report was prepared in September 1998 and the second in September 2001. The present third National Report gives a report on the fulfilment of the Convention's provisions for the period between July 1, 2001 and July 1, 2004 and highlights the main results/achievements in the area of nuclear safety of nuclear installations. The three documents along with the documents Questions & Answers need to be viewed as an integral whole. The National Reports of 1998, 2001 and 2004 are available on the Nuclear Regulatory Authority's web site at www.ujd.gov.sk.

The list of nuclear installations pursuant to Article 2 of the Convention is set out in Annex 6.1.

1.2 The concept of the utilisation of nuclear sources in Slovakia

Slovakia still heavily depends on imports of primary energy sources, which account for as high as 80% of the demand. The all important items of primary energy source imports include oil, gas and nuclear fuel from the Russian Federation.

A major source of the Slovak power system, nuclear power plants make a considerable contribution to covering electricity consumption of Slovakia, where the contribution by nuclear power plants to the overall electricity generation was about 57% in 2003, up from 47% in 1999. The country's dominant electricity producer is Slovenské elektrárne, a.s. The contributions to electricity generation by the respective sources are shown in Fig. 1.1.1.. Consumption and the generation pattern over the last eleven years is on Fig. 1.1.2.

Fig. 1.1.1 Source contributions to electricity generation in SR

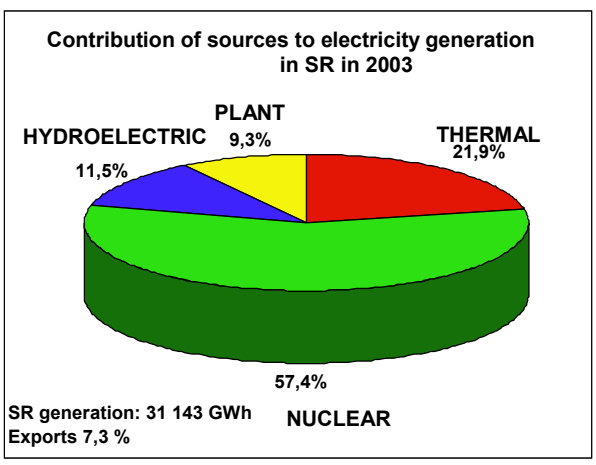
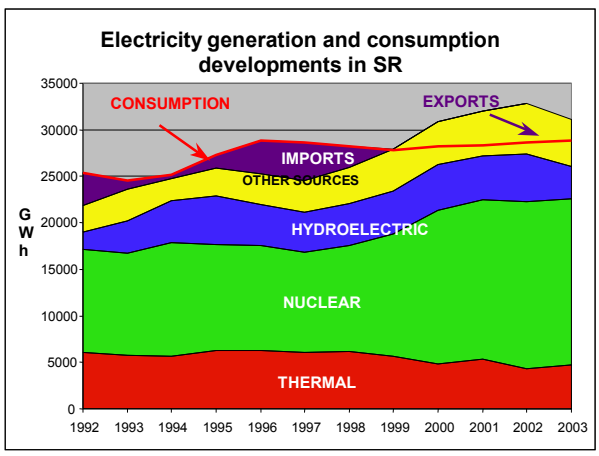


Fig. 1.1.2 Consumption developments and generation pattern in SR



Slovakia currently operates six units of WWER-440 type nuclear reactors and other nuclear installations at the Jaslovské Bohunice and Mochovce sites.

The following goals are of relevance to future uses of nuclear energy :

1. short term goals:

- to ensure the upgrade and safety improvement of NPP V-2 Jaslovské Bohunice,
- to further develop a concept of the management of spent fuel and for decommissioning of nuclear installations,
- to prepare a proposal for the completion of NPP Mochovce Units 3 and 4

2. medium-term goals:

- implement the NPP V-2 nuclear safety improvement programme - implement the list of measures aimed to achieve safety standards in accordance with UJD and IAEA requirements.

3. strategic goals:

- fulfilment of international agreements in the area of environment, nuclear safety, investment and energy trading (the Kyoto Protocol, the Convention on Nuclear Safety etc.),
- sort out the rear nuclear fuel cycle concept
- to develop a concept for the nuclear fuel back end.

2. Nuclear installations in the Slovak Republic according to the Convention

Under Article 2 of the Convention, the Joint Stock Company Slovenské elektrárne is the operator of the following nuclear installations within its subsidiaries:

- Nuclear Power Plant Bohunice - V-1 units
- Nuclear Power Plant Bohunice - V-2 units
- Nuclear Power Plant Mochovce - Units 1 and 2
- Nuclear Decommissioning and Management of RAW and Spent Fuel with the following facilities:
  Interim Spent Fuel Storage Facility (ISFSF)
  RAW processing and conditioning technologies
  National Radwaste Repository

VÚJE Trnava, a.s., owns at the Jaslovské Bohunice site a RAW incineration plant, which is not operated.

2.1 Nuclear Power Plant Bohunice - units V-1

2.1.1 Description of NPP V-1 units

See the Slovak Republic's National Report of September 1998 and 2001.

2.1.2 Safety assessment of NPP V-1 units conducted

2.1.2.1 External assessment missions

Since September 2001 the following external missions assessing the safety of NPP V-1 units have been undertaken:

- 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. The mission stated that the submitted documentation was of high quality, the analysis methodology used corresponded to that recommended and applied world-wide to develop Level 1 PSA studies. The event and fault trees included all of the safety systems and functions relevant to initiating events. The quality assurance programme applied on the PSA study was in line with manuals. Certain recommendations were at the same time made to extend the scope of the PSA study in question.
- WANO Peer Review Follow-up Mission held between 11 and 15 November 2002 reviewed the fulfilment of the measures proposed under the Peer Review Mission held at NPP V-1 in 1998.

2.1.2.2 NPP V-1 Safety Analysis Report

Safety Analysis Report following Gradual upgrading

In connection with the introduction of new fuel design (at Unit 2 and Unit 1 in 2003 and 2004, respectively) with an enrichment of 3.82%, chapters 4 (reactor),15 (safety analyses) and 16(L&C) of the Safety Analysis Report following Gradual upgrading were updated in 2003.

2.1.2.3 Accident analyses

The approach to safety assessment is based on the internationally approved safety standards and manuals, taking account of the relevant national regulations and recommendations. UJD guides on WWER reactor safety analyses are regarded as of special importance as they lay down a classification of initiation events, a set of acceptance criteria and more stringent analysis requirements.

Initiating events (and induced processes) are classified under two basic categories - anticipated transient processes and postulated accidents. In accordance with international practices and the above references, a specific approach was applied for selected events (Anticipated Transient Without Scram - ATWS, Pressurised Thermal Shock - PTS, radioactive leaks, internal structure loads and selected beyond design accidents with a realistic approach).

The single failure criterion and the deterministic conservative approach to the definition of the scenarios were used in accordance with the IAEA-EBP-WWER-01 recommendations.

The entire set of initiating events was analysed with a sufficient number of options (cases) so as to cover the assessment of each criterion and satisfy the selection of adequate analysis conservatism. The SAR contains explicit values for all major parameters, defining the initial and limit conditions for each option allowing for control and possible repetition of the analysis.

A summary of accident analyses

The accident analyses were carried out to the full range of postulated initiating events, applying qualified methods and practices. Work on the analyses is in line with the IAEA recommendations on WWER-type reactor accident analyses and the selection of events was done by comparing with the plant specific PSA. The results are summed up in Chapter 15 of SAR. The whole SAR was updated so as to describe the utility status and safety following the gradual upgrading. The structure is in line with the practice applied in countries with well developed nuclear programmes.

The NPP V-1 accident analysis was complemented with a set of severe accident analyses developed in connection with the V-1 Level 2 PSA study.

2.1.2.4 Probabilistic safety assessment

Level 1 PSA for full power operations

The results of Level 1 PSA for Unit 1 status in 2000 were CDF = 2.56E-05 /year.

To reduce CDF, the PSA study recommended to develop and implement in symptom-based operating procedures for emergency operation.

In December 2003, symptom-based operating procedures were put in place for emergency operation at NPP V-1. Following this change and the incorporation of the IAEA mission recommendations, an updated Level 1 PSA study was prepared in 2003.

The results of the Level 1 full power PSA for Unit 1 status in 2003: CDF = 2.09E-05 / year.

The updated study showed that by putting in place the new generation of emergency procedures the reactor core damage frequency decreased by 26%.

Level 1 PSA study identified a “large-break loss of coolant accident“ (17.5% contribution to CDF) as a dominant initiating event and the spray pump system as a dominant contributor to CDF in terms of equipment failures.

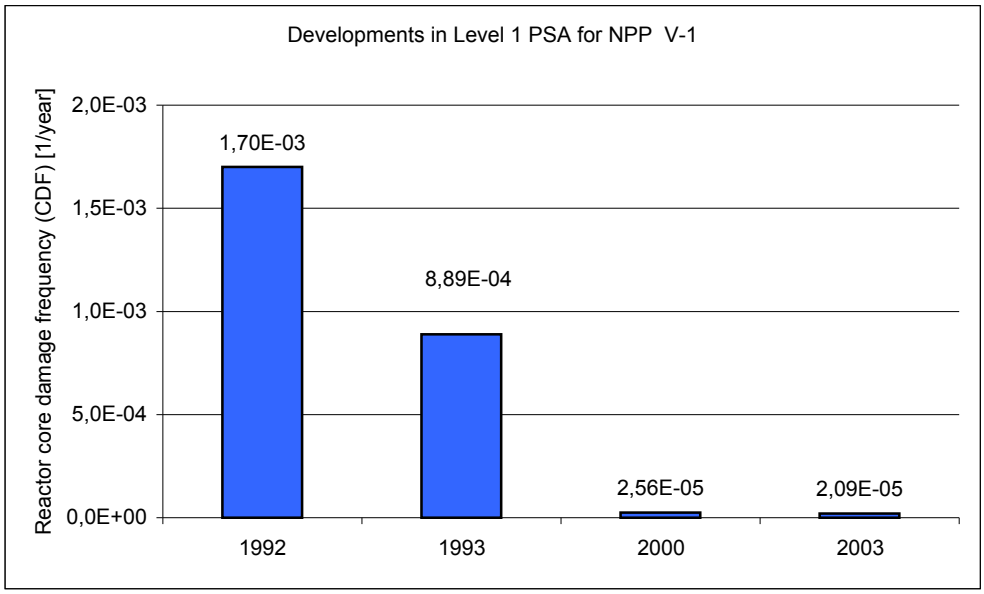


Figure 2.1.1 Development of Level 1 full power PSA results for NPP V-1

SPSA Level 1

In 2002, the Level 1 SPSA for reference V-1 Unit 1 was completed. The study reflects the status of the unit following the ”gradual upgrading” of the NPP V-1 and it has been prepared in co-operation of the engineering companies RELKO and VÚJE.

Level 1 SPSA results and conclusions for Unit 1 status in 2000: CDF = 5.54E-05/year

The reactor core and fuel damage frequency is comparable with CDF for full power operations. It was recommended to extend operating procedures for normal and emergency operation on the shutdown unit to reduce the reactor core damage frequency.

In 2003, the study was updated on the grounds of introducing the symptom-oriented procedures for emergency operation at the full output to be used on V-1 Units 1 and 2.

Level 1 SPSA results and conclusions for Unit 1 status in 2003: CDF= 5.43E-05/year

The reactor core and fuel damage frequency is comparable with CDF for full power operations. A dominant initiating event is a loss of natural circulation with the open reactor (20% contribution to CDF). It was recommended to extend operating procedures for normal operation on the shutdown unit to reduce the CDF.

Level 2 PSA

In June 2003, the Level 2 PSA study was completed for full power operations and shut down reactor on the reference NPP V-1 Unit 1. The study has been prepared in co-operation of the engineering companies RELKO and VÚJE, a.s.

The Level 2 PSA study results for Unit 1 status in 2000: LERF = 1.22E-05/year in unit full power operation.

The recommendations on improvements in this field concern the hydrogen management and technical measures for reactor pit flooding in the case of long term operation.

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 progress during operation and shutdown. The risk monitor reflects the actual status and configuration of equipment of the respective reactor blocks.

The implementation of EOOS at Unit 1 and 2 control rooms along with staff training is expected by the end of 2004.

The utility has systematically used PSA as a tool to develop and prioritise improvements that were implemented during the upgrading programme with a view to achieving best possible safety improvements. Moreover, the PSA conclusions and results have been incorporated into the training programme for NPP V-1 operators, and selected emergency scenarios have been implemented into the new unit simulator at VÚJE, a.s.

2.2 Nuclear Power Plant Bohunice - units V-2

2.2.1 Description of NPP V-2 units

See the Slovak Republic's National Report September 1998 and 2001.

2.2.2 Safety assessment of NPP V-2 units conducted

2.2.2.1 External review missions

Between 2001 and 2003 none external assessment of V-2 unit safety was undertaken.

2.2.2.2 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 V-213 containment atmosphere management, an analytic project had been developed in 2002-2003 in co-operation with VÚJE 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 since early 2003.

2.2.2.3 Probabilistic safety assessment

Level 1 PSA for full power operations

The results of the Level 1 full power PSA study for Unit 3 status in 2000 were CDF = 7.36E-05/year.

To reduce CDF, the PSA recommended to develop and implement a new generation of emergency procedures. The updated PSA confirmed that that by putting in place the new generation of emergency procedures the CDF frequency decreased by 35.4%. Having introduced symptom-based emergency procedures, the unit meets UJD´s reactor core damage frequency requirement (Fig. 2.2.1).

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

The results following the modification to the EFW status in 2002: CDF = 1.34E-05/year.

The updated analyses confirmed that the modification to the SG emergency feedwater safety system reduced the reactor core damage frequency by 82% (Fig. 2.2.1).

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

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.

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%. (Fig. 2.2.1).

The NPP V-2 upgrading will continue as scheduled by implementing other measures and PSA studies will reflect the reactor core damage frequency resulting from the modifications at the reactor units made.

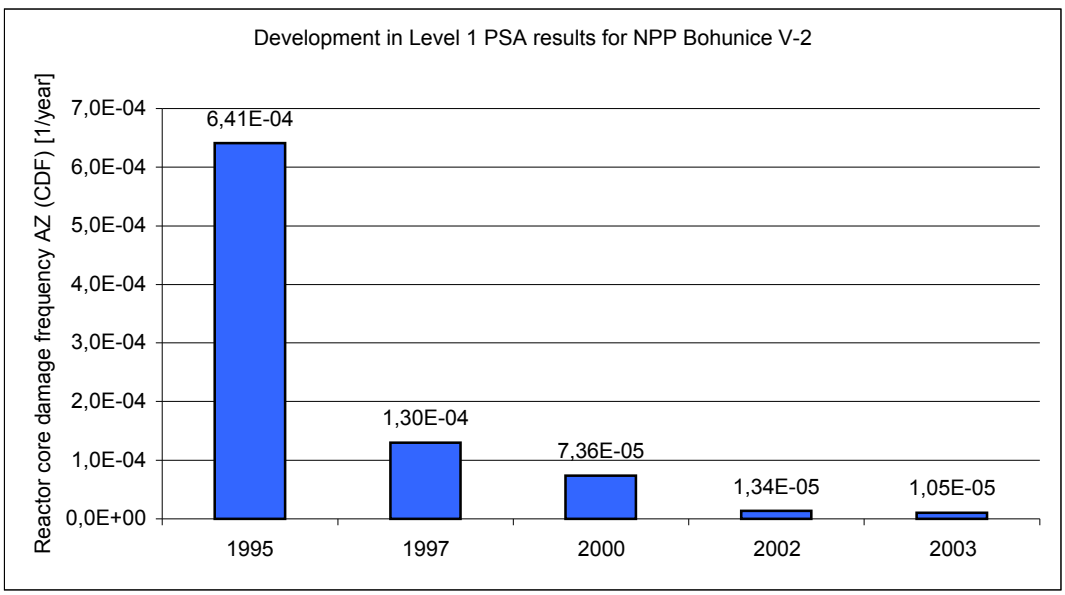


Figure 2.2.1 Development in Level 1 full power PSA results for NPP Bohunice V-2

Level 1 SPSA

The Level 1 SPSA results for Unit 3, status in 1999 were CDF = 6.44E-04/year.

The Level 1 SPSA results and conclusions following the implementation of certain Unit 3 upgrading measures in 2003 were CDF= 5.75E-05/year.

The core damage frequency from SPSA is comparable with CDF for power operations. Consequently the SPSA recommended to extend operating procedures for shut down states with a view to reduce CDF. The required procedures are expected to be developed and put into practice by the end of 2005.

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 = 7.8E-05/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 analysis report

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 UJD´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 UJD. 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 VÚJE Trnava, involving changes in the basic design made under MOD V-2 by the end of 2003.

2.2.4 NPP V-2 units safety improvement programs

The project goals and preparatory phase were described in Chapter 5.4 - Planned Safety Improvement Activities at Nuclear Installations, National Report September 2001.

The implementation of the ongoing program is scheduled until 2008. The timetable for the respective measures is approved and continuously supervised by UJD. Under the program, the following modifications have been made to date:

- RHR redundant system making use of a spray cooler and new low-pressure emergency pump,
- modification to SG primary collector lids on SG36, SG44 and SG46,
- modification to emergency low-pressure pumps of ECCS and spray pumps recirculations,
- upgrading steam and feed water piping penetrations between SG boxes and electrical building,
- installation of a new seismically qualified cooling system of ESFAS room,
- replacement of all 6 kV and 400 kV switches,

- replacement of unit electrical protections,
- extension of diagnostic SG compartment humidity measuring systems and in-core diagnostic system,
- replacement of fire valves with remote ones and others.

for example the implementation of following measures are planned for 2004:

- Installation of second valves on MFP organised leak routes,
- Installation of the MFP room - SG box water return system,
- Installation of the PC emergency degassing system,
- Seismic reinforcement of one of the three SW systems including ventilation cooling towers,
- Replacement of steam generator level controllers,
- Reinforcement of HZ high-energy piping,
- Seismic reinforcement of MGU cranes and columns,
- Seismic reinforcement of the civil structures of the reactor hall and the central pump station, and others.

2.3 Nuclear power plant Mochovce - Units 1 and 2

2.3.1 Description of NPP Mochovce

See National Report, September 1998.

2.3.2 Safety assessment of Mochovce units conducted

2.3.2.1 External review missions

In November 2001 an IAEA - IPSART mission was held to assess the PSA results for low power and shutdown reactor . The recommendations were taken into consideration in the final PSA report.

WANO Peer Review mission held between 17-25 April 2002, focused on safety operation, equipment state and safety culture of the plant. The WANO Peer Review follow-up will be held in November 2004 to review the fulfilment of the recommendations from the Peer Review.

2.3.2.2 Accident analyses

Accident analyses were carried out to the fullest extent of postulated initiating events applying qualified methods and practices. Work on the analyses is in line with the IAEA Guidelines for Accident Analysis for WWER Nuclear Power Plants and the selection of the events was confirmed by comparing with the utility-specific PSA. The results are included in Chapter 15 of the Pre-operation Safety Analysis Report.

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 co-operation 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.

The situation in the area of beyond-design and severe accidents is the same as that for V-2 units - see 2.2.2.2. A study on the Applicability of PHARE 4.2.7a/93 Project Results to EMO Units 1 and 2 was prepared in 2001.

A study on “Analysis of WWER-440/V213 Containment Gas Distribution during Severe Accidents“ was prepared to support the development of guidelines for mitigation of severe accident consequences. 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

Level 1 PSA for full power operation

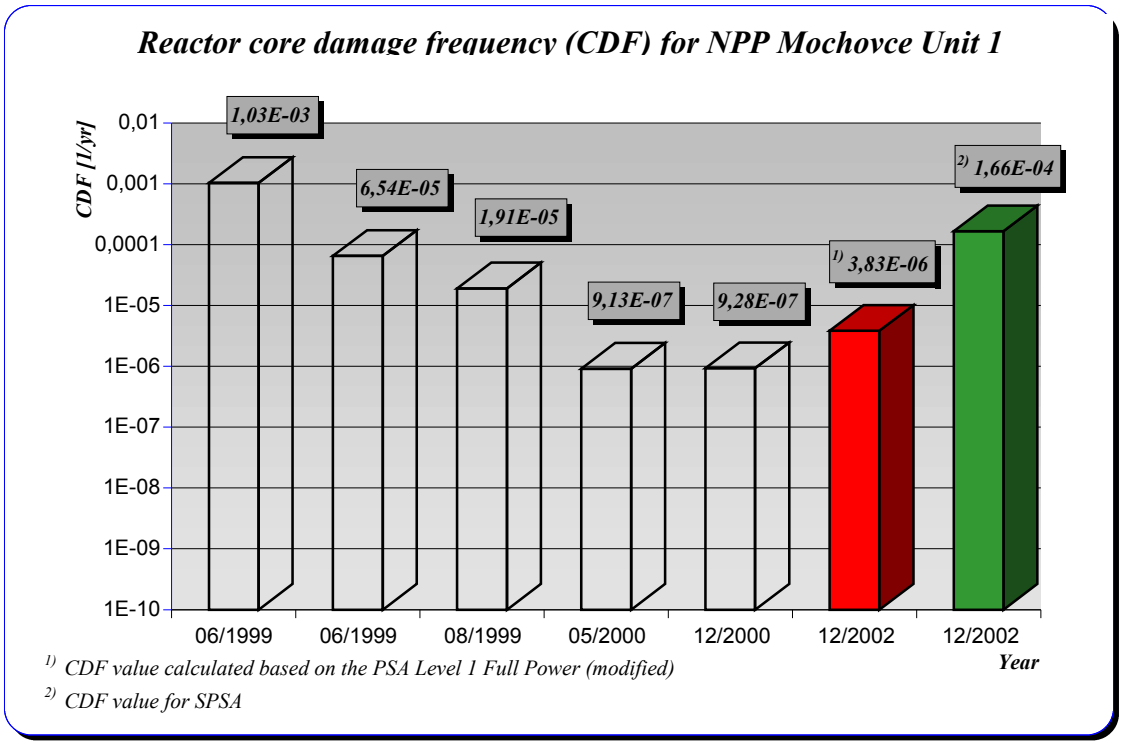
The Level 1 full power PSA result for Unit 1 status in 2000 was CDF = 9.28 E-07/year. Upon holding the IAEA - IPSART Mission (11/2001) also the Level 1 PSA study for the full power was reassessed under the PSA project for low-power and shut down reactor pursuant to the mission´s comments. Having made changes and incorporated the IPSART Mission members´ comments, the calculated value for CDF for the full power is **3.83E-06/year.**

PSA model for reactor low-power and shut down reactor (SPSA)

The fundamental requirement was to undertake SPSA to the same extent as with Level 1 PSA including the objectives and application of SPSA. The SPSA model was developed so as to be fully applicable in the future for the purposes of: living PSA, real time risk monitoring (SAFETY MONITOR), optimising L&C, PSA Level 2, optimising maintenance etc.

The SPSA project was launched in April 2001 and was finished in December 2002.

Under the SPSA project, also harmonisation of the two models was carried out, due to which a PSA Level 1 Integrated Model has been developed for Unit 1, CDF for power operation is **3.83E-06/year**, CDF for low-power and shut down reactor is **1.66E-04/year**).



An overview of CDF developments under the respective Unit 1 PSA model phases

Table 2.3.2 documents contributions to total CDF by the individual initiating events.

Table 2.3.2

Initiating event	Description	Frequency [1/year]	% of overall CDF
L(MI)	LOCA caused by human factor failure	7.34E-05	44.1 %
LOSW(ALL)	Failure of all SW systems (2 of 3)	3.72E-05	22.36 %
LOP	Loss of offsite power	2.93E-05	17.61 %
LVBB	Loss of working 6 kV switchboard	6.06E-06	3.64 %
LOSW(OP)	Loss of working SW system	5.10E-06	3.06 %
COVPR	Cold overpressure	4.37E-06	2.63 %
LNC(GP)	Loss of PC - gas production	4.07E-06	2.45 %
ECW	Extreme cold	2.01E-06	1.21 %
SE	Seismic event	1.18E-06	0.71 %
Others			2.22 %

Real time risk monitoring - Safety Monitor

Optimising the permissible risk degree configuration by the allowed shutdown time of respective safety relevant systems and equipment is a natural superstructure to the PSA (PSA Level 1 and SPSA). By transforming the Level 1 Integrated Model into the software environment of the Safety Monitor a reliable tool has been obtained, allowing on the basis of the defined limit conditions (core damage frequency - CDF) to permit system and equipment protection configurations, thereby meeting and complying with the acceptable degree of risk.

Safety Monitor at the same time constitutes both a useful support facility for operating staff in the unit control rooms in decision-making processes while respecting all the principles defined by L&C and a support tool for planning maintenance related activities during the unit shutdown.

The real time risk monitoring project (Safety Monitor) for Unit 1 was implemented in co-operation with the suppliers VÚJE, a.s., and Jacobsen Engineering, Ltd., and currently is in trial operation to assess the immediate degree of risk pursuant to the appropriate equipment protection configurations.

2.3.3 Mochovce units safety improvement programs

See the Slovak Republic's National Report September 1998 and 2001.

2.3.3.1 Study and analysis stage

See the Slovak Republic's National Report September 1998 and 2001.

2.3.3.2 Project development stage

See the Slovak Republic's National Report September 1998 and 2001.

2.3.3.3 Implementation of safety measures

The categorisation of individual safety problems was based on the IAEA document "Safety Issues and their Ranking for WWER-440/V-213 NPPs" with the difference in that the scope of safety measures was extended by the recommendations of RISKAUDIT, taking into account specific conditions of the NPP Mochovce.

The results of the safety measures are documented in the safety analyses report or other support documentation, as the case may be.

Prior to commissioning the two units, Category 2 and 3 safety measures were preferably implemented in order to satisfy the INSAG 3 requirements in terms of the defence in-depth concept.

The implementation of the safety measures was completed whenever possible in technology terms during operation and, where so required, during refuelling. The aforesaid procedure had continuously been approved and supervised by UJD.

Upon completion of Units 1 and 2 in 2001, an assessment of the safety improvement program was carried out. The assessment suggests that the implementation of the safety measures adopted under the NPP Mochovce safety improvement project, which was part of the completion of Units 1 and 2, is basically finished.

From the point of view of the recommendations under the document IAEA EBP-WW-ER-03 "Safety Issues and their Ranking for WWER-440/V-213 NPPs", safety measure AA08 **"Possible Accidents under Operation on Low Power and Shut down Reactor"** (Category 2) an extensive study of possible event trees has been performed , including thermo-hydraulic analyses dealing particularly with the risk of boron dilution in the primary circuit. The SPSA has been completed in December 2002.

Also, the implementation of the safety measure I&C 09 **"Accident Monitoring Instrumentation"** (Category 2) was finished in June 2004. This safety measure was implemented on Unit 1 (Unit 2 was finished in the year 2003) and the system was successfully tested. The present instrumentation covers the needs for handling design accidents through symptom-based emergency operating procedures

(SBEOP´s). Completion of post-emergency monitoring means was carried out, having regard for the elaboration of severe accident management guidelines (SAMG´s).

Additional safety considerations

In addition to the safety measures implemented in connection with the completion of Units 1 and 2, attention at the NPP Mochovce is naturally being paid also to other safety issues as well.

In line with the IAEA recommendations under the IAEA review mission to establish the site seismic data, the Mochovce site seismic-tectonic and geological data had been pinpointed over 2000, 2001, 2002, 2003 (including new measurements and wells). These data were used for probabilistic assessment of the Mochovce site seismic hazards. Thereafter, an IAEA mission was held in July 2003. The evaluation of work carried out was set out in the assessment report IAEA-TCR-02029 published upon mission completion.

Permanent attention is paid to the containment issue. While the entire system was comprehensively checked up for the functionality under maximum design accident conditions, a comparison of the results of the full range experiments was performed on the basis of thermo-hydraulic and strength calculations supported by a series of verification experiments. Following the European Union's recommendations, the Czech Republic, Slovakia and Hungary performed additional experimental tests of the bubble condenser, which confirmed the functionality of the system for all the design accidents. This was also confirmed by the state regulators of the respective countries with a joint opinion contained in a letter of May 2003. These additional experiments also borne out the correctness of the results obtained at the NPP Mochovce. The in-service containment tightness verification acknowledged the facility´s quality, where during Units 1 and 2 shut down the tightness values of 1.6% and 1.7%, respectively, were measured.

2.3.3.4 Pre-operation safety analysis report

See National Report, September 2001.

2.4 Nuclear power plant Bohunice A-1

See the Slovak Republic's National Report September 2001.

2.5 Interim spent fuel storage facility (ISFSF)

2.5.1 Description of the technology used

ISFSF represents a nuclear installation serving temporary and safe storage of spent fuel from WWER reactors prior to its further processing at the reprocessing plant or prior to its final disposal. It was commissioned in 1986.

The original status of the facility has been described in the Slovak Republic's National Report of September 1998 and 2001.

The storage facility was upgraded to enhance its storage capacity, extend its service life time and upgrade its seismic resistance. The facility overall storage capacity following the back fitting and seismic upgrading has tripled as compared to the original design one. The capacity is being gradually increased by replacing the original T-12 containers by K-48 compact containers, and it will be enough to store all spent nuclear fuel produced during the operation of NPP V-1 and V-2 units. The replacement of the containers will be finished by 2007. Computer-controlled handling equipment serves the purposes of moving spent fuel from the original into new compact containers.

Given the increased demands on removal of residual heat from spent fuel, the original cooling system of pool waters has been replaced by a new one. The system consists of two plate coolers (one being a 100% stand-by) and four pumps. The cooling water heat removal is provided by an autonomous cooling water system comprised of three cooling micro-towers and two circulation pumps (one of them as a 100% stand-by).

2.5.2 ISFSF safety reviews conducted

See National Reports, September 1998, 2001.

2.5.3 ISFSF safety improvement program

See National Report, September 1998.

2.5.3.1 Seismic upgrading

See the Slovak Republic's National Report September 1998.

2.5.3.2 Storage capacity enhancement

See the Slovak Republic's National Report September 1998.

2.5.3.3 Monitoring program

Following the recommendations of IAEA documents on monitoring the status of building, technological parts and spent fuel, a new monitoring program has progressively been implemented since 2001.

The focus of the program is on monitoring the status of:

- building structures such as the ISFSF building foundations, concrete structures of spent fuel pools, support steel elements and structures, fencing of the ISFSF building,
- pressure vessels and piping systems (cooling, cleaning and decontamination system),
- corrosion-induced damage to equipment and technology in contact with the fuel storage pools coolant (lining of pools, transport equipment),
- rotator engines (classified pumps and blowers),
- systems and components of electric supply (transformers, generators, motors and cables),
- spent fuel.

New monitoring points have been installed to monitor the ISFSF building setting-down, and also ground water levels had begun to be monitored. The condition of the ISFSF pool lining is monitored using both samples of the materials placed in the pools and the acoustic emission method. Visual control means, fuel cladding control for tightness and destructive control stand are used to monitor the fuel condition.

2.6 Technologies of RAW treatment and conditioning

A detailed description of RAW treatment and conditioning and spent fuel technologies is given in the National Report of the Slovak Republic prepared under the Joint convention on the Safety of Spent fuel Management and on the Safety of Radioactive waste management, April 2003 available at www.ujd.gov.sk

The following technologies are available at the nuclear installation RAW Treatment and Conditioning Technologies, for which permanent operation licences have been granted:

- bitumenisation lines PS 44 and 100 (under trial operation) in unit 809,
- Bohunice RAW treatment and conditioning centre (BSC)
  - incineration plant
  - supercompaction plant
  - concentration plant
  - cementation plant

The NPP A-1 compound includes the following RAW treatment and conditioning technologies:

- radioactive water treatment plant
- chrompik vitrification line.

VÚJE´s RAW experimental incinerator is no longer operated at the NPP Jaslovské Bohunice site.

2.6.1 Brief description of the technologies

2.6.1.1 Bitumenisation line

See the Slovak Republic's National Report September 1998.

2.6.1.2 Radioactive waters treatment plant

See the Slovak Republic's National Report September 1998.

The bitumenation lines PS 44 and PS 100 were commissioned in 1995 and 2002, respectively. By the end of 2003 a total amount of 1,049 m^3 of V-1 concentrates, of 317 m^3 of V-2 concentrates and 378 m^3 of A-1 concentrates had been conditioned on both bitumenisation lines.

2.6.1.3 Chrompik vitrification line

See the Slovak Republic's National Report September 1998.

18.8 m^3 of KS-2-produced water solution of potassium bichromate (chrompik) had been conditioned on the vitrification line by 2001. In 2002, a vitrification line upgrade was launched in order to condition higher-activity chrompik II and III. The upgrade is scheduled to end in the second half of 2004.

2.6.1.4 VÚJE bitumenisation line and incinerator

The bitumenation line as well as incinirator have been out of operation since 1998 (see the Slovak Republic's National Report September 1998), as has VÚJE´s incinerator.

2.6.1.5 Bohunice RAW treatment and conditioning centre

The Bohunice treatment and conditioning centre processes RAW that may be classified under the following categories:

- combustible solid and liquid wastes,
- compactible solid wastes,
- non-combustible and non-compactible wastes,
- concentrates,
- ion exchange resins,
- other contaminated liquids and sludges.

To condition and the above RAW, the centre includes the following technologies:

- evaporator (concentration equipment),
- cementation line,
- sorting,
- incinerator,
- storage and transport equipment,
- supercompaction room.

2.6.2 Safety reviews of the facilities conducted

Safety reviews of the RAW treatment and conditioning technologies are conducted in the framework of the safety documentation assessment (safety reports, quality assurance programs, L&C) by regulatory authorities and organisations of the Slovak Republic while being submitted under construction and

commissioning proceedings. The annual reviews on the status of nuclear and radiation safety operations are presented to UJD.

The facilities are subject to regular inspections by UJD inspectors. Any shortcomings are documented and corrective measures are taken by the operator.

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

Many analyses have thus far been conducted, aimed at safety of the final product and optimal filling thereof as well as the possibilities for RAW treatment into new packaging forms. A number of technical improvements have been made to improve the technologies. Recently, reconstruction work on the incineration equipment has been carried out, involving modifications designed to enhance safety and operational reliability in respect to filtration and flue gas purification.

2.7 National repository of radioactive waste

The national repository of radioactive waste is a nearsurface-type repository intended to dispose 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 engaged with activities linked with the generation of radioactive wastes. The repository compound is located 2 km Northwest of the NPP Mochovce site.

The repository comprises a system of storage boxes arranged in two double-rows, each carrying 40 boxes. A single box accommodates 90 fibre-concrete containers (FCC´s). The total capacity of the repository is 7,200 containers with a summary volume of 22,320 m^3. The internal volume of the fibre-concrete containers is 3.1 m^3.

The capacity of the two double-rows (80 storage boxes) is capable of holding 7,200 FCC´s with an expected duration of about 10 to 15 years. The repository needs to be extended as a capacity of about 35,000 FCCs is required to dispose of all RAW (complying with acceptance criteria). The repository compound allows for expansion up to ten storage double-rows.

A total of 576 FCCs were held at the repository as of the end of 2003.

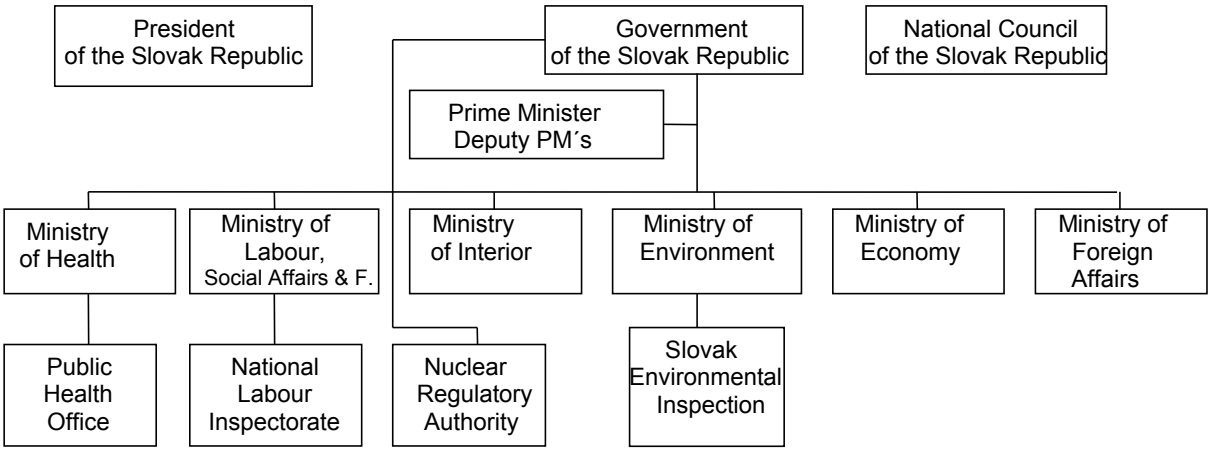
3. Legislation and regulation

3.1 Legislative and regulatory framework

3.1.1 Governmental structure of regulatory bodies

Under Act No. 130/1998 Coll. on peaceful uses of nuclear energy, the supervision of peaceful use of nuclear energy is performed by government authorities within their competencies laid down in the relevant acts by the scheme shown in Figure 3.1.1.

Fig. 3.1.1 Structure of regulatory authorities



Nuclear Regulatory Authority of the Slovak Republic (UJD)

UJD is a central state administration authority providing the exercise of state regulatory activities in the field of nuclear safety of nuclear installations, including supervision of the management of radioactive wastes, spent fuel and other fuel cycle phases, as well as of nuclear materials, including their control and records. It provides for the assessment of the nuclear energy use programme objectives and of the quality of classified facilities and equipment of nuclear technology, as well as the Slovak Republic's commitments under international agreements and treaties in the field on question.

Ministry of Health of the Slovak Republic (Public Health 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 exercised by the Ministry of Health, the Public Health Office. The Ministry's competence includes the supervision of institutional radwaste management except their transport to the disposal facility, establishing radiation limits and the conditions for disposal and deposition of radioactive wastes in terms of contingent health impacts. The Public Health Office methodologically directs the health protection against ionising radiation effects and licenses activities leading to exposure, 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 (MŽP SR)

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

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

Ministry of Interior of the Slovak Republic (MZV SR)

The Ministry of Interior is, inter alia, a central state administration authority for the conceptual management and control of fire prevention, the preparation of an integrated rescue system including civil protection of the public and property, public order and personal security. In case of nuclear and radiation accidents it is also responsible for organising granting of aid to the public (Civil Protection Act No. 42/1994 Coll., as altered and amended).

Ministry of Economy of the Slovak Republic (MH SR)

Ministry of Economy of the Slovak Republic is a central state administration authority for (a.o.) nuclear energy industry, including the treatment of nuclear fuel and of radioactive waste, permitting of imports and exports of nuclear related materials and equipment.

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

The Ministry of Labour, Social Affairs and Family is a central state administration authority on, inter alia, occupational health and safety and labour inspection. State administration on labour inspection is exercised by MPSVR SR, the National Labour Inspectorate (NLI) and labour inspectorates.

NLI reports to MPSVR SR and performs, inter alia, labour inspection in nuclear energy and supervision under special regulations. The labour inspection consists in particular of observation of legal rules and other regulations on occupational health and safety and technical equipment safety including those governing working environment factors. The supervision is carried out by course of the regulations referred to in 4.5.9.1.
The technical inspection reports to MPSVR SR and makes the verification for the safety of classified technical equipments and technical equipments.

3.1.2 Legislation

3.1.2.1 Introduction

The legal structure of nuclear safety regulatory activities is made up of laws passed, on the one hand, prior to the set up of the Slovak Republic and, on the other hand, of new laws passed thereafter.

The legal system may be classified as follows:

1. The supreme fundamental law of the state is the Constitution that is passed by Parliament - is generally binding in nature.

2. Acts stipulate the fundamental rights and obligations specifying principles in various areas; these are passed by Parliament - are generally binding in nature.

3. Government ordinances are subjected to laws and passed by Government - these are generally binding in nature.

4. Regulations and orders are rules issued by central state administration authorities such as Ministries in order set forth the particulars of the implementation of laws and government Regulations - these are generally binding in nature.

5. Guidelines (manuals) contain detailed requirements and recommended action 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 organisational rules of a regulatory authority forming the basis for the internal quality assurance system.

3.1.2.2 Acts on state supervision

On 1 April 1998, the National Council of the Slovak Republic passed **Act No. 130/1998 Coll.** - Act on Peaceful Uses of Nuclear Energy (so-called Atomic Act). The Act lays down the conditions for safe uses of nuclear energy exclusively for peaceful purposes, in accordance with international agreements entered into by the Slovak Republic. Also, it includes clauses setting out financial compensations in the event of a nuclear accident, envisaging the amount of SKK 2 bn as a limit for the operator's financial liability. Pursuant to the Atomic Act, a nuclear installation is used to mean facilities and premises whose part is a nuclear reactor making use of a fission reaction, facilities and premises for the production, processing and storage of nuclear materials, facilities and premises for the disposal of spent nuclear fuel and for the treatment, conditioning, storage and disposal of RAW. Related generally binding legal documents are listed in Annex 6.2.

A new draft Atomic Act is currently prepared and approved by the Government, having regard for the Slovak Republic's admission to the European Union. The most important alterations against Act No. 130/1998 Coll. include the abolition of permits, the assumption of UJD´s competencies as a special building authority under building and occupancy permit proceedings relating to nuclear installation structures, changes in nuclear material record-keeping and control in the context of EU Regulations, changes in authorising radioactive waste transfers from and to the EU, changes in the structure of the Act and in civil liability for nuclear damage (liability limit and change in the currency in which the liability limit is indicated).

Act No. 575/2001 Coll. on organisation of operation of the government and of central state administration, as altered and amended ("Competence Act") lays down assignments and responsibilities of central state administration authorities. Effective as of 1 January 2002, Act No. 575/2001 Coll. has repealed Act No. 347/1990 Coll. (original Competence Act). One of the many amendments thereto was Act No. 2/1993 Coll., which stipulated, inter alia, the establishment of UJD. The provision on UJD has been fully transposed into Art. 29 of the new Competence Act.

One of the underlying laws, **Act No. 70/1998 Coll. on energy, as altered and amended**, governs the conditions for business in energy in the Slovak Republic and the rights and obligations of legal entities and natural persons doing business in this field.

Act No. 127/1994 Coll. on environmental impact assessment orders comprehensive expert and public assessment of environmental impacts of selected constructions under preparation, including nuclear installations, and empowers Ministry of Environment of the Slovak Republic to review all suggestions for technical changes of nuclear installations that may have untoward environmental impacts.

Act No. 254/1994 Coll. as amended and Regulation No. 14/1995 Coll. as amended by Regulation No. 690/2002 Coll., established the State Fund for the Decommissioning of Nuclear Power Generating Installations and Treatment of Spent Nuclear Fuel and Radioactive Wastes. Treatment of spent

nuclear fuel and radioactive waste means their transport, processing and disposal. The Fund that is an independent legal entity is managed by the Ministry of Economy. The Fund is financed from several sources, including contributions from nuclear power plant operators, banks, the State, and others.

Act No. 272/1994 Coll. on public health protection, as amended by Act No. 290/96 Coll., Act No. 470/2000 Coll. and Act No. 578/2003 Coll., lays down the general requirements for health protection, health protection authorities, competencies thereof, individuals obligations in health protection, the requirements for the performance of state health supervision, sanctions. The section on radiation protection establishes the fundamental principles for radiation protection, the conditions and requirements for obtaining licences for activities leading to exposure and for radiation protection relevant activities, the basic requirements for handling radiation sources and institutional radioactive wastemanagement except their transport to the disposal facility, licence holders´ obligations, the conditions for discharging radioactive materials into the environment, the requirements for radiation protection of staff and of the public.

Act No. 95/2000 Coll. on labour inspection, as altered and amended, which, inter alia, regulates labour inspection and supervision, defines labour inspection competencies, establishes the rights and obligations of legal entities and natural persons including the issue and withdrawal of licence for the performance of activities on nuclear equipment. Related generally binding legal rules are set out in Annex 6.2.

Act No. 330/1996 Coll. on occupational health and safety, as altered and amended, lays down the basic conditions for occupational health and safety, elimination or limitation of risk and factors involving the occurrence of on-the-job accidents, occupational diseases and other work-related health damage, and general prevention principles. Related generally binding legal rules are set out in Annex 6.2.

Act No. 50/1976 Coll. on territory planning and rules of construction (so-called Construction Act) as amended, lays down the responsibility of the building authority to obtain, prior to granting location permit, building permit and commissioning decision concerning constructions containing nuclear installation, UJD´s position, the latter being allowed to make its approval conditional upon meeting specific conditions.

3.1.2.3 Draft legislation

A new enactment, the so-called “Atomic Act“ is currently under preparation. Its adoption will also be followed up by the adoption of new implementing legal rules - regulations. The list of regulations issued and effective to date (since 1998) is given in Annex 6.2.

UJD had issued the following regulations over the period between 2002 and 2003:

- Regulation No. 317/2002 Coll. on the requirements for license holders´ quality systems and on alteration and amendment to UJD Regulation No. 187/1999 Coll.,
- Regulation No. 318/2002 Coll. on safety documentation of nuclear installations and on alteration and amendment to UJD Regulation No. 245/1999 Coll.,
- Regulation No. 121/2003 Coll. on nuclear safety assessment,
- Regulation No. 167/2003 Coll. on the requirements for nuclear safety of nuclear installations.

3.1.3 Regulation in the field of nuclear safety

The central regulation is Act No. 130/1998 Coll., under which UJD Regulations are prepared and decisions issued.

UJD issues a variety of legal documents namely: permits, approvals, authorisations, and decisions. The particulars of the Act are to be found both at www.ujd.gov.sk and in the Slovak Republic's National Report September 2001.

Decisions can broadly be characterised as acts to apply law. This implies that this is the application of the rights and obligations laid down in a generally binding legal rule to a particular case involving a particular entity. Decisions issued by administrative authorities are also referred to as individual administrative acts. The obligations to be imposed by virtue of a decision are enforceable and failure to perform them can be sanctioned. Decisions are on principle subject to the possibility of bringing an action to court to judicially review a decision. However the court does not review those decisions excluded from their jurisdiction by course of the Code of Civil Procedures.

In addition to generally binding legal rules, UJD also issues safety guidelines helping operators comply with the generally binding rules (see Chapter 6.2).

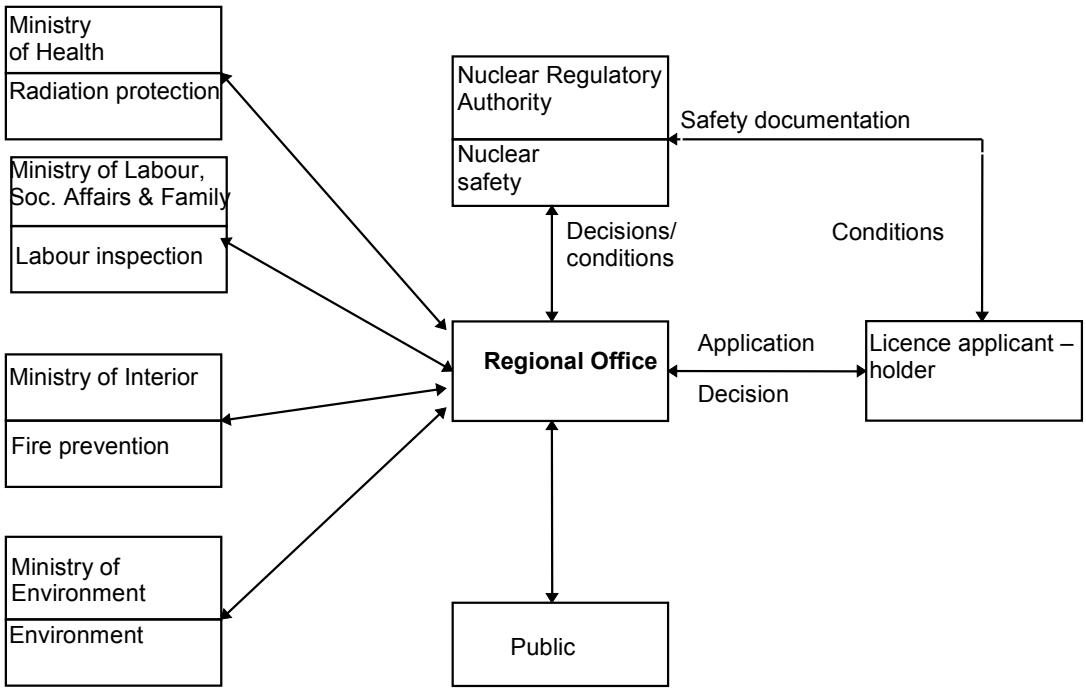
Under the nuclear installation licensing procedure International Atomic Energy Agency standards and recommendations are used and applied.

3.1.3.1 Nuclear installation licensing procedure

The licensing procedure consists of three major stages: sitting, construction commencement and permanent operation. Before granting a licence for permanent operation, the regulatory authority carries out control under the approved programs for hot and cold testing and grants approval for fuel loading, physical start up, energy start up and trial operation. Figure 3.1.3.1. shows major regulatory authorities and the licensing procedure for permanent operation.

The basic condition essential to licensing in terms of nuclear safety is to prepare and submit a Safety Analysis Report and other prescribed safety documentation and to meet the conditions of the regulatory authority's preceding licensing procedures and decisions.
Regional offices issue their decisions on sitting, construction, operation and decommissioning of nuclear installations following permission from UJD, the Public Health Office of the Slovak Republic, labour inspection authorities and other state administration authorities and organisations. As regards licences and permits, the obligations of these authorities are specified by Act No. 50/1976 Coll. (Construction Act), Regulation of the Nuclear Regulatory Authority of the Slovak Republic No. 167/2003 Coll. on the requirements for nuclear safety of nuclear installations, Regulation of the Ministry of Environment of the Slovak Republic Nos. 453/2000 Coll. and 55/2001 Coll., Regulation of the Slovak Labour Safety Office No. 66/1989 Coll., as amended by Regulation of the Slovak Labour Safety Office No. 31/1991 Coll., and Regulation of the Ministry of Labour, Social Affairs ands Family No. 718/2002 Coll. (formerly Regulation of the Slovak Labour Safety Office No. 74/1996 Coll.).
A licence holder is responsible for the safety of a nuclear installation.

Fig. 3.1.3.1 Licensing procedure



3.1.3.2 Regulatory authority - UJD

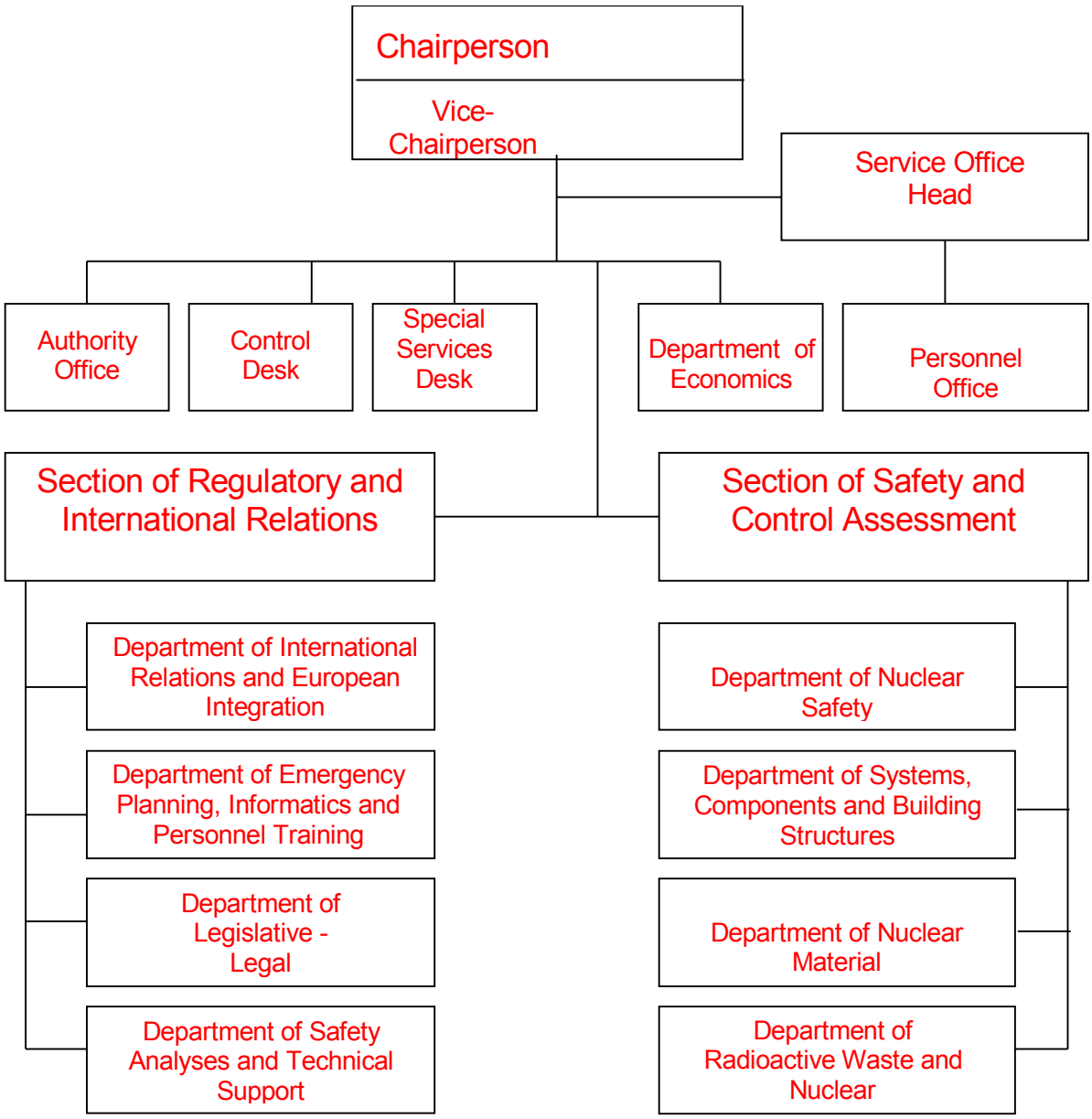
Holding powers under Act No. 2/1993 Coll. and subsequently of Act No. 575/2001 Coll., as altered and amended, UJD is an independent state regulatory authority that reports directly to the government and is headed by the government-appointed chairman. The regulatory authority's independence of any other authority or organisation engaged with the development and uses of nuclear energy applies in all relevant areas (legislation, human and financial resources, technical support, international co-operation, enforcement instruments). Pursuant to Act No. 130/1998 Coll., UJD is authorised to issue generally binding legal rules - regulations and safety guidelines. UJD´s budget consists of some of the state budget and HR management falls fully within UJD Chairman's competence. UJD has financial and human capacities for independent analyses and technical support.
As of 1 January 2004, UJD had a staff of 82. The organisational structure is shown in Fig. 3.1.3.2.

November 1999 saw the launch of the development of a UJD internal quality system whose implementation will allow for a higher-quality and more effective performance of ever-growing UJD assignments. UJD Chairman statement on quality analysed the need to ensure high-quality performance of UJD assignments, responsibility toward the public in terms of providing for nuclear safety and environmental protection. UJD management declared it was aware that the perfect performance of UJD assignments could only be secured using a quality system, the development and implementation of which received the full support from UJD Chairman. Also established at the same time were the principles for building the quality system and the need for active approach by all UJD staff.

In collaboration with an external organisation an analysis was conducted on the possibility of using the hitherto internal management acts as the basis for future quality guidelines. A quality manual was developed. Bringing to bear a uniform methodology, network diagrams were worked out for classified

activities forming the basis for the quality manual and serving to identify the need to modify the hitherto by-laws and define new ones.

Fig. 3.1.3.2 UJD structure



3.1.3.3 Role of the regulatory authority

Pursuant to Act No. 2/1993 Coll., UJD provides for the exercise of the tasks of the state regulatory body for nuclear safety of nuclear installations, including regulation of the treatment of radioactive wastes, spent fuel and other parts of the fuel cycle, as well as of nuclear materials, including their control and accounting. It takes care of the assessment of the goals of the nuclear energy utilisation programme and of the quality of selected facilities and nuclear technology devices, as well as of the 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 Act No. 130/1998 Coll., UJD is the state regulator in the field of nuclear safety of nuclear installations; in particular, it

- performs inspections of workplaces, places of operation and premises of nuclear facilities, checking on the compliance with the responsibilities under the Atomic Act, regulations issued based thereon, operating regulations, adherence to limits and conditions of safe operation, quality assurance systems as well as the responsibilities arising from measures and instructions issued pursuant to the Atomic Act (see chapter 3.2.2.1),
- verifies the compliance with the commitments under international agreements and treaties, in nuclear safety, management of nuclear materials, radioactive waste from nuclear facilities and treatment for disposal and disposal of institutional radioactive wastes, management of spent nuclear fuel, including accounting and control,
- identifies the status , reasons and consequences of accidents, incidents and selected failures, and takes part, being a mandatory body, in the investigations of incidents and accidents led by other authorities,
- checks the performance of mandatory inspections, reviews, operating controls and tests of selected equipment in nuclear facilities,
- orders the elimination of shortcomings impacting upon nuclear safety,
- reviews nuclear safety of nuclear facilities independently of the operator (see chapter 4.5),
- checks the contents and exercise of emergency plans.

UJD edits annual reports on the outcomes of regulatory activities and on nuclear safety. The annual summary reports are submitted to the Slovak Government.

3.1.3.4 International co-operation

Co-operation with the International Atomic Energy Agency (IAEA)

Given its international importance and wide-ranging possibilities for technical assistance, the co-operation with the Vienna-based IAEA has the most important role to play. In collaboration with the Slovak Ministry of Foreign Affairs the Slovak Republic has performed in a timely manner and to the full extent its financial obligations toward the nuclear watchdog.

Co-operation with the IAEA on technical projects is an extraordinary success. For example, over 2004 the Slovak Republic has been involved in handling four national and over 26 regional projects and a number of scientific projects. While handling them, expert missions are taking place with the focus on the development of a simulator training software, putting in place good laboratory practices in sterilising tissues in health care, evaluation of material degradation of primary circuit components, and the like.

Much of the regional projects concern nuclear safety issues. Fellowships, seminars, workshops and training courses with wide international participation are being organised under the regional projects. These are aimed at the issues of NPP component ageing, radiation protection, safety culture and nuclear technology applications in health care.

Co-operation with the Organisation for Economic Co-operation and Development / Nuclear Energy Agency (OECD/NEA)

SR representatives have attended Group of Government Experts meetings on third country nuclear liability, at government representatives meetings of the Committee on Safety of Nuclear Installations and of the Committee for Nuclear Regulatory Activities, of the Committee on Radioactive Wastes, and of other committees and working groups.

Co-operation with the European Commission and European Union countries

UJD representative have attended on a regular basis meetings of European nuclear regulatory representatives held in the presence of CONCERT representatives, meetings of the European Nuclear Installations Safety Group (ENIS-G) and of Nuclear Regulators Working Group (NRWG) with a view to exchanging knowledge on the level of safety of nuclear installations in Europe.

Since May 2004 the SR has been a full member of the Atomic Questions Group.

One of the most important activities in this field was negotiation linked to the preparation of the WENRA´s report assessing the status of nuclear safety in the associated countries. The report, which was sent to Slovakia in November 2000, on principle positively judges the status of legislation in said area and progress made in the process of improving the safety of the operated NPP´s. The report at the same time notes that some of the safety analyses relating to a LOCA and confinement at V-1 need to be finished. The V-2 safety improvement program is expected to continue with the aim of implementing safety relevant measures. The standards of safety of NPP Mochovce units are comparable with those of NPP´s operated in Western Europe.

Bilateral co-operation

Formal (under international treaties) and informal co-operation is taking place with all of the neighbouring states (Czech Republic, Poland, Ukraine, Hungary, Austria) as well as other states such as Armenia, Bulgaria, Germany, France, Finland, Spain, Slovenia, the UK, the USA, Japan). The co-operation is focused on the exchange of experience in peaceful uses of nuclear energy, building an emergency preparedness system, emergency analyses, and the like.

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

The Forum was established for the purpose of mutual exchange of experiences in constructing and operating WWER nuclear power plants. The activities are also promoted by IAEA and other developed nations having nuclear programs. 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 regulator of countries with small nuclear programs

The Network (NERS) was established in 1998 on the Swiss Regulator (HSK)´s initiative with a view to strengthening co-operation and exchange of experience among countries running similar nuclear programs. UJD has been taking regular and active part in NERS activities.

3.1.4 Regulation in the field of health protection against radiation

The role of the state health regulator at nuclear facilities is to check as to how the radiation protection of staff of NPP´s and of the public in environs is provided for. The fundamental requirements for health protection against radiation are laid down in the legal rules referred to in 4.6.1.

UJD and MZ SR have made an agreement aimed at to co-ordinate regulatory activities and to ensure the complementariness of the regulation. A joint commission on handling the issues of common interest has been set up therein.

3.1.4.1 Licensing procedure

In licensing an activity leading to exposure the Act No. 71/1967 Coll. on administrative proceedings, as altered and amended, is to be followed. Act No. 272/1994 Coll. on public health protection, as altered and amended, lays down in more detail conditions for licensing, and in particular:

- requirements for the licence applicant,
- requirements for a special representative to ensure radiation protection,
- requirements for the licence application elements,
- list of documents to be approved and other documents.

Furthermore, the Act lays down licence elements and conditions, under which the licence can be amended, repealed and becomes ineffective.

There are two types of mandatory documents to be attached to the application for a licence on activities resulting in exposure: those subject to approval (to be approved by a health protection authority) and other documents. The documents subject to approval include:

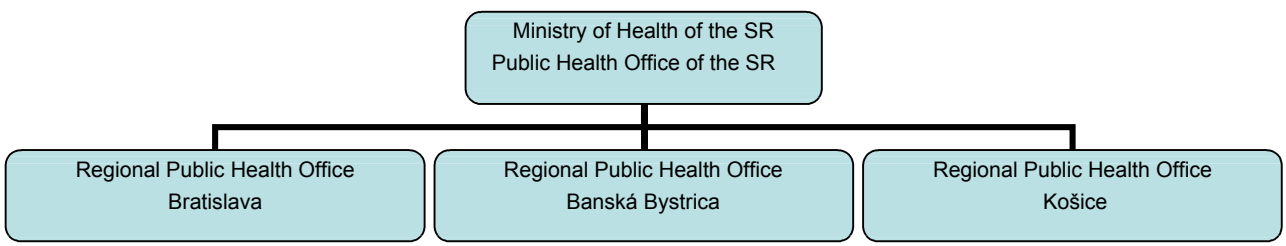
- workplace monitoring plan,
- workplace emergency plan,
- proposed definition of the controlled zone,
- radiation protection assurance quality program,
- draft program for monitoring radioactive discharges into the environment,
- radiation protection program.

Other documents include a list of background documents and documents used by the applicant to document the satisfaction of the requirements concerning radiation protection and safe operation of a nuclear installation such as reasoning activities resulting in exposure, specification of ionising radiation sources and accessories in use, description of a workplace and environs thereof complete with information on shielding and protective devices and equipment of workplaces, workplace radiation protection optimising demonstration, the expected number of staff with ionising radiation sources in the controlled zone, and the way of its protection against entry by unauthorised persons.

3.1.4.2 Supervisory authority

The supervision of health protection against radiation in the Slovak Republic is provided by state health supervision by course of Act No. 272/1994 Coll. on public health protection, as altered and amended. The state health supervisory authorities on radiation protection are the Ministry of Health of the Slovak Republic and the Public Health Office of the Slovak Republic. The state health supervisory authority at nuclear power plants is the Public Health Office of the Slovak Republic.

Fig. 3.1.4.2 Structure of state supervision on health protection against radiation



3.1.4.3 Competence of the supervisory authority

Pursuant to the provisions of the cited Act, the competence of the Public Health Care Office of the Slovak Republic in relation to nuclear installations has principally not changed against the previous state (see the Slovak Republic's National Report of September 2001).

3.1.4.4 Execution of the state supervision

The supervision of radiation protection at nuclear facilities is carried out by the Department for Health Protection against Radiation at the Public Health Office of the Slovak Republic. This Department conducts checks for radiation protection of a nuclear installation's staff and also of the public in environs thereof. The cited Act governs the obligations of licence holders to furnish information and allow for state supervision to be performed, and it also establishes authorisations of persons performing the supervision. The activities of the Department performing the supervision are set out in more detail in 4.6.4.

3.1.5 Regulation in the field of labour inspection

The state administration on labour inspection is exercised by:

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

The technical inspection checks within its inspection activities for compliance with the requirements for safety of classified technical equipments and technical equipments.

3.1.5.1 Activity of the National Labour Inspectorate

NLI carries out labour inspection by course of Act No. 95/2000 Coll. on labour inspection, as altered and amended, and of Act No. 330/1996 Coll. on occupational health and safety, as altered and amended.

Labour inspection is defined as a supervision of observance of legal rules and other regulations on occupational health and safety and safety of technical equipments including regulations governing working environment factors.

Part of the labour inspection is:

- holding oneself responsible for violating the above regulations,
- consultations.

NLI breaks up nuclear labour inspection into two basic parts.

Part 1 - Labour inspections, so-called "Enhanced Mode", focused particularly on pressure components of the primary circuit and other classified components of nuclear installations:

Inspection activities are carried out by course of:

- Slovak Labour Safety Office Regulation No. 66/1989 Coll. assurance of safety of technical equipments in nuclear energy, as amended by Slovak Labour Safety Office No. 31/1991 Coll.,
- Regulation of the Ministry of Labour, Social Affairs and Family of the Slovak Republic No. 718/2002 Coll. on occupational health and safety and safety of technical equipments (formerly: Slovak Labour Safety Office Regulation No. 74/1996 Coll.).

Technical equipments are broken up for the purposes of labour safety in terms of the degree of hazard into items having a high and higher degree of hazard – classified technical equipments – and those having a lower degree of hazard – technical equipments.
Classified technical equipments are:

- pressure vessels and steam generators handling radioactive substances having their highest operating pressure in excess of 0.07 MPa and capacity in excess of 10 litres,
- pumps, pipelines, distributors, piping 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, normal and emergency make-up systems, reactor after-cooling systems, and spent fuel storage facility after-cooling systems,
- hydraulic and pneumatic equipment providing control, regulation, signalling, protection and measurement in running the above equipment, with their highest operating pressure in excess of 0.07 MPa and inner diameter over DN 50,
- building part of the containment (zone) designed for internal pressure, including equipments providing its gas-tightness at the maximum design accident,
- 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,

classified technical equipments (NPP CTE´s).

- pressure, gas, electric and lifting equipment, further classified technical equipments (CTE´s).

Under enhanced mode, inspection activities are focused pursuant to Slovak Labour Safety Office Regulation No. 66/1989 Coll., as amended by Regulation No. 31/1991 Coll., on:

1. control and issue of opinions on materials and activities,
2. checking up special capacity of legal entities and natural persons and issue,
3. control of equipment before commissioning,
4. participation in testing,
5. confirmation of shipping technical equipment documentation.

Pursuant to Ministry of Labour, Labour Safety and Family Regulation No. 718/2002 Coll., enhanced mode activities are focused on:

1. control of shipping documentation, etc.,
2. issue of licences to legal entities,
3. issue (control) of certificates to natural persons,
4. control of workers´ special capacity for activity on electric devices,
5. control of CTE documents.

Part 2 - Labour inspection, so-called "Classical Mode", with the focus on control for compliance with other occupational health and safety, technical equipments safety regulations, labour regulations, etc. (Act No. 264/1999 Coll. and Act No. 90/1998 Coll.).

3.1.5.2 Technical inspection activities

Under Art. 7a of Act No. 330/1996 Coll. on occupational health and safety, as altered and amended, the Technical Inspection:

- delivers expert and binding opinions as to whether the requirements for the safety of technical equipments are complied with in design, construction, production, installation, operation, repair, maintenance and special testing of CTE´s,

- conducts examinations, manages and evaluates CTE´s tests,
- verifies special capacity for production, installation, repair, maintenance, special inspections and special testing of CTE´s,
- verifies special capacity of natural persons for tests, special examinations and special tests, repairs or operation of CTE´s,
- certifies as to whether technical equipments, material and documentation of structures, technical equipments, technologies, machinery and equipment prototypes meet the requirements for the safety of technical equipments.

3.2 Operator's responsibilities

3.2.1 Act No. 130/1998 Coll. - Operator's responsibilities with respect to regulation

See the Slovak Republic's National Report of September 1998

3.2.2 Regulatory methods to verify operator's compliance with licence conditions

3.2.2.1 Inspections

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

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

The plan comprises the following sections: (1) Operation and decommissioning of nuclear installations (NI), (2) Care of NI equipment, (3) Technical support to NI, (4) VÚJE, (5) Transports of nuclear materials, (6) Control of, and accounting for nuclear materials, (7) Controls of other licence holders and (8) supervision of radwaste management.

Inspections follow inspection procedures that are part of the UJD´s Inspection Manual. Individual inspection procedures are developed for inspection activities for which no inspection procedures have been developed.

Types of inspections

In general, planned and non-planned inspections are distinguished; this represents the first level of classification. The second level recognises 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 regulations. Routine inspections are performed mainly by resident inspectors at the corresponding NI. If it comes to inspections that, by their focus, go beyond the professional competence of the resident inspectors, inspections will be performed by nuclear safety inspectors from different Divisions of UJD. Routine inspections follow the procedures included in the Inspection Manual.

Special inspections are performed by nuclear safety inspectors 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 regulations pursuant to § 32 of Act No. 130/1998 Coll.

Special inspections as a rule follow procedures contained in Inspection Manual.

Team inspections focus on the compliance with requirements and conditions set by UJD pursuant to § 32 of Act No. 130/1998 Coll., as a rule within several areas in parallel. Team inspections are planned for areas selected based on long-term assessment of operator's results based on inspection activities and analyses. Team inspections mean inspections 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 triggered by conditions prevailing at the NI (e.g. start up stages) or by events at the NI. UJD uses them to respond to situations that have occurred at the NI.

Rules applicable to any type of inspections

Principally, inspections are announced in advance to the entity subject of supervision. However, they do not need be notified in advance if their focus and nature requires to do so.

Inspections of NI are notified in advance to the corresponding resident inspector. As a rule, resident inspectors participate in the inspections.

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

Inspection protocol.

Any inspection performed must be documented in the form of a protocol. Binding instructions concerning the remedial measures to be taken to eliminate shortcomings identified are recorded in the protocol. They have to be formulated clearly so as to impose the responsibility to eliminate shortcomings identified and to set clear and unambiguous deadlines for performance.

Analysis of inspection activities

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 inspection findings inspection plans for the period to come can be modified, to focus in particular on those areas where most shortcomings have been identified with respect to the entity subject to supervision.

3.2.3 Penalties

See the Slovak Republic's National Report of September 1998.

3.2.4 Operator's obligations toward labour inspection authorities

The operator's obligations toward labour inspection authorities and the Technical Inspection arise out of Act No. 95/2000 Coll., Act No. 330/1996 Coll. and implementing regulations thereon.
The primary obligations in terms of technical equipment safety include:

1. Submit for consideration

- regulations for the performance of maintenance, revisions, tests and checks of equipments including periods therefor,
- evaluation of work carried out on completion of scheduled unit shutdowns,
- a summary report on the fulfilment of operating checks, tests and revisions,
- an analysis of failures occurred for the past month, setting out measures implemented by the 15th day of the following month.

2. During equipment operation

- ensure the performance of checks, tests and revisions under special regulations, instructions and guidelines from the manufacturers, or possibly other requirements from labour inspection authorities,
- operate technical equipments by professional and healthy persons,
- notify a labour inspection authority of the date of running

  1. repeated pressure and tightness tests of the primary circuit

  2. periodic tests for tightness of hermetic premises

  Work out a protocol on the test results containing:

  1. test course

  2. results produced and tests evaluations

  3. action taken for other operation of the installations,

- within 14 days of the scheduled unit shutdown, present the labour inspection authority with a schedule for works carried out, documentation on undertaking repairs, upgrades and tests on the installations including a schedule for complex testing before re-putting into operation,
- file and neatly keep on record shipping technical documentation as well as documentation on in-service checks, tests, revisions, repairs and upgrades of installations until they have permanently been decommissioned; staff must confirm any change in the shipping technical documentation with a particular certificate,
- keep regular records on the course of operation of installations, parameters achieved, operating hours and other major facts related to the planning of maintenance and repairs, the scope of which will be agreed to with the labour inspection authority,
- inform promptly the labour inspection authority of the necessity and scope of repairs or upgrade and of installation operating failures occurred.

4. General safety aspects

4.1 Priority to safety

4.1.1 Nuclear safety principles and definition

See the Slovak Republic's National Reports of September 1998, 2001

4.1.2 Nuclear and radiation safety concept

The status as set out in the Slovak Republic's National Report of September 1998 still holds, thus SE, a.s., Nuclear and Radiation Safety Concept continues to be applied.

The issue of complex SE, a.s., Safety Policy is at present under preparation. Its purpose is to establish safety goals, requirements, principles, responsibilities, measures and methods of their implementation for all safety areas - nuclear safety, radiation protection, environmental safety, security, etc. The Safety Policy will be followed up by an updated Nuclear Safety and Radiation Protection Policy whose publication is also scheduled for 2004. In both policies the Board of Directors will pronounce anew on their basic responsibility for nuclear safety and the nuclear safety priority and its precedence over the other interests of the company will be expressed therein.

4.1.3 Role of the regulatory authority

Pursuant to § 4 of Act No. 130/1998 Coll., UJD is authorised to grant licenses for doing business or use nuclear energy. §5 of the same Act defines conditions to be met for such a license to be granted. Paragraph 1(i) provides that the conditions also include legal competence, integrity character and reliability of the statutory body or its members, as well as professional competence. Based on this provision, UJD requires the applicants for license to meet the following:

1. to take the appropriate steps by the operator's management to provide for all organisational units involved in activities directly connected with the nuclear facility complying with the policy deeming nuclear safety a priority,
2. to respect the division of competencies so that the license holder has the primary responsibility for safety of the nuclear facility. Any changes in competencies split between the license holder and NPP must be submitted to UJD for approval,
3. a separate nuclear safety department within the license holder's organisational structure must be established to be responsible for the fulfilment of tasks connected with the coordination of nuclear safety. The scope of the department's activities has to be submitted to UJD. UJD 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,
4. UJD must be informed on any changes of license holder's management and of the branch plants responsible for nuclear safety, at least one month prior to such changes taking place.

With respect to professional competence Act No. 130/1998 Coll. requires that for collective statutory bodies (in case of a Board of Directors of a shareholding company, such competence must be demonstrated for at least one member, such member not necessarily being the chairman of the Board), at least one member must have university degree of the corresponding background (technical – faculty of mechanical engineering, faculty of electrical engineering, and/or faculty of natural science - nuclear physics, physics-chemistry) and three years of practical experience in the field. This means that such a person must have worked at least three years at a specific nuclear facility filling a position that is directly connected with his/her qualification, and – as far as practicable – with the managerial position at a certain level of management (pursuant to § 13 of Act No. 130/1998 Coll., the most important group of nuclear installations comprise of nuclear power plants).

4.1.4 Labour inspection

The focus of the labour inspection carried out by the National Labour Inspectorate is on technical safety, which is characterised by the physical status of the respective installations securing their strength, tightness, reliability and functionality to the extent of design limit operating states throughout their life. Its integral part is keeping technical documentation and organisational measures leading to operation reliability without posing risk to individuals or property.

4.2 Financial and human resources

4.2.1 Financing of operations and safety improvement programs

Among the principles of the Nuclear and Radiation Safety Concept adopted by the Board of Slovenské elektrárne a.s. is the commitment to spend the necessary funds to meet the main principles of nuclear and radiation safety policies and to provide for continuous training and improvement of qualification of the staff. To fulfil this commitment, it was necessary to develop a financial strategy plan to enable, among the tasks mentioned, to also fulfil also the production and technological development program.

The company's financial strategy was defined as the provision for funding operating and investment needs of the company while optimally making use of internal and external resources.

The period between 2001 and 2003 featured high financial intensity of the debt servicing and unbalanced financial standing in the area of resources and demands, i.e. incapability to repay the debt service through own resources. Efforts in securing external resources were complicated by both the banks´ reluctance to provide new resources without a state guarantee and failure to meet credit limits of foreign banks toward SE, a.s., and the energy sector. As a result, SE, a.s., targeted its efforts over the period particularly to restructuring existing borrowing - extension of their due dates and spread of principal and interest repayments over a longer period of time.

With respect to drawing on and repayment of the debt servicing concerning the completed two Mochovce units, the following resources can be mentioned:

- April 2001 - 5-year credit from Tatra banka, Slovenská sporiteľňa and Citibank secured by the SR state guarantee, used for completion of EMO Unit 2,

- October 2001 - 14-year credit from VÚB to repay some of EMO obligations toward OTP,
- March 2002 - 4-year acceptance credit M+S was used at MO34 plant for investment purposes,
- March 2002 - 7-year credit from EBRD, used to repay instalments on the credits drawn to construct EMO Structure 2 and purchase stock for EBO,
- September 2002 - 5-year acceptance credit from DKW was used for investment purposes at EMO,
- January 2003 - 5-year credit from Bank of Tokyo - Mitsubishi used to repay instalments on credits drawn to complete EMO Unit 2,
- August 2003 - notes for a period of 5 years from Banca Lombarda International S.A. used for investment purposes at EBO and EMO,
- December 2003 - early repayment of a disadvantageous obligation toward SE Finance B.V., which was secured in November 1997 with a view to erecting EMO Unit 2 and MO34 (originally agreed final obligation due date - 2007).

Thus SE, a.s., ensured over the period between 2001 and 2003 transactions totalling over SKK 32.65 bn, by restructuring the credits the balance sheet structure improved and the average interest rate decreased from the original 11.6% to 8.5%.

Also, own resources acquired through the sale of the telecom firm Globtel´s shares of up to SKK 2.6 bn were used to finance some of the debt.

The funds acquired through own income and those acquired through the above financial transactions allowed to implement in addition to routine repairs to the nuclear installations also challenging projects intended to improve safety of existing and newly-included nuclear installations. Slovenské elektrárne, a.s., invested over the past period:

- SKK 9.282 (US billion-bn) - Project for upgrade of EBO V1 units (1994 through 2001),
- SKK 0.28 bn - NPP Mochovce, Units 1 and 2, including AKOBOJE and SM´s (2001),
- SKK 1.7 bn - Improvement of EBO V2 nuclear safety and seismic upgrade (2001 through 2003),
- SKK 0.32 bn - Completion of the safety protection post accident monitoring system - PAMS - Units 1 and 2 (2001- 2002),
- SKK 0.144 bn - SM fire valves - Phase 2, Units 1 and 2 (2002).

SE, a.s., financial strategy is currently focused on complex state non-guaranteed and guaranteed debt restructuring projects. As a result of the above transactions, SE, a.s., expects the interest burden to be reduced from the present 8.3% to 4.3%.
In early 2004, SE, a.s., was granted BB+ by the rating agency Fitch, leading to the company's expected improved reputation and increased attractiveness in relation to the creditors and the investors alike.
It can be concluded that all the required parameters for nuclear installation operation safety and reliability have been ensured by SE, a.s.

4.2.2 Financial sources for decommissioning and RAW disposal and treatment programs

Effective as from 1 January 1994, Act No. 254/1994 Coll. set up a State Fund for the Decommissioning of Nuclear Power Generating Facilities and for Spent Fuel and Radioactive Wastes Treatment (SNIDF). The original Act has been modified by virtue of Acts Nos. 78/2000 Coll., 560/2001 Coll. and 291/2002 Coll. The current text of Act No. 254/1994 Coll. sets out, inter alia:

The SNIDF is managed by the Ministry of Economy of the Slovak Republic and its funds are kept on a special account run by the National Bank of Slovakia. The SNIDF is formed from the following resources:

a) contributions by nuclear installation operators,
b) penalties imposed by the Nuclear Regulatory Authority of the Slovak Republic on natural persons and legal entities under special rules,
c) bank loan,
d) interest on bank deposited funds,
e) public subsidies,
f) other resources, if so specified by special rules.

The SNIDF´s core resource come from contributions by the owners of nuclear installations. In accordance with the provisions of the Act, the operator of nuclear energy sources - Slovenské elektrárne, a.s., is under obligation to pay a contribution of up to SKK 350,000 a year to the SNIDF for every megawatt of installed electricity capacity of a nuclear installation and 6.8% of the purchase price of electricity generated annually at that nuclear installation. The particulars of the method of SNIDF contribution calculation will be established by a generally binding legal regulation to be issued by the Ministry. Between 1995 and 2003 funds totalling SKK 10.916 bn had been generated at the SNIDF account, with the operator's levies for 2003 coming to SKK 2.616 bn. The most recent public subsidy was granted in 2001 to the tune of SKK 59.31 mil.
There is none entitlement by law to the granting of SNIDF means.
SNIDF means can be granted as a special purpose subsidy to the operator of a nuclear installation or the owner of a spent fuel and radwaste repository, a person designed for the management of radioactive wastes whose originator is unknown (hereinafter called the "applicant") under written application supported with technical and economic reasoning.
SNIDF means can be used for:

a) decommissioning of nuclear installations,
b) management of spent fuel and radioactive wastes upon the termination of operation of NI,
c) management of radioactive wastes whose originator is unknown, including radioactive wastes and nuclear materials originating in accidental interceptions or crime whose originator is unknown according to the prosecutor of the Police Corps or the Slovak Ministry of Health,
d) purchase of land to set up a spent fuel and radwaste repository,
e) research and development on decommissioning nuclear installations and management of spent fuel and radioactive wastes upon nuclear installation operation termination,
f) siting, geological survey, preparation, design, construction, commissioning, operation and closure of spent fuel and radwaste repositories including monitoring thereof upon closure,
g) expenditure relating to the SNIDF activities up to 0.3% of the annual SNIDF revenue,
h) contributions to health and safety of the public within zones facing nuclear installation hazards.

Slovenské elektrárne, a.s., branch plant SE-VYZ, currently proceeds with the implementation of Phase 1 of shutdown A-1 Bohunice plant decommissioning. The A-1 Bohunice decommissioning plan envisages Phase 1 to complete in 2007. The phase has the following principal features - spent fuel has been transferred from the utility, the majority of liquid RAW are conditioned into a form allowing for their safe disposal or long-term storage, necessary decontamination of the premises and equipment undertaken to further reduce potential radioactive leak sources. According to the adopted objective, the utility is expected to be gradually dismantled and out phased by 2033 (so-called continual decommissioning option).

The Slovak Government decided to shutdown NPP V-1 units in 2006 and 2008. Under the “Complex Study for V-1 Decommissioning“ developed in 2002, “NPP Decommissioning with Supervised Closure“ for a period of 30 years and follow-up phase-out by 2068 was judged as the most advantageous of the options considered.
SE, a.s., is currently storing all spent fuel from Bohunice WWER units at the spent fuel interim storage facility (ISFSF) at SE-VYZ - Bohunice site. ISFSF has been revamped with a view to enhancing its storage capacity and seismic upgrading. The capacity is being progressively augmented by replacing the original bins with new ones and will be enough to hold all spent fuel coming into being during operation of NPP V-1 and NPP V-2 units. The bin replacement is due to come to an end by 2007, with a new monitoring system in place, too. Seismic upgrading of the construction and technologic parts was carried out by the project in 1999. The planned cost of the entire SNIDF-sponsored project comes to about SKK 2.8 bn. The construction of the so-called dry-type ISFSF is under preparation to store spent fuel from Mochovce WWER units.
The Slovak Government noted by virtue of Regulation No. 5/2001 a Draft Concept for Economic, Material and Temporal Procedure for Dealing with the Management of Spent Nuclear Fuel and with Nuclear Installation Decommissioning. Broad principles defined therein are discussed in Chapter 1.2.

4.2.3 Human resources

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

1. employees which have direct impact on nuclear safety – selected employees whose special professional competence has been verified (theoretical , written and oral exam and practical examination) by an examining commission established by UJD, and to whom a Special Professional Competence Certificate was issued Special,
2. employees with impact on nuclear safety – professionally competent employees whose professional competence has been verified by an examination commission established by authorised specialised facility, by written and oral examination, and to whom a Professional Competence authorisation was issued .

Pursuant to Act No.130/1998 Coll. on peaceful uses of nuclear energy, special competence of employees means a set of professional knowledge, skills, attitudes, experience, knowledge of the generally binding regulations and regulations issued by operator that represent a nuclear safety-related precondition to secure safe operation of NI, to prevent uncontrolled fission chain reaction, to prevent of not allowed discharge of radioactive substances or ionising radiation into the working environment or into the general environment, and to mitigate the consequences of accidents and incidents.

Staff professional competence is used to mean a summary of knowledge and skills, attitudes and habits required to perform certain activity/job verified and acknowledged by an authorised body.

The overall working (professional, health and mental) competence of staff to carry out working activities at nuclear installations is the responsibility of the operator. The operator authorise only professionally competent staff to perform activities. To every selected and professionally competent personal is issued an Authorisation to Perform Corresponding Working Activities as part of the nuclear installation quality assurance. The authorisation to perform working activities is issued for the positions

of selected staff holding an effective Certificate of Special Professional Competence for a given type of NI and for those of professionally competent staff holding a valid Certificate of Professional Competence for a specific type of NI. The authorisation is a document showing staff working competence in relation to regulatory authorities.

For each position within the organisational structure are defined requirements for working competence to perform working activities, i.e. education, professional, health or mental capabilities and prescribed types of training. The employee line supervisor is responsible for meeting them.

Training - acquisition and maintenance - and development of staff working competencies (knowledge, skills and attitudes) is managed at the respective NI´s by Human Resources Training units under the Staff Training System adopted and approved by regulatory authorities. Since 1 January 2004 the staff training units have centrally been managed by Slovenské elektrárne, a.s., Headquarters.

The NI staff training system is maintained and improved based on operating experience, organisational changes undertaken, installation technical changes (upgrading), requirements from regulatory authorities, audits, IAEA reviews and recommendations. It is provided by necessary human, financial and material resources.

The training of the staff and third persons (third persons represent contractors) is being provided in accordance with documents of quality assurance programme set up and maintained in accordance with:

- generally binding legal regulations applicable in the Slovak Republic,
- IAEA regulations, recommendations and guidelines,
- STN EN ISO 9001:1996 and 14001:1996 series standards,
- documentation of management within SE, a.s.´s Quality System.

With respect to the quality assurance system, the top document for the entire area of human resources is represented by the “Concept of SE, a.s.´s Human Resources Management” with management documentation for human resources management developed based on it, including staff and management training and development at the SE, a.s.´s headquarters and at the individual NI.

The management documents set procedures and responsibilities for:

- selection and allocation of employees for positions,
- determination of the content and extent of training, education and development of the staff,
- acquisition, maintenance and improvement of qualification – professional competence of the staff,
- staff development,
- acquisition and maintenance by third persons of general competencies,
- staff re-training.

Fig. 4.2.3. illustrates the system of staff training in place.

With respect to their allocation to basic training, employees are divided according to activities performed by them into six categories that are further subdivided into occupational groups and subgroups according to the occupational orientation:

category 1- are employees (selected personel) with university diploma who perform working activities with direct impact on nuclear safety (primary circuit operator, reactor secondary circuit operator, head of reactor unit, shift supervisor, reactor physicist, etc.). Their professional competence is verified by an examination before a commission established by UJD that issues them Certificate of Special Professional Competence. The certificate is valid for two years. Prior to the elapsing of this period of

time, the employee has to repeatedly pass the exam before UJD´s examination commission in full extent, to have his/her Certificate renewed for an additional period of two years.

category 2 – technical and economical staff of operating, maintenance and technical departments with university diploma or secondary education completed – they comprise heads of sections, departments, divisions, head masters, masters as well as employees involved in operation or maintenance of equipment.

category 3 – operating shift and operating staff, including employees involved in operating activities at technological equipment.

category 4 – employees involved in maintenance (with the exception of engineers) – employees involved in maintenance activities at technological equipment.

category 5 – employees in charge of NI decommissioning and handling RAW and spent nuclear fuel.

category 6 – other employees .

Employees on positions hierarchically superior to specified employees, such as vice-director for operations, chief engineer, head of operation control department, head of nuclear safety department, and head of reactor physics department, must hold university diploma in the field of technology / natural sciences – physics, and must have their special professional competence verified, no further verification of the competence is required.

Staff training facilities

The training of both NI staff training and organisations performing special NI activities is undertaken at specialised training centres holding an authorisation to perform specialised professional training of NI staff granted by UJD once those organisations satisfy technical conditions and training personnel thereof have their professional competence examined. Vocational training is performed in accordance with approved training programs.

Training implementation

a) Introductory briefing and training of employees are delivered by the individual NI.

b) Basic training:

- basic briefing and training – repeated Category I training,
- Category I re-training,
- general training of third persons,

are performed by specialised training establishment, holder of the corresponding authorisation for such activities. VÚJE performing basic and theoretical training, basic and repeated simulator-based training of nuclear installation staff (with the exception of SE-EMO), while the individual nuclear power plants delivering stays, in-service training and periodical professional training of the staff.

Simulator training is performed:

- at multi functional and full scope WWER-440/V 213 simulator for SE-EMO, that emulates all standard and non-standard operating states of the nuclear power plant. The training equipment is a true replica of the NPP Mochovce unit 1 control room. It was built in accordance with the most recent US standards for staff training and technical safeguards by the companies S3 Technology and Sidemen's in cooperation with SE, a.s. experts,
- at the multi functional and full scope WWER-440/V 213 simulator for SE-EBO, units 3 and 4 at VÚJE,

- at multi-functional and full scope WWER-440/V-230 simulator for SE-EBO, units 1 and 2 at VÚJE. A multifunctional simulator for WWER-440/V-230 units developed under PHARE-TACIS project by Corys-TESS, Siemens, Belgatom, Thomson and other subcontractors was commissioned in February 1998. Also, a full scope simulator has been in operation since 14 May, 2001.

c) Other types of training (training of welders, NDT etc.) are performed by various training establishments or directly by NI operators, including SE-EBO, SE-EMO, SE-VYZ by internal or external lecturers.

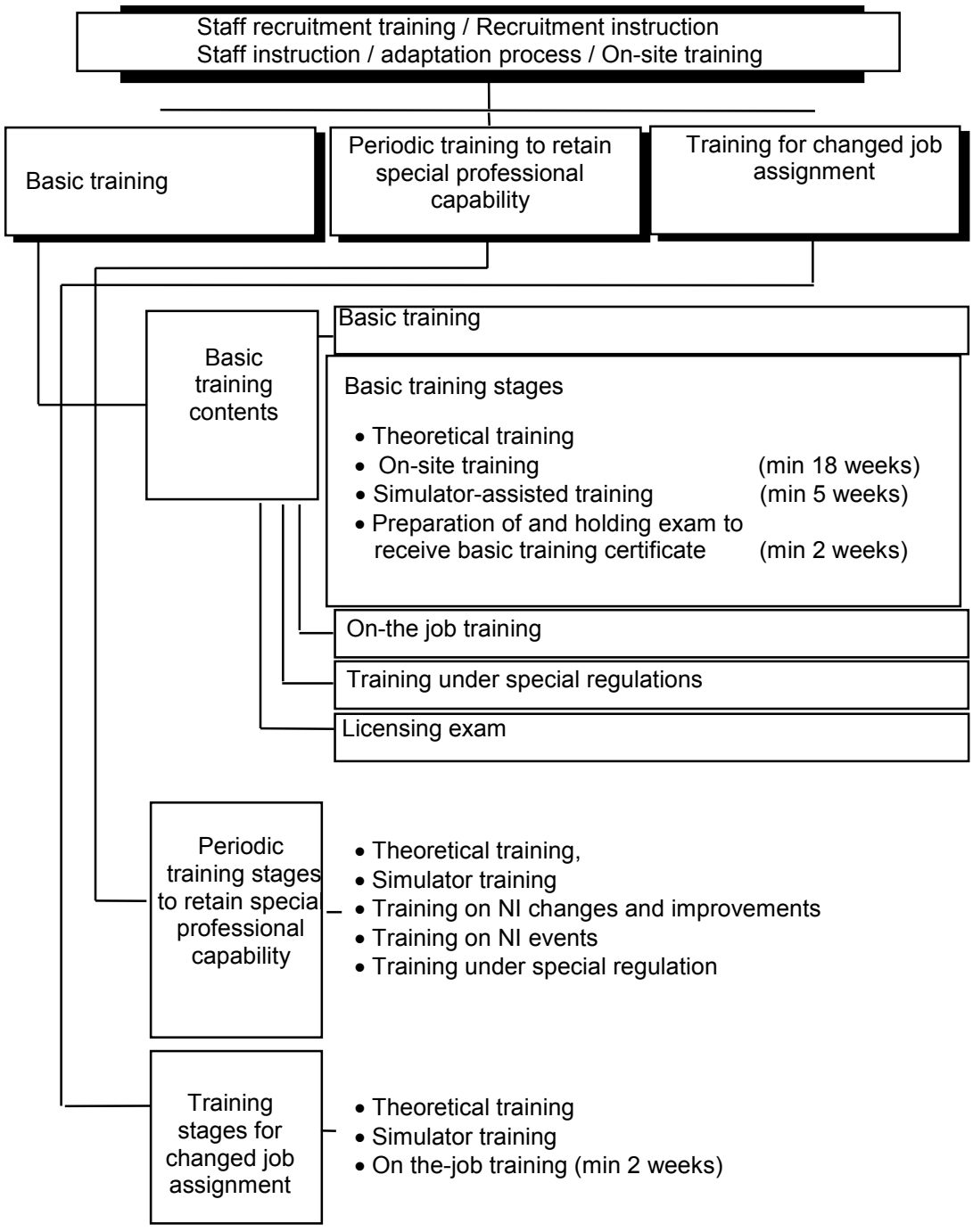
Training programs:

Basic training (theoretical training, simulator training, on-the job training) as well as periodical training of staff for the performance of nuclear safety relevant working activities at specialised establishments are delivered according to UJD approved programs based on suggestions of specialised establishments authorised to train specified employees.

Training programs have been developed for every category, professional group and subgroup of employees separately while accounting for types and stages of training. These set the objectives, content, duration of training, forms of learning and method of verifying upon knowledge.

An important element with respect to qualification upgrading of the employees has been cooperation with universities, in particular in the form of postgraduate and distance studies at the Slovak Technical University, University of Economic and Commenius University in Bratislava.

Fig. 4.2.3 Stages, contents and forms of selected personnel training



4.3 Human factor

4.3.1 Managerial and organisational measures

See the Slovak Republic's National Reports of September 1998, 2001

4.3.2 Methods to prevent human failure

See the Slovak Republic's National Reports of September 1998, 2001

4.3.3 Methods to detect and remedy human failure

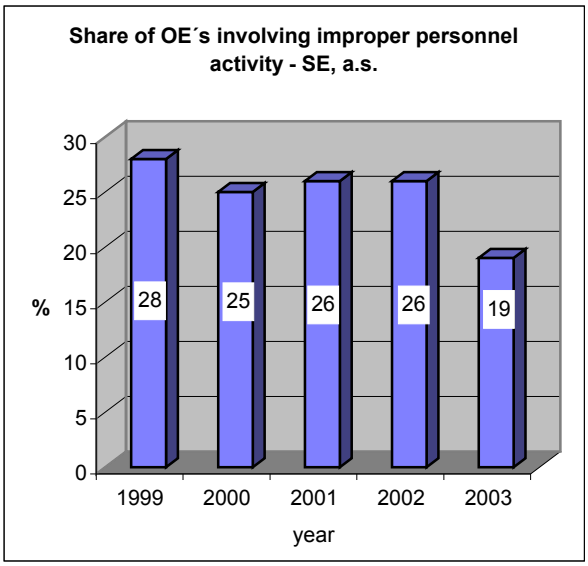
Disclosing of human errors, including root cause analysis and taking of measures to prevent them from repeating in the future is an integral part of the events investigation system at nuclear installation; event investigation feedback groups are established at divisions of power plant technical support. Section 5.3.5 provides a detailed description of the events investigation process at nuclear installations. Here, only some aspects concerning human factor are described.

The efficiency of the system is being evaluated and analysed at regular intervals by feedback group staff. The results, along with draft measures and recommendations, are included in annual reports submitted to the power plant board for approval.

Safety culture and the human factor are also important components of a comprehensive reports on the status of the nuclear and radiation safety of SE, a.s., regularly presented to the company board.

In 2003, SE, a.s., registered 36 (19% of total) events at nuclear installations caused by staff, of which 18 on Bohunice units and 17 on Mochovce units caused by the human factor. The favourable trends in the falling contribution of the human factor to the number NIE´s ensues from the systematic approach to training operating personnel and overall improved culture safety levels at SE, a.s. Over the last five years the human factor has made on average within all of SE, a.s., three plants a 25% or so contribution to the occurrence of NIE´s. The diagram in Fig. 4.3.1 suggests that the share of personnel errors has become steady over the last years, with a substantial improvement occurring in 2003.

Fig. 4.3.1 Share of events involving improper personnel activity



Plant staffs are regularly trained on the results of the investigations into NIE causes and analyses thereof. In addition, this information is also available in corporate computer networks.

To improve the safety culture and self-assessment at the respective plants, the so-called safety culture action plans have been developed, which are annually evaluated and tabled to the plant management for approval. The action plan is issued in the form of the director´s order, thus is generally binding within the plant. Safety culture indicators have been defined to evaluate.

A special group for safety culture self-assessment has been set up and works in line with QA documentation at SE-EMO. It is aimed to make the safety culture self-assessment system more effective. The decision was taken based on the results of a survey among SE-EMO employees. The objective is to provide managers across levels, besides the introduced methods for safety culture improvements (promotion via an in-house newsletter, discussion web site, training sessions, STAR

program, etc.) with a tool for assessing the level of safety culture. To this end a set of indicators and rules for application thereof have been developed

To prevent human errors, the so-called SAMKO program has been put in place at SE-EBO (an analogy of the world-wide known STAR program - i.e. Stop, Think, Act, Review). The program is of a highly illustrative nature, its logo being a firefly named SAMKO and making use of fliers, stickers, articles for the in-house newsletter, etc.

4.3.4 Role of the regulator

Pursuant to Act No. 130/1998 Coll., working activities having direct nuclear safety impacts can only be performed by licensed staff whose special professional competence has been verified by UJD and who have been issued a Licence of Special Professional Competence. Particular working activities by professionally competent staff and licensed staff, the method, terms and conditions for checking up special professional competence as well as the prescribed staff training are laid down by UJD Regulation No. 187/1999 Coll.

Under the cited Act, UJD establishes the method, terms and conditions for checking up special professional competence of licensed staff and the method of licensing specialised facilities; UJD approves curricula and the way licensed staff are trained.

UJD inspectors are authorised to verify special professional competence of licensed staff and withdraw licence of Special Professional Competence.

The requirements on provision for nuclear safety of nuclear installations during start up and operation are set forth by Act No. 130/1998 Coll. and UJD Regulation No. 167/2003 Coll.

The requirements for professional competence of nuclear installation staff are set out in UJD Regulation No. 187/1999 Coll.

UJD Chairperson appoints members of examination committee that verifies special professional competence of selected employees. The examination comprises written and oral part and also practical part for those whose working position is to be changed. If the exams are successfully passed, Licence may be issued. UJD keeps records of all applications for examination, including copies of the protocols on the completion of the basic training, being a necessary precondition for a Licence to be issued. Also, UJD keeps records of all licences issued, and keeps updated lists of valid Licences.

The second group of employees of nuclear installations are those with impact on nuclear safety. They have to pass examinations at an examination commission established at specialised institution . If the examination is passed successfully, the specialised institution issues Licence of Professional Competence. For this group of employees, UJD also approves training programs for all parts of the basic training, as well as re-training or continuing training programs upon an employee going to work at a different NPP type. UJD at the same time supervises their compliance.

Supervisory activities under Act No. 130/1998 Coll. in the field of training of nuclear installations staff are subject to regular inspections. The inspection program is based on verifying upon the compliance with the requirements pursuant to UJD Regulation No. 187/1999 Coll. Within inspections, compliance with plans of training of NPP employees as approved by UJD is verified, along with the fulfilling of training programs according to approved training programs. Also, inspections verify the compliance with NPP guidelines containing requirements on education, professional training and mental capability

of NPP employees. As part of inspections, archiving of documents on training of employees is verified upon.

Additional inspections focus on the system of retraining of NPP staff. Within the inspections, UJD reviews fulfilment of retraining plans. During the inspection, also the system of document keeping and document archiving on staff retraining is reviewed.

UJD uses inspections to inspect specialised institutions – holders of licenses pursuant to §4 (2. e) of Act No. 130/1998 Coll. for professional training of employees of nuclear installations. Inspections focus on review of technical equipment and professional competence of employees of the specialised institution. Within inspections, organisation and records of training of NPP employees are evaluated, along with the basic training documents, technical equipment of the specialised establishment and compliance with the qualification requirements on employees of specialised institution authorised to train selected NPP employees. If the results of inspection are positive, UJD renews the validity of the Licence of the specialised institution for training of employees of nuclear installations.

Review of technical equipment also includes licensing and review of simulator. Within the review of the technical equipment of simulator, parameters and courses of input variables are verified upon, as well as random simulation of technological process according to chosen scenario. Documentation of all adjustments of simulator due to outcomes of tests and/or due to the implementation of technical solutions and design changes of units are verified. Under such reviews, technical and organisational provisions for simulator training are also verified, along with the professional competence of simulator training instructors. The teaching approach, orientation in the system of training, and correct evaluation of attendants are verified. The evaluation of simulator training instructors mentioned represents part of the verification of their professional competence by examination commission. If requirements are met and examinations are passed successfully, UJD issues authorisation for training of selected NPP employees.

4.4 Operator's quality assurance system

4.4.1 History of SE, a.s. Quality System establishment

Slovenské elektrárne, a.s., Quality System is being developed under SE, a.s., Board of Directors´ decision in accordance with the requirements of:

- laws of the Slovak Republic (in particular **Act No. 130/1998 Coll.** on peaceful uses of nuclear energy, **UJD Regulation No. 317/2002** on the requirements for quality systems of licence holders);
- **ISO 9000** standards**;**

- Vienna-based IAEA regulations and recommendations.

Act No.130/1998 Coll. imposes:

To ensure the quality of nuclear installations and activities for all stages of the life of a nuclear installation, from siting to decommissioning thereof, the license holder shall be obliged to create the necessary organisational structure, procedures and sources for establishment and compliance with the requirements for the quality of nuclear installations and activities.

Following up on Act No. 130/1998 Coll., UJD Regulation No. **317/2002 Coll.** of 17 April 2002 governs the requirements for licence holders´ quality systems, the procedure and scope of approval thereof and categorisation of classified equipments of relevance to nuclear safety.

The Regulation lays down requirements for:
a) quality system of licence holders,
b) quality system in siting nuclear installations,
c) quality system in design of nuclear installations,
d) quality system in construction of nuclear installations,
e) quality system in commissioning and operation of nuclear installations,
f) quality system in decommissioning of nuclear installations,
g) quality system in changes of nuclear installations,
h) quality assurance programs,
i) summary program,
j) phased program,
k) quality plan,
l) quality assurance in repairs to and changes of classified equipments,
m) equipment quality assurance,
n) shipping documentation and technical documentation of classified equipments,
o) checks, inspections and tests of classified equipments,
p) list of classified equipments,
q) procedure and scope of approval of quality systems.

4.4.2 The quality concept

SE, a.s., management approved and issued 18 March 2003 an updated **SE, a.s., Quality Policy** setting out the primary goals and objectives of action in ensuring safe, reliable, effective and environment friendly operation of nuclear installations.

QUALITY POLICY

1. **Slovenské elektrárne, a.s., customer-oriented company** providing electricity, heat and support services to the Slovak power system as required by customers.
2. **Top priority of Slovenské elektrárne, a.s.**, is to attain nuclear installation safety levels in accordance with the requirements from regulators and to constantly improve them on the basis of experience and progress in international practices.
3. **The basic tool** of the company management allowing to perform the aforesaid undertakings is a **quality management system** being developed in conformance with ISO 9000:2000 standards.

The quality management system complies with the laws of the Slovak Republic and, in respect of nuclear installations, also with the requirements of UJD Regulation No. 317/2002 Coll. and IAEA recommendations.

4. **All processes** at nuclear, thermal and hydroelectric power plants must be managed so as to take place effectively and to minimise contingent adverse impacts upon safety, public and staff health, the environment and to be in line with effective laws and requirements from state regulatory authorities.
5. The quality management system **primary principles** are:
   - every employee is responsible for the quality of their work,
   - any quality-affecting activities are carried out by competent staff in accordance with prescribed procedures,
   - systematic and continual improvement is the fundamental attribute of Slovenské elektrárne, a.s., quality management system.

4.4.3 SE, a.s. Quality System development and implementation project

The current holder of the license to operate nuclear installations is Slovenské elektárne, a.s. All the branch plants operating NI´s have a developed quality systems and implemented in accordance with the acts and international recommendations.

4.4.4 Verification of SE, a.s.´s Quality System

See the Slovak Republic's National Report of September 2001.

4.4.5 Role of regulator

UJD activities and tasks in performing the state supervision of nuclear safety of nuclear installations are given in the field of quality assurance by Act No. 130/1998 Coll. and by UJD Regulation No. 317/2002 Coll. The Regulation lays down requirements and conditions for quality assurance in respect of classified equipments in terms of nuclear safety of nuclear installations, setting forth the basic requirements for quality assurance of classified equipment and the requirement for developing quality assurance programs. UJD supervises the compliance on the part of responsible organisations with the requirements and conditions of quality assurance of specified equipment mentioned in the Regulation and how such quality assurance programs are implemented. Both UJD and the responsible organisations - nuclear installation operators - accept IAEA documents and, if possible, use them to set their own requirements and procedures to ensure both nuclear safety and quality of classified equipment.

UJD´s philosophy in this area is based on the fact that, apart from the design of nuclear installations and several levels of interlinked protection barriers and appropriate technical and organisational measures, nuclear safety of nuclear installations is also provided for through required quality of selected equipment and corresponding activities. A quality system described by quality assurance program serves to maintain and develop quality.

UJD drafted a new regulation on quality assurance at nuclear installations. The regulation was subjected to intersectional commenting procedure, because of prevailing objections raised by National Labour Inspectorate (NLI), this Regulation could not be enacted as yet. The discrepancies mainly

reside in UJD´s and NLI´s competencies in the area of regulatory activities with respect to selected equipment at nuclear installations.

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

1. Approval of quality assurance programs

This is going on following levels:

a. reviewing, approving and control of quality assurance programs of responsible organisations and of partial programs of quality assurance for specific stages of nuclear installation's life set by such as design, construction, start up, operation, decommissioning, etc.,

b. reviewing, approving and control of individual quality assurance programs developed for the individual selected equipment or group of selected equipment in accordance with their category with respect to their relevance for nuclear safety,

c. reviewing and control of quality systems of licence holders for activities in the peaceful uses of nuclear energy (with the exception of developer and operator), in particular of contractor organisations.

2. Inspections of the implementation of quality assurance programs

Inspections in the field of quality assurance are used by UJD inspectors to verify compliance, on the part of responsible organisation, with the requirements of UJD Regulation No. 317/2002 Coll., conditions shown in UJD decisions, and how they implement the approved documents of quality assurance. Following the approval of the corresponding program, the control (inspection) activities of inspectors focus upon verifying the fulfilment of the individual requirements and practical implementation of requirements, i.e. accordance between approved documented procedures and actual activities. Nuclear safety inspectors draft protocols on inspections performed, and discuss them with heads of the responsible organisations. Any discrepancies identified concerning specified equipment, 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 forms of documentation set.

Apart from the above activities, UJD is authorised to enforce measures and requirements contained in generally binding legal regulations or UJD requirements following from decisions or inspections. As part of this, meetings are organised with the responsible organisation, inappropriate quality assurance programs get not approved, or extraordinary inspections are conducted; in extreme cases, sanctions may also be imposed.

NIP inspection activity focused on the issues of quality assurance systems rests in control of legal entities and natural persons who have been, or will be, granted a licence for a particular activity once their professional competence is checked up. While checking professional competence, a Quality Assurance System or documentation and physical condition of licence holders is verified.

Types of NIP-issued licences for activities on classified technical equipment in nuclear energy:

- Manufacture, installation, repair, upgrading, maintenance, domestic production co-operations
- Construction work on hermetic zone equipment
- Testing
- In-service testing etc.

Types of licences are combined with the precise designation of activity and can be limited, for instance, by parameters such as pressure, temperature, inner diameter or steel grade.

In reviewing professional competence NIP controls in particular the following material and documents:

- Copy of an entry in the Commercial Register
- Organisational arrangements for activity by licence
- Staffing for activity by licence
- Technical conditions for the activities by the licencee
- Other (as required by NIP)

As suggested by the foregoing, the issue of a particular activity licence or control of the conditions of a licence issued are directly linked to the Quality System or the preparation of appropriate documents and application thereof in the implementation (design, construction, manufacture, installation, repair, upgrading, maintenance, testing, operation, transport to decommissioning).

4.5 Safety assessment and verification

4.5.1 Characterisation of nuclear power plants in operation

The structure of the individual types of nuclear power plants in operation includes WWER-440 /V-230 reactor units (2 units at NPP Bohunice) and WWER-440/V-213 reactor units (2 units at NPP Bohunice and units at NPP Mochovce). Two WWER-440/V-213 units are under construction at Mochovce (their construction was however frozen in mid-90s and the facility was preserved). The V-230 reactors are quite different from V-213 reactors as far as their structure and safety elements are concerned, whereas both types of V-213 reactors at NPP Bohunice and Mochovce are based on the same design concept. The V-213 reactors at NPP Mochovce showed a number of improvements in their original design, and also included some new safety elements. During the construction of NPP Mochovce, the safety standard of the original design was reassessed, and a number of safety relevant improvements were introduced.

In the framework of the extensive gradual reconstruction, the project base of WWER-440/V-230 units at Bohunice was significantly supplemented and upgraded, so that the units may presently be considered advanced type of the original WWER-440/V-230 project.

4.5.2 Safety assessment of nuclear power plants by regulator (UJD)

See the Slovak Republic's National Report of September 1998.

4.5.3 Basic principles of UJD issued decisions on safety improvements of nuclear power plants in operation

As is the case with many other countries, Slovakia has none officially codified rules or requirements in place for improving safety of nuclear reactors. As a result, the regulator's requirements are set

specifically for the individual types of reactors. Safety improvement programs are developed by the nuclear power plant operator that assumes the overall responsibility for nuclear safety.

Slovakia's NPP safety concept is based on the so-called "defence in-depth concept", which is widely used world-wide while designing and operating nuclear power plants. In reviewing NI safety, UJD assess the capability of the installations to perform safety functions pursuant to the design so as to assure the required levels of defence in-depth.

The safety improvement process in Slovakia is undertaken in accordance with the current international safety standards, IAEA standards, safety guidelines such BN IAEA No. NS-G-2.3 NPP Modification. UJD Regulation No. 167/2003 concerning the requirements for nuclear safety of nuclear installations and UJD Regulation No. 317/2003 on the requirements for quality systems of licence holders. Some concrete measures were established based on comparing classified national standards with those applicable in developed nations. As a rule for WWER-440 reactors, safety improvement measures are in general intended to enhance reliability, redundancy (in particular for V-230 reactors), physical, electric and I&C separation of safety systems.

The list of safety related shortcomings whose solution is contained in the safety improvement programs for specific reactor types is the result of most recent developments relating to primary circuit integrity, assessment of nuclear installation events, results of BDBA analyses, etc.

UJD takes the deterministic approach to effective management of the safety improvement process, in particular to improve the safety of safety systems (independence, redundancy). PSA´s are used to prioritise the individual measures intended to improve safety.

The safety improvement requirements are in part established on the accident occurrence probability. The UJD-established acceptance criteria for accident analyses are in general expressed as acceptable radiological consequences, which differ by the initiating event probability. Moreover, conservative and best estimate procedures for accident analyses have been prescribed. The best estimate procedures are only accepted for accidents highly improbable to occur (less than 10^{-6}).

Yet another principle employed by UJD in the safety improvement process is to limit the duration of operation of nuclear power plant units by giving permission for a limited period of time, which allows to manage the safety measure implementation process. So far, this approach has applied to the Bohunice units featuring V-230 reactors.

Based on the hitherto experience, UJD has set the probabilistic targets for acceptability at systemic level for safety systems, for the reactor protection system, for core damage, for the so-called early leak of radioactive substances, and the exclusion criterion for external initiating events of emergency sequences.

4.5.4 UJD requirements for WWER-440/V-230 NPP V-1 safety improvement

For a historical overview of the requirements for safety improvement of WWER-440/V-230 Bohunice reactors see the Slovak Republic's National Reports of 1998 and 2001.

Following the safety report review and having incorporated both the comments and the in-depth inspection results, UJD issued in 2001 Decision No. 220/2001 on approval of further NPP V-1 units operation with conditions set out in the annex thereto.

4.5.5 UJD requirements for WWER-440/V-213 NPP V-2 safety improvement

For a historical overview of the requirements for safety improvement of WWER-440/V-230 Bohunice reactors see the Slovak Republic's National Reports of 1998 and 2001.

In 2001, UJD examined and approved by virtue of Decision No. 250/2001 the material "Safety Concept for NPP V-2 Upgrade and Safety Improvement", which was submitted SE. a.s., by the operator of this plant. The modified and subsequently approved document contains a timetable for measures categorised so as for them to be implemented progressively by 2008.

4.5.6 UJD requirements for safety improvement of WWER-440/V-213 at NPP Mochovce

For a historical overview of the requirements on safety improvement of WWER-440/V-213 reactors at Mochovce, see National Report, September 1998.

In meeting UJD 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 was presented to UJD for review on 29 November, 1999. In December, UJD 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 UJD 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 UJD requirements for periodic safety reviews

For a historical overview of the requirements for periodic assessment of safety of WWER-440/V-213, 230 reactors see the Slovak Republic's National Reports of 1998 and 2001.

Under "Atomic Act" No. 130/1998 Coll., UJD has issued Regulation No. 121/2003 Coll. on nuclear safety assessment regulating the intervals and the scope for comprehensive and systematic assessments of nuclear installation safety.

4.5.8 Operational safety assessment by the operator

Pursuant to Act No. 130/1998 Coll., SE, a.s., has carried out systematic operation safety assessments since 1998.

Under UJD Regulation No. 167/2003 Coll., the operator of a nuclear installation is under obligation to draw up an annual operation safety assessment pursuant to the established contents. The aforesaid requirement is met by SE, a.s., plants by preparing complex safety assessment, which conforms to the IAEA documents ECDOC - 1141 "Operational Safety Performance Indicators for Nuclear Power Plants" and TECDOC-1125 "Self-Assessment of Operational Safety for Nuclear Power Plants". The

complex assessment system is presented by a set of indicators and structured into four levels. Top level is safe operation of a nuclear installation characterised 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 include another three levels. Level 4 represents specific indicators, which are directly measurable.

In 2003, uniform safety performance indicators common to all SE, a.s., 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). Upon generation and incorporation of a complex list of operational safety performance indicators into PPRC, entry, collection, registration, evaluation of the indicators can be done using the software. Based on the real values entered and the assessment criteria established the software will evaluate neatly the status of safety of NI´s. The assessment of the indicators is four-levelled and at the same time presented in four colour zones. Furthermore, the software makes it possible to archive data, track trends in the indicators, make uniform reports and compare results delivered within SE a.s.

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 view to preventing further degradation of operational safety.

In addition to the basic (mandatory) operational safety performance indicators SE-VYZ has used already also own - internal safety performance indicators for several years

4.6 Radiation protection

4.6.1 Legislation in the field of radiation protection, and its implementation

The following are the principal legal regulations applicable to the protection against radiation:

- Act No. 272/1994 Coll., as amended,
- Regulation No. 12/2001 Coll. on requirements on securing radiation protection.

Act No. 272/1994 Coll. on protection of public health, as amended by Act No.290/1996 Coll. and Act No. 470/2000 Coll., and Regulation No. 12/2001 Coll. are based on the philosophy of the ICRP recommendation 60 of 1990, International Basic Safety Standards, SS No. 115 of 1996, and accounts also for the provisions of European Union Council directives and regulations in the field of radiation protection.

4.6.2 Implementation of radiation protection legislation

Act No. 272/1994 Coll., as altered and amended, and implementing Regulation No. 12/2001 Coll. have implemented all the Euratom Council directives and regulations (see Annex 6.2).

Within SE, a.s., quality assurance system the implementation of applicable laws is reflected in the „Basic Directive“ on radiation safety. The branch plants have both the national legislation and recommendations from international commissions (ICRP and IAEA) incorporated into directives and work procedures and the established individual exposure limits and the limits for radioactive discharges into the air and waters.

Staff dose and exposure limits are established for quarter and annual periods, with the established intervention limits being lower than those established by law, at which the cause for exceeding them is evaluated and justified.

In any work the principles of radiation safety, in particular the ALARA principle and the dose and risk limitation principle, are taken account of.

The environmental radioactive discharge limits are approved by regulatory authorities. Their purpose is to ensure that they do not cause effective doses fixed by the national legislation and international recommendations to be exceeded for a member of the public under both normal and abnormal operational conditions.

4.6.3 Monitoring of radiation situation by the operator

4.6.3.1 Radiation control at SE, a.s., nuclear installations

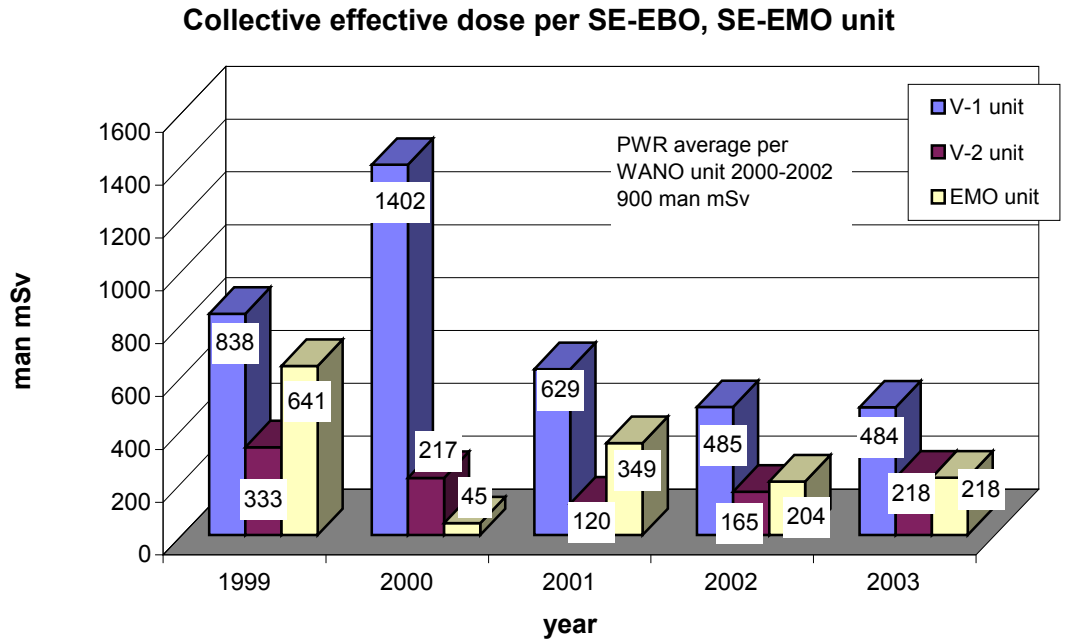
See the Slovak Republic’s National Report of September 1998.

Fig. 4.6.3.1 shows developments in average collective effective dose per SE-EBO and SE-EMO unit for the period between 1994 and 2003. The collective effective dose per NPP V-1 unit in 2000 is higher on the grounds of large-scale work in bringing the gradual upgrading to an end.

The values achieved over 2001 through 2003 are highly favourable, reflecting the operator’s systematic approach to optimising the doses.

The exposure limit had not been exceeded for any of SE, a.s., or contractor’s staff over the said period. At SE, a.s.´s NI, CED values have long kept at low average levels, bearing evidence to its very good management standards by using the ALARA system.

Fig. 4.6.3.1 Average collective dose equivalent per SE-EBO and SE-EMO unit



4.6.3.2 Atmospheric and hydrospheric emission control systems

Atmospheric discharges are continuously monitored using devices positioned within ventilation stacks. This equipment continuously monitors the activity of gases, airborne particles, tritium, C-14 (SE-EBO only) and iodine. Additionally, airborne particles are continuously sampled (fixed filters) to analyse them using gamma spectrometry and determine the content of alpha nuclides and Sr 90 and Sr 89 therein.

Hydrospheric discharges are controlled continually to record deviations from normal conditions. For balance purposes the control of discharge activities in waste waters is performed by measuring the tritium activity and volumetric activities of corrosion and fission products obtained through reservoir sampling prior to discharges and follow-up analyses of strontium and transuranium isotopes.

The atmospheric and hydrospheric radioactive discharge limits are set out in the Annex - Chapter 6.4.

The values for atmospheric and hydrospheric radioactive discharges from SE-EBO and SE-EMO for 2003 are shown in Tables 4.6.3.2a. and 4.6.3.2b. It can be stated that in 2003 as well as all the preceding years the radioactive discharge limits had not been exceeded, with corrosion and fission product discharges and atmospheric discharges running well below the authorised limits.

Table 4.6.3.2a.

Atmospheric discharges in 2003			
Installation	**Type of discharge**	**Activity**	**Share of limit [%]**
NPP V-1	rare gases	8.67 TBq	0.217
	airborne particles	149.34 MBq	0.093
	iodine 131	270.83 MBq	0.208
	rare gases	8.747 TBq	0.219

NPP V-2	airborne particles	17.37 MBq	0.011
	iodine 131	2.281 MBq	0.002
NPP MOCHOVCE	rare gases	10.81 TBq	0.264
	airborne particles	12.52 MBq	0.0074
	iodine 131	1.93 MBq	0.0029

Table 4.6.3.2b.

Hydrospheric discharges in 2003			
Installation	**Type of discharge**	**Activity**	**Share of limit [%]**
NPP EBO +VYZ	corrosion and fission products	80.233 MBq + 86.867	0.440
	tritium	12,974.445 GBq + 2,258.256 GBq	34.857
NPP MOCHOVCE	corrosion and fission products	40.90 MBq	3.70
	tritium	10,714 GBq	89.30

4.6.3.3 Monitoring of environmental impacts

Being part of the radiation control of nuclear installations, also environmental impacts of the operation of nuclear power plants are assessed. Environmental impact assessment of the operation of nuclear power plants commences by pre-operation monitoring of radioactivity at the site considered for the construction of the nuclear power plant and in its surroundings. The series of values obtained serves to realistically compare environmental impacts of the operation of the power plant.

Prior to commissioning NPP Mochovce, a survey and analysis of the site were performed with the results included in the epidemiological survey entitled “Health Condition of the Population in the Area of the Nuclear Power Plant Mochovce” (1999). The study summarised the results of a detailed survey and assessment of an area with a diameter or up to 20 km, based on health indicators. The report provided an exhaustive description of the health condition of the population in the area, before start up of the NPP Mochovce as a document for assessing its impact on the environment.

Environmental impacts of the power generating nuclear installation are monitored and documented by Laboratory of Environmental Radiation Control. The scope of the monitoring is set by a monitoring program that at the same time sets minimum numbers and types of the media to be monitored. The media that are monitored for potential impacts of the power generating nuclear facility include air, water, soil and agricultural products as part of the food chain acting upon human beings. More than 1,150 samples are taken from the environment every year.

To improve the monitoring of impacts of nuclear installations on their immediate surroundings, a teledosimetric system was set up in the vicinity of NPP Bohunice. The teledosimetric system is computer controlled and allows samples of airborne particles, radioiodine to be taken, to determine the dose equivalent rates around the site, and meteorological data. Selected teledosimetric system-obtained data are on-line transmitted to ERC UJD.

Since the amounts of discharges into the air and water streams are small, to assess impacts of NPP Bohunice and NPP Mochovce upon the population in the area, dose burden to which the population is exposed is analysed based on real discharges of radioactive substances in the respective years, accounting for the meteorological situation as monitored by SHMÚ meteorological station at Jaslovské Bohunice and Mochovce.

Table 4.6.3.3a. Calculated IDE´s for public groups at NPP Bohunice environs

Year	IDE [Sv]		
	infants	7-12 years	adults
1998	1.64E-7	1.11E-7	6.61E-8
1999	6.63E-8	8.67E-8	8.29E-8
2000	1.49E-7	2.05E-7	1.92E-7
2001	1.788E-7	2.314E-7	2.283E-7
2002	1.960E-7	2.247E-7	2.213E-7
2003	7.595-8	9.328E-8	8.962E-8

The analysis uses standardised software RDEBO and/or RDEMO that computes individual dose equivalents (IDE). The calculations suggest that the area with the highest level of effective dose equivalents spreads along the prevailing direction of winds. For Bohunice, it is direction S and SS at 3 – 5 km (the village of Malženice), and the critical age group are the 7 – 12-year-olds. For NPP Mochovce, the direction is SSE at 3 – 5 km (the village of Nový Tekov). The critical age group are infants.

These IDE´s are substantially below those received by the members of the public from the natural background. The individual dose equivalent from the natural background at the NPP´s Bohunice and Mochovce environs is 100 up to 10,000 times the values shown in the tables. The IDE calculations are characterised by considerable conservatism and hence fairly overrated against reality, because the estimate of input data, in particular the impact of consumption of crops grown in the region and of water, and their effect on the radiological impact calculation result is complicated.

The calculation results for the three most exposed public groups in both areas are set out in Tables 4.6.3.3a and 4.6.3.3b.

In addition to the monitoring of the very nuclear installations, nuclear installation operation environmental impact assessments are provided by the regulatory authorities (ŠZÚ).

Table 4.6.3.3b Calculated IDE´s for public groups at NPP Mochovce environs

Year	IDE [Sv] NPP Mochovce		
	infants	2-7 years	adults
1998	1.00E-7	8.60E-8	6.80E-8
1999	3.77E-7	2.79E-7	2.09E-7
2000	6.67E-7	4.85E-7	3.59E-7
2001	5.82E-7	4.23E-7	3.17E-7
2002	5.74E-7	4.17E-7	3.13E-7
2003	6.68E-7	4.84E-7	3.59E-7

The Centre for Health Protection against Radiation performs monitoring of integral doses within the system of monitoring points in the environment of the NI using thermoluminescence dosimeters; it measures ous dose rates in the system of monitoring points in the NI environment, it monitors activities of corrosion and fission products in fallout, airborne particles, drinking, surface and ground waters, in soil, sediments, agricultural products and food components produced in the environment of the nuclear facility, it makes random parallel analyses of airborne particles in exhalations and samples from wastewater collection tanks prior to their being discharged.

Slovak Radiation Monitoring Network Centre (SÚRMS) is a standing executive component of KRH that takes care of methodological support of monitoring network components and their uniform proceeding in monitoring radiation situation.

SÚRMS is established at Institute of Preventive and Clinical Medicine in Bratislava as part of the latter. SÚRMS head is appointed by KRH Chairman at the suggestion of Minister of Health.

In times where there is no radiation accident, SÚRMS directly reports to the Minister of Health.

SÚRMS is comprised of the following units that take part in the monitoring of radiation situation in Slovakia:

- Slovak Institute of Hydrometeorology's monitoring system,
- Monitoring system of the Army of the Slovak Republic,
- monitoring system of MV SAR – Office of CP,
- monitoring system of MZ SAR,
- monitoring systems of NPPs.

Results of direct measurements at constant monitoring stations, results of evaluation of samples from the environment and computed values from analyses of the impact on the population of discharges of radioactive substances suggest that although measurable, the impacts of the operation of reactors at NPP Bohunice and NPP Mochovce on the population and the environment are but negligible.

4.6.3.4 Activities of regulatory authorities

Persons exercising state regulatory activities in the field of health are in terms of the provisions of the corresponding legal instruments authorised to enter enterprises and premises, request information, take samples, investigate and inspect the corresponding documents. Upon exercising their activities, they verify the compliance with the generally binding legal act and regulations, conditions set in permits, measures imposed by the regulatory body.

Verification of radiation protection is secured by:

- system of information that operator continuously provides to the institution exercising the regulatory activities under conditions set in the permit to perform activities resulting in irradiation,
- on the spot inspections.

According to the purpose the inspections include monitoring of radiation situation in the working environment, in the surroundings of nuclear installations and in reference localities, using own means. The objective of the measurements is to objectively evaluate the impact of the NI operation on working and general environment.

Upon exercising state regulatory activities with respect to radiation protection, officers exercising the activities verifying mainly the following:

- radiation situation at the nuclear installation, while performing own measurements,
- compliance with approved documentation,
- dose-related burden of the staff, records of dose exposure of NI staff, with own analyses of the burden on the staff,
- monitoring of discharges, with random control measurements of some parameters of the radioactivity of discharges,
- application of optimisation of radiation protection,

- professional and health-related capacity of employees, managing officials and professional representatives for radiation protection,
- documentation relevant for health protection against radiation,
- conditions of introducing into the environment of radioactive substances,
- preparedness of nuclear installations for radiation incidents and emergency situations,
- impact of the operation of nuclear installations on the environment and exposure of the population to doses, with performing own analyses of the radioactivity of environmental media,
- activities of environmental radiation control, etc.

Officials exercising the regulatory activities prepare, based on the findings, background documents for decisions of the health protection body in approving activities resulting in irradiation and in imposing measures, instructions or sanctions.

The Slovak Public Health Authority performs within the working environment in particular monitoring of dose rates, airborne particle activity, surface contamination or other special measurements. It carries out at NI environs monitoring of integral doses using the TLD method and discontinuous dose rate measurements in the system of monitoring points, monitoring of corrosion and fission product activity in fallout, airborne particles, drinking, surface and ground waters, soil, sediments, agricultural products and food components produced around the nuclear installation. Also, the Authority conducts on an irregular basis parallel analyses of emission airborne particles and wastewater samples.

4.7 Emergency preparedness

4.7.1 Emergency preparedness related legislation

The legislation on emergency preparedness is at present based on laws and Regulations of ministries, which make the most contribution to emergency preparedness and emergency planning, in particular:

- Act No. 130/1998 Coll. on peaceful uses of nuclear energy, as altered and amended,
- Act No. 272/1994 Coll. on public health protection, as altered and amended,
- Act No. 42/1994 Coll. on civil protection of the public, as altered and amended,
- UJD Regulation No. 245/1999 Coll. on emergency planning in case of an accident as amended,
- Slovak Ministry of Interior Regulation No. 300/1996 Coll. on the public protection in the manufacture, transport, storage and handling of dangerous substances, as altered and amended,
- Slovak Ministry of Health No. 12/2001 Coll. on the requirements for radiation protection,
- Slovak Labour Safety Office Regulation No. 111/1975 Coll. on record-keeping and registration of occupational accidents and on reporting operational failures of technical equipment, as amended by Regulation No. 483/1990 Coll.
- Slovak Ministry of Interior, Slovak Ministry of Health and UJD Directive No. CO - 187/374/2000 unifying the development and approval or public protection plans in case of a nuclear installation accident.

These fundamental laws are supplemented by other laws governing crisis management and in part emergency planning:

- Constitutional Act No. 227/2002 Coll. on state security at the time of war, belligerency, state of emergency and of destitution concerning, inter alia, handling situations involving terrorist attacks and violent unlawful acts.

- Act No. 387/2002 Coll. on state governance in crisis situations outside of the time of war and belligerency,
- Act No. 129/2002 Coll. on the integrated rescue system,
- Act No. 261/2002 Coll. on prevention of major industrial accidents.

All of the above documents take account in the area of emergency preparedness of the relevant European Union directives and the Vienna-based International Atomic Energy Agency's recommendations such as:

EU:

- 82/501/EEC: 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 arrangements 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 nuclear or radiation accidents - requirements
- Safety Series 50-SG-OG: Preparedness of operator to emergency situation at NI,
- Safety Series 50-SG-G6: Preparedness of public administration bodies for emergency situation at NI,
- Safety Series 55: Planning of accident response in NI environment upon radiation accident at NI,
- Safety Series 72. Rev. 1: Protection of radioactivity sources not controlled upon accidents,
- TEC DOC 953 - Methods of emergency response preparation for nuclear and radiation accidents,
- TEC DOC 955 - Basic evaluation procedures for setting of protective measures for reactor accidents.

4.7.2 Implementation of the emergency preparedness related legislation

4.7.2.1 National emergency preparedness organisation

The Slovak Government set up by course of Act No. 387/2002 Coll. a Central Crisis Joint Staff (CCJS) as its executive body representing all the ministries and other central state administration authorities. CCJS co-ordinates activities of the state administration, self-government and other units in handling a crisis situation, i.e. in relation to UJD SR also in tackling an accident in a nuclear installation or during a transport. There is however up and running in parallel a Slovak Government Commission on radiation accidents (KRH), which is under its statutes approved by a Government Decision as an advisory and co-ordination body for uniform preparation and implementation of measures intended to protect the public and the environment against the consequences of emergencies involving radiological effects in the case of, or the possibility for, their occurrence on and beyond the Slovakia's territory.

To secure measures necessary to cope with a nuclear installation emergency and measures to protect the public and the economy in an accident affecting its vicinity, the national emergency preparedness organisation (Fig. 4.7.2.1) is structured into three levels:

Level 1 comprises nuclear installation emergency commissions whose principal functions include the management of works and measures in the nuclear installation area so as to allow to ascertain the

status of technologic equipment and deal with measures to cope with the emergency and mitigating consequences on the staff, the installation and on the environment and the public.
Another function of this level is information function for activities by state administration authorities at regional and district levels, which will provide information on the status of installations and possible impacts on the surrounding area.
Level 2 is organised at regional level, consisting of regional and district crisis joint staff and their corresponding commissions on radiation accidents whose territory belongs to hazards, where measures are planned to protect the public. This territory is determined by a range of 30 km around the NPP Bohunice and of 20 km around the NPP Mochovce.
Level 3 comprises at nation-wide level a Central Crisis Joint Staff and a Commission on Radiation Accidents with their expert support units (UJD Accident Response Centre – UJD ARC, Operative-Control Group - OCG and SÚRMS). KRH is in particular to co-ordinate and manage the preparation of measures aimed to protect against radiation event consequences if regional level capacities are exceeded.
Also part of this level is SE a.s., Failure Commission closely working with UJD ARC and KRH. The main role of SE, a.s., Failure Commission is to organise and coordinate the rapid elimination of consequences of severe and extraordinary events on the respective generation and distribution equipment.

4.7.2.2 KRH´s special and technical facilities means:

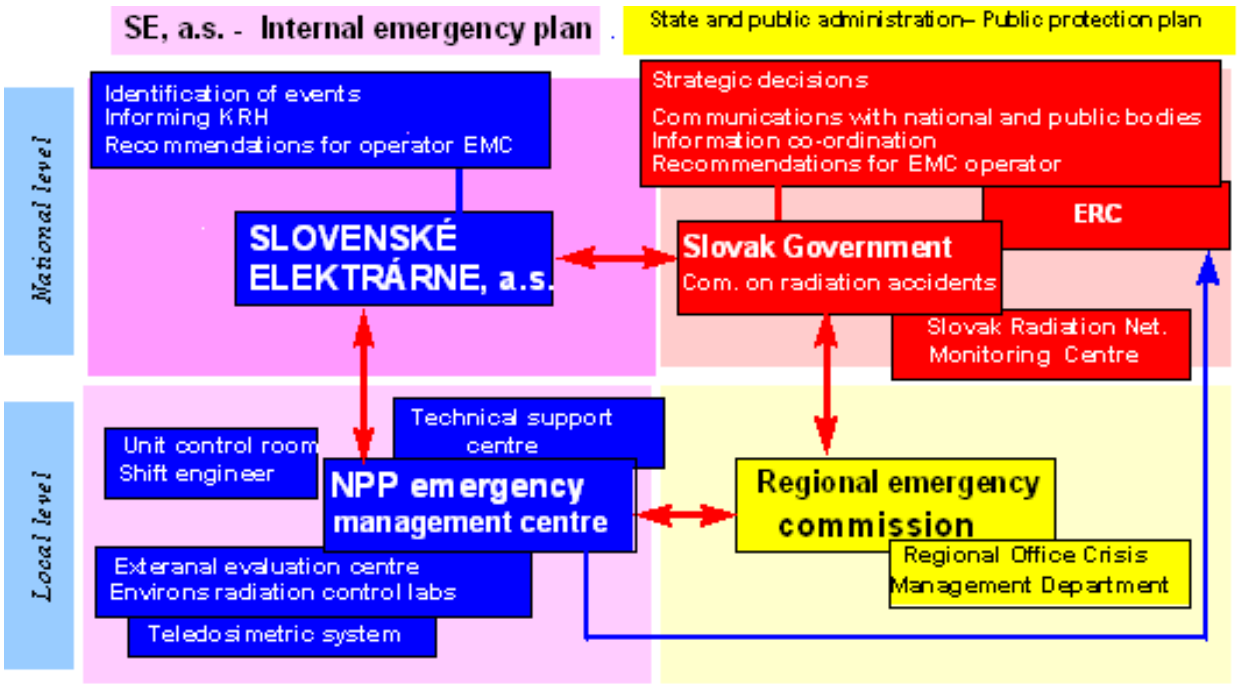
- UJD ERC is a UJD technical support means to monitor NI operation and to evaluate the technical condition and the radiation situation in the event of a nuclear or radiation accident and to forecast accident developments according to Act No. 130/1998 Coll. It serves at the same time as a technical support means for OCG formed within KRH.
- OCG – Operative-Control Group - is an expert advisory body to KRH established under KRH´s statutes and Regulation. The role of OCG is to draw up, following assessment of the situation in the case of a NI accident, background documents and a unified common recommendation by all the ministries involved for decision-making on public protection measures at KRH level. In making the recommendations, OCG collaborates closely UJD ARC.

- Established under KRH´s Regulation and statutes, SÚRMS - Slovak Radiation Network Monitoring Centre is a technical support body set up at the Slovak Ministry of Health, gathering centrally and evaluating data from the entire radiation situation monitoring systems in the Slovak Republic. In the case of a radiation event, the Centre is responsible for monitoring and evaluation of the radiological situation.

Fig. 4.7.2.1 National emergency preparedness organisation of SR – basic principle

4.7.2.3 Emergency documentation

To manage emergency situations at nuclear installations and their impacts upon environs, accident



documentation has been developed setting out the procedures and organisation of work at the respective stages of emergency situations at various national emergency preparedness levels described in Chapter 4.7.2.1.

Operator of nuclear installations has in place internal emergency plans setting out the organisation of emergency response and its implementation concerning the management of emergency situations and staff protection, including staff health protection in the traumatological plan. Additionally, operating procedures are in place allowing to identify and classify an emergency situations according to international recommendations.

Plans to protect the public in endangered areas have been developed at regional level, containing measures designed to protect the public, health, property and the environment as well as links to on site emergency plan.

Approved by KRH 29 November 2001 and being binding upon KRH members, the so-called National Emergency Plan (NEP) has been developed at national level, including all the procedures and measures of the individual members of the Commission on radiation accidents. In addition, emergency procedures and plans for activities of UJD ARC´s and SE, a.s., Failure Commission's activities have been drawn up at national level.

All of the cited plans fully apply both the provisions of the national legislation and the IAEA recommendations and the EU Directives referred to in 4.7.1.

4.7.3 Operator's on-site emergency plans

On site emergency plans and related documents are developed so as to ensure staff protection and preparation in case that there occurs a major radioactive leakage into the working environment or vicinity and it is necessary to take action to protect the health of individuals at NI level or of the public in adjacent areas.

The internal emergency plan describes in particular:

- system of event classification,
- procedures to assess events and consequences thereof,
- emergency response organisation structure and function responsibilities therein,
- public and NI staff notification and warning system,
- emergency response equipment and means,
- protective measures and the method of implementation thereof,
- plan for health measures,
- recovery principles,
- co-operating external organisations and bodies,
- staff and emergency response organisation member training system,
- method of informing the public.

The purpose of the on site emergency plan is to ensure that NI staff is prepared for the implementation of planned measures in the case of a NI event, with accent on providing the fundamental goals:

- lower risk or mitigate consequences of the NI event at its source on installation, staff and the public at NI vicinity,
- avoid severe health damage (e.g. death or serious injury),
- lower the risk of the probability of stochastic effects on health (e.g. cancer and major inherited phenomena).

The aim of the on site emergency plan is to provide for the emergency response organisation (ERO) activity, i.e. planning and preparation of organisational, personnel and technical means and measures to successfully handle crisis and emergency situations by the classified event. ERO at SE EBO and SE EMO consists of the following units:

- Emergency management centre (EMC),
- Technical support centre (TSC),
- Operational support centre (OSC),
- External evaluation centre (EEC),
- Information centre (IC).

Description is given in 4.7.7

The information flow starts as early as the occurrence of an event (Act No.130/1998 Coll.), which is reported to UJD, Slovak Load Dispatching Centre (SED), and subsequently SE, a.s., emergency service.

The very information during an emergency situation involves regulatory authorities (UJD, ŠZÚ), SE, a.s. Headquarters, the Slovak Radiation Network Monitoring Centre (SÚRMS) and regional level emergency commissions (regional and district). The information flow on the state of technological equipment and critical safety functions between NPP and UJD ERC takes place on-line under Act No. 130/1998 Coll. and agreement between SE, a.s., and UJD.

4.7.4 Off-site emergency plans (public protecting plans)

Off site emergency plans in case of a nuclear accident (hereinafter called “Public Protection Plans“) are developed by regional and district offices whose territory lie in the area facing hazards defined as a range of 30 km around SE-EBO and of 20 km around SE-EMO. Municipalities located in the area facing hazards make copies of the public protection plans for a particular district or implementing documents to implement the measures planned. The above public protection plans follow up on the internal emergency plan of NI operator who is obliged to present the public protection plan originators with background documents concerning the expected hazards in the event of an accident or a breakdown.

Public protection plans are developed under co-ordination by the Slovak Ministry of Interior’s Civil Protection Authority (CPA) and, following review by UJD and other state administration authorities and approval by the appropriate principal of the Regional or Local Office, these are approved by CPA.

Upon occurrence of an emergency being a NI radiation event in nature, regional or local offices are in charge of measures under the public protection plans. The activity in question is provided by the appropriate crisis joint staff working with KRH. Simultaneously, also appropriate commissions on radiation accidents of regions and districts are established, enjoying the status of an advisory, coordinating and control body to the head of the appropriate Regional or Local Office entrusted with uniform arrangements for the preparation and implementation of measures to protect the public and the economy at the occurrence of a radiation event. Activities by the said commissions fall within the province of KRH, which is the Slovak Government’s control, advisory and co-ordinating body. To avoid the risk of delay in performing the public protection related duties, the respective commissions are included in the national emergency response organisation (hereinafter called “ERO“).

Upon occurrence of a radiation event involving radioactive leaks, NI operator, acting in line with the public protection plan and following assessment of the situation in respect to technology, identification of the source term, teledosimetric system measurements, the first measurements of the radiation situation at NI vicinity and the meteorological situation, makes sure for degree 3 events that the public are warned promptly and for degree 2 and 3 events that the competent authorities and organisations in the area at risk are notified. Thereafter, state administration authorities, local state administration and municipalities take further urgent and follow-up action including in particular in iodine prophylaxis, taking shelter, evacuation, a.o. The said measures are implemented in areas hit by the consequences of the radiation event, including those into which the emergency consequences might spread in terms of forecasting.

Public protection measures are drafted and secured across all management levels of local state administration and of the ministries involved.

Where the radiation event consequences go beyond the territory of a single district, public protection measures are co-ordinated by the appropriate Regional Office. Where the scope of a radiation event goes beyond the territory of a single region, the Government declares and recalls an emergency for the territory at risk to mitigate the accident implications and this activity is already provided under the new legislation by CCJS.

Where a radiation event arises, KRH continuously monitors regional level activities, takes decisions in support for taking necessary action under the public protection plan, creates conditions for its implementation, considers its efficiency and co-ordinates the activities of regional commissions. Similarly, the regional commission co-ordinates the activities of district commissions falling under its competence. For this the KRH uses the conclusions and recommendations from expert and supporting units such as OCG, UJD ERC, SÚRMS, which as a rule work closely also with the relevant regions.

4.7.4.1 Emergency transport regulations

For the purposes of transportation and transfers of nuclear fuel, spent nuclear fuel, nuclear materials and radioactive wastes, the carrier prepares by course of Act No. 130/1998 Coll. and UJD Regulation No. 284/1999 Coll. on emergency transport regulations (ETRs). The objective of these ETRs is to provide for preventive and protective measures in case of an in-transport accident or a breakdown. NI operator (SE, a.s.) draws up ETRs to transport said materials on roads and railways under his administration. The Railways of the Slovak Republic draws up ETRs for transportation in the Slovak Republic's territory along its railways. Upon review by UJD and other authorities concerned, ETRs are submitted to the Ministry of Transport, Posts and Telecommunications of the Slovak Republic for approval.

4.7.5 Population and staff warning and notification systems

Public warning and notification to authorities, organisations and staff are effected in accordance with Act No. 42/1994 Coll. on civil protection of the Public. The competencies and duties of the appropriate authorities and organisations in ensuring emergency preparedness are specified by the "Agreement on Co-operation in Providing for Emergency Preparedness" between CPA and SE, a.s. (Fig. 4.7.2.1).
Public warning and notification to authorities and organisations within a range of 30 km around the Bohunice site is provided by :

1. external warning system in the hazard area comprises a system of mass remote control along the power distribution system (MRC). Control receivers HERKUL-S - whereby 431 rotary sirens positioned within a 30-km zone are controlled - are used to warn the public. The sirens can be controlled by sectors. Further to siren sound warning additional information for the public will be transmitted by the electronic mass media.
2. external person notification system uses HADOS receivers allowing to receive 7 signals, of which: 1 - EBO standby, 2 - Bohunice standby, 3 - Bohunice state of emergency , 4 - Bohunice accident, 7 - functionality check. The mayors of the municipalities, towns and cities, large companies, other institutions and all KRH members are outfitted with these receivers. Notification to authorities and organisations is provided in addition to the MRC system via public telephone networks, too. The computer controlled automatic telephone person notification device ZU 1619 APC ZUZANA is used to speed up and automate notifications.

Staff warning and notification at the Bohunice site is provided by :

1. internal warning system made up of 3 transmitters, 105 small electronic sirens, 7 electric sirens and 103 lights.
2. internal staff notification system at SE-EBO using of SE-EBO in-house radio, SE-EBO radio network and the notification device ZU 1619 APC ZUZANA. The Multitone paging system has been developed to notify emergency commission members.

The shift engineer of the failed unit decides on triggering the public warning system and notification of authorities, organisations and staff. Periodic tests for notification using HADOS receivers are run four times a year. Acoustic tests for siren warning are performed on a monthly basis.

The public warning and notification to authorities, organisations and staff is provided 20 km around the Mochovce site:

1. radio controlled electronic siren based warning system. The system is capable of working 72 hours without power supply, allowing selective control of the sirens, transmission of voice information and continuous control on the condition and serviceability of the respective sirens.

2. paging radio network based system to notify authorities, organisations and staff. ERO - EMO members on call, municipality, town & city mayors and emergency commission and joint staff members are fitted with the transmitters.

Both systems at the NPP Mochovce are controlled from the notification and warning control centre or the back-up control centre. The shift engineer or EMC head decides on their activation. The systems are regularly tested and maintained in continuous serviceability condition.

4.7.6 Maintenance of emergency preparedness systems

At SE-EBO, SE-EMO and SE-VYZ plants staff is classified by the scope of emergency preparedness under four categories:

Category I - staff with short term stay at NI (visits, tours, etc.),
Category II - staff permanently working at NI,
Category III - staff assigned to ERO,

Category IV - mayors of municipalities and cities within the emergency planning area.

The preparation consists of two parts:

- theoretical training sessions,
- practical exercises.

Utility staff emergency training is undertaken by the respective categories in the form of lectures, instructions, group seminars, practical showings and practical training. Shift staff emergency training constitutes a separate part. Shift exercises are held twice a year at SE-EBO, as are annually area-wide emergency exercises are organised, in which all the plant employees take part, and concurrence emergency exercises conducted in concurrence with the Regional Office, the Local Office, KRH, UJD ERC or other ERO units, as the case may be (fire brigades, medical staff, army, etc.) are organised once per three years. The most recent concurrence exercise attended by UJD ARC, regional and local offices within a 30-km zone were laid on in October 2003.

Once an exercise is over, its course is evaluated using observers and assessors and action taken to improve the activities of the respective ERO units. Such measures are subsequently checked and analysed by the plant management.

4.7.6.1 Emergency preparedness equipment and means

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

- Backup emergency centre (BEC) serves as a substitute emergency commission workplace in case of an extremely adverse radiation situation at SE-EBO. BEC is a newly-established at the off site dosimeter premises, at LRKO Trnava´s premises.
- Civil protection shelters are used for initial shift staff and intervention personnel shelter-taking and for issue of personal protective devices and special kit for intervention units.
- Civil protection assembly points serve for gathering of staff and other persons staying at SE-EBO. By their equipment they create conditions for a short term stay of staff using individual protective devices (IPD´s).
- In-house medical centre (SE-EBO IHMC) is intended for basic medical provision, giving pre-medical and medical aid and preparation for transfer of the injured persons to specialised medical establishments. Also part of SE-EBO IHMC is a decontamination node and workplaces for internal individual contamination measurement.
- Communications facilities and equipment installed at SE-EBO:

a) Slovak Telecom´s public telephone network,
b) SE a.s. ´ telephone network,
c) Globtel mobile telephone sets,
d) Motorola special purpose radio network,
e) Multitone paging network,
f) in-house radio and operational (unit) radios.

Similar equipment, measures and facilities are also available at SE EMO.

4.7.7 International agreements

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 in the relevant area EU regulations, directives and decisions. The area of emergency preparedness this involves in particular 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, a European Community Urgent Radiological Information Exchange (ECURIE) has been set up in EÚ. As from 1 May 2004 the SR has become integrated through UJD in the system together with the other new Member States. UJD is a contact point in the system with a 24-hour standing service. The ECURIE contact point is identical to that of the IAEA Convention on early notification of a nuclear accident under 4.7.7.2. A point of contact - CPA standing service, backs up the ECURIE liaison point. A national coordinator and his deputy have been appointed for ECURIE.

4.7.7.2 Conventions deposited by 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 co-operation in minimising consequences of a nuclear accident. The conventions concern in particular technical and organisational measures to reduce radiation effects on people and the environment due to accidents at nuclear installations.
The Slovak Republic notified the succession to the Convention on early notification of a nuclear accident and the Convention on assistance in the case of nuclear accident or radiological emergency in February 1993 (effective as from 1 January 1993). The special co-ordinator for the performance of the Convention provisions is UJD, 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 UJD on international exercises. 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 co-operation with neighbouring countries

Further to Art. 9 of the Convention on early notification of a nuclear accident, the Slovak Republic succeeded or completed bilateral agreements in the field of early notification of a nuclear accident, exchange of information and co-operation. The agreements lay down the form, the method and the extent of information to be provided to contracting parties in the case of an accident relating to nuclear installations or nuclear activities, and establish the co-ordinators of contact points. The purpose of the said agreements is to make a contribution toward minimising the risk and consequences of nuclear

accidents and creating a framework for bilateral co-operation and exchange of information in areas of common interest in connection with peaceful uses of nuclear energy and protection against radiation.

4.7.7.4 SR participation in international exercises

Two RODOS exercises in support for real time decision-making on the public protection were held in 2002 with the aim of verifying modifications and practical application of the system in case of a nuclear or radiological emergency. In May 2003 UJD organised and co-ordinate in co-operation with the Centre of Nuclear Research in Karlsruhe, Germany, and VÚJE Trnava, a.s., the international exercise DSSNET (International system in support for decision-making), at which RODOS 5th version (software package in support for decision-making). A total of 23 countries and organisations participated in the exercise whose scenario was a simulated and modelled accident of a nuclear installation on the Slovak Republic's territory.

4.8 Public relations

The right to information in the Slovak Republic has been guaranteed by the Constitution and other instruments on human rights since the early 1990´s. The passage of Act No. 211/2000 Coll. provided the citizens with the statutory way of obtaining needed information. This Act along with Act No. 130/1998 Coll. constitutes a legislative framework for public relations. The operator of nuclear installations is under obligatory course of Act No. 130/1998 Coll. (Art. 24 (4)) to notify UJD of events at operated installations and, in case of an accident or a breakdown, to notify the public and the media as well.

The operators of the Mochovce and Bohunice nuclear power plants provide those interested, in particular schools, year-round with data and information on the operated nuclear installations, ionising radiation, climatic changes, sustainable development, etc., for various age brackets of visitors at their information centres and in the form of tours. The premises of the NPP´s Bohunice and Mochovce are visited by 10,000 to 12,000 visitors annually from across SR and abroad alike. Safety improvements on Bohunice and Mochovce units have marked bearing on the life in the regions, whereby mutually beneficial communications with environs are at the same time provided. An important role is played at the Bohunice and Mochovce sites by travelling exhibitions of photographs depicting the history of nuclear energy in the SR and of the country's nuclear installation safety improvement. This responsive and transparent communication is assisted in addition to the monthly "SE, a.s., News" also by the regional monthlies "Bohunice" and "Mochovce" and other informative printed publications, distributed free of charge in the surrounding area. Processed in an open and comprehensible manner, this information gives continually and openly the general public an understanding on the most recent work on safety improvements at the plant of interest and in nuclear energy in general. In addition to information dissemination in the regions, the NPP´s also make a contribution to the all round promotion of the region infrastructure, with the primary priorities embracing the furtherance of health care, education, social institutions, culture and sports. Also significant is the transfer of information among the NPP´s and special interested regional associations at the municipalities of Jaslovské Bohunice and Vráble, especially over the most recent periods with competencies being delegated to lower-level territorial units.

A central state administration authority, UJD furnishes information under its competence on demand and allows the public and the media to check the data and information on the 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 getting the necessary overview of information policy on

a given entity. It independently from nuclear installation operators, provides to the public information on nuclear safety of nuclear installations, including that on the management of radioactive wastes, spent nuclear fuel, nuclear materials, control and record-keeping thereof as well as on further fuel cycle stages.

Up and running since 1995, UJD´s Information Centre's core activity is to bring the UJD mission closer to the SR citizen and provide foreign visitors with information on nuclear safety of Slovakia's nuclear installations and to ensure communications with the public, domestic and foreign mass media.

Since Act No. 211/2000 Coll. took effect, i.e. 1 January 2001, 128 information requests have been registered, of which 56 in 2001, 27 in 2002 and 45 in 2003.

Information that has most frequently been made available concern the following areas: Safety documentation on the NPP V-1 (WENRA, IAEA Missions); UJD decisions (consultation, sending); NPP environmental impacts; ČSKAE, UJD legislation; UJD with neighbouring countries; Spent nuclear fuel and depleted uranium; RAW reprocessing and disposal; Completion of NPP Mochovce Units 3 and 4; IAEA, OECD/NEA, ENS activities; Pressurised water reactor, reactor vessel, conduct of UJD inspections; UJD guidelines and other management acts; the Slovak Republic's National Report on nuclear safety; UJD classified information; Granted licences for activities under the Atomic Act; NPP containment and terrorism.

UJD annually sends the Slovak Republic's press agencies, dailies and electronic media 60 to 80 contributions on its domestic and international activities. UJD is the publisher, along with the State Authority for Nuclear Safety of the Czech Republic (SÚJB), of the journal "Safety of the Nuclear Energy Sector" running major articles on important activities by the two nuclear authorities. UJD domestic and international activities also appear in the "Bulleting of the Slovak Nuclear Society Bulletin (SNUS)". UJD regularly contributes to the world information agency NucNet and the European Nuclear Society, and it publishes each year a Slovak and English-language annual report on the results of UJD activities and on safety of Slovakia's nuclear installations.

UJD´s Information Centre prepares materials, video-clips, holds press conferences and consultations. The Centre provides day-to-day exchange of information, faxes, e-mails and materials between the Bratislava and the Trnava office.

5. Safety of nuclear installations in Slovakia

5.1 Site selection

5.1.1 Legislation relating to site selection

See the Slovak Republic's National Report of September 1998, 2001. In 2003 UJD issued Regulation No. 167/2003 Coll. on requirements for nuclear safety of nuclear installations laying down the requirements for siting of nuclear installations.

5.1.2 Meeting of criteria at the Bohunice and Mochovce sites

See the Slovak Republic's National Report of September 1998.
UJD international agreements
In connection with the planning and building NI´s on the territory of the Slovak Republic, all the bilateral agreements with neighbouring states referred to in 4.7.7 are in force. Under the agreements, the Slovak Republic is obliged to inform the neighbouring states of scheduled nuclear installations and the expected time of commissioning the nuclear installations under construction.

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

- Convention on Transboundary Environmental Impact Assessment,
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

5.2 Design preparation and construction

5.2.1 Legislation relating to design and construction

See the Slovak Republic's National Reports of September 1998, 2001.
In 2003 UJD issued Regulation No. 167/2003 Coll. on requirements for nuclear safety of nuclear installations laying down the requirements for design of nuclear installations.

5.2.2 Project preparation for the Bohunice and Mochovce nuclear installations

See the Slovak Republic's National Reports of September 1998, 2001.
The development of a deep repository continues for new NI´s for the purpose of disposal of spent fuel and RAW. For more information see the Slovak Republic's National Report on spent fuel and RAW April 2003, Chapter G6.

The investment project **EMO Final Processing of Liquid RAW** deals with the treatment of liquid RAW into a form fit for disposal at the Mochovce National Radwaste Repository. This investment project is

under preparation and is scheduled to be implemented over 2004-2006. The investment request was approved by SE, a.s., in 2000 and subsequently amended in 2004. A Framework Contract was concluded in November 2002 with VÚJE, a.s., to implement the technological part. Partial Contract No. 1 to the aforesaid Framework Contract was completed to draw up project background documents. Partial Contract No. 2 to the aforementioned Framework Contract for Complex supply of technologic part of the investment project with the contractor VÚJE Trnava, a.s., and a contract for the implementation of the building part with the contractor EURO-Building, a.s., Bratislava are at the approval stage.

5.3 Operation

5.3.1 Licensing procedure

See the Slovak Republic's National Report of September 1998.
In 2003, UJD issued Regulation No. 167/2003 Coll. on the requirements for nuclear safety of nuclear installations laying down the requirements for commissioning and operation of nuclear installations.

5.3.2 Operation limits and conditions

An amendment of L&C for NPP V-1 units was prepared in January 2001, which is part of the Safety Analysis Report following gradual upgrade. The documents were submitted UJD for consideration.

On V-2 units L&C are prepared in the form and content based on IAEA guidelines (50 – SG – O3) and US NRC guidelines (for PWR units) from commissioning the nuclear installation. Amended L&C were issued in March 1998, divided into separate documents:

- Limits and conditions for operation of V-2 Unit 3
- Limits and conditions for operation of V-2 Unit 4

The amended L&C had been assessed over 2001 - 2003 by the regulatory authority and approved by prescribed rules.
A joint project to unify L&C according to NUREG 1431 has been implemented since 2002 in co-operation with SE - EMO and EBO NPP V-2.

5.3.3 Maintenance testing and control documentation for management and operation

See the Slovak Republic's National Report of September 1998.

5.3.3.1 Operational documentation

For the overall description of operational documentation see the Slovak Republic's National Reports of September 1998, 2001.
Development of symptom-based procedures for emergency conditions for the NPP V-1, as with V-2 and EMO in co-operation with Westinghouse Electric Belgium, was launched in 2001 and completed in 2003. NPP V-1 unit control room staff were trained on using the procedures during their development and the procedures have been in place since December 2003.

A Maintenance Program for Regulations for Emergency Conditions having regard for both generic and specific changes at NPP´s V-2 Bohunice and Mochovce at both power plants had been under way between 1999 and 2003.
Following the results of the SPSA a project was launched in 2004 to draw up symptom-based procedures for emergency conditions for the shutdown reactor for the NPP´s V-2 Bohunice and Mochovce.

5.3.3.2 Documentation for equipment inspections and tests

See the Slovak Republic's National Report of September 1998.

5.3.3.3 Maintenance technologic and working procedures

See the Slovak Republic's National Report of September 1998.

5.3.3.4 Severe accident management guidelines

A project on the development of severe accident management guidelines (SAMG´s) has been implemented over 2002 - 2004 under the joint project with the NPP Mochovce. Also SAMG´s have been developed in co-operation with Westinghouse Electric Belgium with the aim of ensuring the utmost consistence with the regulations for emergency conditions and covering continuously the area of handling accidents. Developed for the state of the NPP´s V-2 and Mochovce after the implementation of the group of hardware modifications ensuring higher probability of the success of the strategies used, SAMG´s are to be used in the Technical Support Centre and in the unit control room. For this reason putting SAMG´s into practice is linked to the making of hardware modifications.
The preparation of activities to put the management of severe accidents into practice is currently taking place.

5.3.4 Technical support of operation

See the Slovak Republic's National Report of September 1998.

5.3.5 Analysis of events at nuclear installations

Based on Act No. 130/1998 Coll., the categorisation of the respective types of events (failures, accidents, breakdowns) is governed in more detail by UJD Regulation No. 31/2000 Coll. Furthermore, it establishes the method of reporting events, the method of ascertaining the causes thereof and the method of informing the public.
Legislative requirements are reflected in by-laws on feedback from operator NI, where procedures and responsibilities for reporting and handling events are laid down.

5.3.5.1 Definition and division of events at nuclear installations

See the state set out in the Slovak Republic's National Report of September 2001.

5.3.5.2 Documentation and analysis of events at nuclear installations

The NIE investigation procedure scheme including the method of notifying the regulatory authority is shown as a flow chart in the appropriate QA document for reporting and analysis of events. The shift engineer issues a report on an event on the prescribed form, also enclosing competent staff opinions.

The NIE analysis is worked out by the Feedback Group based on the opinions from expert units and own analyses and conclusions of the working groups.

The Feedback Group will carry out for NIE´s meeting the criteria for investigation into the root cause in co-operation with the appropriate departments a complex analysis using the methodology Human Performance Enhancement System developed at INPO, USA. The methodology describes working techniques (methods) for analysis of problems associated with installation operation and human performance to reveal the root causes of such problems and establish corrective action to prevent the recurrence of similar problems.

The analysis of NIE´s subject to external notification will end with the preparation of a Report on an Operational Event submitted for discussion by the failure commission, which is a collective advisory body to the power plant directors for dealing with NIE´s. The failure commission meets as a rule on a monthly basis, approves analysis conclusions and imposes in a targeted way corrective action that are binding on all the employees. Reports on NIE´s are sent to regulatory authorities whose representative has the right to attend the failure commission meetings.

The so-called registered events are analysed in a similar manner with the failure commission also taking corrective action thereon.

The implementation of corrective action is documented by the appropriate responsible unit through a computer network where it is filed. The state of the fulfilment is checked by the failure commission.

The entire business of investigation into and analyses of NIE´s is kept in the computer network which all the network users have access to. Any network user can contribute their comments or material findings to the opinions on operational events.

Extraordinary failure commission

The extraordinary failure commission (EFC) is convened by the deputy director for operation (or the emergency commission on-duty shift head) immediately after obtaining the information from shift engineer on the occurrence of an accident or a breakdown unless such events are dealt with under the Internal Emergency Plan by convening the emergency commission. EFC is also convened at the occurrence of other NIE´s meeting the criteria for calling it into session. The role of EFC is to establish the direct cause of the event and define immediate corrective action.

Part of the preliminary report on operational event, minutes of EFC are submitted to UJD and SE, a.s., HQ The definitive analysis, including the root cause analysis, will be worked out by the Feedback Group as a standard report on operational event and approved along with the corrective action by the regular failure commission. A filled-in Surveillance Program for post emergency inspection is submitted for discussion by the extraordinary failure commission.

Independent assessment of NIE´s

The report on an operational event is also transmitted to VÚJE, which periodically annually undertakes an independent assessment of events and proposes contingent corrective action. The report is provided to the operator.

Reporting the occurrence of events

The operator is obliged under UJD Regulation No. 31/2000 Coll. to notify at the established dates government authorities of NIE´s. The operator is under obligation to report promptly UJD the initial information on an accident or a breakdown by phone, fax or in person within 30 minutes of finding it. The preliminary report is submitted by the operator to UJD in writing within 72 hours of finding the accident or breakdown and the final report within 30 days thereof. Required data are defined by the Regulation and reflected in the internal QA document. Part of the information is preliminary assessment by NIE according to the INES scale.

Providing feedback on events at nuclear installations other than NPP´s

The operator uses international information systems on operational experience from nuclear energy (WANO and IAEA) to apply measures from the analyses of foreign operators´ failures for its units and also to hand over own experience to foreign operators. This activity is aimed to prevent the same failures from recurrence by taking preventive action and avoid a doubling of safety analyses and a non-uniform approach to tackling problems.

The system is in place in accordance with UJD Regulation No. 167/2003, a detailed procedure for processing and use of information at foreign NPP´s is addressed by the QA document “Feedback from NIE´s at foreign NPP´s".

Evaluation of effectiveness of corrective action taken

The main indicators of the effectiveness of the feedback from own NIE´s is the trend in the occurrence of failures with an analogical failure mechanism. The Feedback Group draws up annually a summary statistical evaluation of the occurrence of repeated events and assesses for them the efficacy of the measures implemented.

Control for the efficacy of corrective action depends on the type of measure within the quality assurance system:

- **Design change** - a change that prevents an event from recurrence without any request to perform activities by the personnel. The sequence of steps in the installation modification process and responsibilities arising out of the sequence are defined by the QA regulation “Changes and Modifications“.
- **Safety means** - measures restricting adverse consequences of an event without any request to perform activities by the personnel.
- **Warning means** - warning signs, warning sound and light signalling.
- **Regulations** - a revision or issue of a new written to perform activities by the personnel. For measures resulting in a change of regulations for abnormal and emergency operation for which their correctness in real unit operation cannot be verified the system of control for the effectiveness of changes is linked to the mechanism for validation of these regulations.
- **Training** - corrective action taken to improve knowledge, skills and working practices of the personnel (communications, conservative decision-making, self-control, etc.) is implemented by including these themes in training and training days.

Information flows on NIE´s within SE

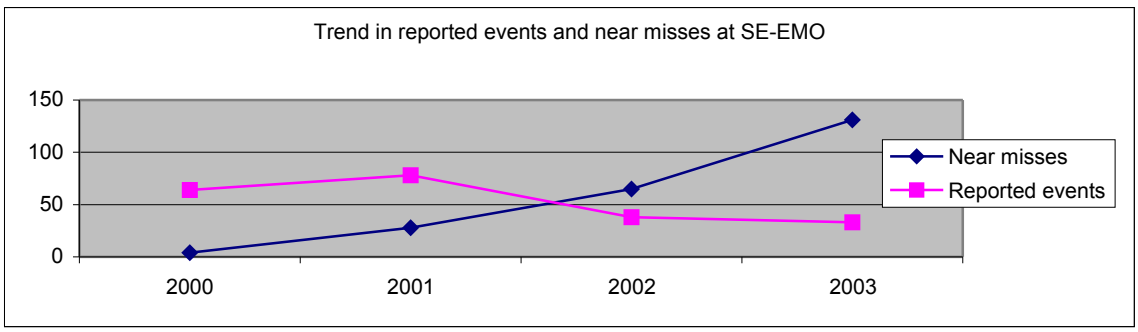
The head of the appropriate sections and departments is obliged to:

- become familiar continuously with the NIE database,
- become familiar continuously with reports on events and minutes of regular and extraordinary failure commissions for every month,
- include applicable knowledge in training programs for subordinated inferior staff. He/she ensures in co-operation with the Human Resources Training Section and VÚJE´s training centre employees that the knowledge of NIE´s is included in the introductory and repeated training (retraining) program.

The obligation of every employee involved is to know the results of NIE analyses, in particular those they took part in. If the analysis assumptions or conclusions contravene their observance or understanding of the event, they are authorised to ask the Feedback Group Department head to resolve NIE´s or explain the discrepancy.

Events without consequences (near miss)

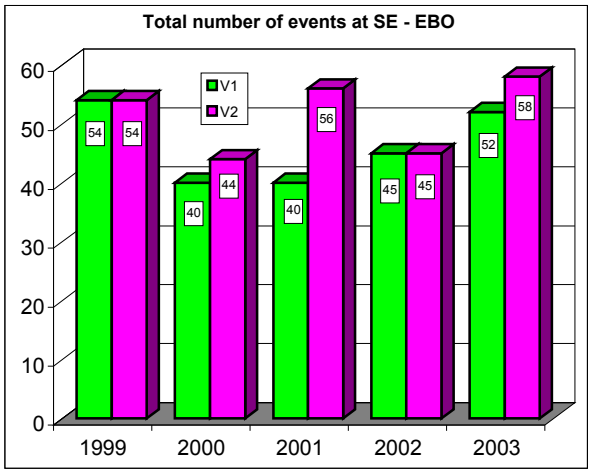
Aimed to avoid major events and a measure intended to improve the safety culture, the operator put in place in 2000 a system of reporting and feedback from minor events without consequences, so-called near miss. Staff is encouraged by the plant management to report minor events. Any employee can report such event in any of the four ways in writing, by phone or in person to the direct superior or the Feedback Group, electronically. Forms to report near misses are to be found in the internal electronic network. Reports on near misses are registered and evaluated by the Feedback Group. The evaluation is carried out by respective areas such as documentation, man-machine interface, working environment, working practices, labour organisation and staff training. The Feedback Group and the respective units involved in the process of dealing with near misses propose corrective action to be taken to prevent them from recurring and thereby events involving consequences from occurring.
SE plans to implement in 2004 a project in co-operation with DTI (Department of Trade and Industry – United Kingdom) to evaluate and improve the efficacy of the current system of handling near misses.
The diagram below for SE-EMO gives an example of the impact of dealing with minor events on downward trend in the occurrence of events involving consequences.



5.3.5.3 Statistical assessment of events at nuclear installations, development trends

The next section contains data on the occurrence of events at nuclear installations in 2003 and development trends for the most recent period (see Figs. 5.3.1- 5.3.6.)

Fig. 5.3.1 Development ofl events at NPP Bohunice



The total number of operational events at the NPP **Bohunice** for the most recent years has been stabilised. None event has been recorded that would materially affect nuclear safety. None events in categories above failure have occurred on the Bohunice units and at other nuclear installations.

Fig. 5.3.2 Development of number of events at NPP V-1 by INES

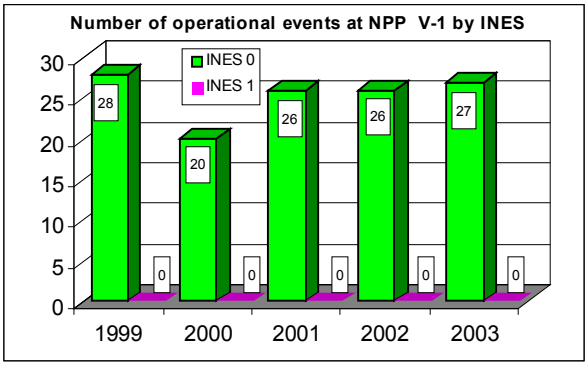


Fig. 5.3.3 Development of number of events at NPP V-2 by INES

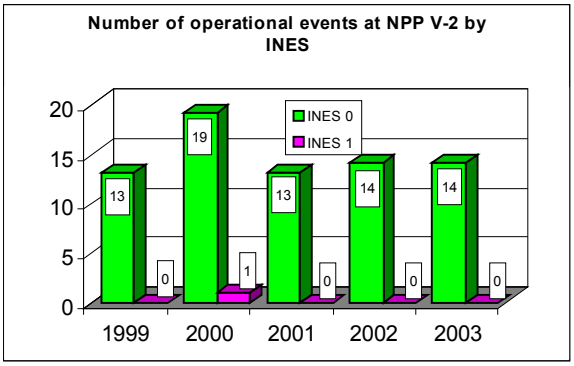


Fig. 5.3.4 Development of total events at NPP Mochovce

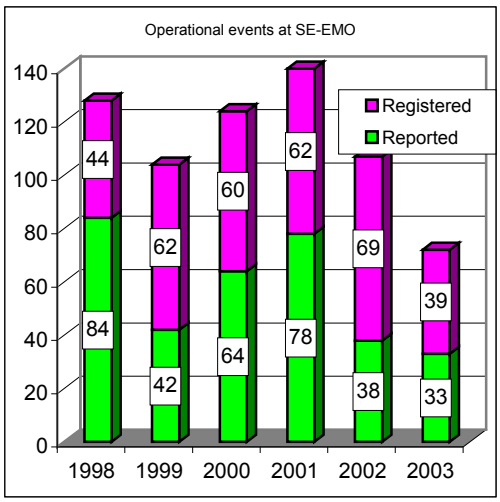
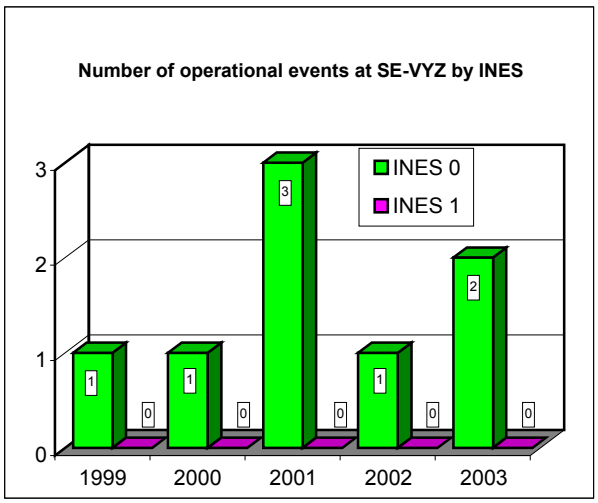


Fig. 5.3.5 Development of total events at SE-VYZ



At the NPP Mochovce the number of events in 2000 and 2001 was related to the commissioning of Unit 2.
In 2003, one case of breaking L&C was recorded at SE-EMO in the context of the unavailability of MFP system on Unit 1. Given its potential safety importance, this event was assessed as an INES 1 event.

Table 5.3.1 summarises the number of operational events for SE, a.s., units in terms of INES assessment. From the perspective of assessment of operational events under the INES, one INES 1 event was recorded on Mochovce Unit 1 in 2003.

Table 5.3.1

Year	out of scale	INES=0	INES 1	INES>1	Total
1996	54	57	1	0	112
1997	53	54	1	0	108
1998	138	76	4	0	218
1999	162	56	0	0	218
2000	132	65	2	0	199
2001	182	54	2	0	236
2002	143	54	1	0	197
2003	128	54	1	0	182

The most frequent causes for OE´s at all NI´s are equipment failures, with the greatest contribution made by control and management and electric system devices. The second most frequent cause personnel errors. The contributions by the respective causes for the occurrence of events in 2003 at the respective NI´s are shown in Figs. 5.3.7 to 5.3.9.

Fig. 5.3.7 Causes for OE´s on V-1 units in 2003

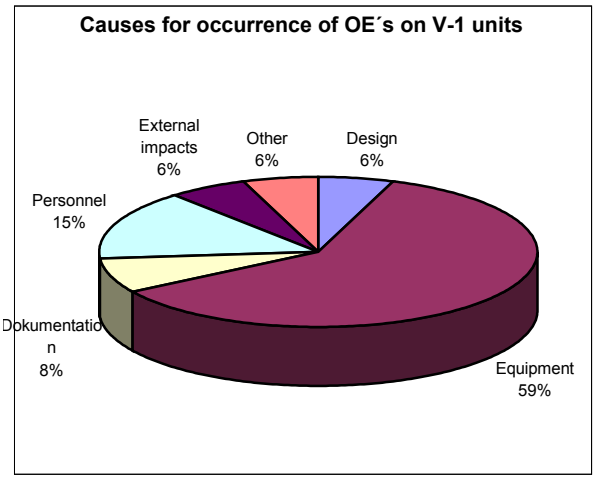


Fig. 5.3.8 Causes for OE´s on V-2 units in 2003

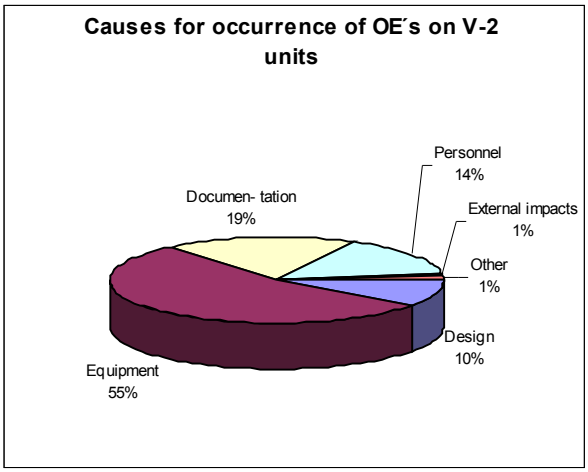
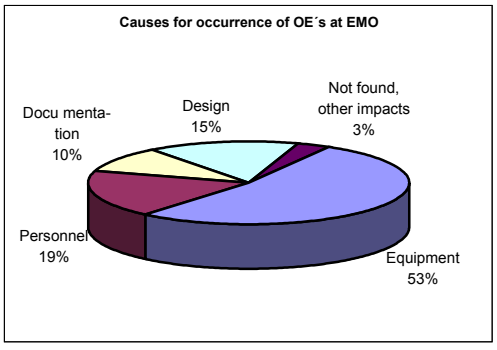


Fig. 5.3.9 Causes for OE´s on SE-EMO units in 2003



5.3.6 RAW generation

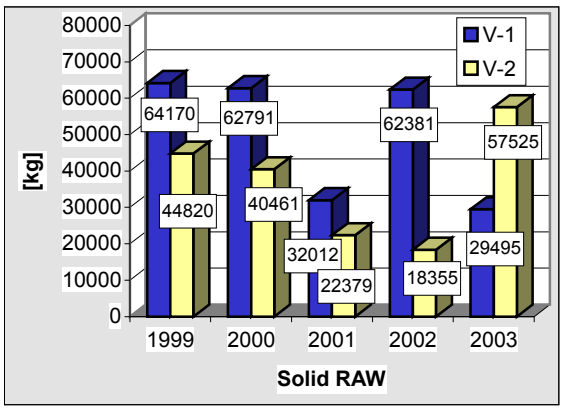
Amounts of solid and liquid radioactive waste generated are monitored aiming at a reduction of their generation. Reduction of the volumes of waste will also reduce the demands on their storage, transportation, and disposal, as well as their environmental impacts.

Figs.5.3.9 and 5.3.10 show amounts of RAW generated at SE-EBO.

Since so far, solid RAW generated at SE, a.s. NI is not processed to final form or transported outside the NI site. The statistics includes all solid RAW that was generated at the corresponding NI for the period of reference. For liquid RAW, their total volume is in m^3 generated during the operation of the power plant for the said period of time, converted to thickened quantities at 120 g/l.

As seen from the diagrams, the generation of both solid and liquid wastes from NPP Bohunice V-1is stabilised during 1999 and 2000. The ongoing works on gradual upgrading significantly influenced the generation of solid RAW at NPP V-1. There was a reduction in the generation of solid and liquid RAO at NPP Bohunice V-2 during 1999 and 2000, reflecting the systematic approach to work with RAW as described in the QA directive "Minimising of RAW Generation".

Fig. 5.3.9 Formation of solid RAW at SE-EBO, EMO



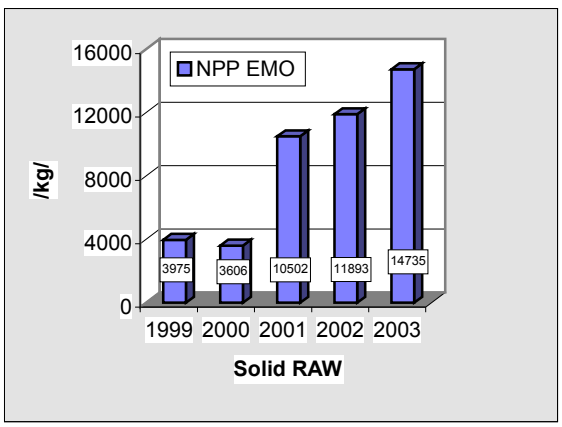
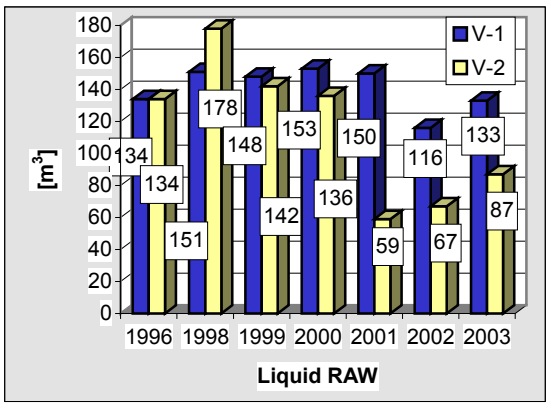
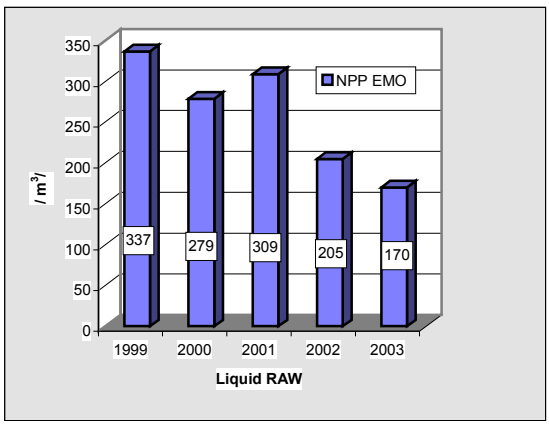


Fig. 5.3.10 Formation of liquid RAW at SE-EBO, EMO





5.4 Planned safety improvement activities at nuclear installations

Following the implementation of the NPP´s Bohunice V-1 and Mochovce safety improvement programs, the most important long-term project is the "NPP Bohunice V-2 Units Upgrading and Safety Improvement Program" described in Chapter 2.2.

The improvement of the nuclear safety and operating reliability standards is viewed as a continuous process and measures stemming from the operator self-assessment and the analysis of operational events are continuously drafted and implemented.
None complex longer-term safety improvement projects are planned at the moment.

6. Annexes

6.1 List of nuclear installations and technical and economical parameters

6.1.1 LIST OF NUCLEAR INSTALLATIONS

In terms of the Convention, the Joint Stock Company Slovenské elektrárne is operator of the following nuclear installations being branch plants:

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

Nuclear Power Plant Research Institute, Trnava a.s. (VÚJE) operates an incinerator and bitumenisation plant radioactive waste at the Jaslovské Bohunice site.

6.1.2 TECHNICAL AND ECONOMIC PARAMETERS

This section presents some technical and economic parameters of NPP Bohunice and NPP Mochovce in operation.

UNIT CAPABILITY FACTOR

Unit Capability Factor - UCF is a WANO parameter that expresses the percentage ratio of electricity actually generated on unit and energy the unit would be able to generate within the given time interval, accounting for external limiting influences (power regulation by control centre, etc.). The lower coefficient values for unit 1 and 2 were due to extended overhauls to implement safety improvements – in 1996 through 2000 (see diagram 6.1.2.a.) and table 6.1.2.b.). Note: Unit 1 at Mochovce was on trial operation in 1998 and was actually only operated during approximately a single quarter.

LOAD FACTOR - COEFFICIENT OF UTILISATION

The load factor accounts for the actual supplies of electricity in relation with electricity supplies to the grid that are possible, with not accounting for external limiting factors (power regulation by control centre etc.). The lower values of the load factor of the Bohunice units achieved were significantly influenced by control centre requirements on power regulation and extended overhauls under the Gradual upgrading of NPP V-1 units (see diagram 6.1.2.c. and table 6.1.2.d.).

ELECTRICITY GENERATION

In 2003, the NPP Bohunice units generated a total of **11,625 GWh,** moderately down from 2002 (12,083 GWh). The NPP Mochovce generated **6,239 GWh** of electricity on aggregate, up from 2002 (5,870 GWh) (see Fig. 6.1.2e, f).

Fig. 6.1.2a.)

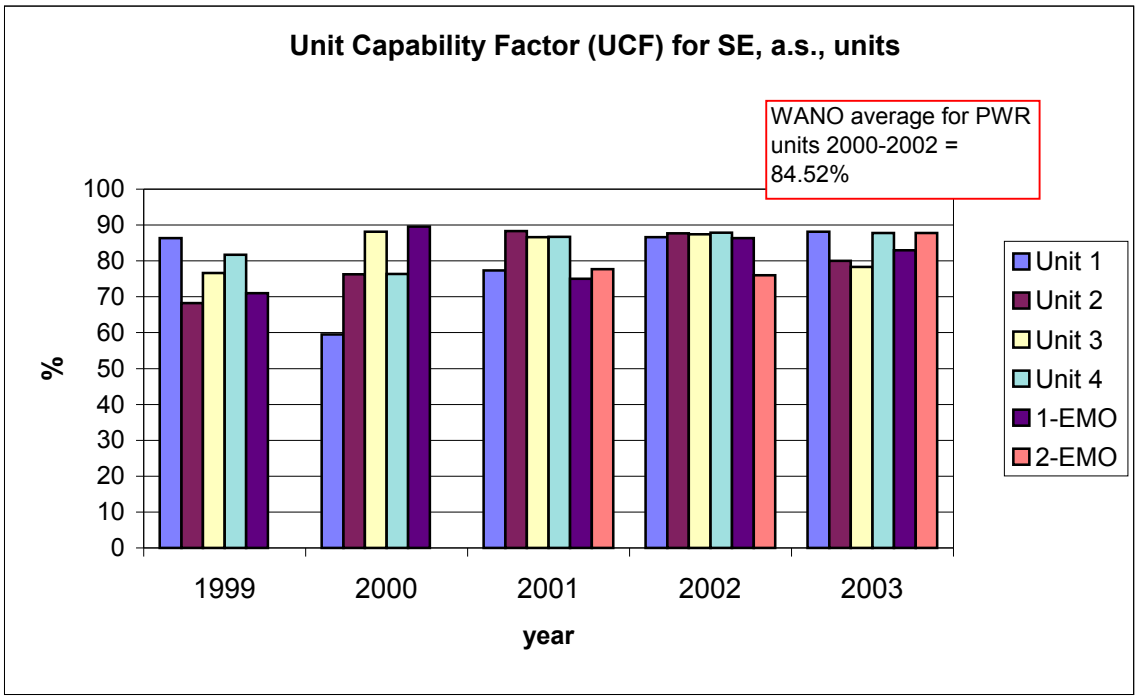


Table 6.1.2.b.)

	1999	2000	2001	2002	2003
1 EBO	86.38	59.53	77.37	86.62	88.10
2 EBO	68.27	76.31	88.29	87.71	80.02
3 EBO	76.67	88.13	86.60	87.38	78.28
4 EBO	81.67	76.32	86.73	87.83	87.76
1 EMO	71.03	89.55	75	86.33	82.95
2 EMO	-	-	77.71	76.01	87.75

Fig. 6.1.2.c.)

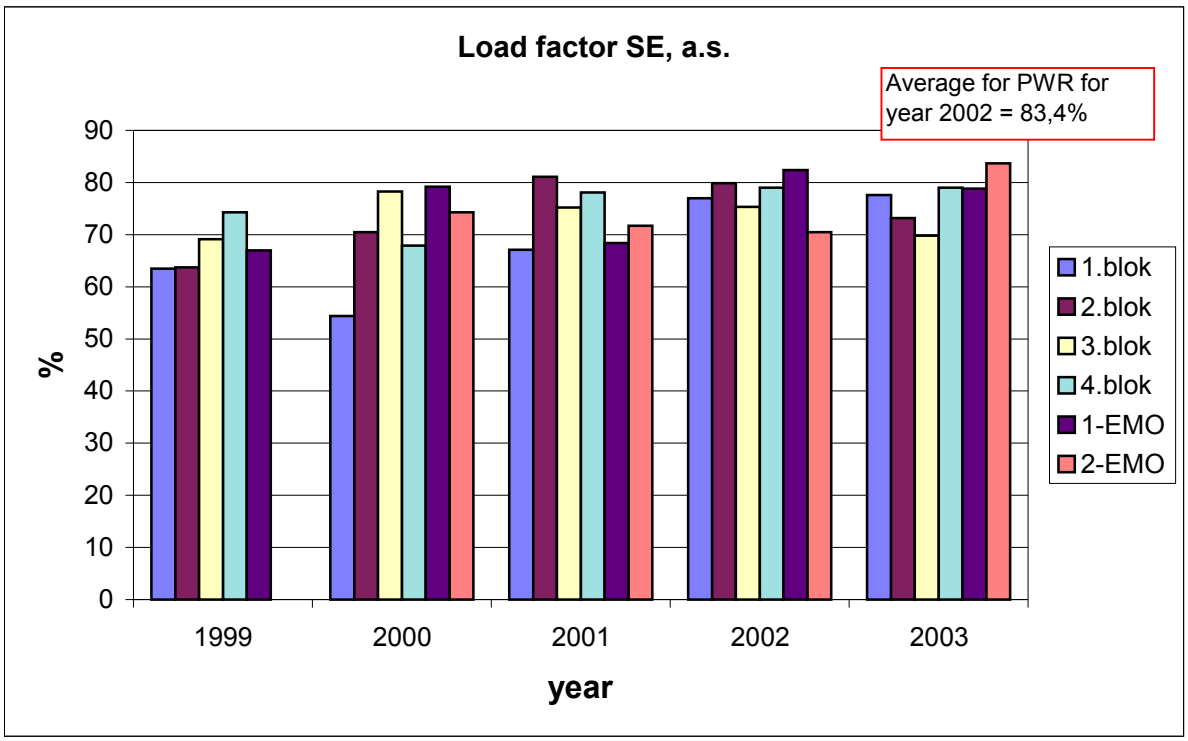


Table 6.1.2.d.)

	1999	2000	2001	2002	2003
1 EBO	63.5	54.4	67.1	77	77.6
2 EBO	63.7	70.5	81.1	79.9	73.2
3 EBO	69.1	78.3	75.2	75.3	69.8
4 EBO	74.3	67.9	78.1	79	79
1 EMO	67	79.2	68.4	82.4	78.8
2 EMO	-	74.3	71.7	70.5	83.7

Fig. 6.1.2.e.)

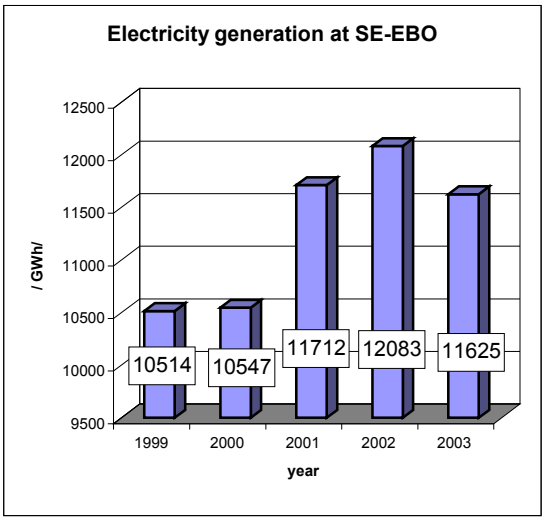
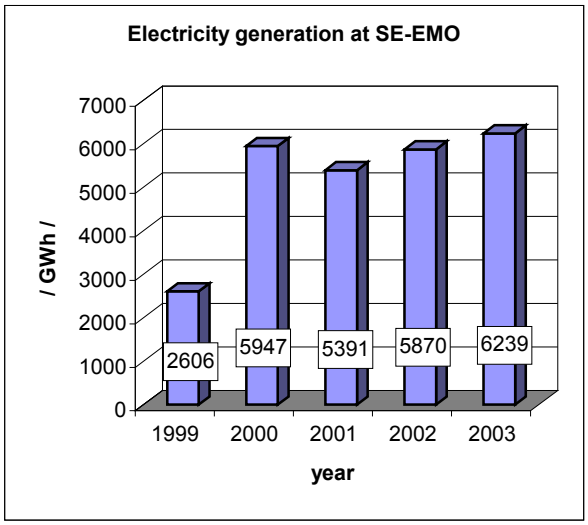


Fig. 6.1.2.f.)



6.2 Some generally binding legal documents concerning nuclear and radiation safety

Act No. 575/2001 Coll. on organisation of operation of the government and of the central state administration, as altered and amended

Act No. 130/1998 Coll. on peaceful uses of nuclear energy and on alteration and amendment to Act No. 174/1968 Coll. on state professional supervision of labour safety, as amended by Act No. 256/1994 Coll., as last amended by Act No. 470/2000 Coll.

Act No. 50/1976 Coll. on spatial planning and building regulations (Construction Act) - as last amended by Act No. 608/2003 Coll.

Act No. 70/1998 Coll. on energy and on amendment to Act No. 455/1991 Coll. on Trade Business (Trade Business Act), as last amended by Act No. 24/2004 Coll.

Act No. 254/1994 Coll. on the State Fund for Decommissioning Nuclear Installations and Management of Spent Nuclear Fuel and Radioactive Wastes - as last amended by Act No. 291/2002 Coll.

Act No. 127/1994 Coll. on environmental impact assessment, as last amended by Act No. 553/2001 Coll.

Act No. 272/1994 Coll. on public health protection, as last amended by Act No. 578/2003 Coll.

Act No. 42/1994 Coll. on civil protection, as last amended by Act No. 515/2003 Coll.

Act No. 95/2000 Coll. on labour inspection, as last amended by Act No. 121/2004 Coll.

Act No. 330/1996 Coll. on occupational health and safety, as altered and amended

Act No. 264/1999 Coll. on technical requirements for products and conformance assessment and on alteration and amendment to certain laws, as altered and amended

Act No. 90/1998 Coll. on building products, as altered and amended

Government Regulation No. 391/1999 Coll. laying down the particulars of technical requirements for machinery, as altered and amended

Government Regulation No. 392/1999 Coll. laying down the particulars of technical requirements and procedures for conformance assessment for electric equipment used within a certain range of voltage, as altered and amended

Government Regulation No. 394/1999 Coll. laying down the particulars of technical requirements for products in terms of electromagnetic compatibility, as altered and amended

Government Regulation No. 29/2001 Coll. laying down the particulars of technical requirements and procedures for conformance assessment for personal protective devices, as amended by Government Regulation No. 323/2002 Coll.

Government Regulation No. 117/2001 Coll. laying down the particulars of technical requirements and procedures for conformance assessment of equipment and protective systems intended to be used within an environment involving explosion hazards, as amended by Government Regulation No. 296/2002 Coll.

Government Regulation No. 159/2001 Coll. on the minimum safety and health requirements in use of working means, amended by Government Regulation No. 470/2003 Coll.

Government Regulation No. 201/2001 Z. z. on minimum safety and health requirements at working places

Government Regulation No. 247/2001 Coll. on the minimum safety and health requirements at work with display units

Government Regulation No. 444/2001 Coll. on the requirements for use of labelling, sings and signals to ensure occupational health and safety

Government Regulation No. 510/2001 Coll. on the minimum safety and health requirements for a site, as amended by Government Regulation No. 282/2004 Coll.

Government Regulation No. 513/2001 Coll. laying down the particulars of technical requirements and procedures for conformance assessment for simple pressure vessels, as amended by Government Regulation No. 328/2003 Coll.

Government Regulation No. 576/2002 Coll. laying down the particulars of technical requirements and procedures for conformance assessment for pressure equipment, amended by Government Regulation No. 329/2003 Coll.

Government Regulation No. 493/2002 Coll. on the minimum requirements for occupational health and safety within an explosive environment

Government Regulation No. 504/2002 Coll. on the conditions for the provision of personal protective devices

Government Regulation No. 176/2003 Coll. laying down the particulars of technical requirements and procedures for conformance assessment for transport pressure equipment

Government Regulation No. 400/1999 Coll. laying down the particulars of technical requirements for other designated products, as altered and amended - currently no longer effective

Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency

Council Regulation (Euratom) 87/3954 of 22 December 1987, as amended by Council Regulation (Euratom) 89/2218 of 18 July 1989 laying down maximum permitted levels of radioactive contamination of foodstuffs and feedingstuffs following a nuclear accident or any other case of radiological emergency

Council Regulation (Euratom) 90/770 of 29 March 1990 laying down maximum permitted levels of radioactive contamination of foodstuffs and feedingstuffs following a nuclear accident or any other case of radiological emergency

Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of the workers and the general public against the dangers arising from ionising radiation

Council Directive 90/641/Euratom of 4 December 1990 on the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas

ČSKAE Regulation No. 9/1985 on nuclear safety of research nuclear installations

UJD Regulation No. 29/1999 Coll. issuing the list of special materials and equipment

ÚBP SR Regulation No. 66/1989 Coll. on safety of technical equipment in nuclear energy, as amended by Regulation No. 31/1991 Coll.

UJD Regulation No. 30/1999 Coll. laying down the particulars of maximum limits for nuclear material amounts for which nuclear damage is not expected to occur

UJD Regulation No. 186/1999 Coll. laying down the particulars of physical protection of NI´s, nuclear materials and radioactive wastes

UJD Regulation No. 187/1999 Coll. on professional competence of nuclear installation staff, as amended by UJD Regulation No. 317/2002 Coll.

UJD Regulation No. 198/1999 Coll. on nuclear material record-keeping and control

UJD Regulation No. 245/1999 Coll. on emergency planning in case of an accident or a breakdown, as amended by UJD Regulation No. 318/2002 Coll.

UJD Regulation No. 246/1999 Coll. on documentation of nuclear installations in decommissioning thereof

UJD Regulation No. 284/1999 Coll. on the particulars of transportation of nuclear materials and radioactive wastes

UJD Regulation No. 31/2000 Coll. on events at nuclear installations

UJD Regulation No. 190/2000 Coll. laying down the particulars of management of radioactive wastes and spent nuclear fuel

UJD Regulation No. 317/2002 Coll. on the requirements for quality systems of licence holders and on alteration and amendment to UJD Regulation No. 187/1999 Coll. on professional competence of nuclear installation staff

UJD Regulation No. 318/2002 Coll. on documentation of nuclear installations and on alteration and amendment to UJD Regulation No. 245/1999 Coll.

UJD Regulation No. 121/2003 Coll. on nuclear safety assessment

UJD Regulation No. 167/2003 Coll. on the requirements for nuclear safety of nuclear installations

Slovak Ministry of Environment Regulation No. 453/2000 Coll. implementing certain provisions of the Construction Act

Slovak Ministry of Environment Regulation No. 55/2001 Coll. on spatial planning background documents and spatial planning documentation

Slovak Ministry of Environment Regulation No. 12/2001 Coll. on the requirements for radiation protection

Slovak Ministry of Labour, Social Affairs and Family Regulation No. 718/2002 Coll. on occupational health and safety and safety of technical equipment

ÚBP SR Regulation No. 111/1975 Coll. on record-keeping and registration of occupational accidents and on reporting operational accidents (breakdowns) and failures of technical equipment, as amended by Regulation No. 483/1990 Coll.

ÚBP SR Regulation No. 59/1982 Coll. establishing the basic requirements for safety of labour safety and technical equipment, as amended by ÚBP SR Regulation No. 484/1990 Coll.

ÚBP SR Regulation No. 374/1990 Coll. on safety of labour and technical equipment in construction work

ÚBP SR Regulation No. 208/1991 Coll. on safety of labour and technical equipment in operation, maintenance and repair of vehicles

ÚBP SR Regulation No. 25/1984 Coll. on labour safety at low-pressure boiler plants

Slovak Ministry fore Construction and Regional Development Regulation No. 520/2001 Coll. establishing building product groups and particulars of conformance demonstration

ÚBP SR Regulation No. 19/1987 Coll. laying down the requirements for the protection against explosions of flammable gases and vapours - currently no longer effective

Slovak Ministry of Labour, Social Affairs and Family Regulation No. 377/1996 Coll. on the provision of personal protective devices - currently no longer effective

Generally binding legal documents that have been repealed or superseded (major amendments):

ČSKAE Regulation No. 67/1987 Coll. on nuclear safety in handling radioactive wastes has been repealed and superseded by UJD Regulation No. 190/2000 Coll. on management of radioactive wastes and spent nuclear fuel

ČSKAE Regulation No. 100/1989 Coll. on security protection of nuclear installations and nuclear materials has been repealed and superseded by UJD Regulation No. 186/1999 Coll. on physical protection of nuclear installations, nuclear materials and radioactive wastes

ČSKAE Regulation No. 191/1989 Coll. laying down the method, terms and conditions for verification of special competence of classified staff of nuclear installations has been repealed and superseded by UJD Regulation No. 187/1999 Coll. on professional competence of nuclear installation staff, as amended by Regulation No. 317/2002 Coll.

Ministry of Health of the SSR No. 65/1972 Coll. on health protection against ionising radiation has been repealed and superseded by Slovak Ministry of Health No. 12/2001 Coll. on the requirements for radiation protection

ČSKAE Regulation No. 28/1977 Coll. on nuclear material record-keeping and registration has been repealed and superseded by UJD Regulation No. 198/1999 Coll. on nuclear material record-keeping and control

Act of the FA of the ČSSR No. 28/1984 Coll. on state supervision of nuclear safety of nuclear installations has been repealed and superseded by Act No. 130/1998 Coll. on peaceful uses of nuclear energy and on alteration and amendment to Act No. 174/1968 Coll. on state expert supervision of labour safety, as amended by Act No. 256/1994 Coll.

FMTIR Regulation No. 84/1976 Coll. on spatial planning background documents and planning documentation has been repealed by an amendment to Construction Act No. 237/2000 Coll. and superseded by Regulation No. 453/2000 Coll.

FMTIR Regulation No. 83/1976 Coll. on general technical requirements for construction has been repealed by an amendment to Construction Act No. 237/2000 Coll.

FMTIR Regulation No. 85/1976 Coll. detailing spatial proceedings and building regulations has been repealed by an amendment to Construction Act No. 237/2000 Coll. and in part superseded by Regulation No. 453/2000 Coll.

Regulation of the Federal Ministry of Environment, the Czech Ministry of Environment and SKŽP No. 376/1992 Coll. amending FMTIR Regulation No. 83/1976 Coll. on general technical requirements for construction, as amended by Regulation No. 45/1979 Coll., has been repealed by am amendment to Construction Act No. 237/2000 Coll.

Regulation of the Federal Ministry of Environment, the Czech Ministry of Environment and SKŽP No. 378/1992 Coll. amending FMTIR Regulation No. 85/1976 Coll. detailing spatial proceedings and building regulations, as amended by Regulation No. 155/1980 Coll. has been repealed by an amendment to Construction Act No. 237/2000 Coll. an superseded in part by Regulation No. 453/2000 Coll.

ČSKAE Decree No. 6/1981 on testing equipment for transport and disposal of radioactive materials has been repealed and superseded by UJD Regulation No. 284/1999 Coll.

ČSKAE Regulation No. 436/1990 Coll. on quality assurance of classified equipment in terms of nuclear safety of nuclear installations, which has been repealed and superseded by UJD Regulation No. 317/2002 Coll. on the requirements for quality systems of licence holders and on alteration and amendment to UJD Regulation No. 187/1997 Coll. on professional competence of nuclear installation staff

ČSKAE Decree No. 2/1978 on nuclear safety in design, licensing and performance of nuclear installations ČSKAE Regulation No. 4/1979 Coll. on general criteria for nuclear safety in siting structures with a nuclear installation

ČSKAE Decree No. 6/1980 Coll. on nuclear safety in start up and operation of nuclear installations - these Regulations have been repealed and superseded by UJD Regulation No. 167/2003 Coll. on the requirements for nuclear safety of nuclear installations

UJD safety guidelines:

BNS I.2.6/2000 UJD requirements for Chapter 4 of the Safety Analysis Report “Core Design“
BNS I.2.6/2001 Quality assurance of safety documentation. Basic requirements and procedures
BNS I.4.1/1999 Single failure criterion
BNS I.4.2/1999 Use of PSA methodology in the performance of state supervision
BNS I.9.1/1999 Documentation of nuclear installations in decommissioning thereof
BNS I.9.1/2003 Documentation of nuclear installations in decommissioning thereof

BNS I.9.2./2001	Management of ageing of nuclear power plants - Requirements
BNS I.11.1/1995	Requirements for the preparation of safety analyses
BNS I.11.2/1999	Requirements for the preparation of safety analyses for abnormal operation processes with an automatic reactor protection failure
BNS I.12.1/1995	Requirements for quality assurance of computer information software
BNS I.12.1/2003	Requirements for quality assurance of computer information software
BNS II.2.1/2001	Requirements for fire safety of nuclear power plants in terms of nuclear safety
BNS II.3.1/2000	Assessment of the permissibility of defects detected in operational checks of classified equipment of nuclear installations
BNS II.5.1/1999	Welding nuclear equipment. Basic requirements and rules
BNS II.5.1/2002	Welding nuclear equipment. Basic requirements and rules
BNS II.5.2/1999	Control of welding and quality of weld joints of nuclear installations
BNS II.5.2/2002	Control of welding and quality of weld joints of nuclear installations - Requirements
BNS II.5.3/1999	Welding materials for welding nuclear installations. Technical requirements and rules for selection
BNS II.5.3/2002	Welding materials for welding nuclear equipment. Technical requirements and rules for selection
BNS II.3.3/2004	Metallurgical products and spare parts for nuclear installations - Requirements
BNS III.4.1/2000	Requirements for granting UJD licence to use fuel in WWER-440 reactors
BNS III.4.3/2000	Requirements for assessment of fuel loadings

6.3 Limits of radioactive discharges

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

Table 6.3.1 shows limits for NPP Bohunice (SE- EBO + SE -VYZ) and Mochovce discharges.

TABLE 6.3.1

Annual discharge limits						
	Ventilation flue				Liquid discharges	
	Rare gases (any mixture)	Iodines (gaseous and air-borne phase)	Air-borne particles – mixture of long-lived radionuclides	Sr 89, 90	Tritium	Others corrosively and fissile products
	Bq/yr	Bq/yr	Bq/yr	Bq/yr	Bq/yr	Bq/yr
Bohunice (EBO,VYZ)	$4 . 10^{15}$	$1.3 . 10^{11}$	$1.6 . 10^{11}$	$3 . 10^{8}$	$4.37 . 10^{13}$ Váh	$3.8 . 10^{10}$ Váh
Bohunice (EBO,VYZ)					$4.37 . 10^{11}$ Dudváh	$3.8 . 10^{8}$ Dudváh
Mochovce 1, 2	$4.1 . 10^{15}$	$6.7 . 10^{10}$	$1.7 . 10^{11}$		$1.2 . 10^{13}$	$1.1 . 10^{9}$

	Annual discharge limits				Activity content [Bq/m^3]	
	Rare gases (any mixture)	Iodines (gaseous and air-borne phase)	Air-borne particles – mixture of long-lived radionuclides	Sr 89, 90	Tritium	Others corrosively and fissile products
	Bq/day	Bq/day	Bq/day	Bq/day	[Bq/m^3]	[Bq/m^3]
Bohunice (EBO, VYZ)	$5.5 . 10^{13}$	$1.8 . 10^{9}$	$2.2 . 10^{9}$		$1.95 . 10^{8}$	$3.7 . 10^{4}$
NPP Mochovce 1,2	$5.5 . 10^{13}$	$9.0 . 10^{8}$	$2.5 . 10^{9}$		$1.1 . 10^{8}$	$4 . 10^{4}$

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