

**Report on
Environmental Impact
of JAVYS, a. s., Operation
for the Year 2016**



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I n t r o d u c t i o n

Report on the environment for the year 2016 provides comprehensive information on air protection, water and waste management, prevention of major industrial accidents, treatment of chemicals, procedures for the Environmental Impact Assessment (EIA) and activities of JAVYS, a. s., related to environmental protection.

Maintaining the certified environmental management system of JAVYS, a. s., in accordance with the standard ISO 14001:2015 Environmental Management Systems, the goal and mission to perform all activities with regard to environmental protection have been demonstrated.

At performance of all the activities, the emphasis has been put on compliance with legal requirements identified based on the legislation of SR and EU in individual areas of environmental protection, as well as on the obligation to comply with the limits and conditions of the decisions made by the national authorities and the supervisory bodies for protection of individual environmental elements.

Within the framework of an integrated management system, the environmental protection falls under the process of safety.



A i r P r o t e c t i o n

In the field of air protection, JAVYS, a. s., complies with the basic legal regulation, i.e. the Act of the National Council of the Slovak Republic No. 137/2010 Coll. on Air, as amended, and all following acts, executive decrees and regulations of the Government of the Slovak Republic.

The operation method of air pollution sources is governed by valid decisions of the national authorities and the supervisory bodies for air protection issued for JAVYS, a. s., from the source permission, definition of the emission monitoring system, to the determination of the limits of discharged pollutants into the air.

SOURCES OF AIR POLLUTION

JAVYS, a. s., is the operator of air pollution sources in the categories – large, medium, small sources.

Start-up and reserve boiler room (SuRBR)	large source
LOOS boiler in the SuRBR premises	medium source
Gas infra-red heaters in the building of the Trnava FCC production plant	medium source
Diesel generator in the pumping station at V1	medium source
Diesel generator next to the outdoor substantiation at A1	medium source
Diesel generator in the V1 sub-station at V1 (2 pcs)	medium source
Diesel generator in the Trnava FCC production plant	small source
Diesel generator at the ISFS	small source
Gas appliances (boilers) in Trnava FCC production plant	small source
Production of fibre concrete mixture in Trnava FCC production plant	small source

By 31 December 2016 the operation of two small air pollution sources was terminated - diesel generator and production of fibre concrete mixture in Trnava Fibre Concrete Container production plant. Termination of the operation of these two sources has been announced to the Municipal Office of Trnava in accordance with the generally binding regulation of Trnava City VZN No. 454.

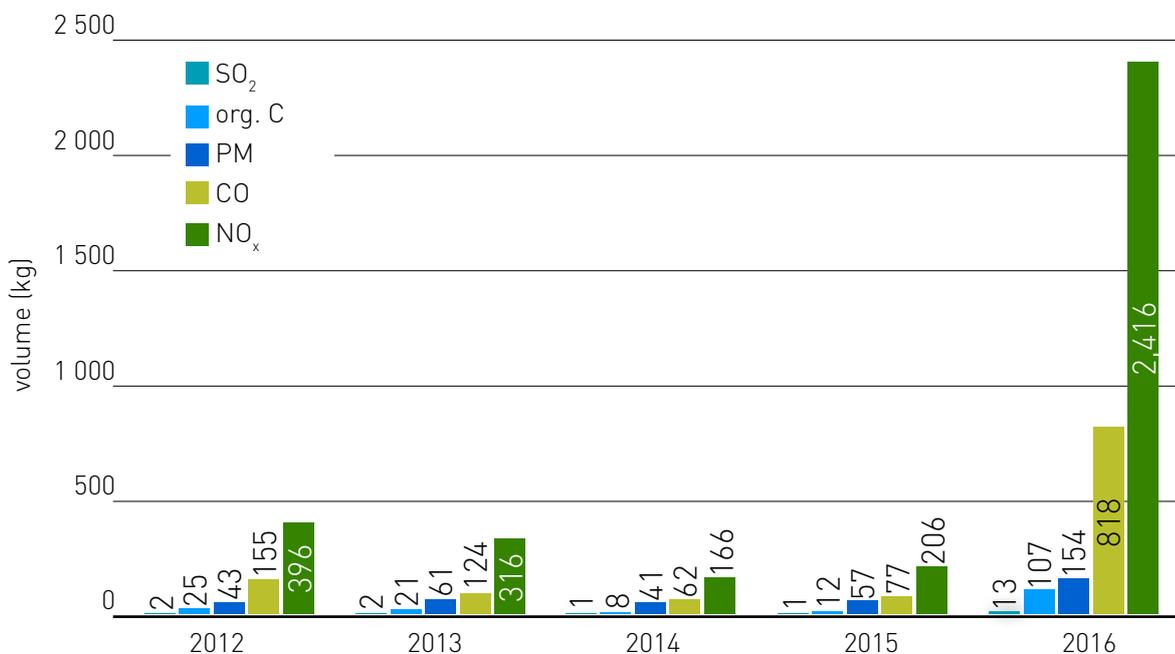
Volumes of emissions discharged from individual sources in 2016

Source of pollution	Fuel	Operational hours	Volume of pollutant (kg)				
			PM	SO ₂	NO _x	CO	C _{org}
	Natural gas (in thousand Nm ³)	hrs/year					
SuRBR	1,330.6	1,179	101.128	12.135	2,224.815	745.819	94.807
boiler LOOS	0.549	4	0.042	0.005	0.814	0.329	0.055
Gas infra-red heaters	103.4	1,441	7.862	0.943	153.300	61.909	10.318
Gas appliances (FCCP)	9.86	137	0.749	0.090	14.613	5.901	0.984
	Diesel (t)	hrs/year	PM	SO ₂	NO _x	CO	C _{org}
DG Caterpillar Olympian	0.664	14.5	0.942	0.013	3.318	0.531	0.047
DG Martin Power MP 1700	2.069	10	2.937	0.041	10.342	1.655	0.228
DG Martin Power MP 400 – 2 pcs	0.336	3	0.477	0.007	1.680	0.269	0.037
DG Caterpillar 3306	1.224	18.2	1.732	0.024	6.100	0.976	0.139
DG in FCCP	0.168	12	0.239	0.003	0.840	0.134	0.019
Production of FCM	-	-	38.184	-	-	-	-
Total from all sources (kg)			154.292	13.262	2,415.822	817.524	106.634

The indicated diesel generators have not been permanently operated, they serve as emergency sources of power supply.

In 2016, there were 444 pieces of fibre concrete containers produced, i.e. 1,909.2 t of fibre concrete mixture, representing air pollution by particular mater at the amount of 0.0382 t.

Trends of pollutants released into the atmosphere from air pollution sources of JAVYS, a. s., in the period of 2012-2016



The increased volume of pollutants discharged from SuRBR into the atmosphere in 2016 was caused by extra supply of heat in steam for the nuclear power plant V2 (SE-EBO) in the time of its planned outage (14 May – 20 June 2016) according the valid agreement between JAVYS, a. s., and SE, a. s.

Volumes of pollutants discharged from BRWTC incinerator in the period of 2012 – 2016

Pollutant (kg)	2016	2015	2014	2013	2012
HCl	1.460	1.740	9.520	0.550	23.840
HF	2.700	2.230	1.510	0.570	0.820
Hg+Tl+Cd	0.265	0.227	0.128	0.069	0.054
As+Ni+Cr+Co	1.232	1.053	0.616	0.372	0.290
Pb+Cu+Mn	1.056	0.903	0.523	0.307	0.240
SO ₂	86.670	46.730	150.320	29.360	107.000
NO _x	642.570	456.450	362.370	247.500	62.930
CO	80.770	79.840	64.930	35.730	17.170
TZL	1.610	1.380	3.320	4.890	3.550
C _{org}	11.990	12.760	6.760	6.890	11.000
Operational hours/year	6,857	5,659	3,796	3,251	2,671

The BRWTC incinerator does not fall under the Act on Air, it is not considered the source of air pollution. State supervision upon the incinerator is carried out by the Nuclear Regulatory Authority of the Slovak Republic

EQUIPMENT CONTAINING FLUORINATED GREENHOUSE GASES

Data on equipment containing fluorinated greenhouse gases indicated in the table below have been reported at the District Office Trnava, the District Office Bratislava and the District Office Levice. They are subject to the terms of operation in accordance with the Act No. 286/2009 Coll. on Fluorinated Greenhouse Gases and the Regulation of the European Parliament and the Council (EC) No. 517/2014 on Fluorinated Greenhouse Gases.

Equipment containing fluorinated greenhouse gases with volume of 5 or more tones equivalent of CO₂ Jaslovské Bohunice site and in the fibre concrete container production plant in Trnava

Building	Equipment	Filling	F Gas Volume (t equivalent CO ₂)
A1 Outdoor Switchrooms	2 compact substations 110 kV	SF ₆	2 × 2120.4
A1 Outdoor Switchrooms	6 measuring current transformers	SF ₆	6 × 91.2
A1 Outdoor Switchrooms	6 measuring voltage transformers	SF ₆	6 × 100.32
V1 Outdoor Switchrooms	4 switchboards 6kV	SF ₆	4 × 118.79
V1 Outdoor Switchrooms	2 switchboards 6kV	SF ₆	163.02
V1 Outdoor Switchrooms	1 switchboard 6kV	SF ₆	105.79
V1 Outdoor Switchrooms	1 ALSTOM AEA 01 switch	SF ₆	189.24
V1 Outdoor Switchrooms	2 pcs of EAE 10 cased VHC switch room – HYPACT	SF ₆	2 × 818.52
V1 Outdoor Switchrooms	4 pcs of AEA 02 Siemens switch	SF ₆	4 × 173.28
V1 Outdoor Switchrooms	26 switchboards 6kV	SF ₆	26 × 25.76
V1 Outdoor Switchrooms	7 switchboards 6kV	SF ₆	7 × 58.14
V1 Outdoor Switchrooms	1 switchboard 6kV	SF ₆	53.81
V1 Outdoor Switchrooms	5 switchboards 6kV	SF ₆	5 × 31.69
V1 Outdoor Switchrooms	1 switchboard 6kV	SF ₆	41.04
V1 Outdoor Switchrooms	2 switchboards 6kV	SF ₆	2 × 27.36
V1 Outdoor Switchrooms	1 switchboard 6kV	SF ₆	36.48
V1 Outdoor Switchrooms	2 switchboards 6kV	SF ₆	2 × 29.64
V1 Outdoor Switchrooms	1 switchboard 22kV	SF ₆	23.26
V1 Outdoor Switchrooms	1 switchboard 22kV	SF ₆	30.55
V1 Outdoor Switchrooms	5 Siemens AEA switch	SF ₆	5 × 57
V1 Pumping Station	2 switchboards r6-16.05	SF ₆	2 × 13.68
V1 Pumping Station	2 switchboards r6-16.05	SF ₆	2 × 25.08
V1 Pumping Station	5 switchboards r6-16.05	SF ₆	5 × 20.52
V1 Pumping Station	2 switchboards r6-16.05	SF ₆	2 × 27.36
V1 Pumping Station	2 switchboards r6-16.05	SF ₆	2 × 15.96
A1 Steam-generator building	1 air conditioning unit MITSUBISHI	R 410A	7.31
A1 Turbine hall	1 air conditioning unit PANASONIC	R 410A	5.51
Active water pumping station	2 air conditioning units DAIKIN	R 410A	2 × 5.01
A1 Administrative building	2 air conditioning units MITSUBISHI	R 410A	2 × 48.02
A1 Administrative building	1 air conditioning unit MITSUBISHI	R 410A	54.29
A1 Administrative building	1 air conditioning unit MITSUBISHI	R 410A	45.94
A1 Administrative building	1 air conditioning unit MITSUBISHI	R 410A	48.02
A1 Administrative building	1 air conditioning unit PANASONIC	R 410A	7.1
A1 Administrative building	1 air conditioning unit PANASONIC	R 410A	7.1
A1 Administrative building	1 air conditioning unit LG	R 410A	15.76
Health Care Centre	1 air conditioning unit TOSHIBA	R 410A	5.01
VUJE Administrative building	1 air conditioning unit TOSHIBA	R 410A	37.58
V1 SuRBR	1 air conditioning unit TOSHIBA	R 410A	5.01
V1 Substation	1 air conditioning unit MITSUBISHI	R 410A	12.11
V1 Administrative building	4 Split units LG	R 410A	4 × 15.76
V1 Administrative building	2 air conditioning units LG	R 410A	2 × 6.06
V1 Administrative building	1 air conditioning unit TOSHIBA	R 410A	5.85
V1 Archive	1 cooling unit LENNOX	R 410A	56.38
Physical protection building	5 air conditioning units TOSHIBA	R 410A	5 × 5.01
BRWTC	2 air conditioning units CARRIER	R 407C	2 × 51.45
Cargo lodge at JAVYS, a. s.	1 air conditioning unit TOSHIBA	R 410A	5.01
Lodge at ISFS	1 air conditioning unit TOSHIBA	R 410A	5.01
FCCP Trnava	1 air conditioning unit TOSHIBA	R 410A	5.01

Equipment containing fluorinated greenhouse gases with volume of 5 or more tones equivalent of CO₂ Bratislava site

Building	Equipment	Filling	F Gas Volume (t equivalent CO ₂)
AC Bratislava	1 air conditioning unit TOSHIBA	R 410A	22.97
AC Bratislava	1 cooling unit DAIKIN	R 410A	20.04
AC Bratislava	2 air conditioning units LG	R 410A	2 × 5.22
AC Bratislava	1 cooling unit YORK	R 407C	39.03
AC Bratislava	2 pcs VRV system DAIKIN	R 407C	2 × 19.87
AC Bratislava	1 pc VRV system DAIKIN	R 407C	20.93
AC Bratislava	1 pc VRV system DAIKIN	R 407C	11.18
AC Bratislava	1 pc VRV system DAIKIN	R 407C	11.35

Equipment containing fluorinated greenhouse gases with volume of 5 or more tones equivalent of CO₂ the Mochovce site (institutional radioactive waste material - IRAW and captured radioactive material - CRAM)

Building	Equipment	Filling	F Gas Volume (t equivalent CO ₂)
Equipment of IRAW and CRAM	1 air conditioning unit MITSUBISHI	R 410A	49.07

Equipment containing fluorinated greenhouse gases with volume of 5 or more tones equivalent of CO₂ the Jaslovské Bohunice site – equipment in the ownership of JESS

Building	Equipment	Filling	F Gas Volume (t equivalent CO ₂)
Health Care Centre	1 air conditioning unit MITSUBISHI	R 410A	17.75
JESS Administrative building	4 cooling units YORK	R 410A	4 × 48.02
JESS Administrative building	2 cooling units YORK	R 410A	2 × 6.06
JESS Canteen	1 cooling unit CARRIER	R 410A	43.12
JESS Administrative building	1 cooling unit YORK	R 407C	26.61

GREENHOUSE GAS EMISSIONS

In accordance with the Act No. 414/2012 Coll. On Emission Trading, JAVYS a. s., is a mandatory trading scheme participant. In 2016, there were **2,607 t of greenhouse gases (CO₂)** discharged into the atmosphere from the operation. The increase compared to last year (increased of 2,548 t) was caused by higher consumption of natural gas in SuRBR. The reason was in supply of heat in steam for the V2 Nuclear Power Plant (SE-EBO) during its planned outage (14. 5. – 20. 6. 2016) according to a valid agreement between JAVYS, a. s., and SE, a. s.

A report on greenhouse gas emissions from operation for the year 2016 was elaborated and it was verified by a verifier accredited under the law based on a valid order. The emission report together with the verification report was sent to the District Office Trnava and the Ministry of Environment of the Slovak Republic.

DISCHARGES OF RADIOACTIVE SUBSTANCES INTO THE ATMOSPHERE

Only small percentage of the guide limits for gaseous and liquid discharges is being discharged into the surrounding environment after repeated control measurements from nuclear facilities of JAVYS, a. s.

The objective of the guide limits for discharges is to ensure that effective dose per capita caused by discharges of radioactive substances into the atmosphere and hydrosphere from the nuclear facilities of JAVYS, a. s., Jaslovské Bohunice shall not exceed 32 $\mu\text{Sv}/\text{year}$ and from the nuclear facility of FP LRAW shall not exceed 10 $\mu\text{Sv}/\text{year}$.

Guide limits for radioactive discharges into the atmosphere are stated in limits and conditions for each nuclear facility (RAW PTT, A1 NPP, ISFS, V1 NPP, FP LRAW). These limits have been set up in the decisions of the Public Health Authority of the Slovak Republic and they have been approved by the Nuclear Regulatory Authority of the Slovak Republic.

Gaseous discharges of radioactive aerosols (β , γ) for the year 2016

Nuclear Facility	Discharge Activity	Guide Limit	% of Guide Limit
Aerosols (MPB)	311,043 Bq	6.58×10^8 Bq	0.047
Aerosols (BL a OS)	36,092 Bq	1.41×10^8 Bq	0.026
Aerosols (BRWTC a OS)	91,207 Bq	1.41×10^8 Bq	0.065
Aerosols (ISFS)	107,620 Bq	3.00×10^8 Bq	0.036
Aerosols V1 NPP	2,933 000 Bq	8.00×10^{10} Bq	0.004
Aerosols from FP LRAW	13,200 Bq	8.00×10^7 Bq	0.017

Air mass from the FP LRAW facility is not discharged directly into the environment, but it is discharged into the stack on the Mochovce Nuclear Power Plant (SE-EMO). Re-filtration of air mass and subsequent discharge into the environment is performed in facilities of SE-EMO, together with the air mass from SE-EMO.

No radioactive substances have been discharged into the atmosphere from the NRWR premises, given the nature of the repository.

In 2016, discharges from nuclear facilities of JAVYS, a. s., into the atmosphere were well below the guide limits set by the Public Health Authority of the Slovak republic.



W a t e r
M a n a g e m e n t

In the field of water protection, JAVYS, a. s., complies with the basic legal regulation – the Act of the National Council of the Slovak Republic No. 364/2004 Col., the Water Act, as amended, and all direct and indirect following acts and executive decrees as amended by later regulations.

The values of permitted quantity of discharged wastewater, the concentration and balance limits of pollutants in wastewaters, the place and method of discharges, the amount of collected surface water, etc. are determined by the applicable decisions of the national and supervisory authorities in the field of water protection issued for JAVYS, a. s.

DRINKING WATER

In the Jaslovské Bohunice site, JAVYS, a. s., uses the drinking water distribution system of Trnavská vodárenská spoločnosť for drinking and sanitary purposes.

The premises in the Mochovce site – NRWR and FP LRAW use water supply from SE-EMO as a source of drinking water.

The premises of the FCC production plant are supplied with drinking water from the public water supply system of Trnavská vodárenská spoločnosť. Supply of drinking water for the administrative centre in Bratislava is provided from the public water supply system of Bratislavská vodárenská spoločnosť.

Amount of drinking water consumed in the period of 2013 – 2016

Site	Amount of drinking water (m ³)			
	2016	2015	2014	2013
Jaslovské Bohunice	46,509	50,364	56,640	81,279
NRWR	642	791	902	254
FP LRAW	257	331	227	220
FCC Production Plant	785	997	983	995
Administrative Centre Bratislava	1,219	1,040	947	1,016
Total	49,412	53,523	59,699	83,764

The total consumption of drinking water in the year 2016 decreased of 4,111 m³ compared to the previous year, which represents reduction in the consumption of 7.68 %.

Analysis of drinking water samples

In JAVYS, a. s., the quality of drinking water is controlled in accordance with the Regulation of the Government of the Slovak Republic No. 354/2006 Coll., as amended, laying down the requirements for water intended for human consumption and the control of the quality of water intended for human consumption. In 2016, there were accredited samplings and analyses of drinking water samples carried out in the premises of the Jaslovské Bohunice and FCCP Trnava in accordance with the valid agreement. Record on testing was issued for each analysis, while in all cases the tested sample complied in the evaluated sample indicators with the limit values set out in the regulation of the Government of SR No. 354/2006, GR SR No. 496/2010 and the regulation of the Government of SR No. 8/2016 Coll.

COOLING WATER

The Site of Jaslovské Bohunice

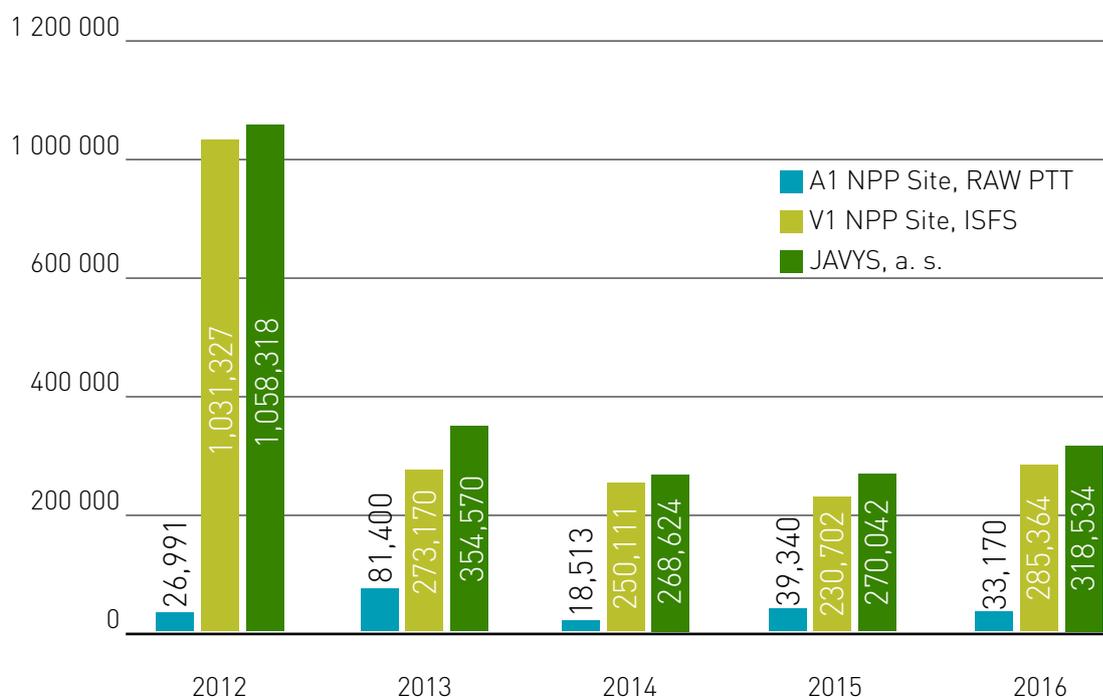
In the Jaslovské Bohunice site, surface water from Sĺňava reservoir is used as cooling water. SE-EBO is the supplier of this water.

Surface (raw) water of the River Váh is used for cooling the safety and emergency systems in V1 NPP, for the cooling the facilities for radioactive waste processing and storage and the facilities for spent nuclear fuel (ISFS). Surface water is filtered on sand filters in the raw water filter station at V1. Consumption of cooling water has had decreasing tendency since 2012.

Consumption of cooling water – the River Váh water in the period of 2012 – 2016 (m³)

Year	V1 NPP Site, ISFS	A1 NPP Site, RAW PTT	JAVYS, a. s.
2012	1,031,327	26,991	1,058,318
2013	273,170	81,400	354,570
2014	250,111	18,513	268,624
2015	230,702	39,340	270,042
2016	285,364	33,170	318,534

Amount of collected cooling water - the River Váh water (m³)



In 2016, there were 318,534 m³ of cooling water consumed with the costs incurred at the amount of 104,626.42 €.

The Site of FP LRAW Mochovce

Technological facilities of FP LRAW (bitumen lines and thickening evaporator) are connected to the supply of unimportant technical water from SE-EMO distribution system, i.e. to the system of circulation cooling water. Consumption of cooling water from January to December 2016 recorded on the invoice measurements was at the amount of 4,198 m³. Volume activity has been continuously measured in the cooling water at FP LRAW. In case of exceeding the prescribed limit values of activity the technology is set out of operation until the identification of the activity source. Active cooling water is then pumped into active wastewater. There was no increased activity of the cooling water recorded during the reported period.

WASTEWATER

The Site of Jaslovské Bohunice

In the site of JAVYS, a. s., in Jaslovské Bohunice there are several kinds of sewage systems in operation.

- Rain water sewage system – flows into the recipient Dudváh through the open channel Manivier.
- Sewage system – flows into the sewage treatment facility – BIOCLAR and then into the River Váh through the pipe drainage collector SOCOMAN.
- Industrial sewage system – water contaminated by petroleum substances flow into the central gravitational oil separator, after purification water is led to SE-EBO for treatment of additional cooling water by clarification.
- Special sewage system - flows into collecting tanks of facilities for special cleaning of radioactive water at the given site, and following the purification and inspection the wastewater is discharged under control.
- Final drainage collector SOCOMAN – discharges other wastewater from technological facilities for processing and treatment of RAW including low radioactive water into the recipient Váh.

Balance of discharged wastewater

Wastewater from the Jaslovské Bohunice site is discharged through the pipe drainage collector SOCOMAN and the open canal Manivier in accordance with the applicable decision No. OU-TT-OSŽP2-2013/00026/GI, issued by the District Office in Trnava on 24 October 2013. This authorization is valid until 31 October 2023.

In accordance with the applicable decision, JAVYS, a. s., shall not be obliged to measure quantity and quality of rainfall water discharged from JAVYS, a. s., into the recipient Dudváh. In case of outages, failures or unexpected events on the pipe drainage collector Socoman it is possible to redirect technological, sewage (after purification) and low-level wastewater into the channel Manivier through retention tanks under the approved special program. In that case, the company shall be obliged to control quantity, volume activity of corrosion and fission products and ³H as well as chemical indicators of pollution according to requirements of the applicable decision for discharges of wastewater.

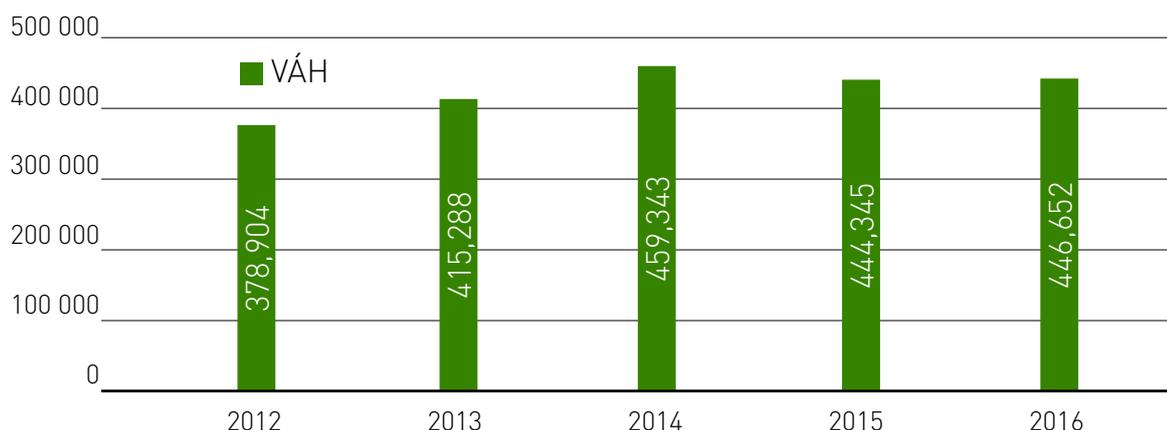
At discharging wastewater from the Jaslovské Bohunice site into the pipe drainage collector SOCOMAN or through the open channel Manivier (only under a special program), it is necessary to control quantity and quality of discharged wastewater in order to avoid exceeding the limit values set out in the applicable decision for discharges of wastewater No. OU-TT-OSŽP2-2013/00026/GI.

There was no exceeding of the limit values of pollutant indicators in wastewater during the reported period.

Amount of wastewater discharged into the recipient Váh in the period of 2012 – 2016 (m³)

Recipient	2012	2013	2014	2015	2016
The River Váh	378,904	415,288	459,343	444,345	446,652

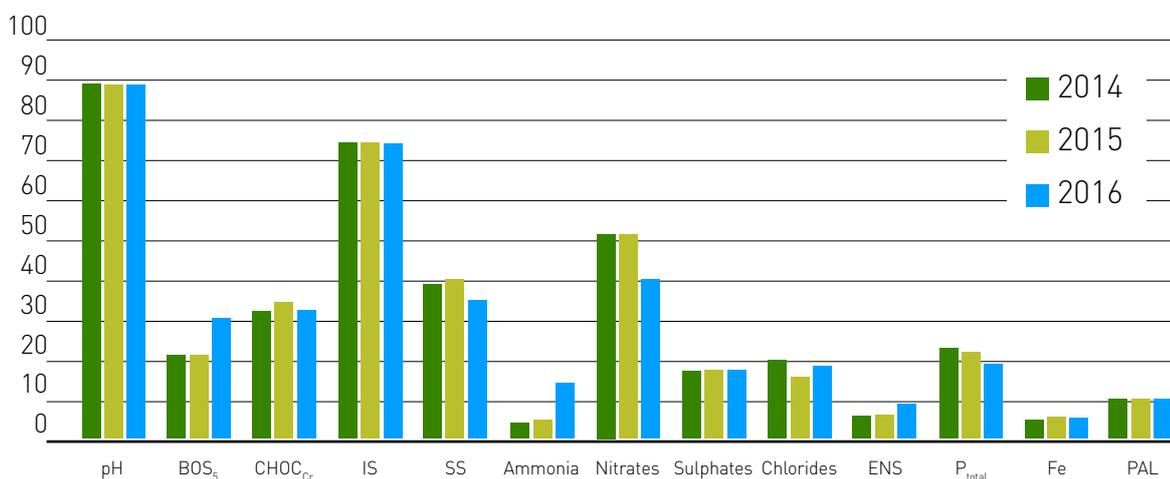
Amount of wastewater discharged into the recipient Váh in the period of 2012 -2016 (m³)



Average concentration of chemical pollution discharged into the recipient Váh

Chemical pollution indicators	Average concentration of discharged pollution (for the year 2016)	Maximum allowed concentration (decision OU-TT-OSŽP2-2013/00036/GI)
	mg/l	mg/l
Acidity, alkalinity – pH	8.075	9.00
Biochem. oxygen consumption – BOS ₅	2.446	8.00
Chem. oxygen consumption – CHOC _{cr}	9.806	30.00
Insoluble substances – IS	15.000	20.00
Soluble substances – SS	351.944	1,000.00
Ammonia – N-NH ₄ ⁺	0.571	4.00
Nitrates – NO ₃ ⁻	20.197	50.00
Sulphates – SO ₄ ²⁻	26.329	150.00
Chlorides – Cl ⁻	18.383	100.00
Extracted non-polar substances – ENS	0.031	0.35
Total phosphates – P _{total}	0.381	2.00
Iron – Fe	0.105	2.00
Detergents – PAL	0.051	0.50

Compliance with concentration values of wastewater discharged into the recipient Váh (%)



The Site of NRWR Mochovce

In the NRWR site, there is a rain water sewage system which flows into the creek Telinsky potok through the rain water tanks.

In the decision No. 00ZPŽ/6573/2011, the Chief Public Health Officer of the Slovak Republic issued permission for JAVYS, a. s., for implementation of activities leading to exposure, stating also the limits on activity of radionuclides discharged in water from surface runoff from the Mochovce NRWR. Decision No. 2015/040759 - permission for specific use of water - discharge of water from surface runoff into the surface flow of the creek Telinsky potok, was issued by the District Office Nitra, Section of Environmental Protection, department of the state water management and selected region components. In 2016, there were 2 724 m³ of water discharged from NRWR from the surface runoff into the creek Telinsky potok. Sewage water in the amount of 187 m³ accumulated in a waterproof cesspool at NRWR was removed to the wastewater treatment plant for cleaning.

On 16 February 2016 the District Office Levice issued the decision No. OU-LV-OSZP-2016/002451-Vod/Na - permission for permanent use of water constructions SO 303/RÚ "Rain Water Sewage System" and SO 105/RÚ „Capture Ditches“, built as a part of the investment project Equipment for IRAW and CRAM management in the existing site of the Mochovce NRWR.

The Site of FP LRAW Mochovce

Sewage water from FP LRAW is drained into the sewage system of SE-EMO, into the wastewater treatment plant and after purification together with the waters from SE-EMO it is discharged into the environment.

Quantity of rainwater is calculated from the total roof surface of FP LRAW and the average annual rainfall (1.7 mm/day). Rainwater is drained into the rainwater drainage system of SE-EMO, together with rainfall waters from other constructions of SE-EMO. Rainwater is collected in retention tanks and after measurement it is discharged into the environment.

The discharge of sewage water and rainwater is provided by Slovenské elektrárne, a. s.

DISCHARGES OF RADIOACTIVE SUBSTANCES INTO THE HYDROSPHERE

Only small percentage of the permitted limits for liquid discharges is being discharged after repeated control measurements from the nuclear facilities of JAVYS, a. s., into the surrounding environment.

The objective of the guide limits for discharges is to ensure that effective dose per capita caused by discharges of radioactive substances into the atmosphere and hydrosphere from the nuclear facilities of JAVYS, a. s., Jaslovské Bohunice shall not exceed 32 µSv/year, from the nuclear facility of FP LRAW shall not exceed 10 µSv/year and from the nuclear facility of NRWR shall not exceed 20 µSv/year.

Guide limits for radioactive discharges into the surface water are stated in limits and conditions for each nuclear facility of JAVYS, a. s., (RAW PTT, A1 NPP, ISFS, V1 NPP, FP LRAW, NRWR). These limits have been set up in the decisions of the Public Health Authority of the Slovak Republic and they have been approved by the Nuclear Regulatory Authority of the Slovak Republic.

Regulation of the discharged activities in wastewater is carried out by measuring the volume activity of tritium, corrosive and fission products, and quantity of water in the collection tanks for RAW PTT, A1 NPP, ISFS and V1 NPP while water discharge is also checked by continuous monitoring in measurement structures. Low-level water also includes water discharged from implementation of the standard operation of groundwater remediation pumping from the well N-3 (SO 106), for which the permission was issued by the District Office Trnava in accordance with Act No. 364/2004 Coll. on Water.

Discharge of low-level water from the Jaslovské Bohunice site (including remediation pumping from the site of RAW PTT and A1 NPP) into the recipient Váh

2016	Activity of radionuclides in wastewaters of the recipient Váh							
	The site of V1 NPP, ISFS				The site of A1 NPP, RAW PTT			
	CFP (MBq)	tritium (GBq)	% of the guide limit CFP*	% of the guide limit $^3\text{H}^*$	CFP (MBq)	tritium (GBq)	% of the guide limit CFP**	% of the guide limit $^3\text{H}^{**}$
Spolu	25.943	3.410	0.1996	0.170	7.873	140.814	0.066	1.408

* guide limit for CFP is 13,000 MBq; guide limit for tritium is 2,000 GBq

** guide limit for CFP is 12,000 MBq; guide limit for tritium is 10,000 GBq

The recipient Dudváh – discharge of low-level water

In 2016, there was no low-level radioactive water discharged into the recipient Dudváh.

Active discharges into the hydrosphere from NRWR and FP LRAW

Only water from surface runoff is discharged at NRWR. The limits of indicators for discharged water were not exceeded during the reported period. The measured values (^3H , ^{60}Co , ^{137}Cs , ^{90}Sr , $^{239+240}\text{Pu}$) were at the level of the detection limits.

The volume of 2,724 m³ of water with total activity of 6.61×10^5 Bq was discharged into the hydrosphere, i.e. into the creek Telinský potok.

The table shows percentage evaluation of the total activity of individual radionuclides in 2,724 m³ of the discharged volume from surface runoff to limits and conditions. The limits for volume activity of radionuclides in discharged water, laid down in the decision of the Chief Public Health Officer, were not exceeded in any of the indicators in the reported period.

Data on quality of discharged rain waste water from NRWR

Radionuclide	Discharge Activity (Bq)	Guide Limit (Bq/year)	% of Guide Limit
^3H	6.82×10^6	1.88×10^{10}	0.033
^{137}Cs	5.80×10^4	2.28×10^7	0.281
^{60}Co	3.30×10^4	2.24×10^7	0.254
^{90}Sr	5.70×10^5	2.44×10^8	0.245
^{239}Pu	1.60×10^4	5.56×10^5	4.286

Two kinds of secondary active liquid waste are produced in FP LRAW. These active media (wastewater, bride condensate) are not discharged into the environment (active discharges), but they are pumped into the system of SE-EMO for further processing.

Data on quality of discharged secondary active wastewater from FP LRAW into SE-EMO

Radionuclide	Wastewater V = 39,48 m ³	Bride Condensate V = 28,5 m ³	Total Activity	Annual Bq Limit	% of the Limit
Tritium (Bq)	6.49×10^8	3.36×10^8	9.85×10^8	3.0×10^{11}	0.33
Corrosion and fission products (Bq)	2.606×10^9	4.2×10^7	2.648×10^9	3.9×10^9	67.897

Note: Wastewater and bride condensate are purified in SE-EMO, i.e. contribution in discharges into the environment are even lower.

In 2016, JAVYS, a. s., did not exceed the limit for tritium activity in discharged water and discharges of corrosion and fission products in wastewater were under the authorised limits.

GROUNDWATER MONITORING AND PROTECTION

The Site of Jaslovské Bohunice

Monitoring and protection of groundwater and soil water in the Jaslovské Bohunice site and its surroundings has been carried out since 1997 in accordance with the approved monitoring program. The long term and regularly monitored radiation situation in the groundwater of the site at RAW PTT and A1 NPP is currently stabilized. The system of continuous remediation pumping has been in operation on the site since 2000.

There have been activities implemented under the project of A1 NPP decommissioning, which have removed the primary sources of contamination of soil and, consequently, contamination of groundwater.

An independent study called Necessity of Remediation Pumping in the Site of A1 NPP has been elaborated to assess effectiveness and suitability of the implemented groundwater remediation pumping (the well N-3). The study recommends keeping the continuous groundwater remediation pumping without changes in the remediation procedure.

Evaluation of standard operation of groundwater remediation pumping from the well N-3

Remediation Pumping 2016	Drawn CFP Activity (MBq)	Drawn Guide Limit of CFP* (%)	Drawn Activity of tritium (GBq)	Drawn Guide Limit of ³ H* (%)	Pumped Water Volume (m ³)
Total	1.68	0.014	65.73	0.657	180,683.6

* Values of "Drawn Guide Limit" have been set up by the decision, guide limit of CFP = 1.2×10^4 MBq, guide limit of ³H = 1.0×10^4 GBq

Besides monitoring inside the company premises, there have been also monitoring of the surroundings carried out. On the basis of the groundwater monitoring results in the vicinity of the Jaslovské Bohunice site, it is possible to observe significant improvement of the radiation situation (decrease in the level of volume activities of tritium to an insignificant level reaching the level of natural background) in the vicinity of the villages Malženice and Žlkovce.

The Site of NRWR Mochovce

There are 52 monitoring wells (groundwater) in the site and in its vicinity of NRWR, from which samples were taken according to the current schedule for 2016, and then chemical and radiochemical analyses were carried out.

Besides monitoring of groundwater, there was also drainage water monitored. Volume activity of individual radionuclides in drainage water in 2016 was below the limit set by the Chief Health Officer of the Slovak Republic in the Decision No. 00ZPŽ/6573/2011.

Drainage water has been discharged through rain tanks. Its quantity and analyses have been included in discharged waters.

Results of chemical and radiochemical analyses of water

Measured Quantity	Activity (Bq/l)
³ H	< 5
Total beta activity	< 1
¹³⁷ Cs	< 0.75
⁶⁰ Co	< 0.82
⁹⁰ Sr	< 0.10
²³⁹ Pu	< 0.05

Results of radiochemical measurements are at the background level and during operation there have not been any negative impacts on the environment in the site of NRWR and in its surroundings.



4

W a s t e M a n a g e m e n t
(I n a c t i v e W a s t e)

In 2016, JAVYS, a. s., complied with the basic regulation in the field of waste management (inactive waste) – the basic legal regulation - the Act of the National Council of the Slovak Republic No. 79/2015 Coll. on Waste, as amended, and all following laws and executive orders, in the wording of later regulations. The new Act on Waste entered in force on 1.1.2016.

The Site of Jaslovské Bohunice

Waste management is performed through collection, separation and storage in the premises reserved for these purposes – Waste Collection Site. Waste of hazardous category is temporarily stored, prior to its final disposal, in the appropriate technologically secured premises in order to avoid its negative impact or threat to life and health of people, property and the environment.

Composition of waste produced directly or indirectly results from the activities related to the business of JAVYS, a. s.

In 2016, there was waste produced in JAVYS, a. s., in categories of other waste (O) and hazardous waste (H) according to the catalogue of waste [Decree of the Ministry of Environment o SR No. 365/2015 Coll.], municipal waste and biodegradable waste.

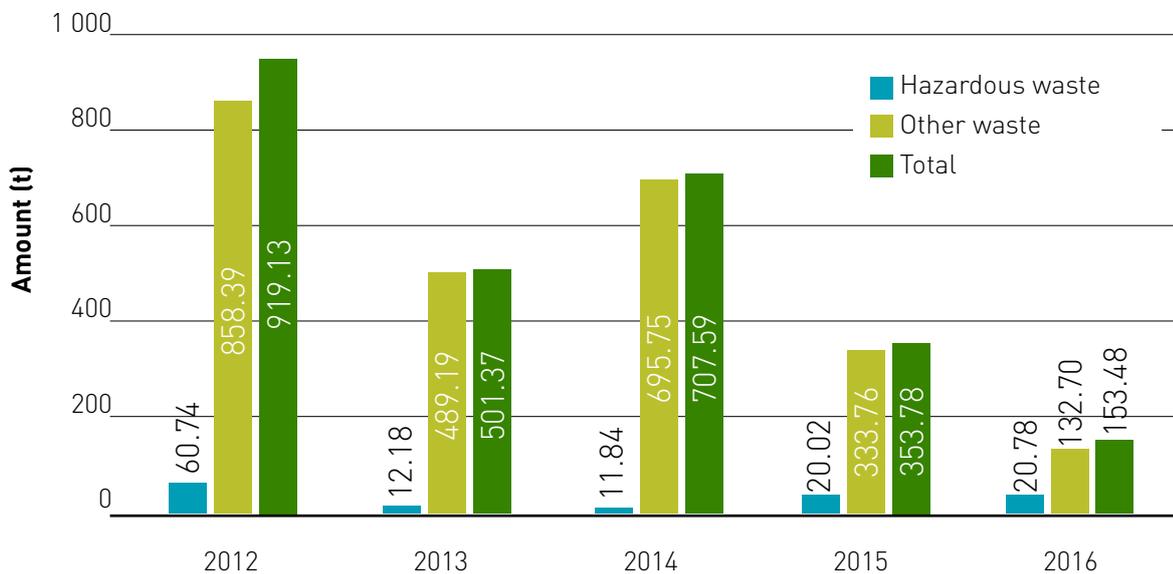
Amounts and types of other waste produced in 2016

Catalogue Number	Waste Type	Waste Name	Amount (kg)	Recovered	Disposed
080318	0	Waste toner cartridge for printers other than 080317	1,590		✓
150101	0	Paper and paperboard packaging	1,670	✓	
150102	0	Plastic packaging - PET	740	✓	
150106	0	Mixed packaging	3,000		✓
160214	0	Discarded equipment other than those indicated in 160209-13	27,400	✓	
170201	0	Wood	14,520		✓
170203	0	Plastic	860	✓	
170302	0	Bituminous mixtures other than 170301	18,110		✓
170403	0	Lead	920	✓	
170604	0	Insulation materials other than in 170601 to 03	63,890		✓
Total Amount (kg)			132,700	31,590	101,110
Total Amount (%)			100	23.81	76.19

Amounts and types of hazardous waste produced in 2016

Catalogue Number	Waste Type	Waste Name	Amount (kg)	Recovered	Disposed
060101	H	Sulphuric acid and sulphurous acid	40		✓
060104	H	Phosphoric acid and phosphorous acid	260	✓	
060106	H	Other acids	700	✓	
060201	H	Calcium hydroxide	150		✓
060204	H	Sodium hydroxide and potassium hydroxide	420		✓
080111	H	Waste paints and varnish containing organic solvents and DS	2,100		✓
080409	H	Waste adhesives and sealants containing DS	320		✓
090104	H	Fixer solutions	480		✓
130506	H	Oil from oil/water separators	540	✓	
130507	H	Water containing oil from oil/water separators	620	✓	
160213	H	Discarded equipment containing NL other than in 09-12	400	✓	
160506	H	Laboratory chemicals consisting of DS, containing DS	1,040		✓
160508	H	Discarded organic chemicals consisting of DS, containing DS	140		✓
160601	H	Lead-acid batteries	4,470	✓	
170409	H	Metal waste contaminated by DS	800		✓
191206	H	Wood containing DS	8,300	✓	
Total Amount (kg)			20,780	15,290	5,490
Total Amount (%)			100	73.58	26.42

Amounts of other waste and hazardous waste produced in the period of 2012 – 2016



Amounts of municipal waste and biodegradable waste produced in 2016

Catalogue Number	Waste Type	Waste Name	Amount (kg)	Recovered	Disposed
200301	0	Mixed municipal waste	30,190		✓
200201	0	Biodegradable waste	30,180	✓	
Total Amount (kg)			60,370	30,180	30,190
Total Amount (%)			100	49.99	50.01

Waste recovery and disposal are provided by companies with appropriate permits and authorizations for the treatment of individual types of waste. Disposal of municipal waste is carried out through municipalities in relevant localities (Trnava, Bratislava, Jaslovské Bohunice) in accordance with generally binding regulations of municipalities.

The Site of Mochovce

In the site of Mochovce, mixed municipal waste was produced at NRWR and FP LRAW in the total amount of 1.812 tons.

Collection and disposal of waste from the premises in Mochovce is provided through a service provider, i.e. SE-EMO.

The background features a dark green gradient with several glowing, ethereal light trails in shades of cyan and yellow. These trails are composed of multiple overlapping, semi-transparent lines that create a sense of motion and depth. A large, semi-transparent number '5' is positioned on the left side of the page, partially overlapping the text.

Serious Industrial
Accidents

In the field of prevention of serious industrial accidents, JAVYS, a. s., complies with the basic legal regulation – the Act of the National Council of the Slovak Republic No. 128/2015 Coll. on Prevention of Major Industrial Accidents and on modifications and amendments of certain acts as well as all following acts and executive orders, in the wording of later amendments.

Categorisation of JAVYS, a. s., in the view of the existing legal regulations for serious industrial accidents

Within the meaning of the Act No. 128/2015 Coll. based on the quantity and characteristics of dangerous substances present in the Jaslovské Bohunice site, Jadrová a vyradovacia spoločnosť, a. s., is not included in categories “A” or “B”.

Nevertheless, the company is obliged to continue in regular monitoring of quantity, fire characteristics and type of dangerous substances present in the premises of the company and in case it is necessary to change the classification the company is obliged to send a new notification to the District Office in the seat of the region.

The application “Management of chemical substances” is used to monitor treatment of dangerous chemical substances. The application includes classification of all chemical substances and mixtures purchased and used in the company and also those brought into the premises of JAVYS, a. s., by contractors and tenants. All chemical substances and mixtures are categorized according to the Chemical Act, the Act on Water and the Act on Prevention of Major Industrial Accidents.



Environmental Impact
Assessment in accordance
with the Act No. 24/2006 Coll.
on Environmental Impact
Assessment (EIA)

In the field of environmental impact assessment, JAVYS, a. s., complies with the basic legal regulation – the Act of the National Council of the Slovak Republic No. 24/2006 on Environmental Impact Assessment and on amendments to certain acts, as amended.

Environmental Impact Assessment Procedures

In 2016, the process of Environmental Impact Assessment was completed. Completion of the storage capacity of the Interim Spent Fuel Storage (ISFS) in the site of Jaslovské Bohunice by issuing the final statement of the Ministry of Environment of the Slovak Republic No. 1604/2016-3.4/hp dated on 11 February 2016. This final statement recommended implementation of variant No. 3 Expansion of the storage capacity for spent nuclear fuel (SNF) by dry storage method with construction connection to the existing building of the Interim Spent Fuel Storage, using storage containers (canisters) for up to 85 cassettes of SNF placed in the reinforced concrete storage modules of the SNF storage.

Activities performed at authorisation of assessed activities

Amendment of the Act on Environmental Impact Assessment by the Act No. 314/2014 Coll. provided coherence of the results of the environmental impact assessment process with subsequent permitting procedures. The Applicant (JAVYS, Inc.) shall be obliged under Section 38 of the Act No. 24/2006 Coll. to prove conformity of performed activities with the results of the assessment and the conditions of the final standpoint of the Ministry of Environment of the Slovak Republic. In 2016, there was a written evaluation elaborated on fulfilling the conditions indicated in the final standpoint for the following activities:

- Decommissioning of the A1 Nuclear Power Plant - Stage III and Stage IV - issue of the permission by the Nuclear Regulatory Authority ÚJD SR No. 369/2016,
- Extension of the National Radioactive Waste Repository in Mochovce for disposal of low-level radioactive waste and construction of the disposal for very low-level radioactive waste,
- Radioactive Waste Processing and Treatment Technologies JAVYS, a. s., in the site Jaslovské Bohunice.

The evaluation was submitted to the permitting authority in order to obtain a binding standpoint of the Ministry of Environment of the Slovak Republic, which assessed compliance of the authorizing procedures with the Act No. 24/2006 Coll. Subsequently, decisions of the relevant permitting authority (ÚJD SR) were issued:

- Decision No. 369/2016 – the permission for Decommissioning of the A1 Nuclear Power Plant - Stage III and Stage IV,
- Decision No. 329/2016 – the permission to use the disposal for very low-level waste Mochovce - Stage I,
- Decision No. 559/2016 – the permission to use Processing and treatment of chrompicks on a Chrompic Vitrification Facility (VICHK).

To grant approvals for implementation of changes pursuant to § 2 letter v) of the Atomic Act, there were the justifications elaborated for the submitted changes, which did not represent a change of the proposed assessed activities and therefore they were not subject to assessment under the Act No. 24/2006 Coll.:

- Amendment of the operational procedure 8-INŠ-601 Declaration of the content of radionuclides in RAW processed on BRWTC prior to their disposal at NRWR, issue No. 4, revision No. 2,
- Implementation of the project Dismantling of Insulations in the Controlled Area of V1 NPP, BIDSF D4.3A, where the RAW Management Plan was changed, rev. No. 4.

Together with the Periodical Safety Review of the nuclear facility FP LRAW, there was the post-project analysis elaborated in accordance with § 39 of the Act No. 24/2006 Coll., which was submitted to ÚJD SR as a part of the Report on Periodic Nuclear Safety Review of the nuclear facility FP LRAW.

Based on the results of the post-project analysis and the binding standpoints of the Ministry of Environment of the Slovak Republic to individual permissions, it can be stated that JAVYS, a. s., performs all the assessed activities in accordance with the final standpoint of the Ministry of Environment of the Slovak Republic and thus also in accordance with the Act on Environmental Impact Assessment.



E n v i r o n m e n t a l
M a n a g e m e n t S y s t e m

Maintaining the certified environmental management system in accordance with the standard ISO 14001:2015 Environmental Management Systems, JAVYS, a. s., performed all activities with regard to environmental protection in 2016.

In the context of procedural approach, environmental protection has been regularly inspected and verified by internal audits of IMS at which the environmental management system has been also examined. In 2016, there was an audit of IMS focused on examination of the environmental protection requirements at FCCP Trnava. During the audit, performed on 27-28 October 2016, there were no discrepancies identified.



A b b r e v i a t i o n s

AC	Administrative Centre
As	Arsenic
Bq	Becquerel
BIDSF	Bohunice International Decommissioning Support Fund (V1 NPP)
BL	Bitumen Line
BRWTC	Bohunice Radioactive Waste Treatment Centre
Corg.	Organic Carbon
Cd	Cadmium
CFP	Corrosion and Fission Products
CO	Carbon Monoxide
Co	Cobalt
Cr	Chrome
CRAM	Captured Radioactive Material
Cs	Caesium
Cu	Copper
DG	Diesel Generator
DS	Dangerous Substance
EIA	Environmental Impact Assessment
EU	European Union
FCC	Fibre Concrete Container
FCCP	Fibre Concrete Container Production
FP LRAW	Final Processing of Liquid Radioactive Waste
GBq	Giga Becquerel
H	Hazardous (Waste)
³H	Tritium
HCl	Hydrogen Chloride
HF	Hydrogen Fluoride
Hg	Mercury
IMS	Integrated Management System
IRAW	Institutional Radioactive Waste
ISFS	Interim Spent Fuel Storage
JAVYS, a. s.	Jadrová a vyradovacia spoločnosť, a. s.
JESS	Jadrová energetická spoločnosť Slovenska, a. s.
MBq	Mega Becquerel
ME SR	Ministry of Environment of the Slovak Republic
Mn	Manganese
MPB	Main Production Building
Ni	Nickel
NOx	Oxides of Nitrogen
NPP	Nuclear Power Plant
NRWR	National Radioactive Waste Repository
O	Other (Waste)
OS	Outdoor Structures
Pb	Lead
PM	Particular Matter
P_{Total}	Total Phosphorus
Pu	Plutonium
RAW	Radioactive Waste
RAW PTT	Radioactive Waste Processing and Treatment Technologies
SAP	Source of Air Pollution
SE-EBO	Slovenské elektrárne, a. s., Bohunice Nuclear Power Plant
SE-EMO	Slovenské elektrárne, a. s., Mochovce Nuclear Power Plant
SF₆	Sulphur Hexafluoride
SNF	Spent Nuclear Fuel
SO₂	Sulphur Dioxide
Sr	Strontium
SR	The Slovak Republic
SuRBR	Start-up and Reserve Boiler Room
Tl	Tellurium
ÚJD SR	Nuclear Regulatory Authority of the Slovak Republic



Jadrová a vyrad'ovacia spoločnosť, a. s.
Tomášikova 22
821 02 Bratislava

www.javys.sk