

JADROVÁ A VYRAĐOVACIA SPOLOČNOSŤ





JAVYS

safely with every step



JAVYS – THE MISSION

- Safe, reliable, economically effective and efficient operation and decommissioning of nuclear facilities
- Safe, reliable, economically effective and efficient disposal of radioactive waste and spent nuclear fuel with minimum environmental impacts
- Active participation in energy projects in compliance with the Energy Safety Strategy
- Implementation of tasks and professional competences in nuclear energy sector in the Slovak Republic

JAVYS - THE ESTABLISHMENT

On July 6th 2005, joint stock company GovCo, a.s. was established based on the decision of the Government of the Slovak Republic to privatise 66 percent of shares in joint stock company Slovenské elektrárne, a.s. (Slovak Electricity Utilities, joint stock company). Assets and activities that were not subject of the privatisation were transferred to GovCo, a.s.; on April 1st 2006. GovCo took over the responsibility for operation termination of the V1 nuclear power plant, decommissioning of nuclear faci-

lities and management of radioactive waste (RAW) and spent nuclear fuel. In 2007, GovCo, a.s. changed its name to Jadrová a vyradovacia spoločnosť, a.s. (Nuclear and Decommissioning Company, joint stock company) – JAVYS, a.s. Slovak Republic represented by its Ministry of Economy is a sole shareholder in the company.

CORE ACTIVITIES

- Decommissioning of A1 NPP
- Decommissioning of V1 NPP
- Radioactive waste (RAW) management
 - from operation of nuclear facilities
 - from decommissioning of nuclear facilities
 - institutional RAW and captured radioactive materials
- Spent nuclear fuel management
- Activities within energy projects



DECOMMISSIONING OF NUCLEAR FACILITIES

Decommissioning and liquidation represent the final phase of lifecycle of each nuclear facility. The time and finances needed for decommissioning depend on the type of the facility and its technical status after its operation was shut down.

A1 NPP decommissioning

| | |
|------------------------------------|----------------------------------|
| Start of construction | 1958 |
| The first controlled reactor power | October 24 th 1972 |
| Connection to distribution network | December 25 th 1972 |
| Operation shut down | February 22 nd 1977 |
| Start of decommissioning | 1979 |
| Reactor type | KS 150 |
| Fuel | natural uranium |
| Moderator | heavy water D ₂ O |
| Coolant | hydrogen dioxide CO ₂ |

The Government of ČSSR (Czechoslovak Socialist Republic) in its Resolution N°135 of 1979 decided not to restart the A1 Nuclear Power Plan (NPP) operation again and prepare its gradual decommissioning. No adequate procedures nor techniques or means necessary for its decommissioning were available at the time when A1 NPP operation was finally shut down. Until 1994, works followed annual plans and included the remedy of consequences caused by the accident, minimising the impact of A1 NPP decommissioning activities on the environment, disassembly of equipment in machine room and auxiliary facilities of the nuclear part of the power plant, and construction of facilities for transporting the spent nuclear fuel to Russian Federation.

Since the 90-ies, decommissioning of the oldest nuclear power plant in Slovakia follows the continuous alternative strategy, which takes into account its specific features and status. The decommissioning process is split to five successive phases, to be ended in 2033.

Within the first phase during the period of years from 1994 until 2009, decommissioning works focused in particular to building technologies and facilities for disposal of A1 NPP spent nuclear fuel and its transport to the Russian Federation. Furthermore,

JAVYS

safely with every step



activities related to processing and storage of operational radioactive waste (RAW) were made, ie. RAW Processing and Treatment Technologies and the National RAW repository in Mochovce were built.

Now, works within the second phase of A1 NPP Decommissioning Project are being implemented, to be completed in 2016.

These mainly focus on liquidation of original technologies and facilities of the power plant that are not operated, liquidation of constructions, processing and treatment of RAW generated during these activities and their storage in the National RAW repository in Mochovce.

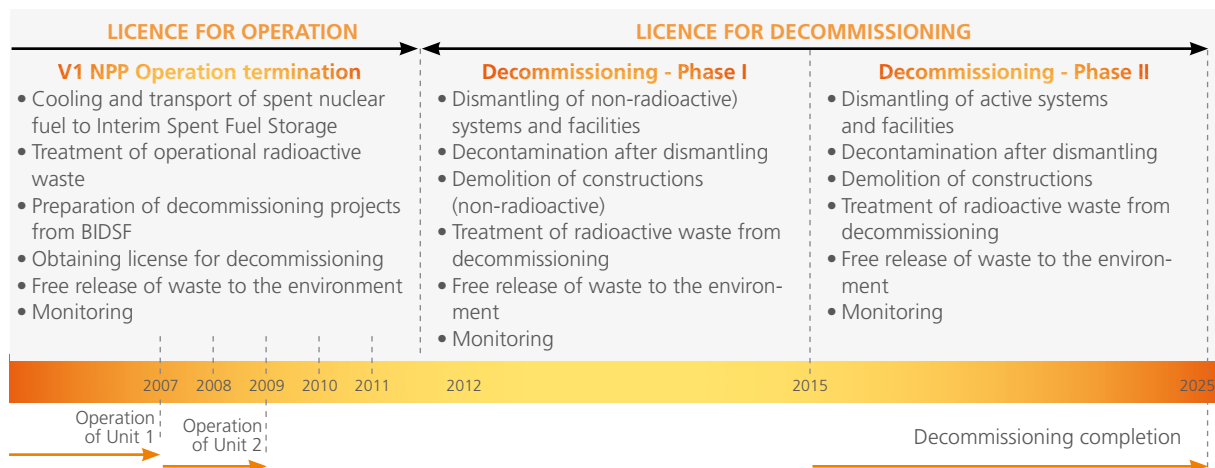
V1 NPP decommissioning

| | | |
|---|---|--------------------------------|
| Start of construction | 1972 | |
| The first controlled reactor power Unit 1 and 2 | November 27 th 1978 | March 15 th 1980 |
| Connection to distribution network | December 17 th 1978 | March 26 th 1980 |
| Start of operation | April 1 st 1980 | January 1 st 1981 |
| Operation shut down | December 31 st 2006 | December 31 st 2008 |
| <i>Technical information</i> | | |
| Reactor type | 2 x VVER 440 (V230) | |
| Fuel | uranium oxide UO ₂ (2,5 % U ₂₃₅) | |
| Moderator and Coolant | water H ₂ O | |



Slovakia signed a commitment to shut down V1 nuclear power plant within the pre-accession negotiations process with the European Union. Two units of the power plant had already been shut down at the end of 2006 and 2008, each after 28 years of operation. Since then, the power plant is in operation termination phase, which also involves transport of spent fuel from the power plant and treatment of radioactive waste from operation. The last transport was made in 2011.

These activities, among many others, are a prerequisite for obtaining licence for V1 NPP decommissioning. Preparatory activities of V1 NPP operation termination and decommissioning are financed from Bohunice International Decommissioning Support Fund for V1 NPP in Jaslovské Bohunice (BIDSF). Spending of BIDSF funds to finance implementation of projects is based on the respective grant agreements concluded between JAVYS, a.s. and the EBRD, being assigned by the European Commission as the Fund administrator.



JAVYS

safely with every step



RADIOACTIVE WASTE MANAGEMENT

Three key principles applied for processing and treatment of radioactive wastes: to reduce their volume, to fix these in a form ensuring their safe storage and establish sufficient barriers to prevent radioactivity leakage to the environment during disposal, including the time when these are stored in a repository. All radioactive wastes are thoroughly collected, monitored and controlled while being processed and treated.

All activities comprising the radioactive waste (RAW) management process are performed at JAVYS nuclear facilities.

RAW Processing and Treatment Technologies in Jaslovské Bohunice

Bituminization plant, Bohunice Radioactive Waste Treatment Centre, low active wastewater treatment plant and processing technologies are used for radioactive waste treatment within nuclear facilities located in A1 NPP buildings. These technologies are used for processing and treatment of radioactive waste from A1 NPP decommissioning processes, V1 NPP operation termination and decommissioning preparation, radioactive equipment from two V2 NPP units operated in Jaslovské Bohunice,

units 1 and 2 in Mochovce, as well as for disposal of radioactive waste from other than nuclear facilities (i.e. institutional RAW and captured radioactive material).

In Bohunice Radioactive Waste Treatment Centre, radioactive waste is sorted and further processed in concentration plant, cementation plant, super-compaction plant and incineration plant.

Other processing and treatment technologies installed within the A1 NPP facility are used for sorting, fragmentation, decontamination of metal materials and their release to the environment.

The key role of fragmentation and decontamination is to clean metal waste below the limits applicable for metal materials to be released to the environment. Metal waste not meeting the limits for release to the environment are stored in certified storage facilities and further processed, e.g. fixation.

Final Processing of Liquid RAW in Mochovce

Final Processing of Liquid RAW in Mochovce is a nuclear facility where the waste is processed at bituminization plant, plant for concentration and cementation plant.



RAW Repository

National Radioactive Waste Repository in Mochovce is a surface type repository for final storage of processed low and medium RAW generated in operation and decommissioning of nuclear facilities in Slovakia, and also institutional radioactive waste and captured radioactive materials.

The location was selected in the period of years 1975 until 1978, following the criteria stipulated in the Slovak legislation and recommendations of the International Atomic Energy Agency. It is in operation since 2001.

The repository is a complex of constructions and technological facilities for handling processed RAW since their arrival to the repository until their final storage. The repository comprises a set of storage boxes organised in rows and double-rows.

Filled fibre-concrete containers containing processed RAW transported from the RAW Treatment Centre in Jaslovské Bohunice and from the Final Processing of Liquid Radioactive Waste in Mochovce are stored in the repository. Repository operation staff shall verify the completeness of accompanying documents and compare it with the information label on fibre-concrete containers with RAW. Once controlled, containers are moved from transport ve-

hicle to a storage box in a pre-defined location, using gantry crane equipped with a handling device.

Environmental impacts of the repository operation are also monitored, and it is clear from the monitoring results that the repository has no adverse effects to the environment.

DISPOSAL OF SPENT NUCLEAR FUEL

Interim Spent Fuel Storage in Jaslovské Bohunice is a nuclear facility operating since 1987, and it forms an important part of the spent fuel management process.

It is a safe wet storage facility for spent nuclear fuel from reactors VVER 440 used in Slovak nuclear power plants, which can be stored there for at least 50 years. Project for enhancing seismic resistance and increase of its capacities was implemented during the period of years 1997 – 2001.

In reactor units, the spent nuclear fuel once taken from the reactor is firstly stored in storage pools next to the reactor and then, it is transported to the Interim Spent Fuel Storage for long-term storage.

In nuclear power plants, fuel casks are placed to transportation container. Special loading machine is used for handling in a

JAVYS

safely with every step



shaft next to the storage pool. Container with the spent fuel is transported to a special place in the reactor room, where thermal and pressure stabilisation is made, and it is prepared for transport.

In the interim storage, a crane firstly moves the container to a receiving pool. Once the container is unsealed and the cover is open, 16-tons crane with a special handling device places it to the predefined position in storage pools. Shielding layer of water is used for handling the spent nuclear fuel. Pools are filled with demineralised water used as coolant, also establishing biological protection against radioactivity.

Internal control systems and environmental impacts systems are continuously monitoring handling and storage of the spent fuel. Monitoring results clearly show that the interim storage has no adverse effects to the environment.

TRANSPORT OF RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL

JAVYS disposes of transport facilities it is using within its own area and also outside; railway transport is also used. Relevant permits and licences were obtained for all these activities.

RAW Transport

Radioactive waste from A1, V1 and V2 NPP are transported to RAW treatment centre in Jaslovské Bohunice and Interim Spent Fuel Storage in Mochovce. Processed RAW fixed in fibreconcrete containers is transported from Bohunice Treatment Centre and Final Processing of Liquid RAW to the National RAW Repository in Mochovce.

Transport of spent nuclear fuel

Spent nuclear fuel is transported from reactor hall to Interim storage in transportation containers in special railway cars. JAVYS transported spent fuel from V1 NPP, and is in charge of transporting spent fuel from V2 NPP and NPP Mochovce.

FIBRE-CONCRETE CONTAINERS PRODUCTION

Fibre-concrete containers plant in Trnava is in operation since 1997.



The necessity to build a technology to produce fibre-concrete containers results from the need to process RAW so that it can be safely stored in the National RAW Repository for long period of time avoiding any leakages to the environment. The technology is based on French licence, producing containers from special concrete reinforced with non-corrosive metal fibres appropriate for usage in nuclear industry.

STRATEGIC PROJECTS

New nuclear source preparation

Following the Resolution of the Slovak Government of 2008, JAVYS commenced preparatory works for establishing a joint venture for construction of new nuclear source in Jaslovské Bohunice. On May 29th 2009, representatives of energy utilities JAVYS and ČEZ (Czech Electricity Utilities) signed a Shareholders' Agreement on establishing a joint venture for building a new nuclear source in Jaslovské Bohunice. Jadrová energetická spoločnosť Slovenska, a.s. (Nuclear Energetic Company of Slovakia, joint stock company) – JESS established at the end of 2009, was assigned the responsibility for preparation, construction and operation of this nuclear source.

JAVYS owns 51% shares in the joint venture, Czech partner in the project – ČEZ Group owns 49% of shares. Both partners share a joint past; Czech Republic and Slovak Republic shared a common energy network, until 1993.

Comprehensive solution for IRAW and CRAM

Slovak Ministry of Economy tasked JAVYS with the disposal of institutional radioactive waste (IRAW) and captured radioactive material (CRAM). Within this commitment, JAVYS implemented projects related to a comprehensive solution for these types of waste and materials in Slovakia. In 2009, Slovak Government approved the approach proposed for disposal of these radioactive waste and materials, adopting thus comprehensive and optimal solution to address the issues of institutional radioactive waste and captured radioactive material in Slovakia. One of the tasks is to build a non-nuclear facility for long-term disposal of institutional radioactive waste and captured radioactive material in Mochovce. Maximum protection of the environment and safety shall be ensured for the disposal of these types of waste and material.

JAVYS

safely with every step



DEEP GEOLOGICAL REPOSITORY DEVELOPING

Since 1996, Slovakia commenced to deal with the issue of deep geological repository for spent nuclear fuel and highly radioactive waste. Until 2001, five locations were selected, where basic survey was made. Following the latest knowledge regarding the location selection and general experience, two locations were finally recommended. The goal is to find a geological barrier, which together with adequate technical solution and artificial barriers would provide sufficient radiation protection meeting the requirements defined by national supervising authorities, EU legislation and IAEA standards. JAVYS was assigned to further develop a proposal to continue in the project focusing on the development of deep geological repository.

SAFETY AND ENVIRONMENTAL PROTECTION

In its safety policy, JAVYS as operator of nuclear facilities committed itself the safety and security to be the priority. Maintaining and enhancing the technologies, thorough preparation and training of personnel and improving organisation and management, JAVYS continuously takes care and enhances the nuclear safety.

Environmental protection ensured through implemented integrated management system and certified environmental management system according to ISO 14001:2004 forms an integral part of any and all activities implemented by JAVYS. Attention is paid to observing the limits in all sectors of the environment (protection of water, air, landscape and countryside; waste management, handling of chemical substances and materials, prevention of severe industrial accidents, integrated prevention and pollution control), as well as the limits and terms and conditions defined by national and supervisory authorities for individual parts of the environment and their protection.



Regarding its operation, JAVYS nuclear facilities release a limited volume of radioactive gaseous and liquid substances to the environment; though their volume is very low with no adverse effect to the environment. The level of activities of releases to atmosphere and hydrosphere represent only negligible parts of the limits approved by the national supervisory authorities.

Environmental radiation control laboratories in Trnava and Levice monitor the environmental impacts; i.e. continuously monitor the surrounding environment using a network of monitoring stations and samples taken from the environment. Integrated management system defines the key principles for environmental and radiation protection. It is valid for all organisational units, its employees and, adequately, also for suppliers. The company is also thoroughly controlled by the respective state authorities – Slovak Nuclear Regulatory Authority, Public Health Office, Regional Environmental Authority, District Authorities in Trnava and Levice, as well as Regional Public Health Offices in Trnava and Levice.

SOCIAL RESPONSIBILITY

The responsibility for the society where it operates is considered by JAVYS a natural and key part of its business. Social responsibility is visible in everyday activities of Jadrová a vyradovacia spoločnosť, a.s.; namely in safety of all its activities, regard for the environment, transparency with cooperating organisations, suppliers and clients. Philanthropy forms an important part of social responsibility, focusing mainly on the support of Jaslovské Bohunice and Mochovce regions, but also elsewhere. It is mainly directed to social sphere, education and training, health care, social life and culture.



Jadrová a vyradovacia spoločnosť, a. s.
Tomášikova 22
821 02 Bratislava

Tel: +421 2 48 262 111
Fax: +421 2 48 262 905
E-mail: info@javys.sk
www.javys.sk