javys

PROVIDED SERVICES

PROCESSING-TREATMENT-TRANSPORT

MISSION

To safely, reliably, and effectively operate and decommission nuclear facilities, manage radioactive waste and spent nuclear fuel, with a minimum impact on the environment.

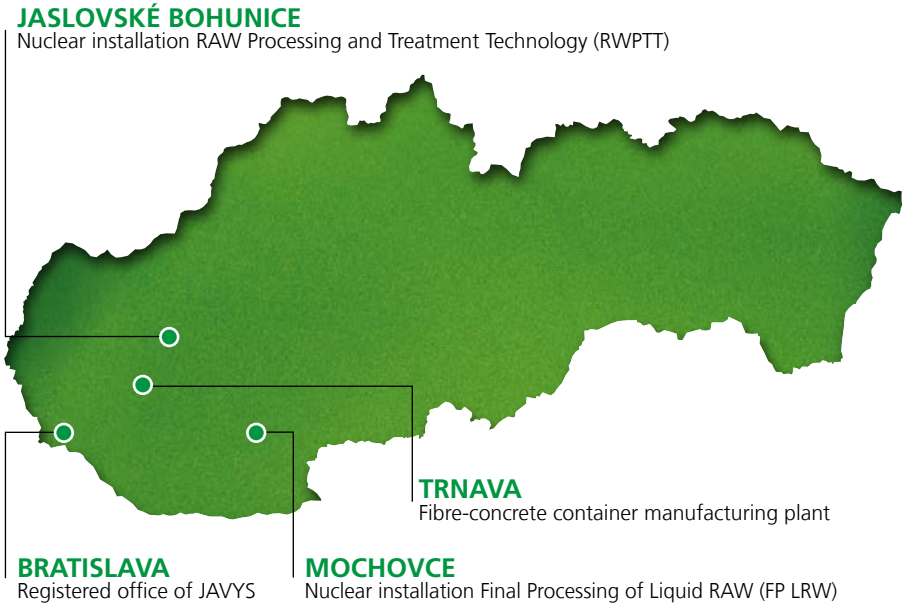
MAIN ACTIVITIES

- Decommissioning of A1 nuclear power plant (NPP)
- Decommissioning of V1 nuclear power plant
- Radioactive waste (RAW) management
- Spent nuclear fuel management
- Institutional radioactive waste (IRAW) and captured radioactive materials (CRAM)

COMMERCIAL SERVICES

- Radioactive waste characterization
- Radioactive waste processing and treatment
- Production of fibre-concrete containers
- Radioactive waste and institutional radioactive waste transport
- Spent nuclear fuel transport

JAVYS SITES



INTEGRATED MANAGEMENT SYSTEM

JAVYS utilizes the Integrated Management System (ISM), which incorporates:

- **Quality Management System (STN EN ISO 9001:2009),**
- **Environmental Management System (STN EN ISO 14001:2005),**
- **Occupational Health and Safety Management System (STN OHSAS 18001:2009),**
- **IT Services Management System (STN ISO/IEC 20000-1:2008).**

JAVYS HOLDS THE CERTIFICATES UNDER THE FOLLOWING STANDARDS

✓ ISO 9001
✓ ISO 14001
✓ ISO OHSAS 18001
✓ ISO 20000-1

NUCLEAR FACILITIES FOR RAW PROCESSING AND TREATMENT

1. Technologies for RAW processing and treatment in Jaslovské Bohunice

- Bohunice Radioactive Waste Treatment Centre (BRWTC)
- Bituminization lines
- Technologies for the sorting, fragmentation and decontamination of metal radioactive materials
- Technologies for the processing of used air-condition filters and cables

Radioactive waste from the decommissioning processes at A1 NPP and V1 NPP, the radioactive waste from two operated units of V2 NPP in Jaslovské Bohunice, and two units in Mochovce is processed and treated here, in Jaslovské Bohunice. In addition also RAW from non-nuclear facilities (institutional RAW and captured radioactive materials) is disposed here, at this working site of JAVYS company.

Bohunice Radioactive Waste Treatment Centre

Technologies used:

- sorting facility for solid RAW
- super - compacting facility for reducing the volume of non-combustible waste
- incinerator reducing the volume of solid and liquid combustible RAW
- concentration facility for liquid RAW
- cementing line for consolidation and stabilisation of concentrated waste, other liquid RAW, solid compressed waste and solid non-compressible waste

The final product is a fibre-concrete container filled with the cement mixture or with the freely loaded solid waste poured over with the cement mixture designed for permanent deposition at the National Radioactive Waste Repository in Mochovce.

Bituminization lines

The facility consists of:

- two lines for the processing of radioactive concentrates in film rotor vaporizers
- low – radiation water treatment unit for the concentration of low-radiation water constructed as a part the line technology
- discontinuous bituminization line processing radioactive ion exchangers

The final bitumen product is discharged into 200 l barrels and transported for the further treatment to BRWTC or FP LRW.

Technologies for the sorting, fragmentation and decontamination of metallic RAW

Metallic RAW, once fragmented into the prescribed size, are decontaminated either by a jet (dry method) or on a large-capacity decontamination line (wet method). The objective is to decontaminate metallic waste below the limit permitting the release of metallic material into the environment.

2. Facility for the processing of liquid RAW in Mochovce

The basic technology for the processing of liquid RAW is the processing of radioactive concentrates, saturated sorbents and sludge into a bitumen matrix, which can then be put into 200 l barrels. Subsequently the barrels are put into the fibre-concrete containers and poured over with the cement grout.

Technologies used:

- bituminization of radioactive concentrates
- discontinuous bituminization of sorbents (saturated ion exchangers)
- concentration by concentrating evaporator
- cementation

In addition to the processing of liquid radioactive waste, the handling facilities also allow the handling of solid RAW produced at NPP Mochovce and NPP Bohunice, which is fixed in the solid container of a 200 l MEVA barrel or in 60 l barrel. The barrels with solid radioactive waste are transported to this facility to be put into the fibre-concrete container and further processed through the technology of cementation up to their storage in the National Radioactive Waste Repository in Mochovce.

The final product is a fibre-concrete container filled with the cement mixture or with the freely loaded solid waste poured over with the cement mixture designed for permanent deposition at the National Radioactive Waste Repository in Mochovce.

Radioactive waste characterization

Design and implementation of RAW characterization system

Destructive analyses of RAW samples

Non-destructive inspection of RAW

Site:
Jaslovské Bohunice

References:
JAVYS

Legislation:
Stipulates criteria of the acceptance of very low and low active RAW in the repository.

1. DESIGN AND IMPLEMENTATION OF RAW CHARACTERIZATION SYSTEM

- Elaboration of RAW characterization procedure
- Setting the reference radionuclides necessary for the determination of radionuclide activity difficult to measure
- Design of software and hardware laboratory equipment necessary for RAW characterization
- Design and elaboration of methodologies for the determination of the radiochemical, physical, chemical, and mechanical properties of RAW in compliance with acceptance criteria

2. DESTRUCTIVE ANALYSES OF RAW SAMPLES

Radiochemical analysis

- gammaspectrometry
- alphaspectrometry
- liquid scintillation spectrophotometry
- total alpha and beta activity measurement

Chemical analysis:

- pH
- specific conductivity
- concentration of cations by absorption spectrophotometry
- concentration of anions by UV/VIS spectrophotometry
- concentration of boric acid by potentiometric titration
- concentration of tensides by extraction
- chemical and biological oxygen consumption
- water hardness

Physical and chemical analysis

- thermal properties of substances by differential thermal analysis
- RAW leachability index
- viscosity of solutions
- basic physical properties of bitumen (flash point, softening point, penetration, water content)
- content of soluble and insoluble substances in solutions
- sorptive capacity of ion exchangers

Mechanical properties

- determination of compression strength of cement products
- determination of discharge speed of cement paste

3. NON-DESTRUCTIVE INSPECTION OF RAW

- Determination of gamma activity of RAW in 200 l barrels (gamma scanner)
- Determination of plutonium content of RAW in 200 l barrels using the method of measuring passive neutrons (alpha scanner)

Radioactive waste processing and treatment

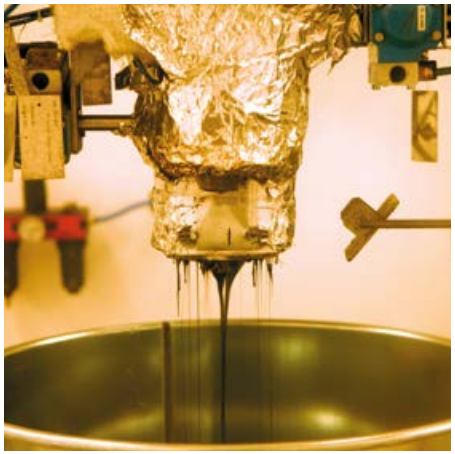
The processing of liquid and solid RAW into a form suitable for temporary storage

Processing and treatment of liquid and solid RAW into a form suitable for permanent deposition

Sites:
- Nuclear installation RAW Processing and Treatment Technology in Jaslovské Bohunice
- Nuclear installation Final Processing of Liquid RAW in Mochovce

References:
- Slovenské elektrárne, a.s. - Processing and treatment of RAW since 2006
- The National Nuclear Fund of the Slovak Republic – Processing and treatment of RAW from the decommissioning process

Legislation:
It is necessary to obtain approval from the respective nuclear safety regulatory authority of the packaging unit:
- for temporary storage of RAW (barrels, ...)
- for permanent deposition of RAW (fibre-concrete containers, ...)
- for transport of RAW (fibre-concrete containers, ISO container, ...)



Production of fibre-concrete containers

Containers as packaging units for temporary storage of solid and solidified RAW

Containers as packaging units for final deposition of treated RAW

The fibre-concrete container is made of a special fibre concrete. It consists of a body, a lid and two caps. It is of cubic shape with the external dimensions of 1.7 x 1.7 x 1.7 m and its internal volume usable for RAW treatment or RAW storage is 3 m^3. It is laid in a maximum of three layers.

The fibre-concrete containers are produced on the basis of a formulation set out by the companies SGN/SO GEFIB RE within the original contractual relation with SEP, š.p. of 1992.

References:
Since 2001 the low level waste of all producers in the Slovak Republic that comply with the acceptance criteria has been stored in the fibre-concrete containers at the National Radioactive Waste Repository.

Legislation:
It is necessary to obtain the decision of the respective nuclear safety regulatory authority, which approves a fibre-concrete container as a packaging unit for the storage, transport or deposition of RAW at the respective repository.

TRANSPORT OF SOLID OR SOLIDIFIED RAW

RAW transport containers approved under Act No. 541/2004:

- 200 l MEVA barrel of 0488 type
- transport container PK III /barrels
- ISO 20 container
- 2 EM-01 container
- transport shielding container unit for 9 barrels

Transport of solid or solidified RAW within the European Union is performed by the approved means of transport. The transport also includes the obtaining of all necessary permits for transport within the European Union.

TRANSPORT OF NEW AND FILLED FIBRE - CONCRETE CONTAINERS

RAW transport containers approved under Act No. 541/2004:

- VBK FRC AS IP2 container

Transport of new and filled fibre-concrete containers within the European Union is performed by the approved means of transport – by road and railway.

TRANSPORT OF INSTITUTIONAL RAW AND CAPTURED RADIOACTIVE MATERIALS

RAW transport containers approved under Act No. 541/2004:

- transport shielding container UK 200
- transport shielding container K9
- manual transport containers

The transport containers are designed for the transport of captured emitters.

Radioactive and institutional radioactive waste transport

Solid or solidified RAW

Fibre-concrete containers

Institutional RAW and captured radioactive materials

Transport is performed within the European Union, including services related to radiation and nuclear safety.

References:

- Slovenské elektrárne, a.s.: Transport of RAW for processing and treatment in the nuclear facilities RAW Processing and Treatment Technology in Jaslovské Bohunice
- Transport of filled fibre-concrete containers from the operation of V1 NPP, V2 NPP, Mochovce NPP to the National Radioactive Waste Repository in Mochovce
- The National Nuclear Fund of the Slovak Republic: Transport of RAW for processing and treatment on the premises of JAVYS
- Transport of filled fibre-concrete containers from the decommissioning of A1 NPP and V1 NPP to the National Radioactive Waste Repository in Mochovce

In terms of legislation it is necessary to obtain the approval of:

- RAW transport containers under Act No. 541/2004
- packaging units for permanent deposition of RAW (fibre-concrete container, ...) by the respective nuclear safety regulatory authority
- packaging units for RAW transport (fibre-concrete container, ISO container ...) by the respective nuclear safety regulatory authority

Spent nuclear fuel transport

Provision of transport including a transport container and qualified staff

References:

- Slovenské elektrárne, a.s. – Transport of spent nuclear fuel since 2006
- ČEZ – NPP Dukovany – Transport of spent nuclear fuel from Jaslovské Bohunice to NPP Dukovany

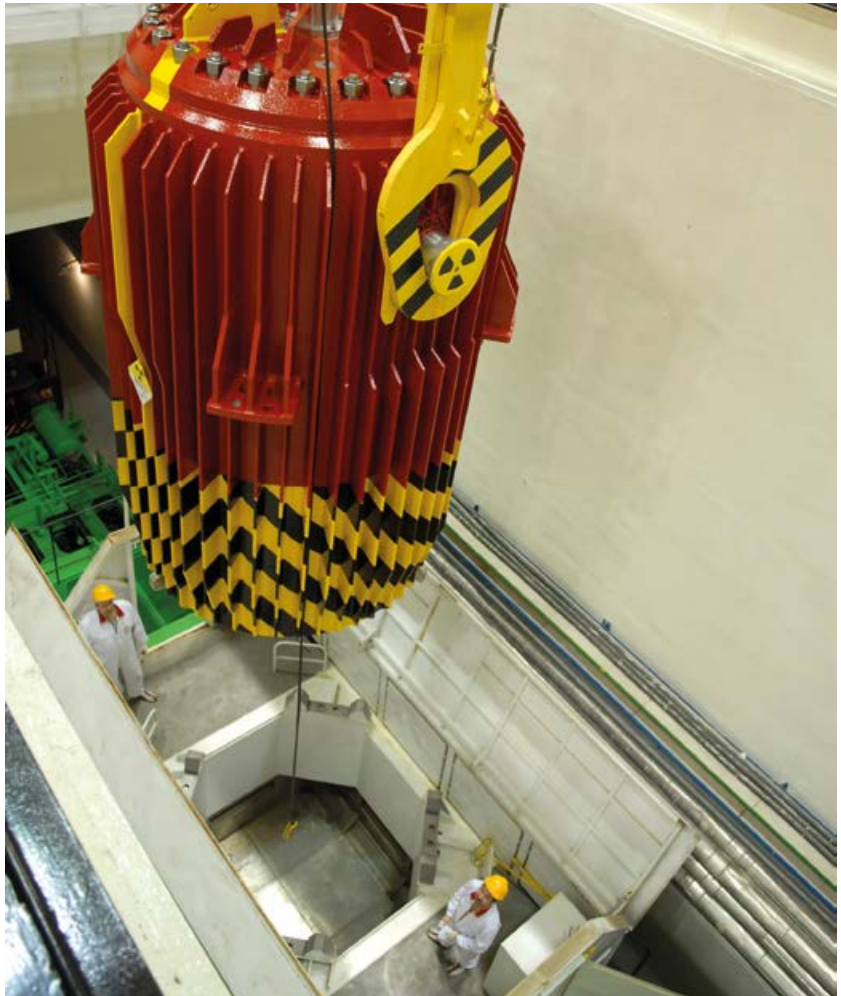
Legislation:

Transport container of C-30 type for spent nuclear fuel from the reactors of VVER 440 type is licensed as a transport facility of B (U) type.

Transport of spent nuclear fuel from VVER 440 type reactors is performed by transport container C-30, including services related to radiation and nuclear safety. The transport set consists of a transport container of the C-30 type, reservoir of the KZ-48 type (T-12 or T-13), and a railway carriage Uaais/Hx of the 9-713.0 type.

In transporting through the so-called "wet method," spent nuclear fuel is put into the reservoir of the KZ-48 type situated in the water medium in the packaging unit of a transport container of the C-30 type. In the container, above the spent nuclear fuel, a nitrogen cushion is formed with an overpressure of 0.1 MPa, which along with the incinerators of hydrogen eliminates the occurrence of an explosive mixture.

The packaging unit is firmly connected to the special railway carriage Uaais/Hx of the 9-713.0 type and they both make a transport set together.



Reservoir	KZ-48	T-12	T-13
Parameter	**Limit value**		
Maximum number of assemblies in a reservoir	48	30	18
Maximum residual performance	24 kW	24 kW	24 kW
Maximum spent degree of fuel in reservoir	55 MWd. kgU^{-1}	50 MWd. kgU^{-1}	55 MWd. kgU^{-1}
Maximum residual performance of one assembly	605 W	605 W	605 W
Maximum enrichment in % (U^{238})	4,4 %	3,82 %	4,4 %

Transport railway carriage – special railway carriage Uaais/Hx of the 9-713.0 type

Maximum design speed	100 km/h
Weight of empty carriage	43,5 t ± 2 %
Weight with empty packaging unit	112,5 t
Weight with filled packaging unit C-30	123 t
Length	19 410 mm

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