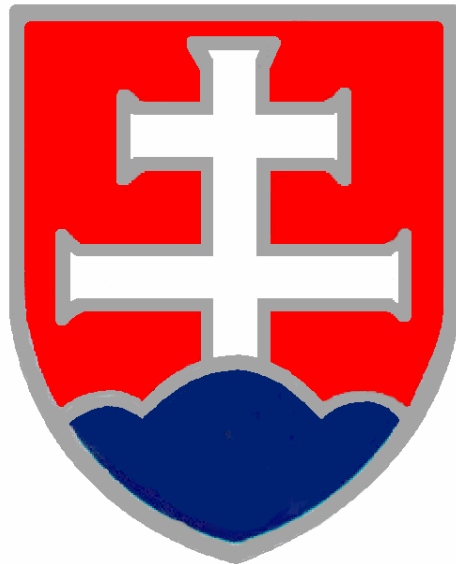


NATIONAL REPORT OF THE SLOVAK REPUBLIC



**COMPILED IN TERMS OF
THE JOINT CONVENTION ON THE SAFETY OF SPENT
FUEL MANAGEMENT AND ON THE SAFETY OF
RADIOACTIVE WASTE MANAGEMENT**

June 2008

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Used abbreviations

ALARA	Dose rates must be as low as reasonably achievable with economical and social aspects consideration - As Low As Reasonably Achievable
AZ	Active zone
BOZP	Safety and health protection at work
BS	Safety report
BSC	Bohunice treatment centre
BSVP	Storage pond of spent nuclear fuel
CO	Civil protection
ČSSR	Czechoslovak Socialistic Republic
ČSKAE	Czechoslovak Atomic Energy Commission
EIA	Environmental Impact Assessment
EGP	Energoprojekt (general designer of NPP V-1, V.2)
FS KRAW	Final treatment of KRAW
HRK	Emergency and regulation assembly
HÚ	Deep repository
HVB	Main production unit
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IED	Individual dose equivalent
INES	International Nuclear Event Scale
ISM	Integrated management system
JAVYS, a. s.	Jadrová vyrábajúca spoločnosť
JM	Nuclear material
JP	Nuclear fuel
JPC	Nuclear fuel cycle
JZ / JEZ	Nuclear equipment, facility/ nuclear energy equipment, facility
KED	Collective dose equivalent
KHP	Hermeticity test of fuel coating
KGO	Tightness test of fuel coating
KRH	Commission of the SR Government for Radiation Events
KV	Complex testing
L&C	Limits and conditions for operation
LRAW	Liquid RAW
MH SR	Ministry of Economy of the Slovak Republic
MPSVR SR	Ministry of Labor, Social Affairs and Family of the Slovak republic

MSVP	Interim storage of spent fuel
MV SR	Ministry of Internal Affairs of the Slovak Republic
MZ SR	Ministry of Health of the Slovak Republic
MŽP SR	Ministry of Environment of the Slovak Republic
NF	Nuclear fuel, system code QA
NIP	National Labor Inspectorate
NJF	National Nuclear Fund
NPP	Nuclear power plant
NPP A-1	Nuclear power plant Bohunice A-1
NPP V-1	Nuclear power plant V-1 Jaslovské Bohunice (1. and 2. unit)
NPP V-2	Nuclear power plant V-2 Jaslovské Bohunice (3. and 4. unit)
NPP Mochovce, EMO	Nuclear power plant Mochovce
NR SR	National Council of the Slovak Republic
NS	National report
NUSS	Nuclear Safety Standards
ORS	Operation and management group
PDS	Long-term storage enclosure
PPBS	Pre-operational safety report
PHARE	EU Initiative for economical integration of Central and Eastern Europe countries
PKV	Pre-complex testing
PO	Primary circuit
PS	Operational file
PSA	Probabilistic safety assessment
QA	Quality assurance
Ra	Radioactive
RAW	Radioactive waste
RF	Russian federation
RS	Reactor hall
RÚ RAW	National RAW Repository
SE, a. s.	Slovenské elektrárne, akciová spoločnosť
SE - EBO	Nuclear power plants Jaslovské Bohunice, branch of SE, a. s.
SE - EMO	Nuclear power plant Mochovce, branch of SE, a. s.
SE - VYZ	Decommissioning of JEZ and RAW and spent fuel management, former branch of SE, a. s.
SKR	Control and management system
SR	the Slovak Republic

SNF	Spent nuclear fuel
SRAW	Solid RAW
SÚRMS	The Slovak Center of Radiation Monitoring Network
STN	Slovak technical standard
ŠFL JEZ	the State Fund of Nuclear Facility Decommissioning (now NJF)
TK	Transport container
TK C-30	Transport container for VJP of C-30 type
ŤK	Heavy metal
třk	Tons of heavy metal
TNR	Reactor pressure vessel
TTĎ	Transport and technological part
TSÚ RAW	Technologies for RAW treatment and conditioning
TV	Television
UBN	Events without consequences
ÚJD SR	the Nuclear Regulatory Authority of the Slovak Republic
ÚKŠ	the Central Crisis Headquarters
US NRC	United States Nuclear Regulatory Commission
ÚVZ SR	the Office of Public Health Care of the Slovak Republic
VBK	Fiber-concrete container
VDL	High-capacity decontamination plant
VICHR	Vitrification plant of chrompik
VRAW	High level active radioactive waste
VUJE, a. s.	VUJE, a. s. Trnava – engineering, design and research organization
VVER	Water-Moderated Energy Reactor
VZT	Air-conditioning
WANO	World Association of Nuclear Operators
ZRAM	Captured radioactive materials
ZS	Loading machine
Z. z.	Collection of Laws
ZSSR	the Union of Soviet Socialist Republics
ŽP	Environment
ŽSR	the Railways of the Slovak Republic

A Introduction

The Slovak Republic ratified the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereafter “Joint Convention”) on the 6th of October 1999. The submitted national report describes measures taken for implementation of every obligation of the Joint Convention. It was elaborated based on the Article No. 32 of the Joint Convention and its structure complies with the recommendations of the Guidelines regarding the form and structure of national reports.

Slovakia has operated altogether six nuclear units with nuclear reactors of VVER-440 type. Four units are installed in Jaslovské Bohunice (EBO 1-4, called NPP V1 and NPP V2) and two of them at Mochovce (SE-EMO 1-2). EBO 1 has been definitely shut down on 31.12.2006, EBO 2 will be shut down according to the plan on 31. 12. 2008.

Nuclear power plant A1 located at Jaslovské Bohunice was designed to use natural uranium as fuel in a heavy water reactor cooled with carbon dioxide (HWGCR – 150MW). This power plant was shut down in 1977 after an accident (INES 4) and it is in the first stage of decommissioning at present. The spent fuel from this plant was transported to the Russian Federation based on a valid contract.

Technologies for radioactive waste management are located in the locality of Jaslovské Bohunice and Mochovce. They are a part of the so-called Bohunice Conditioning Centre (BSC RAW), which is in operation since 1999 and the so-called Final liquid RAW treatment (FS LRAW), which is in trial operation since 2007. There are also experimental radioactive waste treatment facilities installed in the locality of Jaslovské Bohunice and are currently in decommissioning in the stage of protective disposal.

The National Repository of low and intermediate level radioactive waste (RÚ RAW) is in operation since 1999 in the locality near SE - EMO.

The interim spent fuel storage is in operation in Jaslovské Bohunice since 1987, where the project of seismic resistance and storage capacity increase has been implemented.

More details on the technologies for the management of spent fuel and radioactive waste are in the next chapters of this report. SE, a. s., JAVYS, a. s. and VUJE, a. s. are the authorization holders for operation and decommissioning of nuclear installations in Slovakia.

The state supervision of nuclear safety on spent fuel management and radioactive waste management is performed by the Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR). The basic legal act for peaceful use of nuclear energy was the Act NR SR No. 130/1998 Coll., which has been replaced on 1st December 2004 by the Act NR SR No. 541/2004 Coll. (so-called Atomic Act) as amended. ÚJD SR is an independent central authority of state administration headed by a chairman with significant powers according to the valid legislation. The chairman has a direct access to the government. The

state supervision of the radiation protection is assured by the Public Health Care Office of the Slovak Republic (ÚVZ SR) in compliance with the Act No. 355/2007 Coll. on Protection, Support and Development of Public Health.

Labour inspection (especially supervision of safety and health protection at work and safety of technical equipment) is performed by the National Labor Inspectorate (NLI) in compliance with the Act No. 125/2006 Coll. on Labor Inspection as amended and of the Act No. 82/2005 Coll. on Illegal Work and Illegal Employment as amended. Verification of fulfillment of requirements on safety of classified technical equipments and technical equipments is performed by legal entities in accordance with the Act No. 124/2006 Coll.

The Slovak Republic is a contracting party of all significant international treaties and conventions in the field of peaceful use of nuclear energy.

A list of nuclear facilities according to the Join Convention is presented in Annexes L I - III.

The previous national reports from 2003 and 2005 are available at the web site of the Nuclear Regulatory Authority: www.ujd.gov.sk.

New or updated information in comprision with the previous national report is indicated by italics letters.

B Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) Management Conception

B.1 Spent Nuclear Fuel (SNF) Management Conception

The basic conception of SNF and RAW management is established by the Resolutions No. 930/1992, No. 190/1994, No. 684/97 and No. 5/2001 of the Slovak government.

In 2000, the Slovak government adopted the Power Policy of the Slovak Republic that also relates to the conception of fuel cycle back-end of nuclear energy.

The current basic conception of SNF management in SR resulting from the previous documents can be characterized as follows:

1. An open fuel cycle is applied during the operation of nuclear reactors in SR. At the present time, it is impossible to perform a closed fuel cycle in SR, because the VVER-440 reactors are not licensed to use MOX fuel.
2. For SNF management, transportation of SNF abroad for re-processing with the following return of re-processing products (Pu, U, VRAW) to SR is not considered.
3. Short-term storage of SNF (3 to 7 years after its removal from the reactor) is performed in the ponds located near the reactors (BSVP), situated in every reactor unit.
4. Long-term storage of SNF (40 to 50 years after its removal from the reactor) is performed in a separate SNF storage facility in Bohunice.
5. A long-term goal of the SNF management conception is a construction of an interim storage (40-50 years) for SNF from the EMO production and a deep geological repository for SNF and VRAW in the Slovak Republic.
6. Possibilities of SNF transportation abroad for permanent disposal or reprocessing without importing the reprocessing products back to Slovakia are being verified.
7. Possibilities of international or regional solution of the final SNF management are being verified; the use of new technologies in the area of SNF management is examined.

SNF storage facility in Bohunice (MSVP - JAVYS, a. s.) is in operation since 1987. The reconstruction of MSVP - JAVYS, a. s. is being completed in the present time in order to increase the storage capacity. A seismic resistance and safety improvement project was finished in 1999. A concept of SNF storage facility in Mochovce (MSVP - EMO) was passed; the project is currently in its preparatory stage.

The total production of SNF from the A-1 reactor unit (HWGCR reactor, in operation since 1973 till 1977) has been transported to the Russian Federation until the half year of 1999. Before 1987, a small part of SNF from VVER-440 reactors (697 fuel assemblies) was transported to the Russian Federation.

Possibilities of SNF transport for reprocessing to the Russian Federation without the return of re-processed products back to SR are in the present time inhibited by legislative restraints. A preliminary proposal for such transport has been already expressed by the Russian side.

In 2001, the Slovak government in his Resolution No. 5/2001 accepted "The proposal of economical, material and time solution on spent fuel management and nuclear facilities decommissioning" and assigned to submit a "Conception of nuclear facilities decommissioning and spent fuel management assessed in compliance with the Act No. 24/2006 Coll. as amended by 31. 12. 2007. This strategic document was designed as Strategy of nuclear energy back-end and was passed by the governmental Resolution SR No. 328/2008 as of 21st May 2008.

B.2 Radioactive Waste (RAW) Mmanagement Conception

The current conception of radioactive waste management in Slovakia was approved by the governmental Resolution SR No. 190/94 and after its updating to fit the current conditions, it can be characterized as follows:

1. Effectively use the current equipment for radioactive waste treatment and conditioning installed at Jaslovské Bohunice site.
2. Basic solidification methods of liquid radioactive waste, radioactive sludge and spent ion-exchanging resins into a form suitable for final disposal include cementation and bituminization.
3. The volume of solid radioactive waste will be minimised by applying compaction and incineration.
4. The treated radioactive waste is than grouted by active mixture of concrete and concentrate into fibre-reinforced concrete containers. These containers are suitable for transportation as well as for storage and disposal.
5. For treatment of intermediate level waste and radioactive waste with high contents of trans-uranium (specific liquid radioactive waste and sludge produced during the storage of spent fuel at Nuclear Power Plant A1 is necessary to apply a vitrification method.
6. Low-active soil and concrete debris shall be arranged into layers on supervised stockpiles.
7. The available methods (high-pressure compaction, cementation, etc.) shall be used for the treatment of metal radioactive waste. Because of the increasing trend of metal radioactive waste production a melting unit shall be installed and used for its conditioning. The low-activity metal waste shall be treated by applying fragmentation and decontamination and cleaned material can be than released into the environment.

8. Methods and technology of releasing of material (especially construction materials) into the environment shall be resolved.
9. Institutional radioactive waste shall be treated and conditioned into a form acceptable for disposal by applying standard methods for treatment of radioactive waste produced by nuclear facilities. The disused sealed sources shall be conditioned into a form suitable for centralised long-term storage or disposal.
10. Long-lived storage of radioactive waste is allowed only in specially adapted areas approved by the regulatory authorities. The radioactive waste, which is dedicated for long-term storage, shall be stored in solid form and in suitable containers.
11. The conditioned radioactive waste produced during the operation and decommissioning of nuclear power plants and the conditioned institutional radioactive waste that meet the acceptance criteria shall be disposed of in the National Repository in Mochovce.
12. The waste that is not acceptable for the National Repository in Mochovce shall be stored at the power plants. An integral storage shall be installed at Bohunice to allow storing of radioactive waste that is not acceptable for NRR.
13. The radioactive waste that does not meet the acceptance criteria for disposal in near surface repository shall be disposed of in a deep geological repository, such deep geological repository shall be built.
14. Transport of radioactive waste shall be carried out exclusively by using packaging and transporting equipment approved for this purpose.
15. The costs of radioactive waste management produced during the decommissioning of nuclear power facilities shall be covered from the resources of Fund. The costs of radioactive waste management produced during the operation of nuclear power plants shall be covered by the operational costs of these power plants.

B.3 Criteria Used for Definition and Classification of Waste

In Slovakia (the Act No. 541/2004 Coll.), radioactive waste shall mean any material in gaseous, liquid or solid form for which no further use is foreseen, and that contains or is contaminated with radionuclides at concentrations or activities greater than clearance levels into the environment.

The limit concentrations enabling particular radionuclides to be released into environment are featured in the Annex No. 3 of the governmental Ordinance No. 345/2006 Coll.

Classification of radioactive waste into classes is based on their ability to be disposed and is defined in the Regulation of ÚJD SR No. 53/2006. This regulation distinguishes the following categories of RAW:

- a) **transitional radioactive waste**, activity of which decreases during the storing below the limit value enabling their release into environment,

b) **low-level radioactive waste and intermediate level radioactive waste**, activity of which is higher than the limit value enabling their release into environment and produced residual heat of which is less than 2 kW/m^3 :

1. **short-lived** radioactive waste, which meet the limits and conditions of safe operation for surface repository of radioactive waste after conditioning and average volume alpha nuclides activity of which is less than 400 Bq/g ,
2. **long-lived** radioactive waste, which do not meet the limits and conditions of safe operation for surface repository after conditioning or average volume alpha nuclides activity of which is higher than or equal to 400 Bq/g ,

c) **high-level radioactive waste**, produced residual heat of which is higher than or equal to 2 kW/m^3 and these waste are not disposable in the surface repository of radioactive waste.

It has not been defined yet when the spent fuel becomes a high-level radioactive waste.

C Scope of Application

This report gives information on the fulfillment of the Joint Convention. Link of chapters to particular articles of the Joint Convention is stated in the Sheet C1.

Sheet C1: Material identifier

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

The scope of this report includes information on safe management of SNF from nuclear power facilities including the transportation and inventory of SNF.

The most significant facilities from the SNF management point of view are in the Annex I.

At present time, there are no facilities for SNF reprocessing nor facilities for management of high-level waste and other products (plutonium, uranium) from fuel reprocessing in the Slovakia Reprocessing of SNF is not included in the conception of SNF management (see B.1.). Currently, SNF produced is not even reprocessed abroad with the intent to return the products back. SNF from NPP A-1 and a part of SNF from VVER-440 reactors, which were in the past transported into the former Soviet Union, were transported without returning RAW and reprocessing products back to Slovakia.

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

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

D.1.1 Basic Characteristics of Main Facilities for Spent Nuclear Fuel (SNF) Management in VVER NPP

The main facilities are:

- fuel charging machine (CM),
- spent fuel pool (SFP),
- spent fuel pool reserve gride,
- spent fuel pool coverage,
- transport channel sealing plate,
- transport container pit,
- transport container stands,
- spent fuel laden transport container suspension,
- inspection shaft,
- sealed capsule for damaged fuel assemblies,
- platform over transport container shaft,
- service platform for spent fuel laden transport container in RH,
- sipping in core complete with a through-flow activity analyser MAK-8 serves to locate leaking fuel assemblies during shutdown. The equipment consists of seven-bell by means of which the whole core can be checked except for working part of emergency control road in 66 steps. The bell moves in the core using a working rod of the charging machine. The working part of emergency control roads is controlled in hermetic casing.
- the equipment for taking dropped objects from the core will be placed on the reactor-dividing plane. A dropped object in the core can be detected from the control panel using a TV system. It can be recovered and placed into a transport container through a head featuring interchangeable tools.
- platform for the spent fuel transport container in the reactor hall,
- overhead travelling electric crane 250/32/2 t.

For detailed technical description of these facilities see the [2003 National Report](#).

Regarding the overall conception of modernization of units and safety improvement program at EBO 1 - 4 and based on the analysis of some significant operational events, various modifications of SNF management technologies have been performed until 2002.

The most significant include the following:

- Modernization and reconstruction of electro-part of TV-systems and systems of fuel charging machine (automatic process control with options of manual, emergency and simulation regime).
- Reconstruction of the „Sipping in-core test“ equipment.
- Supply of special semiautomatic manipulator for removal of unknown objects from Reactor pressure vessel.
- Installation of remote electro-control of Spent nuclear fuel transport container suspension trappings.
- Reconstruction of TK C-30 container navigation
- Supply of portable demi-water heater for TK C-30.
- Equipment and software for measurement of leakages from NPP V-1 spent fuel pool (EBO1 and EBO 2).

The main criteria of these modifications were, the limitation of human error during operational events occurrence, safety improvement of SNF manipulations, facility reliability and a operational safety of the technologies and of these units as a whole.

Two equipments were also additionally bought for NPP EMO, enabling to perform works on the reactor during shutdown more effectively:

- sipping-in-core completed with a through-flow activity analyzer MAK-8 serves to locate leaking fuel assemblies during shutdown. The equipment consists of a bell by means of which the whole core besides fuel parts of control rods can be checked in 66 steps. The bell moves in the AZ using a working rod of the charging machine. Fuel part of control rod is controlled in KHP casings.
- equipment for removal of fallen objects from the core will be placed on the reactor-dividing platform. The fallen object in the core can be detected from the control panel using a TV system. It is possible to capture and place this object into a transport container with the help of a head with interchangeable tools.

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

MSVP is a nuclear installation, which serves for temporary and safe storage of spent nuclear fuel from the VVER reactors before its further processing in a reprocessing plant or before its definite disposal. It is designed as a wet storage. It was commissioned in 1986. Active operation began in 1987.

The original design of VVER-440 units presumed, that after three years long placement in the storage pond near reactor, the SNF will be transported into the former Soviet Union. Later, the Soviet side has started to require the storage of SNF for at least 10 years in the localities of nuclear power plants. Due to this, a Spent Nuclear Fuel Interim Storage was built in Jaslovské Bohunice for the needs of SE - EBO units.

Since 1989 also spent fuel from NPP Dukovany in the Czech Republic was stored in MSVP. After the construction of storage in the Czech Republic, this fuel has been during 1995-1997 gradually transported back to NPP Dukovany.

Spent Fuel Interim Storage has been during 1997 – 1999 reconstructed in order to increase the storage capacity, to extend service life and to any roveseismic resistance of the facility. Total storage capacity of MSVP after reconstruction and seismic improvement is almost three times as big as the designed one (increase from the original 5 040 pcs to the current 14 112 pcs of fuel assemblies - 1 694 t ŤK).

The capacity has been continuously increased through replacement of the original T-12 containers with KZ-48 new containers (completed in 2007) and will be sufficient to store all spent nuclear fuel produced during operation of units EBO 1- 4. Contrary to SE - EMO, in units EBO 1-4 it has not come to compacting of fuel ponds near the reactor and the spent fuel is transported from the units EBO 1-4 to MSVP after 2,5 – 3 years placement in ponds near the reactor.

The aim of MSVP seismic enhancement project was to enhance the resistance of building and technological structures up to the level of international guidelines and requirements and in accordance with the performed geological and seismic surveys. Classification of building structures, technological equipment, electro-devices and SKR - 1 was performed on the basis of methodology of "Requirements" – Category 1 (1a, 1b, 1c) on RLE level (Review Level Earthquake). Evaluation of performed calculations resulted in necessary modifications of building structures and technologies, which have been thereafter performed in the framework of the project "Seismic enhancement and increase of storage capacity of MSVP Bohunice". It was accomplished by this project implementation, that even after a seismic event all safety functions of MSVP are preserved up to the level set for Jaslovské Bohunice site (8o MSK 64) and its life has been extended by min. 50 years.

Besides changes and modifications of the original architectural design and technological equipment, which resulted from the requirements for seismic improvement and increase of storage capacity which were the main objectives of the reconstruction, other changes and modifications have been performed enhancing technical and safety level of MSVP:

- installation of a manipulator for spent fuel transfer MAAP 400,
- enhancement of air-conditioning systems of control rooms, ventilation of MSVP entrance, modifications of air-conditioning due to disposition changes of hygienic loops, ventilation of emergency exits (stairway) based on the requirements of fire protection,
- enhancement of filtration of pond water by a filtration unit for capturing micro-organisms in pond water, including liquidation of filtration cartridges,
- modification of decontamination system,
- installation of detection system for fuel assemblies tightness (Sipping in Pool) and monitoring of corrosion of pond linings,
- modernisation of system and instrumentation of radiation control of MSVP,

- disposition modifications of hygienic loop located on the floor ± 0.00 m and +3.60 m,
- modification of the entrance for personnel into the MSVP building,
- building modifications resulting from new technology requirements,
- monitoring of building structures life and technological systems including monitoring of spent fuel conditions.

The interim storage is designed as a separate building with no constructional link to other objects of the Bohunice area with nuclear installations. The building consists of a container section and a storage section. The storage section consists of four storage ponds. One of them is a reserve pond. The bottom of the pond is at the level of ± 0.00 m, over-coating of the pond is at the level of +7.20 m. The level of cooling water is permanently kept at the level of +6.3 m.

The storage ponds are cross-connected with a transport channel. Individual ponds are separable from the transport channel by hydro-closures. The transport channel continues as a receiving and transferring shaft, also with the possibility to be separated by hydro-closures. Spent fuel is stored inside containers located in the ponds under the water, which serves as a shielding and removes residual heat from the spent fuel assemblies.

The ponds are equipped with double linings (carbon and stainless steel) with inter-spaces, from which organized leakages are draught into the system of organized leakages. Ponds are covered with over-coating with clapper segments which distinctively determine the transportation path of the container and the precise placement of the container in a predetermined place in the storage pond. The over-coating of the ponds can be sealed individually or by sections. Individual ponds can be separated from the transport pond by hermetic closures. 98 compact containers KZ-48 (in 14 rows, 7 containers each) can be stored in every storage pond, whereas 48 fuel assemblies can be placed in every container. The total maximum storage capacity of MSVP is 14 112 pcs of VVER-440 fuel assemblies. The transport of containers is performed in max. elevation of 600 mm above the bottom of the transport pond and storage ponds.

MSVP object has its own **cooling and purification station**. Due to the increased requirements on the removal of residual heat from spent fuel (increased burn-out, more SNF), the original cooling system of pond waters was replaced by a new system. The new system is made of two panel coolers (one is a 100 % reserve) and four pumps (one for each pond, while the reserve pond pump is a reserve pump of the remaining pumps). The heat removal from the cooling water can also be provided by a separate autonomous cooling system of cooling water that consists of three cooling micro-towers and two circulation pumps (one as a 100 % reserve). The operation of the cooling station is periodical according to the need for cooling of pond waters and for keeping its temperature within required values. The purification station serves for keeping the necessary quality of the water in the ponds within required parameters, which is assured by mechanical filtration and ion exchange. The operation is periodical.

Transport container C-30 TK serves for on-site shipment from the units to the interim storage or for out-of-plant transport of SNF. TK is transported in a special railway wagon. In MSVP and HOB, the transport container suspension is used for its transport.

The fuel alternatively is transported in a container in water environment with nitrogen cushion (wet transport), possibly only gas - nitrogen - is used as the cooling medium (dry transport). The transport package C-30 taken by a 130 t crane into the receiving shaft with the help of a special transport suspension is transferred from the transportation rail corridor. After essential handling in the reception shaft, container de-sealing and lid removal, the container with spent fuel is transported onto the respective position in the storage pond by a trap and a 16 t crane.

Air-conditioning system provides for ventilation of inner premises of the interim-storage and continual monitoring of radioactive aerosols in discharges. The ventilation system output is 127 000 m³ of air in an hour.

Based on the IAEA recommendations and ÚJD SR decision a new **monitoring program** is gradually implemented since 2001 to monitor the condition of building structures, technological parts and spent fuel; this program is focused on monitoring the conditions of:

- building structures such as foundation of MSVP building, concrete constructions of spent fuel ponds, supporting steel elements and constructions, sheating of MSVP building,
- pressure vessels and piping systems (cooling, purification and decontamination system),
- corrosive damage of equipment and technology, which is in contact with coolant of spent fuel ponds (construction of ponds, transportation equipment),
- rotary machines (selected pumps and fans),
- systems and components of electric power supply (transformers, generators, drivers and cables),
- spent fuel.
- New monitoring points including the monitoring of the groundwater level will be installed to monitor the settlement of the MSVP building. Conditions of pond linings of MSVP are monitored via conditions of samples of material placed in the ponds and by the method of acoustic emission. Detection system of fuel coating tightness (Sipping in Pool) and a built inspection stand for fuel monitoring, where non-destructive inspections of nuclear fuel bars will be performed, are used to monitor the conditions of spent fuel.

BASIC TECHNICAL DATA OF MSVP - JAVYS, a. s.	
storage capacity by 31. 12. 2007	14 112 fuel assemblies
number of ponds	3 operational + 1 reserve
object ground-plan	45m x 70m
total built-up area	95 000m ³
extension possibility	2 - 3 ponds
storing method	containers KZ 48
maximum temperature of pond water	50 °C
capacity of pond water purification system	25 m ³ /hour
method of spent fuel shipment	rail wagons, containers TK C-30
size of pool, length x width x depth	23,4 x 8,4 x 7,2 m
number of containers per pond	98 pcs KZ-48 type

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

D.2.1 Facilities for Radioactive Waste (RAW) Management

NPP with VVER are equipped with the following facilities for RAW treatment and storage:

Facility for solid radioactive waste management includes collecting equipment, sorting equipment, washers, dryers, low-pressure compactor and fragmentation equipment. They serve for the fragmentation of large pieces of metal SRAW.

Facility for liquid radioactive waste management includes purification (filtrating) stations with ion exchange resins (ŠOV 1, 4, 5 - one-unit; ŠOV 2, 3, 6 - common), distillation evaporators, purification stations of contaminated oils, connecting assembly of concentrate homogenization and pumping stations.

Facility for gaseous radioactive waste management includes air-conditioning systems equipped with aerosol and iodine filters. During 2003-2004 the original iodine filters of soviet provenience were exchanged for iodine filtration stations. A new system of workplace exhaustion was installed within the fragmentation workplace completion.

Facility for solid RAW storage - SRAW

The method of SRAW storing depends on the kind of SRAW and the package, in which it is packed:

- SRAW determined for incineration and high pressure compaction is stored in 200 l MEVA drums in storage shafts,
- metal SRAW (only in EBO 3 - 4 and SE - EMO) is stored in enclosure palettes
- e.g. medium and high level active SRAW from reactor is stored in special packages, in stainless steel cylinder-shaped containers in a special storage, which is accessible directly from the reactor hall and is formed as a set of vertical metal cylindrical shafts embedded into concrete mass in order to shield radiation

- other SRAW with higher activity in shielded drums and with them in shielding boxes,
- air-conditioning filters in metal packages are placed in storage shafts
- large SRAW are freely stored in determined storage shafts

Facility for liquid RAW storage includes tanks for storage of untreated liquid RAW and concentrates. Contaminated oils are stored in cans put in MEVA drums, or directly in MEVA drums, into which they are pumped from the tanks.

Concentrate is stored in stainless steel tanks with volume of 415 to 550 m³. Exhausted ion-exchangers are stored in stainless steel tanks with volume of 150 to 450 m³, which are placed into impervious concrete shafts capable to capture the whole volume of the tank in case of failure.

D.2.2 Technologies for Treatment and Conditioning of Radioactive Waste

The following technologies are included in the nuclear installation called as Technologies for RAW treatment and conditioning (with year of issuance of the authorization for permanent operation):

- bituminization facility PS 44 (1995) and PS 100 (2000) determined for treatment of concentrates and sorbents of EBO 1-4 and NPP A-1,
- purification station (1973) for evaporation and purification of waters from NPP A-1,
- station for treatment of active waters PS 100 (2000),
- cementation facility KWU (1984), originally as a reserve for emergency purposes, currently shutdown and determined for decommissioning,
- Bohunice RAW Conditioning Centre (BSC RAW - 2001) contains the following technologies:
 - incineration facility (incineration of incinerable LRAW and SRAW),
 - high pressure compaction facility (compacting of SRAW, especially metal waste),
 - concentration facility (final evaporation of concentrates on evaporator),
 - facility for RAW conditioning by cementation into VBK containers,
 - RAW sorting facility,
 - storage and transport facility.

A detailed technical description of these facilities is in the National Report 2006.

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

Facility, which is currently in active test operation, serves for treatment and conditioning of LRAW (radioactive concentrates, saturated sorbents and sludges) and some kinds of solid RAW from the operation of EMO units. In the future also conditioning of treated solid RAW from other JZ is considered. The result product will be VBKs complying with L&C for storage, transport and disposal in RÚ RAW, where LRAW solidified by bituminization in 200 l drums or solid RAW put in VBK directly or in drums or as compacts will be embedded by active grout.

The facility is situated in immediate vicinity of existing EMO NPP. It includes the following technologies for RAW treatment and conditioning:

- Bituminization
- Thickening concentration evaporator
- Cementation

Facility will provide for expedition of solid RAW produced in EMO units to Jaslovské Bohunice for high pressure compaction and incineration.

D.2.4 Facility for Institutional Radioactive Waste (IRAW) Management

The original centralized system of IRAW collection in SR has been violated due to the separation of the Czech and Slovak Republic separation. Establishment of a new national system has begun by the governmental Resolution No. 537/1997, which determined the liability of company SE - VYZ for storage of captured contaminated radioactive materials within Slovakia, whereas these obligations were transferred since 1. 4. 2006 to the current Nuclear and Decommissioning Company, a.s., „JAVYS, a. s.“

Furthermore, the Ministry of Economy has imposed implementation of the IRAW management conception, provisions of management, monitoring and disposing of captured radioactive materials and assurance of radioactive materials storage on the company JAVYS, a. s.

The system of IRAW and Captured radioactive materials management in surface repository since its formation till its disposal is technologically secured. In a long-term perspective, it is necessary to build a storage for the indisposable IRAW and Captured radioactive materials. Legislative changes and unclearly set competency margin between regulations have led to strategy changes and necessity of formal changes of IRAW management.

JAVYS, a. s. operates technological facilities for complex treatment and conditioning of radioactive waste from JZ that can be used after licensing also for similar activities with IRAW. Storage capacities were created for short-term storage of IRAW. National repository determined for permanent disposal of conditioned low and medium level radioactive waste, as well as transport, manipulation devices and human resources can also serve after relevant resolutions of regulatory bodies for securing of the IRAW management system.

D.2.5 Facility for Radioactive Waste (RAW) Shipment

To ensure the conception of RAW and IRAW management, a transport system was established providing for shipment of:

- a) solid and liquid RAW within the site of Jaslovské Bohunice,
- b) solid RAW between localities Jaslovské Bohunice and Mochovce,
- c) institutional RAW and ZRAM from the entire territory of SR to the site of Jaslovské Bohunice.

The shipment of RAW is performed in certified transportation equipments on transport means meeting the conditions of European Agreement concerning the International Carriage of Dangerous Goods by

Road (ADR) and of the Regulation concerning International Carriage of Dangerous Goods By Rail (RID), Act No. 541/2004 Coll. and the Regulation ÚJD SR No. 57/20006 Coll.

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



Transport of fiber-concrete containers to the regional RAW repository

D.2.6 Repository of Radioactive Waste - National Radwaste Repository (RÚ RAW)

The National Radwaste Repository is a surface repository designed for disposal of solid and solidified low and medium level radioactive waste, produced during operation of nuclear installations. The Repository site is located about 2 km to northwest from the NPP Mochovce site.

The National Radwaste Repository is in the present time formed by a system of disposal boxes arranged into two double-rows, 40 boxes each. Capacity of one box is 90 fiber-concrete containers VBK. The total capacity of the Repository is 7 200 containers with total volume of 22 320 m³. The inside volume of VBK is 3.1 m³. Compacted and bituminized waste are fixed inside it by active or non-active cement grout.

The National Radwaste Repository (the 1st double-row of disposal boxes) gained the permission of ÚJD SR for permanent operation in November 2001.

The site of the Repository enables expansion to ten disposal double-rows, that means: the disposal of cca 36 thous. VBK with RAW. The basic safety requirement on the Repository is that during its operation, period of institutional control and after its completion no leakage of radionuclides into environment shall occur that would cause radiation exposure exceeding the values set by valid legal regulations.

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

The Repository is protected against meteorological impacts by a hall, which assures that the disposal premise is covered during the whole process of disposal until the time, when it is replaced by a definite over-coating.



Inside look on the regional RAW repository

D.3 List and Description of Facilities in Decommissioning and Belonging Facilities for Radioactive Waste (RAW) Management Produced during Decommissioning

D.3.1 NPP A-1 Bohunice – in decommissioning

Nuclear power plant A1 with a heterogeneous reactor KS-150 was designed for electrical output of 143 MW. Natural metal uranium was used as fuel, heavy water (D₂O) as moderator and carbon dioxide (CO₂) as coolant.

The moderator was cooled by three loops, each one consisting of two coolers and one D₂O pump. The primary cooling circuit (CO₂) comprised of 6 loops, while each loop was composed of one steam generator, a turbo-compressor and two parallel pipes of hot and cold branches of CO₂ cooling. A separate part of NPP A-1 was formed by facilities for installation of fuel assemblies (PČ) and facilities of transport and technological part (TTČ), which served for manipulation with fresh and spent fuel, its post-cooling and storage. The post-cooling and storage system of spent fuel assemblies included two short-term storages, rod cutting chamber (on which PČ were hung in technological channels in the reactor pressure vessel) and a long-term storage. The spent PČ were transported with the help of a loading machine over into the long-term storage filled with cooling water into long-term storage casks. Chrompik used to be initially the coolant in the long-term storage casks, later an organic coolant dowtherm was used. Three turbo-generators with installed output of 50 MW each were the main facility of the secondary circuit of the power plant.

Nuclear power plant A1 was connected to the electric distribution network in December 1972. After an operational accident in January 1976, the operation was restored; after another operational accident in February 1977, technical, economical and safety analyses were performed and based on their results the government decided in 1979 by its Resolution No. 135/79, that the operation of NPP A-1 will not be restored.

Activities directed toward the decommissioning of NPP A1 have commenced. Due to the absence of legislation related to the decommissioning of nuclear power plants, partial problems were solved during that time on case-by-case bases and the particular activities were approved as changes with impact on nuclear safety. The works were focused on:

- elimination of consequences of the operational event,
- preparation of spent fuel transfer to former Soviet Union/Russian Federation,
- development and installation of RAW management technologies.

The first integrated documentation on decommissioning of NPP A1 was elaborated in 1992. The currently valid conception and schedule of NPP A1 decommissioning was passed by the governmental Resolution No. 227/92. By governmental Resolutions No. 266/93, 524/93, 877/94 and 649/95, this schedule including the complex procedure was approved.

Updated documentation for the initial stage of decommissioning was elaborated in 1994 - 1996. Based on the Atomic Act No. 130/1998, ÚJD SR issued in 1999 after the assessment of safety report designed in 1996 and after completion of spent fuel transfer to RF the authorization for **the first stage of decommissioning** (until 2007) provided that:

- all spent fuel is removed from the long-term storage and media representing the highest potential risk has been solidified or re-stored in new tanks,
- majority of liquid operational RAW is conditioned into a form enabling safe disposal,
- the rest of RAW is processed into a form enabling safe disposal or their storage,
- essential decontamination is performed with the aim to further reduce potential sources of radioactive material leakage.

Since especially the implementation works showed significant time lapses, either due to insufficient inputs for estimation of RAW amounts and capacities of technologies for RAW management during its planning, due to unsuccessful solutions or due to pushing the works aside to positions of lower priority, the scope of works of the first stage was on the basis of SE - VYZ request revised by the Resolution of ÚJD SR No. 144/2003, which has indicated, that neither in the extended term until the year 2008 the basic activities focusing on safety improvement and reducing of risk extent will be completed and they will have to be preferentially performed in the beginning of the next stage of decommissioning focused on disassembly of external objects.

The present status of power plant A1 can be characterized as follows:

- transport of spent fuel into the Russian Federation was completed in 1999 (based on an intergovernmental agreement from 1956)
- media for cooling of spent fuel were partially treated, partially re-stored: chrompik (water solution of chromate and potassium bi-chromate) was vitrified or restored into new tanks, sludge in enclosures determined for cooling of PČ and on the bottom of DS pond is solidified into geo-polymers, dowtherm (organic liquid mixture of biphenyl and biphenyloxid) is gradually re-purified and incinerated. More than 99% of water activity of the long-term storage pond was captured on special sorbents.
- liquid operational waste (concentrates) were bituminized and are together with waste from the locality of Jaslovské Bohunice gradually conditioned and disposed in repository
- storage of solid RAW in obj. 44/20 outside of reactor building was reconstructed, waste were removed, sorted and stored in an organized way. Part of these waste was conditioned and disposed.
- the original, not operated storage tanks of the obj. 41 (with contaminated sludge) represent the highest potential risk for environment. Waste from this object located outside of reactor building are gradually removed and treated by cementation with the purpose of further conditioning and disposal or storage.
- Technological facility with induced activity or higher level of contamination will be dismantled in the next decommissioning stages.

D.3.2 Facilities for Management of Radioactive Waste (RAW) from Decommissioning – Part of NPP A-1

Hall above the original solid RAW storage including sorting facility for solid RAW

Waste from the shafts of RAW disposal are removed, sorted and stored in an organized way in 200 dm³ drums. The incinerable RAW are transported into the BSC incinerator. The sorting facility is used for sorting of SRAW occurred during operation of NPP A-1 that is compacted into packages to incinerable and non-incinerable.

Workplace of contaminated concretes management (PNKB)

The workplace includes PNKB containment and some additional stands for short-term storage of contaminated and decontaminated concrete talus in drums as well as contaminated and decontaminated concrete blocks. PNKB containment is designed as an assembled shelter and is separated into two equally large parts, on which the two basic technological activities of concrete release into environment take place:

- storing of contaminated concrete talus on a vibrating conveyer,
- decontamination of concrete blocks by dry methods (milling, slotting and similar).

Fragmentation facility of metal RAW

Fragmentation and sorting of metal RAW with surface contamination up to 500 Bq/cm² has begun in 1996. Metal RAW, occurred during disassembly of technological equipments of turbine building and a secondary part of electrical building of NPP A-1, or during reconstruction of facilities of NPP V-1, was processed.

During 2001-2002 reconstruction enabling to work with metal materials with surface contamination up to 3000 Bq/cm² took place.

Metal RAW is after fragmentation decontaminated by blasting or on VDL and after monitoring on a certified monitoring equipment after issuance of a certificate, a part of decontaminated RAW is released into environment.

High-capacity decontamination equipment

The process of electrochemical, chemical and ultrasonic decontamination takes place in sealed decontamination tanks with own ventilation. A part of VDL is an individual chemical management system for preparation of new decontamination solutions and an individual workplace for liquidation of used decontamination solutions after their preceding neutralization.

In 2002 VDL was supplemented by a electrochemical decontamination tank with accessories enabling to decontaminate metal RAW from carbon and stainless steel. At the same time the reconstruction of

inlet pipe lines leading to the VDL workplace and pipe lines between decontamination tanks was performed.

Decontamination of metal RAW began in 1999; the permanent operation in the current scope for decontamination of metal RAW with surface contamination until 3 000 Bq/cm² takes place since 2002.

The majority of decontaminated metal materials can be released into environment after monitoring on a metrologically certified monitoring equipment.

Vitrification facility of chrompik (VICHR)

The vitrification plant is used for fixation of radioactive chrompik into a glass matrix of boric-silicate type with the aim to achieve significant volume reduction and enhance the safety while storing this specific radioactive liquid waste. Chrompik is pumped from the storage tanks into a measuring tank with volume of 128 dm³ in order to be dosed into an evaporator, where a concentrate of volume 3 dm³ is acquired by temperature of 130-140 °C. Then it is discharged into a melting inductive furnace, where glass matrix is added. The concentrate is dried and the mixture is melted down in the furnace by temperature of 1150°C. The result is poured out into a steel patron, which is after cooling transported into the vitrification storage. Activity of condensate's steams from the evaporator is reduced on the sorbents. Parts of the vitrification facility are cooled by an inserted cooling circuit, which creates at the same time a barrier against leakage of ra-materials in case of untightness.

A reconstruction of the vitrification plant VICHR was performed during 2002 – 2004 with the aim to use the plant for vitrification of chrompik with special radioactivity 10¹¹ Bq. kg⁻¹.

Facility for treatment of VZT filters

The facility is determined for treatment of contaminated filters from the operation of VZT systems of JZ in the locality Jaslovské Bohunice. It comprises of three technological units:

- technological working station of crushing and separation,
- technological working station of separated crushed material compacting,
- sanitary node.

Manipulation chamber for handling medium level radioactive materials

Manipulation chamber was created by reconstruction of hot chamber. It represents a special manipulation box furnished with a control room separated by shielding with built-in observation hole made of lead glass equipped with a system of equipments, which enable:

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

Workplace of long-term storage enclosures fragmentation

The workplace enables:

- to fragment metal parts of PDS without inner content,
- to dispose fragments in empty drums, pre-concreted drums and drums with steel insertion,
- to measure the dose rate on the surface of the drum and total activity in the drum,
- to perform inner rinsing of scissors, knives, working chamber, filling and discharging head,
- to trap the rinsing medium in trapping tanks,
- to embed the lid on the drum and insert the drum into the transporting container for drums.

D.3.3 Bituminization Plant and incinerator of Nuclear Power Plant Research Institute (VUJE), a. s.

The experimental incinerator and experimental bituminization plant have terminated their operation and are since 2007 in decommissioning.

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

Facility for fixation of sludges This semiautomatic equipment was commissioned in 2007 and enables to fix ra-sludges with specific activity beta, gamma cca 10^9 Bq.kg⁻¹ into a cement matrix.

Workplace of contaminated soils management is autonomous; transportable by regular transporting means; requires power supply. It comprises of 4 functional mutually bounded units:

- preparation of soils,
- transportation of soils for monitoring,
- monitoring and sorting of soils,
- expedition of soils out of the workplace after monitoring and sorting.

Mobile cementation facility of VUJE, a. s., which used to be a part of experimental incinerator, is used for solidification of contaminated gravels and sand.

For **solidification of ra-sludges into geo-polymer matrix SIAL**, 4 mobile fixation technological units for supply treatment of sludges at NPP A-1 and other NPP were designed, produced and completed. Products of these plants are sludges fixed in a SIAL matrix in steel drums of volume of 60 dm³ or 200 dm³.

For decontamination of some equipments such as tanks, pipes and others, **decontamination circuit portable facilities** identified as DEZA-OD were designed and manufactured. These facilities comprise of several modules, which are mutually interconnected and enable to perform pre-disassembly decontamination of equipments and pipe lines in closed hydrodynamic circuit. Decontamination is performed with the help of decontamination solutions. In the present time, one of these facilities is installed at NPP A-1 and another one at NPP V-1.

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

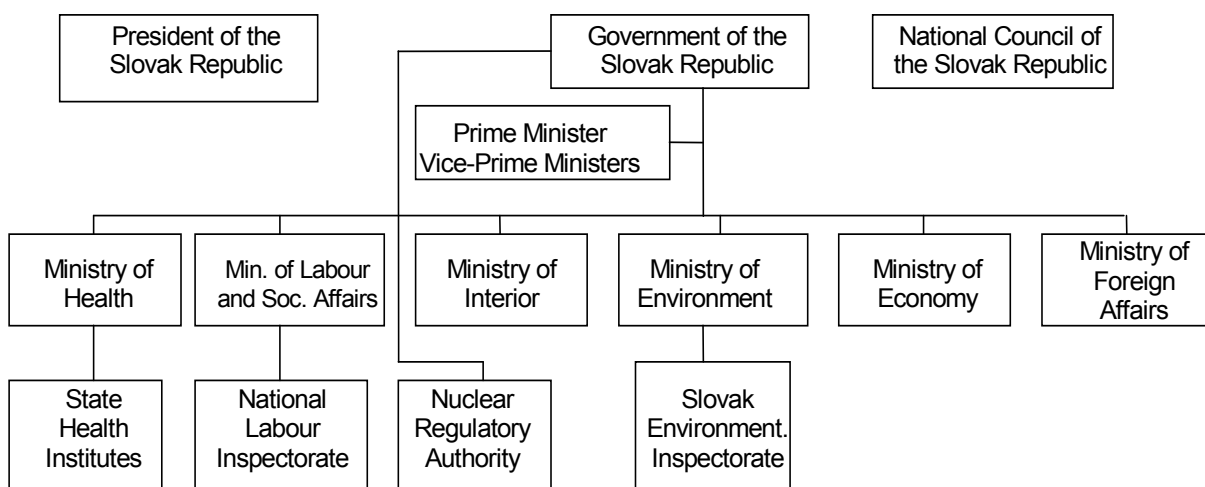
Inventory of *SNF and RAW* is listed in the Annexes IV. and V.

E Legislation and Regulatory Framework

E.1 Legislative and Regulatory Framework

E.1.1 Structure of Regulatory Bodies

Regulation of the peaceful use of nuclear energy is performed by the governmental bodies and organizations within the framework of their competence defined by the respective acts according to the structure described in picture No. E.1.



Pict.E.1 Structure of regulatory bodies

Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR)

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

Ministry of Health of the Slovak Republic (MZ SR) - Public Health Care Office of the Slovak Republic (ÚVZ SR)

State administration in the field of health protection is executed by the Ministry of Health, the Public Health Care Office of the Slovak Republic and regional offices of public health care. The Ministry's competences include establishing irradiation limits and conditions for treatment and disposal of radioactive waste in terms of potential impacts on health. The Public Health Care Office methodologically directs the health protection against ionizing radiation effects and licenses activities

leading to exposure of beyond-regional significance, including permits for nuclear installations, licensing activities with relevance to radiation protection, performs the state health regulation at nuclear installations and is a point of contact for the EU on health protection against ionizing radiation effects (radiation protection). Regional offices of public health care issue licenses for activities leading to exposure in health care, industry and other areas and execute the state health supervision in these workplaces.

Ministry of Environment of the Slovak Republic (MŽP SR)

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

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

Ministry of Interior of the Slovak Republic (MZV SR)

The Ministry of Interior is a central state administration authority for, amongst others, the conceptual management and control of fire prevention, the preparation of an integrated rescue system including civil protection of the population and property, public order and personal security. In case of nuclear and radiation accidents, it formulates a concept of organization to grant aid to the public and participates in the management and execution of rescue works.

Ministry of Economy of the Slovak Republic (MH SR)

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

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

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

The Ministry of Labor, Social Affairs and Family SR oversees and controls the National Labor Inspectorate (NLI) and is responsible for the execution of labor inspection. The National Labor Inspectorate is a governing body for labour inspectorates, which perform (inter alia) also labor inspection in nuclear sector and regulation pursuant to distinctive regulations.

E.1.2 Legislation

E.1.2.1 Introduction

The legal system of the Slovak Republic may be classified as follows:

1. The supreme fundamental legal act of the state is the Constitution that is passed by the Parliament – it is generally binding in nature.
2. Legal acts stipulate the fundamental rights and obligations specifying principles in various areas; these are passed by the Parliament – they are generally binding in nature.
3. Governmental ordinances are subordinate to legal acts and passed by the Government - they are generally binding in nature.
4. Regulations (decrees) and edicts are rules issued by central state administration authorities (such as ministries) in order to set the particulars for implementation of legal acts and governmental regulations - they are generally binding in nature.
5. Guidelines (manuals) contain detailed requirements and recommended steps to be taken to ensure that the requirements are met. These are issued by regulatory authorities.
6. By-laws (such as directives and orders) are internal organizational rules of a regulatory authority or a nuclear installation operator.

E.1.2.2 Acts in the field of State Regulation

Details on legislation are also stated in E.2.2 and F.1. and relevant parts of the chapters G and H.

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

Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) was passed by the National Council of SR on 9.9.2004 and has been meanwhile amended by the Acts No. 238/2006 Coll., No. 21/2007 Coll., No. 94/2007 Coll. and No. 335/2007 Coll. The Act came into force on 1. 12. 2004 and abolished the original Act No. 130/1998 Coll., as well as all its complementary regulations.

The Atomic Act lays down conditions for safe use of nuclear energy exclusively for peaceful purposes in accordance with international treaties concluded by the Slovak Republic. It also contains clauses determining financial compensations in case of a nuclear accident.

Under the Atomic Act, a nuclear installation means a set of building structures and technological equipments:

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

The most important changes in comparison to the original Act No. 130/1998 Coll. have occurred in the field of abolishment of licenses issuance, the take-over of competencies by ÚJD SR as a special construction authority in the construction permitting and approval proceeding concerning the constructions of nuclear installations, changes in the field of record keeping system and control of nuclear materials in connection to the EU regulations, changes in permission of transport of radioactive waste from and to EU, changes in the structure of the act and changes in the civil liability for nuclear damages (the limit amount of liability and change in the currency, in which the limit of liability is stated).

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

Generally binding legal provisions implementing the Atomic Act, issued by ÚJD SR in the form of a Decree, are set out in the list of Annex IV.

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

Before issuance of approval for siting of a construction related to construction whose part is a nuclear installation, the construction authority is the relevant regional construction authority which shall seek obligatory statement of ÚJD SR that can bind its approval upon fulfillment of conditions.

Act No. 125/2006 Coll. on Labor Inspection and alternations and amendments of Act No. 82/2005 Coll. on Illegal Work and Illegal Employment regulates labor inspection, through which the protection of employees at work and execution of state administration in the field of labor inspection is asserted, defines the competencies of state administration authorities in the field of labor inspection and their powers by execution of supervision according to special act (Act No. 264/1999 Coll. on technical requirements for products and on conformity assessment and alternations and amendments of certain acts as amended by Act No. 436/2001 Coll.), establishes rights and obligations of labor inspector and duties of natural and legal entities. The Act has abolished and replaced the Act No. 95/2000 Coll. on Labor Inspection Subsequent generally binding legal regulations are in the Annex VI.

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

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

Act No. 24/2006 Coll. on Environmental Impacts Assessment effective since the 1st of February 2006, has abolished and replaced the original Act No. 127/1994 Coll. on environmental impact assessment. In order to ensure high environmental protection, the Act establishes the process of expert and public assessment of environmental impact of:

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

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

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

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

Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Facilities and Management of Spent Nuclear Fuel and Radioactive Waste (Act on Nuclear Fund) has abolished the original Act No. 254/1994 Coll. and its implementary Decree No. 14/1995 Coll. It has established the National Fund for decommissioning of nuclear facilities and management of spent nuclear fuel and radioactive waste. The National Nuclear Fund (further referred to as Fund) is an independent legal entity administrated by the Ministry of Economy SR. The Fund has its own bodies (Board of Trustees, Supervisory Board, Director, Managers of Sub-accounts, Main Inspector). Resources of the Nuclear Fund are various – contributions of permission holders for operation of nuclear installations generating power, levies collected by operators of transfer and distribution network in prices of supplied electricity

directly from final customers (serving to settle the so-called „historical debt“), penalties imposed by ÚJD SR, interests from deposits, subsidies and contributions from EU funds, state budget and others.

Act No. 444/2006 Coll. on Civil Public Protection (full text of Act No. 42/1994 Coll. on Civil Public Protection as amended) prescribes rules of action of the Ministry of Interior elements during nuclear and radiation accidents.

The original Act No. 126/2006 2006 Coll. on Public Health Care and alternations and amendments of certain acts was replaced by a new **Act No. 355/2007 Coll. on Protection, Support and Development of Public Health and alternations and amendments of certain acts** with effectiveness since the 1st September 2007. The Act lays down requirements for public health protection, public health care authorities, their powers, basic conditions for activities leading to exposure and issuance of authorizations for these activities, obligations of physical and legal entities, measures for public health protection, execution of state health care regulation and sanctions for violation of obligations in the resort of public health care. Details on requirements for assurance of radiation protection in order to implement the Act are stated in subsequent decrees. In 2006, governmental ordinances were passed that transposed EU directives the field of radiation protection.

E.1.2.3 Draft Legislation

In the meantime, works are pursued on the revision of the Atomic Act based on the results and suggestions from application experience. The amendment should harmonize particular provisions of the Atomic Act so as to remove ambiguity or inhomogeneity of the provisions that was discovered by application experience. The submission of the proposal for amendment of the Atomic Act is planned in 2010. At the same time, works are conducted on amendment of the Atomic Act, that will transpose new Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel. The submission of the proposal for this particular amendment of the Atomic Act will take place in 2008.

E.2 Regulatory Authorities

E.2.1 Regulation of Nuclear Safety

E.2.1.1 Role of Regulatory Authority

ÚJD SR is the successor of former Czechoslovak Commission for Atomic Energy (ČSKAE).

It was established on the 1. of January 1993 a its competencies arouse originally from the Act No. 2/1993 Coll.; in the present time it is the Act No. 575/2001 Coll. (Competence Act). ÚJD SR is an independent state regulatory authority that reports directly to the Government and is headed by a Chairman appointed by the Government. The regulatory authority's independence on any other authority or organization engaged in the development and utilization of nuclear energy applies in all

relevant areas (legislation, human and financial resources, technical support, international co-operation, enforcement instruments).

Pursuant to § 29 of Act No. 575/2001 Coll., ÚJD SR provides for the exercise of state regulation for nuclear safety of nuclear installations, including regulation of the management of radioactive waste, spent fuel and other parts of the fuel cycle, as well as of nuclear material, including their control and record keeping system.

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

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

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

The competence of ÚJD SR is implied by § 4 of the Atomic Act (<http://www.ujd.gov.sk/files/legislativa>).

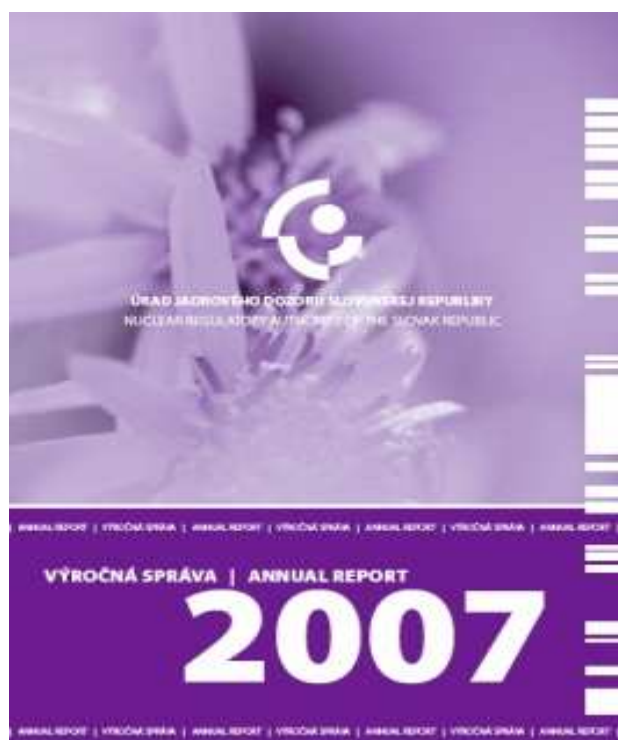
Pursuant to the Atomic Act, ÚJD SR performs the state regulation of nuclear safety of nuclear installations; in particular it:

- carries out inspections of workplaces, operations and premises of nuclear facilities, operations and premises of approval or authorization holders; checks the fulfillment of obligations pursuant to this Act, generally binding legal provisions issued on its basis, operational procedures issued by the authorization holder, observance of limits and conditions of safe operation and safe decommissioning, quality assurance system, as well as of duties arising from decisions, measures or orders issued pursuant to the Atomic Act,
- inspects fulfillment of commitments under international agreements and treaties signed by the Slovak Republic in respect of ÚJD SR competency,
- inspects the system of professional training of employees, training programs of employees with professional competency, training programs of licensed employees of authorization holders, and

inspects professional competency as well as special professional competency of authorization holder employees,

- investigates in situ the status, causes and consequences of selected failures, incidents and accidents at nuclear installation or events during radioactive materials transport; during the investigation of incidents, accidents, and events during radioactive materials transport by a different authority, it takes part in the investigation as the non-excludable body
- controls performance of the obligatory inspections, revisions, in-service inspections and in-service testing of classified equipment important to the nuclear safety,
- imposes elimination of deficiencies relevant to nuclear safety, physical protection, emergency preparedness,
- assesses nuclear safety, physical protection, emergency preparedness independently from the permission holders,
- checks the contents, updating and exercising of emergency plans, which it approves or reviews, and the associated trainings,
- conducts in situ reviews at workplaces, operations and premises of applicants for approval or permission and approval or permission holders, including observation of quality assurance system.

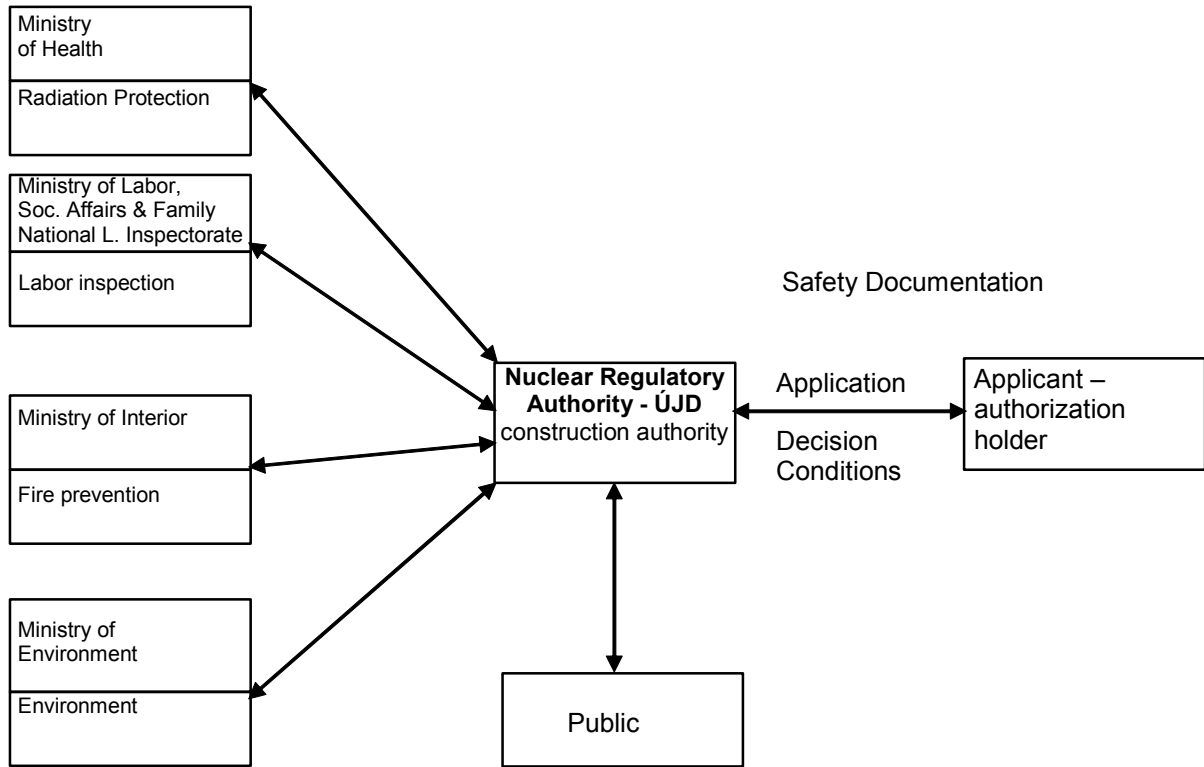
ÚJD SR issues annual reports on the status of nuclear safety of nuclear installations and on its activities in the previous year. It presents the report once a year, always by 30 April, to the Government and subsequently to the National Council. The annual reports can be found at <http://www.ujd.gov.sk>.



E.2.1.2 Nuclear Installation Authorization Procedure

The authorization procedure for nuclear installation consists of 5 major stages: siting, construction, commissioning, operation and decommissioning. Before granting an authorization for operation, the

regulatory authority carries out inspection under the approved schedule of particular stages of nuclear installation commissioning (testing, fuel loading, physical start up, energetic start up, trial operation) The main regulatory authorities and the authorization procedure for operation are depicted in picture Re.E.1.



Re.E.1 Authorization Procedure

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

Regional construction authority issues decisions on siting of nuclear installation construction and its decision-making is based on the approval of ÚJD SR and opinion of other regulatory authorities (Public Health Care Office of SR, labor inspection bodies – see also E.1.2.2). Authorization for nuclear installation construction, permission for premature use of construction (including authorization for commissioning of nuclear installation), approval for temporary use of facility (including authorization for trial operation) and decision on construction approval (including authorization for operation of nuclear installation) are issued by ÚJD SR already as a construction authority. ÚJD SR exercises its competence as an construction authority and state administration authority for nuclear safety at the same time in one and the same procedure, in which its decisions are based on its own partial decisions (partial approval of safety documentation), as well as on the opinion of relevant regulatory authorities - Public Health Care Office of SR (radiation protection), National Labor Inspectorate, Labor Inspectorate (labor inspection and safety and health protection at work) and other bodies and organizations of state administration (fire prevention, civil protection). *Obligations of ÚJD SR and other*

competent bodies during approval and authorization issuance are stated in the Act No. 50/1976 Coll. (Act on Spatial Planning), Act No. 541/2004 Coll. (Atomic Act), ÚJD SR Decree No. 50/2006 Coll., On Details Concerning Nuclear Safety Requirements for Nuclear Installations in Respect of their Siting, Design, Construction, Commissioning, Operation, Decommissioning and Closure of Repository, as well as other legal documents like: Regulations No. 453/2000 Coll. and No. 55/2001 Coll., Act No. 124/2006 Coll., Act No. 125/2006 Coll. and Regulation No. 718/2002 Coll. (see Annex IV[☺]). When issuing authorizations, the procedure is governed by in the Act No. 71/1967 Coll. on Administrative Procedure (Administrative Order); exceptions are determined in particular legal acts.

The permission holder is liable for nuclear safety.

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

Further details on legislation for SNF and RAW management are mentioned in the relevant parts of chapters G and H.

E.2.1.3 Regulatory Methods to Verify Operator's Compliance with Authorization Conditions

Inspections

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

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

The plan is divided into the following fields: (1) Operation including RAW management and decommissioning of nuclear installations (JZ), (2) Maintenance of equipments, (3) Technical support of, (4) VUJE, a. s., (5) Transport of radioactive materials, (6) Nuclear materials inspection and record keeping and (7) Control of other authorization holders.

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

Inspection Division

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

Planned inspections:

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

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

Special inspections normally follow procedures contained in the Inspection Manual.

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

Non-planned inspections:

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

Rules valid for all types of inspections

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

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

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

Inspection Protocol

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

Analysis of inspection activity

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

Sanction

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

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

E.2.2.1 Regulatory Authority Role

State administration in the field of health protection against radiation is performed by:

- the Ministry of Health of SR (MZ SR), which is a central state administration authority for health care, health protection and other activities in the health care sector,
- the Public Health Care Office of SR, which is a second-stage state administration authority and performs besides others, state health supervision at nuclear installations; it possesses state-wide powers,
- the regional offices of public health care, which are first-stage state administration authorities and perform supervision of activities leading to exposure in health care, industry, research, education; they possess regional powers,
- sector authorities of public health care in the sector of the Ministry of Transport, Posts and Telecommunications, in the sector of the Ministry of Interior, the Ministry of Defense and the Slovak Information Service; they possess powers within the given resort.

The basic legal act, which regulates requirements for radiation protection is the Act No. 355/2007 Coll. on Protection, Support and Development of Public Health. A list of implementary legal provisions of the Act, which lay down details on radiation protection, and of approximate governmental ordinances, which transpose EU directives in this area, is in the Annex No. IV.

Regulation of radiation protection assurance at nuclear installations, and radioactive waste and spent nuclear fuel management is performed by employees of the Department of Radiation Protection of the Public Health Care Office of SR (further referred to as ÚVZ SR). The above cited Act determines the competencies and obligations of the employees performing supervision.

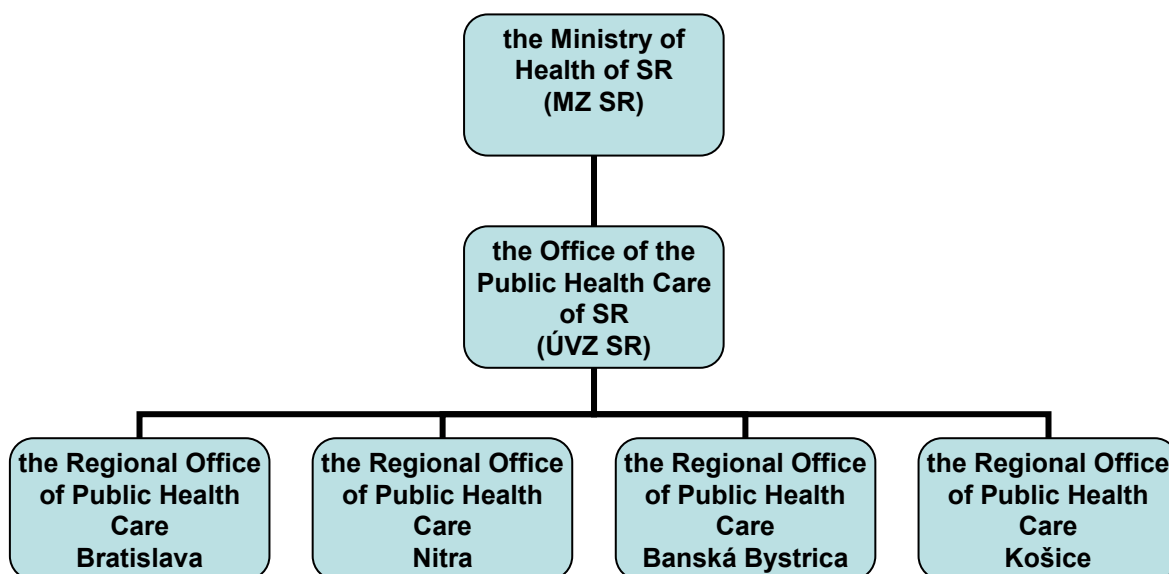
ÚVZ SR employees performing supervision are entitled to enter the site and objects to request, require information, take samples, conduct investigations, request documents and impose in situ measures to remove deficiencies.

The person performing state health care supervision may by the in-situ measure e.g.:

- forbid the use of device and equipments, which imminently endanger health,
- ordain the shutdown or its part, if risk to health is identified,
- impose special measurements, analyses or investigations performance for the purpose of assessment of health harming factors as well as assessment of their impacts on health.

Regulation of radiation protection is performed a priori by the assessment of a proposal for performance of an activity leading to exposure in the stage of its approval and after authorization, during the performance of the activity leading to exposure, continuously according to the nature of the risk, which the activity represents.

A measure to assure of complementarity of supervision performed by ÚJD SR and ÚVZ SR is an agreement entered into by ÚJD SR and MZ SR. Its objective is the coordination of regulatory activities. In order to assure effective fulfillment of this agreement, a joint commission was established to handle issues of common interest.



Pict. E.1 Structure of state regulation in the field of health protection against radiation

Powers of the Regulatory Authority

In terms of the provisions of the cited Act, Public Health Care Office with respect to nuclear facilities grants authorizations for:

- operation of the nuclear installation,
- decommissioning stage of the nuclear installation,
- radioactive waste and spent nuclear fuel management,
- transport of radioactive sources, waste, contaminated equipments and spent nuclear fuel,

- activities with relevance to radiation protection,
- release of radioactive materials from the institutional control

Furthermore, it issues an assessment in a form of a decision on:

- siting and construction of the nuclear installation,
- building and technological modifications during construction, operation and decommissioning of the nuclear installation,
- new technological procedures during decommissioning of the nuclear installation.

Besides that, it:

- issues instructions for elimination of identified shortcomings,
- establishes commissions to review the professional qualification for performing activities leading to exposure,
- imposes sanctions,
- as a concerned authority, it expresses its opinion on activities with relevance to radiation protection, and
- upon request, it issues expert assessments in the area of radiation protection.

The authorization of activities leading to exposure concerning nuclear facilities is not considered the final granting of a license, nevertheless it represents a precondition for a license to be granted by the ÚJD SR.

E.2.2.2 Permission and Authorization Procedure of Nuclear Installations

The first step to assure requirements for radiation protection is the issuance of the authorization for activities leading to exposure. During the authorization procedure, the radiation protection assurance of the employees and population is examined and assessed. The applicant shall submit with the application documentation, content of which is determined in the Annexes of the Act No. 355/2007 Coll. The applicant must prove in this documentation the observance of requirements for radiation protection in the design as well as in the operational documentation, according to which the operator assures radiation protection during operation of the nuclear installation or during its decommissioning.

The authorization of the activities leading to exposure is subject to provisions of the Act No. 71/1967 Coll. on Administrative Proceeding.

The Act No. 355/2007 Coll. on Protection, Support and Development of Public Health and on amendments of some acts defines detailed conditions for granting authorization, in particular:

- *requirements on expert representative for radiation protection,*
- *requirements on essentials of application for authorization,*
- *list of documentation to be approved and other documents.*

The Act further sets essentials for authorization and conditions, under which the authorization may be changed, revoked or loses its validity. The authorization may be issued only, when the requirements set by the Act are fulfilled.

E.2.2.3 Regulatory Methods to Verify Observance of License Requirements by Operator

The control system of observance of obligations and requirements for radiation protection assurance laid down in the legal acts and the observance of conditions and obligations laid down in the authorization for the activity leading to exposure is especially provided by a system of targeted in situ inspections, but a very effective device and information source is also a complex system of reports, information and announcements on nuclear installation situation, employees exposure, emergency events and radioactive waste management, which the operator must continuously provide in written form to the regulatory authority in pre-set terms.

During in situ inspection, the following are inspected particularly:

- equipment state,
- regime observance,
- monitoring system state, monitoring plan observance and results recordkeeping,
- documentation on operation,
- documentation on radiation protection assurance,
- operational procedures,
- records of discrepancies, results of event investigations.

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

Inspections are mainly focused on special area important from the viewpoint of radiation protection.

E.2.3 Regulation in the field of Safety and Health Protection at Work

E.2.3.1 Role of Regulatory Authority

The state administration on labor inspection is exercised by the:

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

Labor inspection in accordance with the Act No. 125/2006 Coll. is inter alia responsible for:

- a) *the supervision over observance of legal provisions and other provisions for assurance of safety and health protection at work including provisions, which govern factors of the working environment,*
- b) *allotment of liability for violation of provisions referred to in a),*
- c) *consultations within the extent of elementary professional knowledge and advice concerning methods to observe stipulated provisions in the most effective way.*

The obligations of nuclear installations operator, legal and natural entities with respect to labor inspection authorities result from the Act No. 124/2006 Coll., Act No. 125/2006 Coll. and implementary provisions to these acts (Annex IV.).

E.2.3.2 Regulatory methods to verify observance of license requirements by the operator

One of the specific areas of labor inspection is the labor inspection in the nuclear sector.

The Labor Inspectorate Nitra was on the 1st September 2007 authorized by the National Labor Inspectorate to coordinate labor inspection in the field of nuclear energy. In 2007, 19 inspections were recorded.

The labor inspections have identified 11 significant deficiencies in the area of classified technical equipments. Mainly non-performance of expert reviews and tests of electrical equipments in determined terms and non-removal of deficiencies identified during periodical expert reviews and tests of electrical equipments have been discovered.

Deficiencies have occurred as a consequence of organizational changes in Slovenské elektrárne, a. s. Deficiencies have been operatively removed by professional competent employees of the power plants. Labor inspection inspectors have controlled the removal of deficiencies, so no resolution on prohibition of electrical equipment use has been issued.

After entry into force of the Act No. 124/2006 Coll. on Safety and Health Protection at Work, Act No. 125/2006 Coll. on Labor Inspection and the Act No. 82/2005 Coll. on Illegal Work and Illegal Employment a need arose for negotiations on further development in the area of labor inspection assurance in nuclear energy. Negotiations of Labor Inspectorate Nitra management and SE, a. s. resulted in an agreement for the scope of labor inspections related to this issue in compliance with the above mentioned acts.

An inseparable part of safety and health protection at work is the safety of technical equipment. It is characterized by physical conditions of a particular equipment providing its resistance, tightness, reliability and functionality in the scope of the designed borderline operational state during the whole lifetime. Its inseparable part is the management of the technical documentation of the equipment and technical and organizational measures leading to operation reliability without endangerment of people or property.

F General Safety Provisions

F.1 Responsibility of the Licence Holder

F.1.1 Principles and Definition of Nuclear and Radiation Safety

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

The authorization holder shall be liable for nuclear safety.

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

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

F.1.2 Policy of Nuclear Safety and Radiation Protection

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

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

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

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

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

The primary responsibility for nuclear safety and radiation protection lies within the Board of Directors of the operators' companies, who determine and pursue the application of main goals, requirements, fundamentals and principles of nuclear safety and radiation protection in all activities related to the nuclear installations, from their siting, design, construction, commissioning, operation until decommissioning, including management of spent nuclear fuel and radioactive waste. The obligations following the primary responsibility are delegated to the executive management.

F.1.3 Obligations of Authorization Holder with Respect to Regulator

The operator is liable to provide adequate funds and human resources to ensure nuclear safety, including the necessary engineering and technical support activities in all areas related to nuclear

safety. The authorization holder must pay attention to safety issues prior over any other aspects of the authorized activity.

The obligations of the operator are prescribed particularly by provisions of acts mentioned in the part E.1.2.2.

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

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

The duty is imposed on the operator to report events at nuclear installations to regulatory authorities and in the case of incidents and accidents also to other organizations and the public, to take action to prevent them from recurrence.

The duty is for the authorization holder to provide the public with information on nuclear safety is stipulated. This duty does not lead to change ÚJD SR's obligation to provide the public with its own independent assessment.

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

F.2 Human and Financial Resources

F.2.1 Human Resources

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

- employees which have direct impact on nuclear safety – licensed employees whose special professional competency has been verified by an exam (written exam, oral exam and exam of

competency on a representative full-scale simulator) and a practical test for licensed employees by Examination Commission for licensed employees, established by ÚJD SR, which issues the *License of Special Professional Competency*,

- employees which have impact on nuclear safety – professionally competent employees whose professional competency has been verified by a professional commission established by the operator of a specialized facility, by written and oral exam, and to whom the *Certificate of Professional Competency* has been issued.

Special professional competency of employees means according to the Atomic Act a sum of technical knowledge, practical experience, principal attitudes and knowledge of generally binding legal provisions and operating procedures issued by the authorization holder to ensure the nuclear safety, needed to perform working activities with direct impact on nuclear safety.

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

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

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

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

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

- generally binding legal provisions applicable in the Slovak Republic,

- IAEA safety standards, recommendations and guidelines,
- STN EN ISO 9001:2001 and 14001:2004 series standards,
- documentation of management within Quality System.

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

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

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

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

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

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

category 6 – other employees assigned to professional training on NI.

Operator of specialized facility – facilities for staff training

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

F.2.2 Financial Resources

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

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

Financing RAW, SNF management and decommissioning of nuclear installations

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

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

Resources of the Fund are financial means reimbursed as:

- a) obligatory contributions of the authorization holders for operation of nuclear installations generating power,*
- b) levy collected by operators of networks (transmission and distribution network),*
- c) penalties imposed by ÚJD SR according to a specific legal provision,*
- d) interests (revenues) from deposits on nuclear fund accounts,*
- e) voluntary contributions from natural and legal entities,*
- f) subsidies and contributions from EU funds and other international organizations, financial institutions and funds provided to cover the expenses of back-end nuclear energy,*
- g) subsidies from state budget,*
- h) revenues from financial operations,*
- i) other resources, when laid down in a specific provision.*

The core (major) resource of the fund in the present time comes from the obligatory contributions of nuclear operators generating power.

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

- a) sub-account for decommissioning of nuclear installations operated at the Jaslovské Bohunice site including the management of radioactive waste from this decommissioning, structured as analytical accounts:
 - 1. nuclear power plant A-1,*
 - 2. nuclear power plant V-1,*
 - 3. nuclear power plant V-2,**
- b) sub-account for decommissioning of nuclear power plant operated at the Mochovce site including*

- the management of radioactive waste from this decommissioning,*
- c) sub-account for decommissioning of nuclear installations, which will be commissioned after the effectiveness of the Act on Nuclear Fund, including the management of radioactive waste from this decommissioning,*
 - d) sub-account for management of nuclear materials and radioactive waste, originator of which is unknown,*
 - e) sub-account for siting, geological research, preparation, design, construction, commissioning, operation and closure of radioactive waste or spent fuel repositories including monitoring after the closure of these repositories and including respective research and development,*
 - f) sub-account for institutional inspection of repositories,*
 - g) sub-account for storage of nuclear spent fuel in the nuclear installations themselves,*
 - h) sub-account for reimbursement of expenses determined for administration of the Fund and expenses related to the administration of the Fund.*

Resources of the Fund are kept on individual sub-accounts and on individual analytical accounts proportionally in relation to the amount of contributions paid by respective authorization holders for operation of nuclear installations generating power.

Financial means from the Fund are granted upon application for grant of financial means. The applicant can be authorization holder for operation, operation termination, decommissioning, for repository closure and institutional inspection, for radioactive waste and spent nuclear fuel management, for nuclear materials management in the nuclear installation or outside of it or authorization holder for export of nuclear materials or for shipment of radioactive materials including transboundary movement.

Means of the Fund can be used for reimbursement of legitimate expenses spent on activities related to the back-end of nuclear energy stated in the Act. The means of the Nuclear Fund can be granted to the applicants as targeted subsidies based on a written application with design and technical and economical justification. A precondition for granting financial resources from the Fund is that the activities related to the back-end of nuclear energy, for which the resources are requested, are in compliance with the Strategy of the back-end of nuclear energy of Slovakia and that these activities will not cause instability of the energy system or threat or deterioration of environment and of population protection. Financial resources can be granted only upon compliance with conditions defined by the Act 238/2006 Coll. and after the approval of the Board of Trustees of the Fund. After their approval, the resources from the Fund are granted upon contracts on granting financial means.

Financial means of the Nuclear Fund can be used for:

- a) termination of operation of nuclear installation,*
- b) decommissioning of nuclear installations including management of radioactive waste from this decommissioning,*
- c) management of spent nuclear fuel and radioactive waste after termination of operation of originating nuclear installation,*
- d) management of nuclear materials and radioactive waste, whose originator is unknown,*

- e) *purchase of land to establish spent fuel and radioactive waste repository,*
- f) *siting, geological survey, preparation, design, construction, commissioning, operation and closure of repository,*
- g) *report and activities related to the administration of the Fund.*

F.3 Quality Assurance

Legislative requirements

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

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

According to the Atomic Act a specific condition for issuance of authorization or permission for construction of nuclear installation, its commissioning, operation, decommissioning, nuclear material management and other activities is the approval of the documentation of quality assurance system.

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

ÚJD SR Decree No. 56/2006 Coll. in reference to the Atomic Act (No. 541/2004 Coll.), regulates requirements for quality system documentation of authorization holder, as well as details concerning quality requirements for nuclear installations, details concerning quality requirements for classified equipment and details concerning the scope of their approval.

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

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

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

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

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

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

Policies Declared and Implemented by Operators

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

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

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

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

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

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

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

Formation of Integrated Management System on the base of Quality Management System - ISM

Operators form ISM that use IAEA No. GS-R-3 documents. Elaboration and implementation of integrated management system (including quality system) is conducted in terms of valid Slovak legislation, international ISO 9001; ISO 14001 and OHSAS 18001 standards as well as IAEA documents. The platform for integrated management system formation is an existing quality management system, which complies with the legal provisions of the Slovak legal order and other provisions in line with the aforementioned policies. The integrated management systems of operators are procedurally oriented.

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

- internal audits conducted within ISM at individual operators for the fields of safety, quality, environmental protection, in a form of autonomous or combined internal audits,
- supervisory audits of external certificate companies, which have certified the environmental management system and/or the safety management system (OHSAS),
- inspections conducted by ÚJD SR.

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

Role of regulatory authorities

Activities and tasks of ÚJD SR with respect to state regulation of nuclear safety of nuclear installations are in the field of quality assurance laid down by the Act No. 541/2004 Coll. as well as by the Decrees No. 50/2006 Coll. and No. 56/2006 Coll.

Inspection activity of labor inspectorates consists in control of legal and natural entities, who perform certain activities (i. e. production, assembly, repair, reconstruction, review, testing, maintenance, import, ...) on equipments subject to the enhanced mode of labor inspection.

F.4 Operational Radiation Protection

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

The issues of health protection against ionizing radiation are regulated by the Act No. 355/2007 Coll. on Protection, Support and Development of Public Health. The newest knowledge from the field of protection and public health care is for the first time reflected in the Act. The aim of the legal regulation is to protect the health and the environment against harmful effects not only of ionizing radiation, but also against other factors that could endanger health, in the most effective way. Along with the cited Act, European Commission Directives were transposed in the form of governmental ordinances. Other details for implementing of the Act No. 355/2007 Coll. are issued in the form of regulations (Annex IV.).

F.4.2 Monitoring of Radioactivity by Operators

Pursuant to the § 45 sec. 24 i) of the Act No. 355/2007 Coll., the authorization holder for activities leading to exposure, for activities with relevance to radiation protection and release of radioactive materials and radioactive contaminated objects and substances from the administrative control shall assure the monitoring of ionizing radiation and radionuclides, which occur or are released due to performance of activities leading to exposure into the working environment and environment in the surrounding of the workplace, in line with the monitoring plan and shall inform employees of the monitoring results. Details on requirements for ionizing radiation monitoring in relation to ionizing radiation are set in the governmental Ordinance No. 345/2006 Coll. (§ 30 to 32).

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

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

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

Monitoring plan must contain:

- a) *magnitudes important with respect to radiation protection, which will be monitored, the method, scope and frequency of measurements,*
- b) *guidelines for measurement results evaluation and method of record keeping,*
- c) *reference levels and measures upon their exceeding,*
- d) *specification of measurement method,*
- e) *specification of parameters of used types of measurement instruments and tools.*

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

The identification of personal doses is secured by individual monitoring. Individual monitoring shall be systematic for category A workers. When suspecting based on the monitoring or calculation that limits

of irradiation of workers with sources of ionizing radiation can be exceeded, then the determination of personal doses also takes into account the conditions and circumstances of irradiation. Individual monitoring can be performed by authorized dosimetry service according to a specific legal act.

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

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

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

F.4.3 Liquid and Gaseous Discharges

Liquid and gaseous discharge limits are stated in the Annex II.

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

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

The governmental Ordinance No. 345/2006 Coll. on Basic Safety Requirements for Health Protection of Workers and Population Against Ionizing Radiation in its point I.2 of Annex No. 3 (Criteria of release of radioactive substances into environment) states:

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

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

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

Discharges of ra-materials into atmosphere are continuously monitored in ventilation chimneys of nuclear installations (radionuclides with long half-lives emitting beta, gamma radiation in aerosols) in order to control the non-excess of daily limits. Samples are at the same time taken in the samplers with a view to ascertain radionuclide composition and balancing. Values of released radioactivity of aerosols are determined in the taken samples using gamma-spectrometric analysis, radiochemical analysis of the value of strontium ^{89}Sr and ^{90}Sr and alpha-spectrometric analysis of the value of transurans ^{238}Pu , $^{239+240}\text{Pu}$ and ^{241}Am . Furthermore, values of tritium ^3H and carbon ^{14}C are determined in selected ventilation chimneys (NPP A-1 in the ventilation chimney of 46/A object, technology of RAW treatment and conditioning in the chimneys of 808 object, and 46/B object, Interim storage of spent fuel in the chimney of 840 object).

The limits themselves distinguish between two types:

- balance values, which are determined in magnitudes of annual discharges.
- reference levels, which do not have direct relation to the radiological limit. They serve as the background for identification and investigation of potential event and potential intervention at the source, from which the discharge originates. These are magnitudes of radionuclide activity in a measure of time (in case of gaseous discharges a day or a week) or volume activities.

NPP V-1 has after its delimitation into JAVYS, a. s. due to administrative reasons its own limits valid until the final shutdown (2008). They are approximately half of the limits for the whole site, which however remain in further validity.

Balance values for NPP V-1 are actually balance values for the subject JAVYS, a. s.: it fully applies for the rare gasses and ^{131}I (these nuclides, as it was said before, are produced only during the power plant operation), for all other items to a certain extent: the limits for the rest of installations of JAVYS, a. s. represent for $\beta\gamma$ - aerosols 1,25 % of the limit for NPP V-1 (isotopic composition will probably be different), 19 % for ^{89}Sr and ^{90}Sr in aerosols and 44 % for the mixture of selected transurans (specifically ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am) emitting α -radiation.

JAVYS, a. s. discharges today its gaseous radioactive discharges from five chimneys (main production unit NPP A-1 + bituminization plants, Bohunice Treatment Center, interim storage of spent fuel, object 44/10 – special treatment of waters, NPP V-1). Only chimneys NPP V-1 and MSVP from these have determined own limits of gaseous discharges and the others are determined for „ventilation chimneys in the site of NPP A-1“. That is why as an initiative of ÚJD SR the following division of these limits has been proposed: for the chimney NPP A-1 (+ bituminization plants) – 90 % of the limit for the chimneys

in the site of NPP A-1 and for chimneys of other technologies for waste treatment and conditioning – 10 % of the limit for the chimneys in the site of NPP A-1.

Reference levels of gaseous discharges are for the whole site determined as follows:

	Recording level	Investigation level	Intervention level
Rare gasses [Bq,day ⁻¹]	1,1.10 ¹²	3,3.10 ¹²	5,5.10 ¹³
¹³¹ I (gaseous form) [Bq,day ⁻¹]	3,6.10 ⁷	1,07.10 ⁸	1,8.10 ⁹
Mixture of radionuclides with long half-lives in aerosols [Bq,day ⁻¹]	4,4.10 ⁷	1,32.10 ⁸	2,2.10 ⁹

Liquid discharges from MSVP are accumulated, measured and released together with liquid discharges from NPP V-1.

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

No activity exceeding regular level of rain and surface waters has been identified in the liquid discharges from repository during the whole period of operation. Evaluation of annual liquid discharges during 2004-2007 is displayed in the Sheet F.4.3e.

Sheet F.4.3e Annual liquid discharges – waters from surface flow RÚ RAW

year	Volume of discharged water - m ³	Annual discharged activity kBq (usage of L&C -%)			
		H 3	Cs 137	Co 60	Sr 90
2004	4140	3870 (0,02)	301 (1,31)	275 (1,22)	186 (0,07)
2005	6774	6430 (0,03)	142 (0,62)	135 (0,60)	149 (0,06)
2006	5821	5610 (0,03)	931(0,41)	105 (0,47)	64 (0,03)
2007	3272	3300 (0,02)	589 (0,26)	7,85 (0,03)	7,8 (0,003)

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

Values of radioactive material discharges into atmosphere and hydrosphere from NPP A-1 and technologies of RAW treatment and conditioning between 1994 - 2007 are displayed in the Sheet F.4.3a and Sheet F.4.3b. It can be stated that just as in the year 2007, and in all preceding years, the limits for radioactive material discharges have not been exceeded, while discharges of corrosion and fission products into atmosphere have been deep below the authorized limits.

Sheet F. 4.3a. Gaseous discharges from NPP A-1 and treatment technologies of TSÚ RAW

Year	Aerosols beta / gamma		Sr 89, 90		Aerosols alfa	
	Discharge [MBq]	% of used limit	Discharge [kBq]	% of used limit	Discharge [kBq]	% of used limit
1994	2,20	0,23	33,20	0,12	155,00	1,76
1995	4,11	0,44	289,00	1,03	418,00	4,75
1996	7,16	0,76	770,00	2,77	781,00	8,88
1997	10,42	1,11	680,00	2,44	1710,00	19,43
1998	16,87	1,79	1180,00	4,20	730,00	8,30
1999	21,50	2,29	540,00	1,93	809,00	9,19
2000	21,62	2,30	158,10	0,56	973,57	11,06
2001	20,70	2,20	207,51	0,74	997,12	11,33
2002	75,75	0,05	1683,21	0,56	78,32	0,16
2003	25,38	0,02	921,42	0,31	24,84	0,05
2004	15,47	0,01	409,87	0,14	28,41	0,06
2005	25,24	0,02	355,44	0,12	20,03	0,04
2006	10,46	1,09	443,13	1,58	41,99	0,48
2007	4,05	0,42	151,92	0,54	9,81	0,11

Sheet F. 4.3b. Liquid discharges from NPP A-1 and treatment technologies of TSÚ RAW

Year	Tritium		Corrosion and fission products	
	Discharge [GBq]	% of used limit	Discharge [MBq]	% of used limit
<i>Recipient Váh</i>				
1994	840	1,92	24,47	0,064
1995	1958,48	3,1	50,631	0,13
1996	505,08	1,16	33,8	0,09
1997	11850	27,12	29,665	0,08
1998	249,87	0,57178	130,7	0,34395
1999	1120	2,56293	169,3	0,44553
2000	740,8	1,69519	87,68	0,23074
2001	3023	6,91762	67,874	0,17862
2002	589,009	1,34785	90,566	0,23833
2003	2258,26	5,16763	86,867	0,2286
2004	2411,095	5,5174	85,296	0,22446
2005	2141,8	4,90114	70,511	0,18556
2006	1000,4	8,93	76,01	0,48
2007	237,827	2,59	89,21	0,74
<i>Recipient Dudvák</i>				
1994	211,2	48,33	36	9,5
1995	0,213	0,05	3,905	1,03
1996	0,13	0,03	1,69	0,44
1997	0,048	0,01	0,495	0,13
1998	0,004	0,00092	1,016	0,27
1999	0,002	0,00048	0,532	0,14
2000	0,00027	0,000063	0,223	0,06
2001	0,00021	0,000047	0,046	0,01211
2002	0,0014	0,00032	0,463	0,12184
2003	0,0005	0,00011	0,013	0,00342
2004	0	0	0	0
2005	0	0	0	0
2006	0	0	0	0
2007	20,38	55,08	13,17	10,98

Sheet F.4.3c Gaseous discharges from Interim spent fuel storage

MSVP	Aerosols beta / gamma	
	Discharge [MBq]	% from limit
1994	33,62	11,20
1995	23,90	7,97
1996	12,92	4,31
1997	20,38	6,79
1998	23,95	7,98
1999	27,12	9,04
2000	25,31	8,44
2001	12,48	4,16
2002	50,42	16,81
2003	0,65	0,22
2004	1,50	0,50
2005	3,06	1,02
2006	0,87	0,29
2007	1,26	0,42

In 2007, waters have been released for two months into recipient Dudváh (Manivier), which has a separate limit for water discharges. The increased usage of such limit has been caused by sanitation pumping of groundwaters and the fact, that this limit is of lower order than the limit for discharges into recipient Váh.

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

The Sheet F.4.3d compares contribution of nuclear power plants and RAW management technologies to the total discharges of the Jaslovské Bohunice site in 2004, when the highest value of total discharge activity was from RAW management technologies.

Sheet F.4.3d Comparison of discharges from NPP and from RAW management technologies in Jaslovské Bohunice site during 2004.

Discharge kind	The whole site GBq	NPPV-1+NPPV-2 GBq	A-1+ RAW GBq	TSÚ
Rare gasses	40787	40787	0	
Iodine isotopes	3,68	3,68	0	
Aerosols	0,15	0,14	0,01	
Tritium	15 268	12857	2411	
KP+ŠP	0,15	0,07	0,08	
total	56059	53648	2411	

F.4.4 Dose Limits and Radiation of Personnel

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

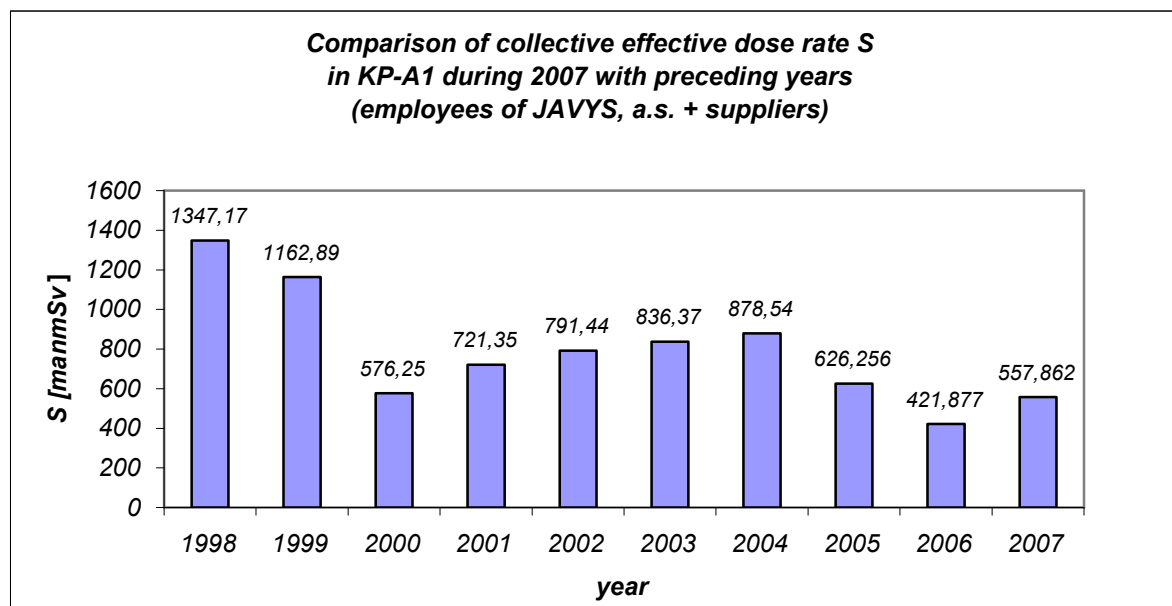
Basic principles of radiation protection, especially the ALARA principle and principle of limitation of dose rates and risks, are considered during all works.

Graphical display of average collective effective dose rates (KED) of NPP A-1 and RAW treatment and conditioning technologies for years 1998 to 2007 is depicted in the Sheet F.4.3c). The trend of gradual decrease of KED highness, or the steady trend, is obvious from the course of values. Achieved KED values during 2000 to 2007 reflect the activities performed at NPP A-1 and treatment plants.

During 1998 and 1999 intense preparation for transport and transports of non-manipulatable fuel to Russia took place– the reason of KED increase in comparison to 2000 - 2007. During 2001 to 2004 intense works on decontamination of reactor hall, heavy-water management system, technological circuits of the main production unit and partial or entire decommissioning works of some technologies of main production unit A-1 took place.

KED is permanently on the lower average level, what proves a very good level of management by the application of the ALARA system, optimization of planned individual and collective dose rates. During the mentioned period there was no exceed of radiation limits by an employee of JAVYS, a. s. (A-1, RAW treatment and conditioning technology) or contractor of works.

Sheet F. 4.3c.) *Collective effective dose rates of NPP A-1 and treatment technologies and MSVP*



F.4.5 Monitoring of Environmental Impacts

For description of the monitoring system see the National Report SR on safe RAW and SNF management 2003.

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



Monitoring equipment at the regional RAW repository

Sheet F.4.5 Calculated annual IED for population groups in the surrounding of NPP Bohunice

Year	IDE [Sv]		
	Infants	7-12 years	Adults
1998	1,64 E-7	1,11 E-7	6,61 E-8
1999	6,63 E-8	8,67 E-8	8,29 E-8
2000	1,49 E-7	2,05 E-7	1,92 E-7
2001	1,79 E-7	2,31E-7	2,28 E-7
2002	1,96 E-7	2,25 E-7	2,21 E-7
2003	7,59 E-8	9.33 E-8	8.96 E-8
2004	1,32 E-7	1,49 E-7	1,46 E-7
2005	1,18 E-7	1,6 E-7	1,51 E-7
2006	1,09 E-7	1,44 E-7	1,37 E-7
2007	1,91 E-7	2,24 E-7	2,19 E-7

F.5 Emergency Preparedness

F.5.1 Legislation in the Field of Emergency Preparedness

The legislative base in the field of emergency preparedness is at the present time made up from legal acts and resort decrees (MV SR, MZ SR, ÚJD SR, NIP), which have the largest share on the emergency preparedness and emergency planning (see Annex VI.).

These basic acts are supplemented by other acts from the field of crisis management, such as:

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

All aforementioned documents respect relevant European Union directives (Annex VI.) and recommendations of the IAEA:

- Safety Series GS-R-2: Preparedness and Response to a Nuclear or Radiological Accident – Safety Requirements,
- Safety Series 50-SG-06: Preparedness of the Operating Organization to Emergencies at NPP,
- Safety Sries 50-SG-66: Preparedness of the Public Administration Bodies to Emergencies at NPP,

- Safety Series 55: Emergency Response Planning in NF Surroundings in Case of a Radiation Accident at NPP,
- Safety Series 72, Rev.1: Protection in Uncontrolled Radioactivity Source Accidents,
- TEC DOC 953: Methods of Emergency Preparation of Response to Nuclear and Radiological Accidents,
- TEC DOC 955: Basic Assessment Procedures to Determine Protective Measures during Reactor Accident.

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

The system of emergency preparedness is common for all nuclear installations. It is described in detail in the National Report to the Convention on Nuclear Safety 2007 (www.ujd.gov.sk/documents).

National Organization of Emergency Preparedness

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

National organization of emergency preparedness is structured into three levels:

- emergency committees at nuclear installations,
- local state administration crisis staffs,
- the Central Crisis Staff and Emergency Commission of the Slovak Government (EC) with its support components (Emergency Response Center of ÚJD SR, Operation Control Group - OCG and The Slovak Center of Radiation Monitoring Network - SÚRMS).

Accident Documentation Related to JZ

To manage emergency situations in nuclear installations and their impacts on the surrounding environment, accident documentation has been developed to lay down procedures and organization of work for the individual degrees of emergency at various levels of the national emergency preparedness:

- on-site emergency plan and operating instructions for classification of emergency event,

- plans for public protection in the area at risk – off-site emergency plan (on regional level), that includes measures on protection of public, health, property and environment and is linked to on-site emergency plan,
- National Emergency Plan (on national level).

Upon the occurrence of a radiation event associated with the release of radioactive substances, the authorization holder in accordance with on-site emergency plan, plan of civil protection, assessment evaluation of the situation and meteorological situation, provides for warning of respective bodies and organizations in the area at risk and population according to the event degree (1. degree – emergency at the nuclear installation, 2. degree – emergency in nuclear installation site, 3. degree – emergency in the surrounding of the nuclear installation). Afterwards, the state administration bodies, local state administration bodies and municipalities take care of further unavoidable and subsequent measures.

Emergency Transport Procedures

They are developed by the authorization holder for the purposes of transfer and transport of fresh and spent nuclear fuel, nuclear materials and radioactive waste pursuant to the Atomic Act and ÚJD SR Decree No. 55/2006 Coll.

Warning and Notification Systems of Population and Personnel

The warning of the population and the notification of authorities, organizations and personnel is performed in line with the Act No. 42/1994 Coll. on Civil Protection.

F.5.3 Maintenance Systems of Emergency Preparedness

The training includes two parts:

- theoretical training,
- practical training.

Emergency training of the power plant personnel is conducted according to particular categories in a form of a presentation, interpretation, group seminar, practical display and practical training - drills. A separate part of emergency training is the training of shift personnel.

Practical training is conducted as shift training, whole-site emergency training, cooperative emergency training with state authorities engaged and intentional training.

After the drill completion, its course is being evaluated with the help of observers and judges and measures are taken to improve the activity. For example, in autumn of 2007 an international drill Javor 2007 has taken place. Furthermore, also representatives of EU, IAEA and from Hungary, Czech Republic and Austria have participated. The purpose was to evaluate consequences of radioactive substance release during a fictive accident of NPP V-1 Bohunice. The scenario of the drill has been set so as to extend to the territory of the Czech Republic. The main mission of the drill has been the

verification of information flows between particular entities involved in the drill, sending technological data, draft and implement measures, all this on the international level.

In May 2008, ConvEx 2b drill has taken place. The drill has been targeted at radioactive materials release in a densely settled area. The scenario was prepared by the IAEA. ÚJD SR has attended it on behalf of Slovakia.

Equipments and Means of Emergency Preparedness

- Backup emergency center
- Civil protection shelters
- Civil protection assembly points
- In-house medical centre
- Communications facilities and equipment installed in the JZ site

F.6 Decommissioning

A qualified personnel is required during the whole decommissioning process since 1998 in accordance with the Atomic Act and when applying for authorization for decommissioning stage, the operator submits documentation on the system of professional training and education of personnel to ÚJD SR for assessment.

All works are done by personnel, which is specially instructed by practical exercises on models prior implementation (according to work schedule) of technically demanding work operations.

Financial sources. The operator is obliged since 1995 to provide for during the operation purposefully bound resources connected with decommissioning. These means form a part of the income of the National Nuclear Fund (hereafter referred to as the Fund) for decommissioning and RAW management. The raise and the use of the Fund means are described in detail in chap. F.2.2. A levy is collected by operators of the transfer and distribution methods and is meant to settle the debt, which has occurred, since NPP A-1 nor NPP V-1 did not form and will not form sufficient sources for their decommissioning. Until 1995, the state alone has paid all expenses for decommissioning of NPP A-1; since 1995, the decommissioning of this NPP is paid from the Fund. Some activities after 1995, such as transport of the spent fuel to RF, were covered via the Fund by the state.

Application of radiation protection measures is ensured in the present time in line with the requirements of the Atomic Act and the Act on Public Health. Continuity of radiation protection procedures and requirements applied during operation of installation (see F.4.) is maintained in accordance with the safety documentation submitted by the operator when applying for decommissioning authorization. This documentation includes decommissioning plan characterizing radiation sources in the given premises and assurance of radiation protection of personnel and surrounding during the decommissioning process. It also analyses possible emergency conditions with description of mitigation procedures and appraisal of the consequences (dose loads of personnel).

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

Actual issues of exposure regulation are regularly analyzed during the negotiations of "ALARA" commission prior to approval of work programs. Dose loads are regularly evaluated in the Committee of Nuclear Safety. The evaluation of personnel dose load is periodically discussed with UVZ SR representative with emphasis on the most exposed works.

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

Emergency measure implementation is assured in the present time in line with requirements of the Atomic Act (see F.5).

Documentation for authorization of decommissioning stage includes in accordance with requirements of the Atomic Act and Decree of ÚJD SR No. 58/ 2006 Coll. the following:

- *limits and conditions.*
- *quality system documentation and requirements,*
- *on-site emergency plan,*
- *decommissioning stage plan,*
- *decommissioning conception for the period after the completion of the decommissioning stage to be authorised,*
- *plan of physical protection including contract with Police as well as description of the method of aviation activities at premises or in the vicinity of the nuclear installation,*
- *plan for radioactive waste management, shipment and management of conventional waste from decommissioning,*
- *document providing evidence for financial coverage of liability for nuclear damage,*
- *test program of classified equipment,*
- *operational procedures determined by ÚJD SR,*
- *professional training system for employees,*
- *training programs for licensed employees,*
- *training programs for professionally competent employees,*
- *documents providing evidence for meeting the qualification requirements by licensed employees and employees with professional competency,*
- *off-site emergency plan for regions within the area at risk,*

- *modifications of boundaries of nuclear installation,*
- *modifications of the size of the area at risk by nuclear installation,*
- *classification of classified equipment into safety classes.*

Decommissioning stage plan describes the initial and the final state of a nuclear installation and planned activities in the given stage, including their impact on the personnel of the nuclear installation and surrounding of the nuclear installation; it contains a statement that financial means necessary for implementation of the described activities will be provided and that the capacity of facilities for spent fuel and radioactive waste management will be in accordance with the decommissioning strategy and schedule. The decommissioning plan or decommissioning stage plan includes also an analysis of potential emergency situations and their consequences. In addition it should contain results of radiation situation control after the nuclear installation shutdown or after the preceding decommissioning stage and proposal of a program for radiation situation control after completion of the decommissioning or the decommissioning stage.

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

Final decommissioning documentation includes:

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

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

G Safety of Spent Nuclear Fuel (SNF) Management

G.1 General Safety Requirements

General safety aspects of SNF management are described in the Chapter F.

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

Fulfillment of the following conditions of safe SNF management is required by legislation since 1976 (safety documentation and its assessment by regulatory authorities) with detailed safety analyses for particular stages of nuclear installation since 1978-9:

- maintain subcriticality,
- ensure after-heat removal,
- minimise the effects of ionising radiation on operating personnel, the public and the environment,
- have regard for the properties affecting nuclear safety such as toxicity, flammability, explosiveness and other dangerous properties.

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

The requirement to minimize the impact on future generations; is included in the assessment of environmental impacts of activities (in full validity since 1994) and in the National strategy of SNF (or RAW) management expressed during the 90-ties in the relevant resolutions of the Government (see B.1). *Future generations are entitled to the same level of protection as the current one. This results in a requirement to asses (the Act No. 127/1994 Coll.) and manifest (the Act No. 541/2004 Coll. and the Act No. 355/2007 Coll., 345/2006 Coll., Decree No. 545/2007 Coll.), that the waste disposed into the repository will never cause radiation load of population higher that it is admissible in the present time.*

The operator proves the fulfillment of these requirements in the terms of a preliminary safety report and in safety reports submitted prior to the construction and commissioning of the nuclear installation. Periodic verifications are carried out during operation in order to ensure that the physical state and operation of the nuclear installation is constantly in line with the design and applicable safety requirements. Operators have a quality assurance system in place covering all activities relevant to

safety. Following safety analyses, tests, reviews and operating experience, operators have defined limits and conditions, observance of which is strictly controlled during operation. Written procedures are developed to handle or mitigate the consequences of predictable events and accidents. The application of the “defence in-depth” principle also contributes to the prevention of events and accidents.

G.1.1 Revisions and Inspections of Existing Installations

- The list and description of SNF management facilities is stated in point D.1.
- Assessment of safety of SNF management facilities is stated in point G.4.

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

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

G.2 Siting of Facilities

G.2.1 Legislation in the Field of Siting

The siting of a nuclear installation is subject to ÚJD SR’s approval under the Atomic Act (see also E.2.1.2). Assessment of all factors concerning the site, which could influence the safety of the nuclear installation and its safety-related impacts on individuals, society and environment, is required by legislation since 1979 and in full scale for the environment since 1994. Informing the public on safety of installation prior to its siting and consultations with stakeholders in vicinity of installation are legislatively regulated since 1976, in full scale since 1994. The obligation of the operator to continuously inform the public on nuclear safety is included in the legislation of SR since 1998.

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

- Article 41 of the Treaty Establishing the European Atomic Energy Community
- Council Regulation (Euroatom) No. 2587/1999 of 2 December 1999
- Commission Regulation (EC) No. 1209/2000 of 8 June 2000.

ÚJD SR issues a statement for purpose to asses the environmental impact of the nuclear installation as well as potential impacts of the surrounding environment on the nuclear installation upon an

application according to the Act on Environmental Impact Assessment. ÚJD SR as a construction authority for construction containing nuclear installation proceeds on the base of the Civil Construction Act as amended.

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

1. review of assessment of environmental impacts of the nuclear installation, as well as assessment of potential impacts of the surrounding environment on the nuclear installation,
2. approval of the requirements for quality of the nuclear installation,
3. approval of the proposal for nuclear installation boundaries,
4. approval of the proposal of size of the area at risk by nuclear installation.

G.2.2 Siting of Facilities for Spent Nuclear Fuel (SNF) Management

The siting of installations for SNF management has not taken place in full scope according to the requirements of the Joint Convention only for the nuclear installation NPP A-1 (siting at the end of 50ties) and NPP V-1 (siting at the beginning of 70ties). Transport of SNF from A-1 into RF has been completed in 1999. Since that time treatment of RAW has taken place within the decommissioning of the A-1 NPP. Safety assessment of the facility and its safety-related environmental impacts has been performed according to the valid legislation at the end of the 90ties.

The safety assessment of NPP V-1 has been performed similarly in safety reports for particular units after the reconstruction of NPP V-1 in 2001.

Requirements for nuclear safety of the nuclear installation during the stage of its siting are characterized by the territory features. Features, which exclude the nuclear installation siting on such territory, are stated in the Annex No. 2. of the Decree No. 50/2006 Coll.:

- a) under operating conditions or in the event of an operational occurrence, it is not possible to ensure that the set doses of population irradiation are not exceeded on the territory,*
- b) the maximum calculated earthquake intensity value on the territory reaches or achieves 8 degrees on the international earthquake intensity scale - MSK,*
- c) the territory is threatened by the consequences of mining, irruptions of mine water or powerful tremors resulting from mining activities, extraction of gas or oil or there are reserves of tailwater on it,*
- d) the territory is subject to geodynamic and karst phenomena threatening the stability of the rock mass on the land, such as caving, motionally and seismically active faults, fluidification of the ground, tectonic activity or other phenomena, which may alter the inclination of the surface of the environs beyond the established technological requirements,*
- e) the territory contains a protected area for natural medicinal sources, underground and surface sources of drinking water,*

- f) *the territory contains notified mining areas for the extraction of raw materials,*
- g) *the territory extends into a protected area for industrial or other economic facilities with which there may be undesirable operational clashes.*

With regard of SNF management at NPP V-1, NPP V-2, the following aspects of siting of NPP V-1, V-2 are important:

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

Seismic load of the locality Jaslovské Bohunice (within the scope of safety improvement designs of NPP V-1, V-2 and MSVP) was re-assessed and measures for improve seismic resistance of NPP V-1 and Interim spent fuel storage were implemented.

The original design of NPP Mochovce was elaborated based on the knowledge of seismic risk in the locality from the period of preparation and designing of NPP Mochovce in the 80ies, considering the VI. degree of MSK scale for safe shutdown of reactor during earthquake and acceleration value in horizontal direction $PGA = 0,06 \text{ g}$. The IAEA recommendation 50-SG-D15 advises for nuclear power plants the lowest acceleration value in horizontal direction of 0.1 g .

Based on the above all “Classified civil structures and technological systems” were seismically re-assessed, and improvements of civil structures were step-by-step implemented. Beam supports were fitted in existing walls, light walls were reinforced with steel sections and wire mesh, and new columns to reinforce floors were fitted in some buildings. Improvement of the seismic behaviour of technological equipment includes particularly anchorage of components and reinforcement of tanks.

G.3 Design and Construction

Legislative requirements for provision of suitable measures to restrain radiation impacts of facilities for SNF management including impacts from discharges or leakages are valid since the end of 70ies. Evidence on their fulfillment is submitted in the documentation to be attached to the application for approval of nuclear installation construction. Documents on fulfillment of safety requirements including requirements on quality of technologies have been later complemented for NPP A-1 and NPP V-1 (see G.2.2).

Documents of conceptual plans for future decommissioning of nuclear installations already during design stage are legally required since 1998. Preliminary conceptual plans are submitted with the documentation to be approved according to the Atomic Act. For those nuclear installations, which did not have elaborated Conceptual decommissioning plans during design and construction, these documents have been additionally finalized until 2000. Preliminary proposal for the method of

repository closure, especially stabilization, covering and building of drainage covering systems, is included in the preliminary safety report.

Spatial Planning

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

The required documentation necessary for nuclear installation construction includes:

- preliminary safety report providing evidence for the meeting legal requirements on nuclear safety based on the data considered in the design,
- project documentation needed for building permission proceedings,
- preliminary plan of management of radioactive waste, spent nuclear fuel including their transport,
- preliminary conceptual plan for decommissioning,
- classification of classified equipment into the safety classes,
- preliminary plan for physical protection,
- quality system documentation and nuclear installation quality requirements and evaluation thereof,
- preliminary on-site emergency plan,
- preliminary limits and conditions for safe operation,
- preliminary inspection program of nuclear installation prior to its operation,
- preliminary outline of the boundaries of the nuclear installation,
- preliminary definition of the size of the area at risk by nuclear installation,
- other documentation required according to the Construction Act.

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

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

- a) securing subcriticality at 5 % min. during all operational conditions, 2 % during operational events, either by suitable set-up of spent nuclear fuel or by placing a solid neutron absorbent into the storage space; efficiency of the solid absorbent use is proved by calculation or experiment,
- b) permanent removal of residual heat produced by spent nuclear fuel from the premises of its storage; heat removal is secured by natural or compulsory streaming of cooler so the temperature of spent nuclear fuel would not exceed the limit value,
- c) its full or partial decontamination,
- d) safe manipulation of spent nuclear fuel,
- e) recordkeeping and control of stored spent nuclear fuel,

- f) provision of relevant physical protection of storage premises,
- g) prevention of heavy objects fall into the premises of spent nuclear fuel storage,
- h) effective purification, re-filling and capture of the cooling media leakages in wet storages of spent nuclear fuel.

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

Conception of nuclear power plants safety is based on “defence in depth”, which is used generally in the world during designing and operation of nuclear power plant. During safety assessment of JZ, ÚJD SR assesses the ability of the equipment to fulfill safe functions in terms of design so as to ensure the required level of “defence in-depth”.

G.4 Safety Assessment of Facilities

G.4.1 General Principles of Safety Assessment

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

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

Similar requirements are valid for Spent nuclear fuel (SNF) and RAW repository, including the assessment of risks resulting from their existence for periods after their closure.

During shut-down or during decommissioning of a nuclear installation the authorization holder is obliged to perform regular, complex and systematic assessment of nuclear safety taking into account

the state of the act knowledge in the field of nuclear safety assessment and to take measures to remove identified deficiencies. The authorization holder is obliged to perform periodical safety assessment since 2004 based on the requirements of the Atomic Act.

In addition the safety of SNF and RAW management facilities, especially of those, which are not part of the nuclear power plants, are assessed by international missions (mainly IAEA).

Overview of issued safety reports and their evaluation by regulators and overview of international safety missions is shown in the Sheet G.1.

G.1. List of safety documentation and international missions focused at safety of SNF and RAW management

<i>JZ</i>	<i>Preceding documentation</i>	<i>Preliminary SR</i>	<i>Periodical assessment</i>	<i>International missions</i>
<i>NPP A-1</i>	<i>EIA in the scope of decommissioning</i>		<i>1980, decommissioning plan 1992, 1995-98</i>	
<i>NPP V-1</i>	<i>Preliminary BS</i>	<i>1978,1980</i>	<i>1990, 1998-2002(reconstruction) 2003 (fuel)</i>	<i>6 missions 1990-95 IAEA 1998 WANO 1998</i>
<i>NPP V-2</i>	<i>Initial and Preliminary BS</i>	<i>1983,1985</i>	<i>1996, 2001 (modernization) 2005 (fuel) 2006</i>	<i>Safety Rev. 94 Peer Rev. 95 OSART 1996,98</i>
<i>NPP EMO</i>	<i>Initial and Preliminary BS EIA for EMO3,4</i>	<i>1998,1999</i>	<i>2007 (output increase) will be submitted 2008</i>	<i>OSART 93,06 Riskaudit 94,99 WANO 02,04</i>
<i>Interim Spent Fuel Storage</i>	<i>Preliminary BS (reconstruction 1997)</i>	<i>1987, 2000(reconstruction)</i>		
<i>Interim Spent Fuel Storage EMO</i>	<i>Initial BS and EIA 2001</i>			
<i>TSÚ RAW</i>	<i>Preliminary BS, EIA (for BSC)</i>	<i>1998 (pre BL 1994, 2002)</i>	<i>will be submitted 2009</i>	
<i>FS LRAW</i>	<i>EIA within EMO3,4, Preliminary BS 2004</i>	<i>2006</i>		
<i>Integral storage</i>	<i>EIA 2003, Preliminary BS 2004</i>			
<i>RÚ RAW</i>	<i>Initial and Preliminary BS</i>	<i>1998</i>	<i>will be submitted 2009</i>	

G.4.2 Operational Safety Assessment of Systems and Components for Spent Nuclear Fuel (SNF) Management

Safety assessment is a part of the overall safety assessment of SE - EBO, SE - EMO and JAVYS, a. s. and is conducted as follows:

- by the operator in regular notifications and evaluations, sent to ÚJD SR, and also in overall annual Assessments of Nuclear fuel cycle in the scope of quality system at particular installation.

- by an independent science/research/design or engineering organizations with relevant licenses from ÚJD SR (VUJE, a. s. and others).
- by routine inspections of ÚJD SR within the agreed or pre-set schedules.

G.5 Operation of Facilities

G.5.1 Commissioning

Conditions for issuance of authorization for operation after successfully performed commissioning, separated into stages, are regulated by legislation since 1984.

Original documentation by a Russian contractor was supplied for all stages of NPP A-1,V-1,V-2 commissioning (programs and schedules of the main stages of commissioning and commissioning and tuning works of particular technological systems of the units 1 and 2 /functional tests/ as well as preliminary operational procedures). The documentation was adjusted to the existing conditions of NPP V-1, V-2 construction and commissioning by the general designer (EGP) and the prime contractor of technology (ŠKODA). In the frame of an inter-governmental agreement between ČSSR and the former USSR, Russian specialists have provided technical assistance during the commissioning of NPP V-1, V-2.

Transport and technological part equipments and systems for SNF management were tested in non-active as well as in active conditions of units.

After completion of Pre-complex testing, Complex testing of each transport and technological part system, „Assessment of Pre-complex testing, Complex testing” has been developed to document course and fulfillment of determined tasks.

Based on the negative experience with tightness of simple linings at most of VVER-440 units, the construction of pool lining at NPP V-2 was modified from the original simple stainless-steel lining to a double lining with leak outlet between the linings.

All other nuclear installations have been commissioned according to standard programs approved by regulatory bodies in line with legislation, which leans on IAEA recommendations and since 1998 stipulates in detail requirements for course and documentation of commissioning so as to verify safety functions of the nuclear installation.

G.5.2 Legislative Requirements for Commissioning and Operation

Article 19 of the Atomic Act (No. 541/2004 Coll.) defines requirements for commissioning and operation of nuclear installation. Article 21 of the Act lays down requirements for spent nuclear fuel management. It further sets requirements on nuclear safety, professional competency, quality assurance, physical protection, notification and assessment of operational events and emergency preparedness. Relevant resolutions of ÚJD SR define further detailed requirements (see Annex VI.).

ÚJD SR issue the authorization for nuclear installation commissioning and for operation after submission of written application, with the following documentation being attached:

- limits and conditions of safe operation,
- list of classified equipment as classified into safety classes,
- testing programs of classified equipment as determined by the Authority,
- nuclear installation commissioning program, split up into stages,
- operational control program of classified equipment,
- quality system documentation and requirements on the quality of the nuclear installation, and their evaluation,
- operational procedures,
- on-site emergency plan,
- preliminary safety report,
- probability assessment of operation safety of shut-down reactor and for low output levels, as well as for full reactor output in case of nuclear installation comprising nuclear reactor,
- physical protection plan, including contract with the Police,
- radioactive waste and spent fuel management plan, including their transport,
- conceptual plan of decommissioning of the nuclear installation,
- document providing evidence for financial coverage of liability for nuclear damage, except repository,
- professional training systems for employees,
- training programs for licensed employees,
- training programs for professionally competent employees,
- documents providing evidence for the meeting of the qualification criteria by licensed employees and employees with professional competency,
- documents providing evidence for the preparedness of nuclear installation to be commissioned, for trial operation evaluation report on the commissioning of nuclear installation, and for permanent operation evaluation report on trial operation,
- off-site emergency plan for regions within the area at risk,
- definition of boundaries of nuclear installation,
- definition of the size of the area at risk by nuclear installation.

The operator's activities are governed by IAEA safety standards, such as SC 50-C-O „Nuclear power plant operational safety“, SC 50-C-QA „Quality assurance at nuclear power plants“, SS No. 111-F „The principles of Radioactive Waste Management“, SS 11-S-2 „Establishing a National system for Radioactive Waste Management“, SS 111-G1.1 „Classification of Radioactive Waste“.

The authorization for operation of nuclear installation can be issued repeatedly, while all general and specific conditions for issuance of the authorization for operation must be complied with, as well as obligations on the side of the authorization holder in connection with periodical assessment of nuclear safety and updating of relevant safety documentation in line with its results.

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

Limits and conditions of safe operation” is a basic legislative document used at every nuclear installation. The document has been developed based on legislative requirements, in regard of which the operator shall:

- submit a L&C proposal prior to issuance of ÚJD SR approval for a construction,
- ensure approval of the L&C by ÚJD SR in the stage of commissioning and all subsequent changes of L&C with attached safety justification,
- observe L&C, while ÚJD SR is in charge of inspection of the observance.

For example the document for the fuel found contains the following L&C:

- *Water level in the ponds for storage and refueling (assurance of sufficient water layer to protect personnel against radiation from fuel).*
- *H₃BO₃ concentration in the storage pond (assurance of subcriticality in the fuel pond).*
- *Cooling of storage pond water (assurance of residual heat removal) for transport means and others.*

G.5.4 Management and Operational Documentation for Operation, Maintenance and Taking Care of Equipments for Spent Nuclear Fuel (SNF) Management

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

a) Procedural documentation:

- Basic directive „Fuel cycle“,
- Recordkeeping and inspection of nuclear materials,
- Monitoring of fuel in the core,
- Manipulation, transport and storage of SNF, etc.

b) Technological operational procedure:

- Transport of SNF from the NPP units to the interim storage,
- Storage and transport of spent fuel,
- Re-fuelling machine, etc.

Reviews, revisions, maintenance, tests, and complex care of equipments for SNF management are performed according to instructions developed for the entire Transport and technological part, as well as for particular systems and equipments. Obligations, responsibilities and competencies of the personnel are defined in descriptions of their work positions.

For Interim spent fuel storage is the above-mentioned documentation supplemented by a procedure Maintenance of wagon-container C-30 during transport of spent nuclear fuel.

Authorization holder shall record and keep data on operation of nuclear installation important for decommissioning, which is listed in the conceptual decommissioning plan.

G.5.5 Technical Support of Operation

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

- surveillance of observance of nuclear safety during operation and assessment of all design modifications and operational regimes relevant to nuclear safety,
- organization of off-site and on-site radiation inspection, personal dosimetry inspection and surveillance of observance of rules of radiation safety, organization of measures for health protection of employees and citizens in the surrounding of NPP against ionizing radiation by application of ALARA principle,
- seismic activity monitoring,
- improvement of safety, reliability and operational effectiveness,
- development of operational procedures for normal and accident operation and other operational documentation and its permanent updating,
- event analysis, elaboration of their analysis and the whole organization of feedback of own and foreign nuclear installations,
- recordkeeping of nuclear materials, calculation of fuel loads and strategy of fuel cycle, surveillance of nuclear safety during fuel exchange and physical start-up.

The operator cooperates during performance of the above-mentioned tasks with extern support organizations.

G.5.6 Analysis of Operational Events

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

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

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

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

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

Employees, who manage operational events and events without consequences, are regularly trained on methodologies of investigation of root causes (e.g. IAEA and WANO workshops) and are also regular participants of international review groups (IAEA - OSART, WANO - Peer Review).

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

G.6 Spent Nuclear Fuel (SNF) Disposal

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

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

Systematic development of a deep geological repository (HÚ) in SR for permanent disposal of SNF and high level RAW started in 1996. The following tasks were dealt with during the development:

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

There were 5 candidate sites selected in the process of the step-by-step assessment during the period, where the basic field research was performed. In addition to that, partial reports summarised international experience in the deep geological repository development, directions and plans in all areas were set, expert teams for solution of individual issues was established, and co-operation started with organizations dealing with deep geological disposal in Belgium, Switzerland, Czech Republic and Hungary was established.

The National Nuclear Fund has elaborated in 2007 in accordance with the Act on National Nuclear Fund (No. 238/2006 Coll.) the „Strategy of backend of nuclear energy in SR“. In principle, the 3 following alternatives are considered in it as real, for dealing with the final stages of SNF and high level RAW management:

- *disposal in deep repository in geological environment of suitable features*
- *international solutions (export of fuel into RF, international repository)*
- *zero variant, meaning: safe storage of fuel for a further not specified period („wait and see“ approach).*

In terms of the above mentioned alternatives, it is presumed that the overall national project will be in the future implemented in three periods as follows:

1. *acquiring information for possible placement of repository in geological environment,*
2. *cooperation with international organizations with the possibility of development, construction and operation of international repository,*
3. *international activities, which would solve the export of fuel abroad without the return of high-level active waste after their re-processing.*

In 2008, a frame program for the repository development project was elaborated for another 3 years.

H Safety of Radioactive Waste (RAW) Management

Since the requirements for safety, of SNF and for RAW management are often identical in the Slovak Republic, there are references made to applicable chapters in part G on the relevant places.

H.1 General Safety Requirements

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

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

Radioactive waste shall be managed so as to:

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

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

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

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

For RAW inventory see Annex IV.

H.1.1 Radioactive Waste Generation (RAW) Minimization Program

The requirement for minimization of RAW generation is laid down in the Atomic Act (No. 541/2004 Coll.). The minimization system is elaborated at every nuclear installation in line with legislative requirements. Fulfillment of programs for RAW generation minimization is controlled annually in the "Report on RAW management". This report proposes new measures to minimize RAW generation for the next period and evaluates their fulfillment.

The "Draft procedure for measurement of low-contaminated materials from NPP V-1, V-2 operation and their release into environment" and "Methodology for release of low-contaminated waste into environment from NPP V-1, V-2 operation" were implemented for radioactive materials containing radioactive nuclides underneath the level enabling their release into environment. Authorization for release of ra-materials into environment was issued in 2003 by the Public HealthCare Office of SR for the locality of Jaslovské Bohunice and in 2004 for Mochovce site.

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

A “Generic catalogue of radioactive waste for its treatment and conditioning“ has been issued In 2003. This document provides basic information for correct labeling and categorization of RAW by its packaging and devolving or acceptance for the purpose of treatment in treatment facilities. The document also defines principles and conditions for RAW acceptance to be treated and conditioned so as to meet the requirements for creating a product during the treatment and conditioning of these RAW, which would comply with criteria for permanent disposal in RÚ RAW Mochovce and would not endanger safety during any further manipulations of RAW including transports. The criteria of acceptance are included in limits and conditions of relevant installation.

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

- storage of untreated RAW,
- RAW treatment,
- storage of intermediate products
- shipment between individual steps
- RAW conditioning.

Before start of RAW processing, the characterization of physically-chemical and radiochemical properties of concrete sort (type) of RAW, indicated in the accompanying sheet of RAW in the package (required by ÚJD SR Decree No. 53/2006 Coll.). The accompanying sheet is handed over together with RAW by particular activity stages within RAW management.

Safety requirements on particular activities are listed in the ÚJD Decree No. 53/2006 Coll.

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

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

For description see G.1.

H.1.4 Biological, Chemical and other Hazards

For description see G.1 and F.4.

H.1.5 Limitation of Impact on Future Generations and their Inadequate Load

For description see G.1.

H.2 Existing Facilities and Procedures in the Past, Review of Safety Assessments

For description see G.1.1.

Equipments for RAW management have met during their commissioning the safety requirements established in the valid legislation. They were gradually synchronized with the increasing requirements according to the legislative conditions (see Sheet G.1). The ČSKAE Decree No. 67/1987 Coll., which laid down safety requirements for RAW storage, has allowed their implementation within five years. The ÚJD SR Decree No. 190/2000 Coll. has required an accompanying sheet of RAW and consistent recordkeeping of RAW. The records in electronic form for RAW occurred before 2000 has been gradually completed based on partial written background documents, or in case of “the historical waste”, they were removed, sorted and categorized according to the requirements on the accompanying sheet of RAW. *ÚJD SR Decree No. 53/2006 Coll. is valid today for the area of RAW and SNF management.*

H.3 Siting of Proposed Facilities

H.3.1 Legislative Requirements

For description see G.2.1.

H.3.2 Siting of Particular Nuclear Installation

Siting of facilities for RAW management has not taken place in the past fully in compliance with the current requirements of the Convention only for installations included in the original design of NPP A-1 and NPP V-1. The performance of additional analyses is described in G.2.2 and Sheet G.1.

Siting in a locality suitable for building of a repository has taken place during 1975 – 1978. Criteria for siting were specified based on the actually valid legislation and safety guidelines of IAEA. Attention was devoted first of all to requirements on suitable geological and hydrogeological conditions of the selected site, because the safety analyses of the repositories operated in the world have clearly shown, that the critical way of population exposure is the transport of radioactive materials by groundwaters. 34 sites were selected in Slovakia, from which 12 were chosen for further observation. The site Mochovce has been selected out of these based on the siting criteria.

Documentation in the scope of a preliminary safety report and environmental impact assessment was elaborated and assessed for an integral storage (see Sheet G.1). According to the current

presumptions, the construction of the integral RAW storage will be commenced in the second part of 2009.

H.4 Design and Construction of Facilities

Legislative requirements and procedures for design and construction of facility for RAW management are common with the ones for design and construction of facilities for SNF management – see G.3. The proceeding for construction approval takes place as described in the part E.2. in line with the requirements of the Act on Spatial Planning (No. 50/1976 Coll.) and the Atomic Act (No. 541/2004 Coll.). The Authority shall decide on the issuance of construction approval for construction of nuclear installation based on written application of the applicant with attached documentation (see G.3).

Safety assessment of the RAW repository after its closure is a part of the analysis of long-term safety of repository, which frames the principle part of safety reports. Initial (1981) and Preliminary (1984) safety report have assessed the long-term safety of repository for disposal of operational waste from NPPs of VVER type. The safety assessment of disposal of waste from NPP A-1 was included in later safety analyses.

H.5 Safety Assessment of Facilities

See G.4.

H.6 Operation of Facilities

H.6.1 Commissioning and Operation of Installations

Authorization for commissioning of nuclear installation and operation of nuclear installation is issued by ÚJD – see G.5.1, G.5.2.

According to the diction of the Atomic Act (No. 541/2004 Coll.), the operation of the nuclear installation is structured into trial operation and operation. After assessment of the report on evaluation of the preceding stage of nuclear installation commissioning, ÚJD SR issues an approval for the next stage of commissioning based on the application of the authorization holder.

The Authority issues the approval for trial operation after submission of written application with attached report on evaluation of nuclear installation commissioning. This approval constitutes a part of the approval for premature use of construction for trial operation according to a special provision. After positive evaluation of the trial operation, the Authority will commence upon the proposal of the authorization holder the construction approval proceeding.

The issuance of approval for operation is subject to submission of a report on evaluation of the nuclear installation commissioning stage and of a record of preparedness of the nuclear installation and the employees for permanent operation.

All facilities for RAW management have a valid approval of ÚJD SR for their operation issued upon the above mentioned conditions.

By the Resolution of ÚJD SR No. 328/2007 issued on 4.10.2007 the trial operation of a new nuclear installation FS LRAW (final treatment of liquid RAW at Mochovce) started. The trial operation is in the given resolution limited for a period of 12 months since the date of validity of the Resolution.

H.6.2 Limits and Conditions for RAW Management

L&C exist in SR for all nuclear installations; their format and contents follow IAEA and US NRC guides. The following is stated by each limit condition:

- aim of the limit condition,
- text of the limit condition,
- validity of the limit condition (to which regime of JZ it applies),
- activity of operational personnel in case the limit condition is not met,
- requirements on inspection – they determine frequency, type and scope of inspections and tests of systems and equipments.

The fulfillment of limits and conditions is continuously monitored by the maintenance staff and by technical support personnel.

An amendment to the provision with relevant justification is drafted in case of necessity for L&C modification and this modification comes into force after its approval by the regulatory body.

Regulatory Departments of nuclear safety of the operator elaborate periodically quarterly and annually a report on nuclear safety, which is submitted to the management. The report includes also evaluation of the whole area of L&C. The number of changes of L&C, term of non-preparedness of safety systems and eventual violation of L&C serve as indicators.

H.6.3 Working Procedures

The system of RAW management is elaborated in detail in the procedural and operational documentation in order to ensure fulfillment of requirements of the ÚJD SR Decrees No. 53/2006 Coll. and No. 57/2006 Coll.

Procedures, principles and instructions for operational documentation processing is described in detail in relevant directives and guidelines of QA system. Every operational document passes through annotation and approval process in particular concerned departments and at the end, it is approved by

the top management of the organization. The same procedure also governs the process of changes and amendments of individual documents of the used documentation:

- Operational documentation
- Documentation of inspections and tests of equipments
- Technological and working procedures of maintenance
- Results obtained during activities are reflected into the modification of these procedures as well as to limits and conditions modifications.

H.6.4 Engineering and Technical Support

For description see G.5.5.

H.6.5 Procedures for Waste Characterization and Sorting

In 2003, „Generic catalogue of radioactive waste for their treatment“ was issued. This document provides basic information for correct labeling and categorization of RAW by its packaging and devolving/acceptance for the purpose of treatment in particular treatment centers (see H.1.2).

H.6.6 Reporting of Events to Regulatory Authority

The system of reporting events to the regulatory body is the same for all nuclear installations (see G.6.5).

H.6.7 Conceptual Decommissioning Plans

Conceptual decommissioning plans are included in the documentation submitted prior to the commissioning of a nuclear installation and they specify preliminary conceptual decommissioning plans (see G.3, H 4.1). Conceptual decommissioning plans document the presumed conditions after operation termination and contain goals and procedure of decommissioning including financial demands estimation, description of presumed radiation situation and amounts and activities of radioactive waste; they state requirements on capacity of installations for radioactive waste management and requirements on gathering and record keeping of data important for planning of decommissioning.

Conceptual decommissioning plans are updated every ten years within the periodical safety assessment of the nuclear installation.

H.7 Institutional Measures after Repository Closure

H.7.1 Record Keeping

All information on disposed radioactive waste including the placement of containers, amount and activity of radioactive waste, their property specifications, composition of particular package forms is during operation kept in compliance with operator's procedures. The scope of records kept after repository closure is specified by ÚJD SR in the conditions for authorization for repository closure.

After the repository closure, the operator shall ensure transmission of information about disposed waste containers to be archived in that institution, which will be appointed by the state to perform institutional control. A plan of repository closure and institutional control as one of the basic documents required for the issuance of ÚJD SR authorization for repository closure contains besides others also a method of long-term keeping and transmission of information with identification of used media, as well as data important for implementation of reparative measures or for reassessment of safety of repository in the future and a method of keeping records about results of inspections, measurements and monitoring during institutional control.

H.7.2 Institutional Control

Under the term institutional control we understand all activities, performed after the end of disposal of RAW and repository closure. Monitoring systems will be in operation, which will provide information about possible water penetration into disposal vaults and its further migration. Necessary maintenance of the repository structures will be ensured, and the system of physical protection of repository will be in operation during active period of institutional control.

Duration of institutional control is influenced by various factors and aspects in mutual interaction, which must be respected at the determination of institutional control duration. The most important from them are the results of safety analyses, which by determination of the most critical scenarios of possible contact of RAW with public, specify total and concentration activity limits of disposed RAW and provide the basic presumptions for considerations about determination of the duration of institutional control.

The basic purpose of institutional control is to avoid access of unauthorized persons to the site of repository and control its main parameters during the time, after which it will be possible to release the area for unlimited use. The precise scope of institutional control will be established following safety analyses prior to the closure of the repository.

On the basis of results of safety analysis and in accordance with recommendation of international mission WATRP, the 300 years duration of institutional control is assumed for NRR Mochovce and for intruder scenarios is considered, that system of final repository cover will prevent the access close to disposed RAW for a period of 500 years.

Also part of the repository closure and institutional control plan is the plan for maintenance of and repair to the respective components of the repository over the period of active part of institutional

control as well as establishing the scope of activities to be carried out within passive part of institutional control of the repository.

The **current pre-operation safety analysis report (PoSAR)** sets out the above basic information on the operator including the organisational structure, specifies the construction in question (purpose and scope) and furnishes the basic information whereby the operator documents its organisational and technical preparedness to operate the radwaste repository as well as the current solution to financial coverage of activities relating to the repository. PoSAR documents that both during operation and over the institutional control period individuals, society and the environment are protected from radiation events. PoSAR guarantees that the criteria set out for the repository by MoH will not be exceeded as long as the limits set forth therein are complied with:

1. effective dose to a member of the public due to the evolution scenario (scenarios with a probability that will approach 1 over time) shall not exceed 0.1 mSv/y in any year following the completion of institutional control of the repository;
2. effective dose to a member of the public due to a intrusion activity (scenarios where a probability will substantially be less than 1) shall not exceed 1 mSv/y in any year following the completion of institutional control of the repository.

It contains the following sections dealing with safety assessment for periods subsequent to the closure of the repository:

a) Repository closure and institutional control plan (at the level of design study)

- Stabilisation of the site
- Completion of repository operation
- Post-operation monitoring

b) Safety analyses

- Characteristics of disposed waste
- Safety aspects of repository operation
- Long-term stability
- Long-term repository safety analyses
- Waste acceptance criteria for disposal resulting safety analyses

The Mochovce NRR's long-term safety analyses envisaged two groups of scenarios - evolution and intrusion.

- *Evolutional scenario* describes normal repository development, expecting a gradual loss of the functionality of engineering barriers due to natural degradation, subsequent leaching of radionuclides, passage through clay seal into the saturated layer, transport through groundwater and their transport into the biosphere by all possible pathway to human (e.g. irrigation, drinking water preparation, etc.). The analyses under this scenario rests in setting up mathematical models for the respective stages of transport of radionuclides from their release from the repository to their spread in the biosphere. As a result of the repository evolutional development was establishment of the overall inventory of radionuclides which can be disposed of in the

repository so as to comply with the evolutionary scenario limit value.

- *Intrusion scenario* is based on the assumption upon expiry of institutional control at which time the location will be released for unlimited use such activities might occur at the repository as the construction of roads or buildings, permanent residence at the site (without knowing that there is radioactive waste disposed of). These scenarios are crucial for the derivation of concentration limits for specific radionuclides in the waste to be disposed of. As the degree of intrusion of RAW disposed of is different for the respective scenarios, the concentration limit of the medium/lower layer was determined by the scenario for the construction of a multi-storeyed building and the limits for the upper layer of containers depending on radionuclide were calculated from the resident and construction scenarios.

Evolution and intruderscenarios are assessed in the analyses of long-term safety of the Mochovce repository.

H.7.3 Intervention Measures

It is assumed that intervention measures will be performed in the case of detection of unplanned release of radioactive materials in drainage system of the repository or in some part of the environment in the vicinity of the repository, if any.

Pursuant to the Atomic Act, the holder of the authorization for repository closure and institutional control will provide the performance of such corrective intervention. The scope of corrective action is not established precisely as yet, depending on the results of controls and measurements carried out during the institutional control, on the results of the program for monitoring the state of repository barriers and the radiological monitoring plan. Afore-mentioned controls, measurements, monitoring programs are designed so as to cover all potential pathways for leakage and spread of radionuclides from the repository into the environment.

I Transboundary Movement of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW)

I.1 General Requirements for Safety at Borders

SNF and RAW transboundary shipment, import, and export is governed by the Atomic Act (No. 541/2004 Coll.) and by the Decree ÚJD SR No. 57/2006 Coll., which is based on IAEA recommendations formulated in the document series TS-R-1. Approval of type of transportation equipment is issued at the most for five years. Authorization for SNF shipment can be issued for up to one year and in case of RAW shipment for up to three years.

All transboundary shipments of spent nuclear fuel have been carried out upon approvals and authorizations of relevant regulatory and administrative authorities of the state of origin after announcement of the state of destination and its approval.

In the present time, revision of the Atomic Act based on the results and suggestions from application experience is performed. The amendment should harmonize particular provisions of the Atomic Act so as to remove ambiguity or inhomogeneity of the provisions that was uncovered by application experience. At the same time, works are conducted to transpose the new Council Directive 2006/117/Euratom on the supervision and control of shipment of RAW and SNF.

I.1.1 Basic Requirements for Safety Documentation

Safety documentation shall contain a set of measures for efficient protection of persons, property and environment against the consequences of irradiation during shipment of radioactive materials. This protection is assured by separation of radioactive contents and environment, by control of dose rates during shipment, by prevention of criticality achievement and by prevention of shipment damage due to released and absorbed heat.

These measures must apply to all activities and conditions associated with the movement of radioactive materials; they include design, maintenance and repair of transportation equipments, preparation, expedition, loading, transfer including storage during transport, unloading and acceptance of consignment in the point of shipment destination.

I.1.2 Issuance of Shipment Authorization

Shipment of radioactive materials

Radioactive materials (nuclear material, radioactive waste and spent nuclear fuel) may only be transported based on shipment authorization issued by the ÚJD to consignor and by means of transportation equipment, which was approved by the Authority.

Authorization for shipment of radioactive materials shall not be required for shipment of:

- a) products from non-irradiated natural and depleted uranium and non-irradiated thorium,*
- b) nuclear materials which total amount transported within period of 12 consecutive calendar months not exceed:*
 - 1. 500 kg of natural non-irradiated uranium or*
 - 2. 1000 kg of non-irradiated depleted uranium and non-irradiated thorium.*

Application for the authorization for shipment of radioactive waste to EU Member States or other countries shall be submitted by the applicant using a standard document. The document contains statement confirming that the radioactive waste will be taken back and if it is not possible to assure its shipment to the consignee or should the shipment become impossible under conditions imposed by the competent authorities of other countries.

Authorization for shipment is issued for each shipment separately. Where the same type of radioactive materials is concerned, with the same type of shipment by the same consignor, UJD may issue the authorization for shipment of radioactive materials or spent nuclear fuel for a repeated shipment for a period of one year, and in case of radioactive waste for a three years period at maximum.

The Authority issues the authorization for shipment of radioactive waste and approval of transportation equipment type in a form a decision.

The Authority shall specify the following (besides the regular terms) in the decision, in which it issues the authorization for shipment of radioactive materials:

- a) the type of the authorization,*
- b) the identification label assigned by the Authority,*
- c) the date of issue and validity period,*
- d) the list of relevant Slovak and international legal provisions, including International Atomic Energy Agency's Regulations for the Safe Shipment of Radioactive Materials, under which the shipment is authorized,*
- e) the restrictions on the shipment mode, the type of the transportation equipment, the shipping container, and eventual possible instructions on the transport route,*
- f) the following statement:*

"This permit shall not relieve the consignor from the obligation to comply with the requirements under legal rules of the states to or through which the shipment is to be effected",

- g) a detailed list of additional operational inspections necessary during preparation, loading, transport, disposal, unloading and handling of the consignment, including eventual special provisions concerning disposal in terms of safe heat dispersion and subcriticality assurance,*
- h) the reference to information provided by the applicant related to any special activities to be carried out prior to the shipment,*
- i) the reference to the relevant approval of the transportation equipment type or the consignment project,*

- j) *the specification of the real radioactive content which may not be obvious from the nature of the package file; this shall include the physical and chemical form, the relevant total activity (or activities of various radioisotopes), the amount of possible fission material in grams, and the statement as to whether the material to be transported is not a low dispersed radioactive material,*
- k) *the specification of the relevant quality assurance program.*

The Authority may bind the authorization on conditions considered to be necessary.

The Authority may issue authorization for transportation of radioactive materials also under special conditions, which shall contain besides the essentials mentioned above also:

- *scope of temperatures of surrounding environment, for which the approval for transport under special conditions was issued,*
- *detailed list of additional operational inspections required during preparation, loading, transport, disposal, unloading and handling of the consignment, including eventual special provisions concerning disposal in terms of safe heat dispersion,*
- *reasons for transport being conducted under special conditions (if appropriate/necessary),*
- *description of compensation measures to be used, if the transport is conducted under special conditions,*
- *reference to information provided by the applicant referring to used consignments or special acts to be performed prior to the transport.*

I.1.3 Approval of Transportation Equipment Type

The Authority shall state the following (besides the regular terms) in the decision, in which it approves the type of transportation equipment:

- a) the type of approval license (certificate),
- b) the identification label assigned by the Authority,
- c) the date of issue and validity period,
- d) possible restrictions on the shipment mode,
- e) the list of relevant Slovak and international legal provisions, including International Atomic Energy Agency's Regulations for the Safe Shipment of Radioactive Materials, based on which the type of transportation equipment/consignment project was approved,
- f) the following statement:

"This permit shall not relieve the consignor from the obligation to comply with the requirements under legal rules of the states to or through which the shipment is to be effected".

- g) the reference to approval of alternative radioactive content, to validated approvals of other relevant bodies or additional technical data or information according to the requirements of the Authority,
- h) the declaration of transportation authorization, of the decision combines approval for consignment project with authorization for shipment,

- i) the identification of package file,
- j) the description of package file in the form of a reference to drawings or design specification. If appropriate, also reproducible illustration, not larger than 21 x 30 cm, depicting the consignment together with very brief description, including material used for its construction, total weight, total external parameters and appearance,
- k) specification of consignment project with reference to drawings,
- l) specification of authorized radioactive content, including possible restrictions of radioactive content, which may not be obvious from the nature of the package file; this shall include the physical and chemical form, the relevant total activity (or activities of various radioisotopes), the amount of possible fission material in grams, and the statement as to whether the material to be transported is not a low dispersed radioactive material,
- m) additionally, for consignments of fission materials:
 - 1. detailed description of authorized radioactive content,
 - 2. criticality safety index (CSI),
 - 3. reference to documentation, which proves the subcriticality of the content,
 - 4. other special circumstances, from which the non-presence of water in certain empty premises is assumed when assessing subcriticality,
 - 5. any other presumptions, based on which the decrease of neutrons multiplication, as a result of real irradiation course, is presumed when assessing subcriticality,
 - 6. the scope of temperatures of surrounding environment, for which the type of transportation equipment was approved,
- n) for the consignment of B(M) type: explaining information useful for other relevant authorities,
- o) the list of proposed additional operational controls to be carried out during preparation, loading, disposal, unloading and handling of the consignment, including eventual special provisions concerning disposal in terms of safe heat dispersion,
- p) the reference to information provided by the applicant related to the used consignments or specific acts to be performed prior to the shipment,
- q) the declaration concerning surrounding conditions used in the consignment project,
- r) the specification of relevant quality assurance program,
- s) the reference to conveyor identity, if necessary.

The Authority may bind the approval on conditions considered to be necessary.

I.2 Experience with Radioactive Waste (RAW) Transboundary Shipment

The Atomic Act (No. 541/2004 Coll.) enables the import of RAW which has occurred by treatment and conditioning of RAW exported for this purpose and their re-import has been approved in advance by ÚJD SR and it also enables import of RAW for the purpose of their treatment and conditioning, if export of RAW with an aliquot activity has been stipulated in a contract and authorized by ÚJD SR. Any

other import of RAW is banned. The Atomic Act precisely specifies in Art. 3 (8) the countries, to which the transport of RAW is banned.

The RAW transboundary shipment process is governed by the Article 16 of the Atomic Act, which is an implementation of the EU Council Directive No. 92/3 on shipments of RAW between Member States and in and out of the Community. Regarding the amended of the EU Council Directive, a new wording of the given Article has been prepared.

ÚJD SR has issued an authorization for shipment of spent nuclear fuel from the research reactor in the Czech Republic the Russian Federation in the framework of the USA initiative - Global Threat Reduction Initiative.

J Disused Sealed Radioactive Sources

There exist more than 200 workplaces, which have authorization for management of ionizing radiation sources and during operation of which institutional radioactive waste occur, in the Slovak Republic in the present time. These workplaces operate in various areas - industry, education, health care, research and so on. These workplaces belong to the scope of powers of various state sectors – the Ministry of Economy of SR, the Ministry of Health of SR, the Ministry of Education of SR, the Ministry of Transport, Posts and Telecommunication of SR, the Ministry of Internal Affairs of SR, as well as the Ministry of Defense of SR.

The Council Directive 2003/122/Euratom on the control of high-activity sealed radioactive sources and orphan sources requires that Member States provide for inter alia „adequate management of disused sources, including agreements regarding the transfer, if appropriate, of disused sources to a supplier, another authorized holder or a recognized installation“.

The original centralized system of the mentioned RAW collection in SR has been interrupted due to the separation of the Czech and Slovak Republic. The establishment of a new national system began with the governmental Resolution No. 537/1997, which determined the liability for storage of contaminated radioactive materials within the company Slovenské elektrárne, a. s. – Decommissioning of nuclear-power installations, radioactive waste and spent nuclear fuel management (SE – VYZ), whereas since 1. 4. 2008 the obligations were transferred to the current JAVYS, a. s.

The project EUAID/200401676407 „Improvement of the management of institutional radioactive waste in Slovakia“, preformed with the financial support of EU from the Transition Facility, was intended to suggest improvement of the existing system of institutional RAW management including sealed sources, to create a database and create thus a foundation for an effective system of centralized collection and management of this kind of RAW.

The given project has identified certain deficiencies in the field of legislation, licensing and technologies for treatment of institutional waste and measures were drafted for their removal. These measures are subject to discussions of an expert group consisting of representatives of concerned authorities and organizations.

No sealed radioactive sources are produced in Slovakia. All sealed radioactive sources were and are imported into Slovakia mainly from Germany, United Kingdom, Russian Federation, Poland, and the Czech Republic.

There are approximately 3000 sealed radioactive sources currently registered in the database. The number does not include Am-241 radioactive sources used in the fire detectors. Approximately 1200 sealed radioactive sources from this number are currently not used and are stored by particular users.

Captured radioactive sources of unknown origin (orphan sources) are stored in the JAVYS, a. s. company authorized by the regulatory bodies for this purpose.

The fundamental legislative requirements for the use of sealed radioactive sources are established in the Act No. 355/2007 Coll., including the possibility of taking back the sources by the producer. This act lays down basic principles for radiation protection, conditions and requirements for use of radioactive sources, exposure limits, requirements for institutional radioactive waste management, requirements for release of radioactive materials into environment, and defines basic obligations of radioactive source users.

Ordinance of the government No. 348/2006 Coll. on requirements for control of high-activity sealed radioactive sources and orphan sources regulates conditions for management with these sources in accordance with EU legislation.

The Ordinance of the government No. 345/2006 Coll. specifies requirements for optimization of radiation protection, assurance of radiation protection when using sealed radioactive sources, determines exposure limits for employees and population, states requirements for storage, transport and use of sealed sources, lays down requirements and procedures for performance of acceptance tests, tests of tightness, tests of long-term stability and operational stability of sealed sources, issuance of authorizations of sealed sources.

K Planned Measures to Improve Safety

K.1 Evaluation of Measures for Safety Improvement Mentioned in the Preceding National Reports

The installation for final treatment of liquid RAW in SE - EMO has been constructed and is in trial operation.

Interim storage of spent fuel:

- *the equipment of test stand SVYP for controls of SNF has been implemented,*
- *the seismic resistance improvement and expansion of storage capacity of the interim spent fuel storage has been completed and compact containers KZ-48 were put into use,*
- *the monitoring of long-term service life of technologies and building parts of the interim spent fuel storage has been implemented.*

Integral storage of RAW:

- *It is planned to build an integral storage of RAW within NPP A-1 for RAW indisposable in the repository at Mochovce (RAW, which does not comply with the criteria for disposal). The action is in the stage of construction approval.*

Technologies for RAW treatment and conditioning in the locality of Jaslovské Bohunice:

- *an equipment for drying of drums with content of RAW with increased humidity has been implemented and thus enabled the insertion into VBK and conditioning by cementation.*

Radio-communication network:

With a view to assure permanent and fast connection with maintenance of the nuclear installations in case of emergency situation during simultaneous outage of the telephone network, the radio-communication network in the locality of Jaslovské Bohunice has been expanded to the possibility of use by the company JAVYS, a. s. The two independent systems of connection assures that an interruption of communication with the maintenance personnel will not occur, thus increasing the safety of operation of nuclear installations.

The following has been performed at the nuclear power plant Bohunice V-2:

- *government of the seismic resistance enhancement of liquid RAW storage ponds,*
- *installment of stabile fire-fighting equipment in the room of solid RAW storage.*

The following has been performed at the nuclear power plant Mochovce:

- *in the framework of observing the ALARA principles, the cleaning of reator pressure vessel and other inner surfaces of primary from mechanical impurities,*

- *measures for minimization of solid RAW are being implemented.*

K.2 Planned Measures for Safety Improvement

The following measures are planned to be implemented in the forthcoming period:

- *to assure a backup source for power supply for important appliances of the waste treatment facility at the Bohunice site,*
- *to commission the sorting carousel with meteorological test certificate for measuring dose rate of small solid waste before their release into the environment (NPP V-1, NPP V-2) – it is in the stage of design preparation,*
- *to implement measures related to decommissioning of NPP V-1:*
 - *updating of safety documentation – Safety report, Limits and Conditions, Operational procedures,*
 - *implementation of projects covered within the decommissioning of NPP V-1 – assurance of safe and reliable operation of remaining nuclear installations on the Bohunice site,*
 - *re-qualification of personnel in the framework of the decommissioning of NPP V-1.*

L Annexes

- I. List of nuclear installations for SNF and RAW management
- II. Discharge limits for radioactive materials into atmosphere and hydrosphere
- III. List of nuclear installations in decommissioning
- IV. Inventory of stored SNF (††K)
- V. Inventory of stored RAW
- VI. List of Acts, Decrees and Guidelines
- VII. List of international expert reports (and also safety reports)
- VIII. List of authors

Annex I. List of Nuclear Installations for Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) Management

Slovenské elektrárne, a. s. operates:

- *Nuclear power plant Bohunice, branch SE - EBO NPP V-2 – unit 3 and 4*
- *Nuclear power plant Mochovce, branch SE- EMO unit 1 and 2*

Jadrová a vyrad'ovacia spoločnosť, a. s. operates:

- *Nuclear power plant V-1 – unit 1 and 2*
- *Interim spent fuel storage (MSVP)*
- *Technologies for RAW treatment and conditioning in Jaslovské Bohunice*
- *National RAW Repository Mochovce*
- *Final treatment of liquid RAW Mochovce*

Annex II. Discharge Limits for Radioactive Materials into Atmosphere and Hydrosphere

Prior to commissioning of a nuclear installation, common limits of discharges were set for each site. The splitting of locality Jaslovské Bohunice into two branches in 1996 has not changed the situation; a common assessment for the whole site has been elaborated.

After the creation of two subjects in the locality of Jaslovské Bohunice in 2006 (JAVYS, a. s. and SE, a. s.), that the division of discharge limits was initiated by almost equal portions between SE, a. s. and JAVYS, a. s. (NPP V-1, NPP A-1, technology of RAW treatment and conditioning and interim spent fuel storage. At the same time, permanent shutdown of unit 1. of NPP V-1 on 31.12.2006 was considered as well as the fact, that discharges from equipments for RAW and SNF management are significantly lower than the discharges from NPP in operation. Discharge limits :

Gaseous discharges				
Annul discharge limit for group of JZ	Rare gasses (voluntary mixture)	Iodines (gaseous and aerosol phase)	Aerosol – mixture of long lived radionuclides	Sr 89, 90
	Bq/year	Bq/year	Bq/year	Bq/year
Jaslovské Bohunice site before 2007				
All JZ	$4 \cdot 10^{15}$	$1,3 \cdot 10^{11}$	$1,6 \cdot 10^{11}$	$3 \cdot 10^8$
Jaslovské Bohunice site since 2007				
JAVYS, a. s. (including NPP V-1)	$2 \cdot 10^{15}$	$6,5 \cdot 10^{10}$	$8 \cdot 10^{10}$	$1,4 \cdot 10^8$
SE, a.s. NPP V-2	$2 \cdot 10^{15}$	$6,5 \cdot 10^{10}$	$8 \cdot 10^{10}$	$1,4 \cdot 10^8$
Mochovce site				
Mochovce 1,2	$4,1 \cdot 10^{15}$	$6,7 \cdot 10^{10}$	$1,7 \cdot 10^{11}$	unlimited
Liquid discharges				
Annul discharge limit for group of JZ	Tritium Bq/year		Other corrosive and fission products Bq/year	
	recipient Váh	recipient Dudváh	recipient Váh	recipient Dudváh
Jaslovské Bohunice site before 2007				
All JZ	$4,37 \cdot 10^{13}$	$4,37 \cdot 10^{11}$	$3,8 \cdot 10^{10}$	$3,8 \cdot 10^8$
Jaslovské Bohunice site since 2007				
JAVYS, a. s. (including NPP V-1)	$2,3 \cdot 10^{13}$	$2,3 \cdot 10^{11}$	$2,5 \cdot 10^{10}$	$2,5 \cdot 10^8$
SE, a. s. NPP V-2	$2 \cdot 10^{13}$	$2 \cdot 10^{11}$	$1,3 \cdot 10^{10}$	$1,3 \cdot 10^8$
Mochovce site				
Mochovce 1,2	$1,2 \cdot 10^{13}$		$1,1 \cdot 10^9$	

Annual limit of liquid discharges from Republic repository of radioactive waste RÚ RAW

Nuclide	Annual limit of activity [Bq]/year
H – 3	$1,88 \cdot 10^{10}$
Cs – 137	$2,28 \cdot 10^7$
Sr – 90	$2,44 \cdot 10^8$
Co – 60	$2,24 \cdot 10^7$
Pu – 239	$5,56 \cdot 10^5$

Annex III. List of Nuclear Installations in Decommissioning

Jadrová a vyrad'ovacia spoločnosť, a. s.:

- Nuclear power plant NPP-A-1 (including technological equipments for management of RAW from this NPP, installed in it)

VUJE, a. s.:

- experimental incinerator
- experimental bituminization plant

Annex IV. Inventory of Stored Spent Nuclear Fuel (Fuel Assemblies - FA)

The design capacity of MSVP has been 600 t of heavy metal: 5040 pcs of fuel assemblies. The storage capacity has been increased up to 14112 pcs of SNF during the reconstruction of MSVP.

Current capacity of MSVP	Number of stored FA in container T-12		Number of stored FA in container KZ-48		Number of stored FA in container T-13		Number of stored FA from V-1		Number of stored FA from V-2		Number of stored FA from EMO		Total number of stored FA
	cont	FA	cont	FA	cont	FA	1.unit	2.unit	1.unit	2.unit	1.un it	2.unit	
10 590	4	115	172	8 238	1	12	2206	2014	1955	1758	288	144	8 365

Total storage capacities are used up to 59 %.

Annex V. Inventory of Stored RAW

V.1. Inventory of stored radioactive waste (RAW) at NPP V-1 (by 31. 12. 2007)

Utilization of storage premises for storage of solid RAW

Storage	Total capacity /m ³ /	Utilized capacity /m ³ /	Available capacity /m ³ /
Total	820	186	634

Storage of VTZ filters

Storage	Capacity /m ³ /	Utilized capacity /m ³ /	Available space /m ³ /
Total	600	385	215

Storage of ra-concentrate

Pond	Capacity [m ³]	Utilized capacity [m ³]	Volume converted for total salinity 190g/l [m ³]	Available volume [m ³]
Total	4215	1451	1505	2764

Storage of low level active and medium level active sorbents

Pond	Capacity [m ³]	Utilized volume [m ³]	Available volume [m ³]
Total	1584	431,01	1151,79

V.2 Inventory of stored radioactive waste (RAW) at NPP V-2 by 31.12.2007

Storage of solis RAW on pallets

Storage	Total capacity /pcs of pallets/	Utilized /pcs of pallets/	Available /pcs of pallets/	Note
Total	1920	1613	307	

Utilization trend is calculated from 2000-2001: 15 pcs of pallets/a year.

Available volume reserve (if not exported): 17 years.

Storage of solid RAW in storages without internal structure

Storage	Total capacity /pcs of drums/	Utilized /pcs of drums/	Available /pcs of drums/	Note
Total	11490	1869	9621	

Utilization trend is calculated from 2001-2007: 360 pcs of drums for a year.

Available volume reserve (if not exported): 26 years.

Storage of Air-conditioning filters in storage 108/12

Bunka No.	Capacity [pcs]	Utilization [pcs]	Available space [pcs]
Total	912	389	523

Utilization trend of storage 108/12: Annual average production - 35 pcs.

Available space reserve (if not exported): 15 years.

Storage of solid RAW with high level activity (Mogilník)

Total capacity of storage facility: 529 cells.

Utilized: 167 cells.

Empty: 362 cells.

The storage facility of high level active RAW is filled up to cca 31% from the total design capacity.

Storage of ra-concentrate

Pond	Capacity [m ³]	Utilization [m ³]	Available volume [m ³]
Total	4860	2344,5	2515,5

Utilization trend of ponds during 2001 - 2007: 68 m³ annually

Available space reserve (if not exported for conditioning): 37 years.

Storage of ion exchangers

Pond	Capacity [m ³]	Utilization [m ³]	Available volume [m ³]
Total	1380	106,3	1273,7

Utilization trend of ponds:

Low level active sorbents: Annual average production: 0,8 m³.

Available space reserve (if not exported): 521 years.

Medium level active sorbents: Annual average production: 3,6 m³.

Available space reserve (if not exported): 233 years.

Storage of ra-oil and oil sludges

Ra-oils are disposed in 12 pcs of MEVA drums in the storage of contaminated petrol materials in the object 800, room No. A0058:

2400 l of oil from PO equipment repairs.

V.3 Inventory of RAW at SE EMO (by 31.12.2007)Storage of SRAW in sacks on pallets

Storage	Capacity /pcs of pallets/	Utilization /pcs of pallets/	Available volume / pcs of pallets /
Total	672	359	313

* volume of one pallet is 0,5 m³

Storage of solid RAW in drums on pallets

Storage	Capacity (pcs of pallets/pcs of drums)	Utilization (pcs of pallets/pcs of drums)	Available volume (pcs of pallets/pcs of drums)
<i>Total</i>	495/1980	337/1348	158/632

* volume of one drum is 0,2 m³

Storage of solid RAW in storages without internal structures

Storage	Capacity (m³)	Utilization (m³)	Available volume (m³)
<i>Total</i>	1782	0	1782

Storage of ra-concentrate

	Capacity (m³)	Real utilization (m³)	Summary beta activity (kBq/l)	Available volume (m³)
<i>Total</i>	2660	1938	-	722

* analysis of concentrate sample of 7.12.2007

Storage of ion exchangers

Pond	Capacity	Utilization	Available volume
<i>Total</i>	920	65	855

V. 4 Inventory of stored RAW at JAVYS, a. s. by 31. 12. 2007RAW stored in the facilities of JAVYS, a. s. on the site of NPP A-1

Secondary RAW occurs in the current time in connection with decontamination, disassembly and demolition works in nuclear installations, which are in decommissioning (NPP A-1).

Due to historical reasons, RAW from NPP A-1 Bohunice represents a special problem, since it was not either consistently sorted nor registered during operation of this installation. A large amount of liquid operational RAW was already been treated and conditioned for disposal, or the activity of these waste was decreased. Continuously occurring concentrates (cca 10 m³ in a year) are every year treated by bituminization. By the end of 2007, summary inventory of liquid (including the uncondensed) RAW represented 700 m³.

Overall amounts of solid RAW at NPP A-1 have reached in 2007 cca 1150 m³ of non-metal RAW and 622 t of metal RAW. Total volume of stored contaminated soil and talus has reached in 2007 the value of 6819 m³. Products of cementation and bituminization plants, which are prior to their conditioning stored also in storage of NPP A-1 Bohunice, represent almost 232,8 m³.

Utilization of storage premises in JAVYS, a. s. (site of NPP A-1) for storage of SRAW

Storage	Total capacity (m³)	Utilization (m³)	Available capacity (m³)
<i>Total</i>	2194	1956,2	82,8

Storage premises for storage of SRAW are filled by 200 l drums of MEVA type ($1 \text{ m}^3=5$ drums). 9806 drums with solid RAW were disposed in total by 31.12.2007 in certificate storages of JAVYS, a. s., from which:

- 1357 drums with solid incinerable RAW
- 3155 drums with compactible metal RAW
- 4130 drums with compactible non-metal RAW
- 1164 drums with solid RAW determined into VBK without processing (drums with bitumen and cement products)

Inventory of solid RAW of JAVYS, a. s. placed in the objects of NPP A-1 and TSÚRAW

Row No.	RAW kind	Volume (m^3)	Weight (t)
	Total	8018,1	9063,399

Inventory of liquid RAW of JAVYS, a. s. is totally: 699,7306 m^3

V.5 Amounts of radioactive waste (RAW) treated and conditioned in Bohunice Treatment Centre of Radioactive waste (BSC RAW) during 2006-7

	Conditioned (treated)	in 2006	in 2007
Utilized VBK		241 pcs	276 pcs
Exported into repository		228 pcs	270 pcs
Operational file	Waste kind	Amount	Amount
PS 04 - Cementation	Washing liquids, sludges, ion exchangers	29,63 m^3	42,40 m^3
	Bitumen product (grouting)	1040 pcs (252,2 t)	881 pcs (221,2 t)
	Non-compactible (grouting)	56,9 t	148,88 t
PS 06 - Incinerator	Solid RAW (together)	100,666 t	126,23 t
	A-1	43,985 t	50,157 t
	V-1	23,145 t	52,827 t
	V-2	15,013 t	12,554 t
	EMO	18, 521 t	10,692 t
	Liquid RAW (together)	17,532 m^3	14,662 m^3
	A-1- dowerm	9,731 m^3	2,502 m^3
A-1 - oil	7,401 m^3	11,760 m^3	
V-1 - oil	0,400 m^3	0,400 m^3	
PS 08 - Compacting equipment	Together	131,508 t	171,206 t
	A-1	69,838 t	48,236 t
	V-1	32,85 t	85,718 t
	V-2	15,844 t	11,603 t
	EMO	11, 134 t	10,022 t
	Ashes	1,842 t	15,627 t
	IRAW	0	0
PS 03 - Concentration	Together	513,1 m^3 (401,48 m^3)*	631,8 m^3*(435,91 m^3)*
	Concentrate V-1	242,7 m^3 (191,57 m^3)*	430,5 m^3 (288,11 m^3)*
	Concentrate V-2	270,4 m^3 (209,91 m^3)*	201,3 m^3 (147,80 m^3)*
PS 05 - Sorting	Solid RAW	39,998 t (892 pcs of drums)	76,779 t (1961 pcs of drums)

* really treated concentrate (converted to 120 g/kg H_3BO_3)

RAW disposed at the repository at Mochovce

By the end of 2007, 1584 pcs of fiber-concrete container were disposed of in total, representing cca 4800 m³ of solidified RAW from NPP A-1, NPP V-1 and NPP V-2. A substantial part of these waste was made by concentrates in the form of bituminisation products or cementation grouts of VBK and solid waste treated before grouting into VBK by high pressure compacting.

Annex VI. List of Selected Acts, Decrees and Guidelines

Act No. 575/2001 Coll. on Organization of Governmental Activities and of Central State Administration as amended

Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to certain acts as amended

Act No. 50/1976 Coll. on Spatial Planning and Construction Order (Construction Act) as amended

Act No. 656/2004 Coll. on Energy and alternations of certain

Act No. 276/2001 Coll. on Regulation in Network Industries and alternations and amendments of certain acts - last amendment by Act No. 107/2007 Coll.

Act No. 238/2006 Coll. on National Nuclear Fund for Decommissioning of Nuclear Facilities and Management of Spent Nuclear Fuel and Radioactive Waste (Act on Nuclear Fund) and alternations and amendments of certain acts as amended

Act No. 24/2006 Coll. on Environmental Impacts Assessment and alternations and amendments of certain acts as amended

Act No. 355/2007 Coll. on Protection, Support and Development of Public Health Care and alternations and amendments of certain acts

Act No. 42/1994 Coll. on Civil Protection as amended

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

Act No. 124/2006 Coll. on Safety and Health Protection at Work and alternations and amendments of certain acts as amended

Act No. 264/1999 Coll. On Technical Requirements For Products (Conformity Assessment) as amended (last amendment by Act No. 254/2003 Coll.)

Act No. 90/1998 Coll. on Building Products as amended

82/501/EHS: Council Directive of 24 June 1982 on the major-accident hazards of certain industrial activities

87/600/Euratom: Council Decision of 14 December 1987 on Community's arrangement for the early exchange of information in the event of a radiological emergency

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

MV SR Decree No. 533/2006 Coll. on Details and Protection of Population Against Hazardous Substances Impacts

ÚJD SR Decree No. 46/2006 Coll. on dual-use goods (special materials and equipments), which are under the ÚJD SR regulation

ÚJD SR Decree No. 47/2006 Coll. on details concerning maximum limits of small quantities of nuclear material and radioactive waste in respect of which no nuclear damage is expected

ÚJD SR Decree No. 48/2006 Coll. on details of notification of operational events and events during transport, as well as details of investigation of their reasons

ÚJD SR Decree No. 49/2006 Coll. on periodic nuclear safety review

ÚJD SR Decree No. 50/2006 Coll. on details concerning the nuclear safety requirements for nuclear installations in respect of their siting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorization of classified equipment into safety classes

ÚJD SR Decree No. 51/2006 Coll. on details concerning requirements for provision of physical protection

ÚJD SR Decree No. 52/2006 Coll. on professional competency

ÚJD SR Decree No. 53/2006 Coll. on details concerning requirements for management of nuclear material, radioactive waste and spent fuel

ÚJD SR Decree No. 54/2006 Coll. on record keeping and control of nuclear material as well as notification of selected activities

ÚJD SR Decree No. 55/2006 Coll. on details concerning emergency planning in case of nuclear incident or accident

ÚJD SR Decree No. 56/2006 Coll. on details concerning requirements for quality system documentation of authorization holder, as well as details concerning quality requirements for nuclear installations, details concerning quality requirements for classified equipment and details concerning the scope of their approval

ÚJD SR Decree No. 57/2006 Coll. on details concerning the requirements for transport of radioactive material

ÚJD SR Decree No. 58/2006 Coll. on details concerning the scope, content and method of preparation of nuclear installation documentation necessary for particular decisions

Governmental Ordinance No. 340/2006 Coll. concerning health protection of individuals against the dangers of ionizing radiation in relation to medical exposure, which transposes the Council Directive 97/43/Euratom of 30. June 1997

Governmental Ordinance No. 345/2006 Coll. on Basic Safety Requirements for Health Protection of Workers and Population Against Ionizing Radiation

Governmental Ordinance No. 346/2006 Coll. on requirements for radiation protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas

Governmental Ordinance No. 348/2006 Coll. on requirements for control of high-activity sealed radioactive sources and orphan sources

MH SR Decree No. 524/2007 Coll. on details of radiation monitoring network

MH SR Decree No. 528/2007 Coll. on details of requirements for irradiation limitation from natural sources

MH SR Decree No. 718/2002 Coll. on assurance of safety and health protection at work of technical equipment

MH SR Decree No. 453/2000 Coll. implementing some provisions of the building act

MH SR Decree No. 55/2001 Coll. on Territorial Planning Materials and Territorial Planning Documentation

MRSVR SR Decree No. 500/2006 Coll. Stipulating the Form of Report of Registered Industrial Injury

Decree No. 59/1982 Coll. stipulating basic requirements for assurance of safety of work and technical equipment as amended by Decree No. 484/1990 Coll.

Decree No. 374/1990 Coll. on Safety of Work and Technical Equipment in Construction Activities

Governmental Ordinance No. 310/2004 Coll. on details for technical requirements and procedures of conformity assessment applicable to machinery

Governmental Ordinance No. 308/2004 Coll. on details for technical requirements and procedures of conformity assessment applicable to technical devices used at a certain range of voltage as amended by governmental Ordinance No. 449/2007 Coll.

Governmental Ordinance No. 194/2005 Coll. on electromagnetic compatibility as amended by governmental Ordinance No. 318/2007 Coll.

Governmental Ordinance No. 392/2006 Coll. on Minimal Safety and Health Requirements at Using Work Instruments

Governmental Ordinance No. 391/2006 Coll. on Minimal Safety and Health Requirements for Workplace

Governmental Ordinance No. 276/2006 Coll. on Minimal Safety and Health Requirements for Work with Display Screen Equipment

Governmental Ordinance No. 117/2001 Coll. on details for technical requirements and procedures of conformity assessment applicable to equipments and protective systems intended for use in potentially explosive atmospheres as amended by governmental Ordinance No. 296/2002 Coll.

Governmental Ordinance of SR No. 387/2006 Coll. on Requirements For Assurance Of Safety And Health Labeling At Work

Governmental Ordinance of SR No. 396/2006 Coll. on Minimal Safety and Health Requirements for Construction Site

Governmental Ordinance of SR No. 393/2006 Coll. on Minimal Requirements for Assurance of Safety And Health Protection at Work in Potentially Explosive Atmospheres

Governmental Ordinance of SR No. 395/2006 Coll. on Minimal Requirements for Providing and Using Personal Protective Equipments at Work

ÚJD Safety guides:

- BNS I.12.1/1995** Requirements to assure quality of computers information software
- BNS I.11.1/1995** Requirements for performance of safety analyses
- BNS I.4.2/1996** Use of PSA methodology in performance of state supervision
- BNS I.4.1/1999** Single failure criterion
- BNS I.9.1/1999** Safety of nuclear facilities during decommissioning
- BNS I.11.2/1999** Requirements for performance of safety analyses for for processes of abnormal operation with an automatic reactor protection failure
- BNS III.4.1/2000** Requirements on ÚJD SR permission issue for fuel use in VVER 440 reactors
- BNS III.4.3/2000** Requirements on assessment of fuel loading
- BNS I.2.6/2000** ÚJD SR requirements for chapt. 4 of Safety Analysis Report “Core design”
- BNS II.3.1/2000** Evaluation of acceptability of faults detected during the in-service operation of nuclear installation classified equipment
- BNS II.5.1/2002** Welding at nuclear installations. Basic requirements and rules
- BNS II.5.2/2002** Supervision of welding and quality of welded joints at nuclear installations - Requirements
- BNS II.5.3/2002** Welding materials for welding of nuclear installations. Technical requirements and rule of choice
- BNS II.3.1/2003** Evaluation of acceptability of faults detected during the in-service operation of nuclear installation classified equipment
reprint of
II.3.1/2000
- II. BNS** Assurance of quality of safety documentation. Basic requirements and procedures
I.2.6/2001
- BNS II.2.1/2001** Requirements for assurance of fire safety of nuclear power plants in terms of nuclear safety
- BNS I.9.2/2001** Ageing management of nuclear power plants - Requirements
- BNS II.5.1/2003** Welding at nuclear installations. Basic requirements and rules
reprint of
II.5.1/2002
- BNS II.5.2/2003** Supervision of welding and quality of welded joints at nuclear installations - Requirements
reprint of
II.5.2/2002
- BNS II.5.3/2003** Welding materials for welding of nuclear installations. Technical requirements and rule of choice
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II.5.3/2002

BNS I.9.1/2003 Safety of nuclear facilities during decommissioning
reprint of

I.9./1999

BNS I.11.2/2003 Requirements for performance of safety analyses for processes of abnormal operation
reprint of with an automatic reactor protection failure

I.11.2/1999

BNS I.12.1/2003 Requirements to assure quality of computers information software
reprint of

I.12.1/1995

BNS II.3.3/2004 Metallurgical products and spare parts for nuclear power plants

BNS III.4.4/2004 Requirements for realization and evaluation of results of physical tests in start-up
process

BNS II.5.4/2004 Qualification of systems for non-destructive testing in nuclear energy. Requirements and
guides

BNS I.2.5/2005 ÚJD SR requirements on chapt. 16 of Preliminary safety analysis report "Limits and
Conditions"

BNS I.8.1/2005 Specification on the scope of Preliminary Plan of Physical Protection and Plan of
Physical protection in line with Decree wording on details concerning physical protection
assurance of NI, NM and RAW

BNS IV.1.3/2005 Requirements for Design and Operation of Nuclear Spent Fuel Storage Facility

Annex VII. List of International Expert Reports and Safety Reports

List of safety documentation and international mission focused on safety of JZ for SNF and RAW management in SR (see Sheet G1) :

JZ	Preceding documentation	Preliminary safety report	Periodical assessment	International missions
NPP A-1	EIA in the framework of decommissioning		1980, decommissioning plan 1992, 1995-98	
NPP V-1	Preliminary BS	1978,1980	1990, 1998-2002(reconstr.) 2003 (fuel)	6 missions 1990-95 IAEA 1998 WANO 1998
NPP V-2	Initial and Preliminary BS	1983,1985	1996, 2001 (moderniz.) 2005 (fuel) 2006	Safety Rev. 94 Peer Rev. 95 OSART 1996,98
NPP EMO	-, - ; EIA for EMO 3, 4	1998,1999	2007 (output incr.) will be submitted 2008	OSART 93,06 Riskaudit 94,99 WANO 02,04
MSVP	Preliminary BS (reconstruction 1997)	1987, 9/1998	2000(after reconstruction)	
MSVP_EMO	Initial BS and EIA 2001			
TSÚ RAW	Preliminary BS, EIA (for BSC)	1998 (for BL 1994, 2002)	will be submitted 2009	
FS LRAW	EIA within EMO3,4, Preliminary BS 2004	2006		
Integral storage	EIA 2003, Preliminary BS 2004			
RÚ RAW	Initial and preliminary BS	4/1999	will be submitted 2009	

Safety reports and assessment documents of the missions (taken from the NS to the Convention on Nuclear Safety 2007):

1. Safety report of NPP V-1 after gradual reconstruction 5/2001
2. Pre-operational safety report for the National RAW Repository 4/1999
3. Pre-operational safety report – transport of solid RAW in ISO containers 1/2000
4. Pre-operational safety report – re-qualified fragmentation workplace for treatment of metal RAW with surface contamination up to 3000 Bq/cm² 4/2001
5. Pre-operational safety report for MSVP 9/1998
6. WENRA: Nuclear Safety in EU Candidate Countries 10/2000
7. IAEA: Review of Results of the Gradual Upgrading at Bohunice WWER-440/230 NPP Units 1 and 2 11/2000

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| 8. | Licensing Related Assessment of Design and Operational Safety for VVER 213 (PHARE/SK/TSO/VVER03) | 12/1999 |
| 9. | Report on Nuclear Safety in the Context of Enlargement (9181/01) | 5/2001 |
| 10. | International Conference on the Strengthening of Nuclear Safety in Eastern Europe – IAEA Report | 6/1999 |
| 11. | Final Report of the IAEA EBP and other Related IAEA Activities on the Safety of WWER and RBMK NPPs | 1998 |
| 12. | <i>Report on periodical assessment of nuclear safety of NPP V-2 (PSRV-2/OO/V01-6706/2007)</i> | 2007 |

Documentation submitted by the Slovak Republic in order to fulfill the provision of the Article 37 of the Euratom Treaty in terms of interpretation in the COMMISSION RECOMMENDATION of 6 December 1999 on the application of Article 37 of the Euratom Treaty (notified under document number C(1999) 3932) (1999/829/Euratom), published on 16. 12. 1999 in the Official Journal of the European Communities, No. L 324:

- *Technologies for RAW treatment and conditioning at the Jaslovské Bohunice site*
- *Integral storage of RAW at Jaslovské Bohunice*
- *Decommissioning of the nuclear power plant A-1 (I. stage)*
- *Decommissioning of the nuclear power plant A-1 (II. stage)*

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