JAVYS Operation Environmental Impact Report 2011

Content

1. Introduction

The 2011 Environmental impact assessment (EIA) report provides comprehensive information about waste and water management, air pollution protection, prevention of major industrial accidents, environmental impacts assessment processes, and environmental protection related activities undertaken by JAVYS.

The goal and mission of JAVYS – to apply environmental friendly approach and environmental protection – is proven by maintenance of the certified environmental management system in accordance with the "Environmental Management Systems" ISO 14001:2004 Standard.

Environmental protection requirements defined both in Slovak and EU legislation as well as the obligation to observe the limits and terms stipulated in decisions governing environmental protection issued by the state and supervisory authorities are translated to all JAVYS activities.

Environmental protection is one of the crucial processes of the integrated management system. IMS Policy also includes environmental policy.

2. Air Protection

With regard to air protection, JAVYS observes the key legislation – the National Council of the Slovak Republic Act No. 137/2010 Coll. on Air as amended as well as all directly and indirectly related laws and regulations.
The decisions issued by the relevant state and supervisory air protection authorities – District Environmental Office in Trnava and Slovak Environmental Inspection in Bratislava - define the air pollution sources operation method, issue the permit for source operation, and define the emission monitoring system and the limits for discharge of pollutants.

Air Pollution Sources

Jadrová a vyraďovacia spoločnosť, a.s., operates several air pollution sources in three categories – major, medium, and minor sources.

Auxiliary boiler plant (NaRK)	major source
LOOS boiler located in NaRK building	medium source
Gas boiler room	medium source, owned by JESS
BR WTC Incineration facility	medium source
Infrared emitters in FCC production unit in Trnava	medium source
Diesel generator V1	medium source
Diesel generator in FCC production unit in Trnava	minor source
Diesel generator ISFS	minor source
Fibre concrete mixture production in FCC production unit in Trnava	minor source

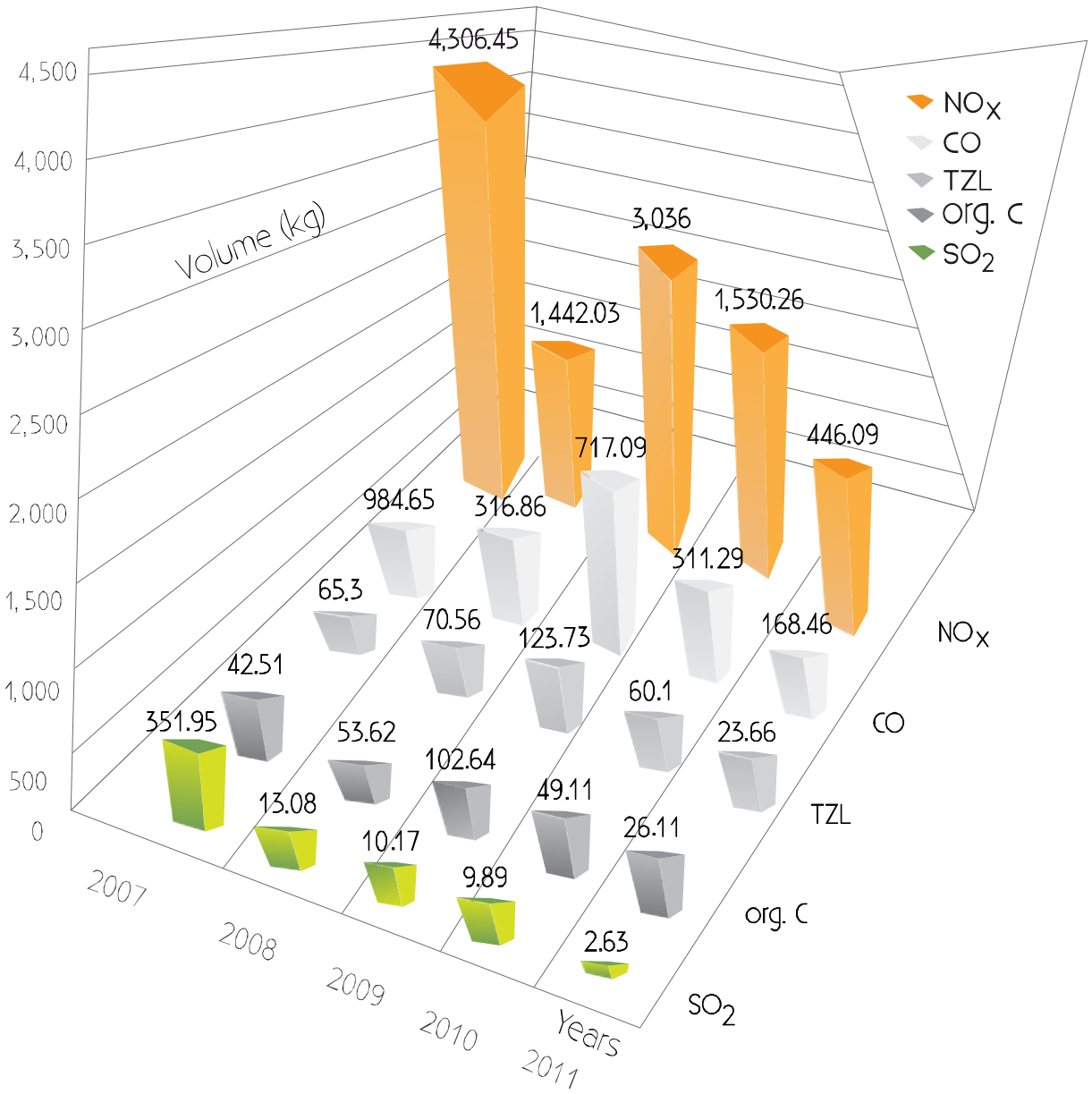
Emissions from individual sources in 2011

SOURCE	Fuel	Pollutant (t)				
		TZL	SO_2	NO_x	CO	C_{org}
	Natural gas (m^3)					
Auxiliary boiler plant (NaRK)	87,651	0.006662	0.000798	0.146551	0.049127	0.006245
Boiler LOOS	1,593	0.000121	0.000014	0.002362	0.000954	0.000159
Gas infrared emitters	91,619	0.006963	0.000835	0.135779	0.054834	0.009139
Gas boiler room	104,373	0.007932	0.000952	0.154679	0.062467	0.01041
	Diesel (t)					
Diesel generators (V1) with 1.680 MW input	0	0.0	0.0	0.0	0.0	0.0
Diesel generator ISFS	1.344	0.001908	0.000026	0.00672	0.001075	0.000153

Diesel generator in FCC production unit does not work non-stop. In 2011, 60 l of diesel oil was used to check the operation capability during one-hour testing operation.

The operating permit for fibre-concrete mixture production was issued by the Municipal Authority in Trnava on March 10th 2010. In 2011, 352 FCC containers were produced, i.e. 1,513.6 tons of fibre-concrete mixture (0.03027 tons of TZL).

Pollutants discharged to atmosphere during the period 2007 – 2011



BR WTC Incineration plant – volumes of pollutants released during the period 2007 – 2011

Pollutant	2007 (t)	2008 (t)	2009 (t)	2010 (t)	2011 (t)
HCl	0.002	0.001	0.002	0.00105	0.00054
HF	0.002	0.006	0.011	0.00896	0.000113
Hg + Tl + Cd	0.003	0.0009	0.00002	0.000035	0.000034
As + Ni + Cr + Co	0.012	0.004	0.0003	0.00043	0.00033
Pb + Cu + Mn	0.002	0.0006	0.00008	0.000157	0.000205
SO_2	0.347	0.011	0.005	0.00611	0.00405
NO_x	3.593	0.989	1.17	0.85275	0.67666
CO	0.726	0.168	0.093	0.07838	0.05793
TZL	0.036	0.02	0.004	0.00523	0.00561
C_{org}	0.045	0.029	0.018	0.01446	0.01247
Number of operation hours	6,037	7,574	6,143	5,342	4,851

Equipment containing fluorinated greenhouse gases

Facilities stated in the table were notified to the District Environmental Authority in Trnava and District Environmental Authority in Bratislava. Their operating conditions are governed by Act No. 286/2009 Coll. on Fluorinated Greenhouse Gases and Regulation No. 842/2006 of the European Parliament and of the Council on Certain Fluorinated Greenhouse Gases.

Facilities containing more than 3 kg of fluorinated greenhouse gases

Building	Unit	Substance	Total volume (kg)	Number pc	Owner
A1 external switching station	compact 110 kV switching station	SF_6	186	2	JAVYS
A1 external switching station	current transformer	SF_6	24	6	JAVYS
A1 external switching station	voltage transformer	SF_6	26.4	6	JAVYS
Special laundry	air conditioning unit	R 410A	8	1	JAVYS
Special laundry	air conditioning unit	R 410A	11	1	JAVYS
V1 administrative building	split unit	R 410A	7.55	1	JAVYS
Building	split unit	R 410A	7.55	1	JAVYS
V1 administrative building	split unit	R 410A	7.55	1	JAVYS
AC Bratislava	air conditioning unit	R 410A	11	1	JAVYS
Health care centre	air conditioning unit	R 410A	8.5	1	JESS
Administrative building	cooling unit	R 410A	2 x 23	2 cooling circuits	JESS
Administrative building	cooling unit	R 410A	2 x 23	2 cooling circuits	JESS
V1 administrative building	split unit	R 407C	3.2	1	JAVYS
V1 administrative building	split unit	R 407C	3.2	1	JAVYS
V1 administrative building	split unit	R 407C	4.3	1	JAVYS
V1 administrative building	split unit	R 407C	4.5	1	JAVYS
V1 administrative building	split unit	R 407C	3.1	1	JAVYS
V1 administrative building	split unit	R 407C	3.2	1	JAVYS
AC Bratislava	cooling unit	R 407C	22	1	JAVYS
AC Bratislava	VRV system	R 407C	11.2	1	JAVYS
AC Bratislava	VRV system	R 407C	6.3	1	JAVYS
AC Bratislava	VRV system	R 407C	6.3	1	JAVYS
AC Bratislava	VRV system	R 407C	11.2	1	JAVYS
AC Bratislava	VRV system	R 407C	11.2	1	JAVYS
Administrative building	cooling unit	R 407C	15	1	JESS

Radioactive releases to the atmosphere

JAVYS nuclear facilities only release small portions of the limits approved for gaseous releases to the environment, and these are subject to multiple control measurements. The approved limits for releases guarantee that under standard or specific operating conditions the annual radiation limit for a person of 0.25mSv/year is not exceeded as a consequence of overall releases of radioactive substances to the atmosphere from nuclear power plant operation and from all sources.

Limit values for radioactive releases are defined in individual Limits and Terms of JAVYS (RAW PTT, A1 NPP, ISFS and V1) and were stipulated by decisions issued by the Slovak Public Health Authority and approved by the Nuclear Regulatory Authority of the Slovak Republic.

Gaseous releases in 2011

Nuclear facility	Release activity	Annual limit	% of the annual limit
RAW PTT and A1 NPP aerosols	2,789.836 kBq	9.4×10^5 kBq	0.297
ISFS aerosols	765.083 kBq	3.0×10^5 kBq	0.255

V1 NPP	Release activity		Annual limit		% of the annual limit
Inert gases	2.058	TBq	2,000	TBq	0.103
Aerosols (from gamma spectrometry, without ^{55}Fe)	3.470	MBq	80,000	MBq	0.004
Iodine	0.423	MBq	65,000	MBq	0.001

NRWR and FP LRW atmosphere monitoring

No radioactive substances were released from NRWR taking into account its characteristics. 493,490,000 m^3 of air was released from FP LRW to SE-EMO smokestack, with the overall activity of 97,274 Bq.

In 2011 releases to the atmosphere from JAVYS nuclear facilities were deeply below the limits approved by the Slovak Public Health Authority.

3. Water Management

JAVYS observes the key water protection legislation – the National Council of the Slovak Republic Act No. 364/2004 Coll. "Water Act" as amended, as well as all directly and indirectly related laws and regulations.

Limits for volumes of discharged wastewater, concentration and balance limits of pollutants in wastewater, the place and method of discharge, volume of surface water, etc., are defined in decisions issued for JAVYS by the state and supervisory water management authorities.

Drinking water

In the Jaslovské Bohunice site, JAVYS is connected to the drinking water pipeline of Trnava Water Utility. NRWR and FP LRW in Mochovce use SE, a.s.- EMO plant facilities for drinking water supply.
The FCC production premises in Trnava are connected to the drinking water pipeline of Trnava Water Utilities, drinking water for the administrative centre in Bratislava is supplied from the Bratislava Water Utilities drinking water pipeline.

Drinking water consumption during the period 2009 – 2011

SITE	Volume (m^3) of drinking water		
	2009	**2010**	**2011**
J. Bohunice Site	164,413	165,673	176,550
NRWR	208	243	194
FP LRW	275	288	250
FCC production unit	1,134	1,467	1,011
AC Bratislava	2,218	1,823	1,792
TOTAL	**168,248**	**169,494**	**179,797**

Cooling water

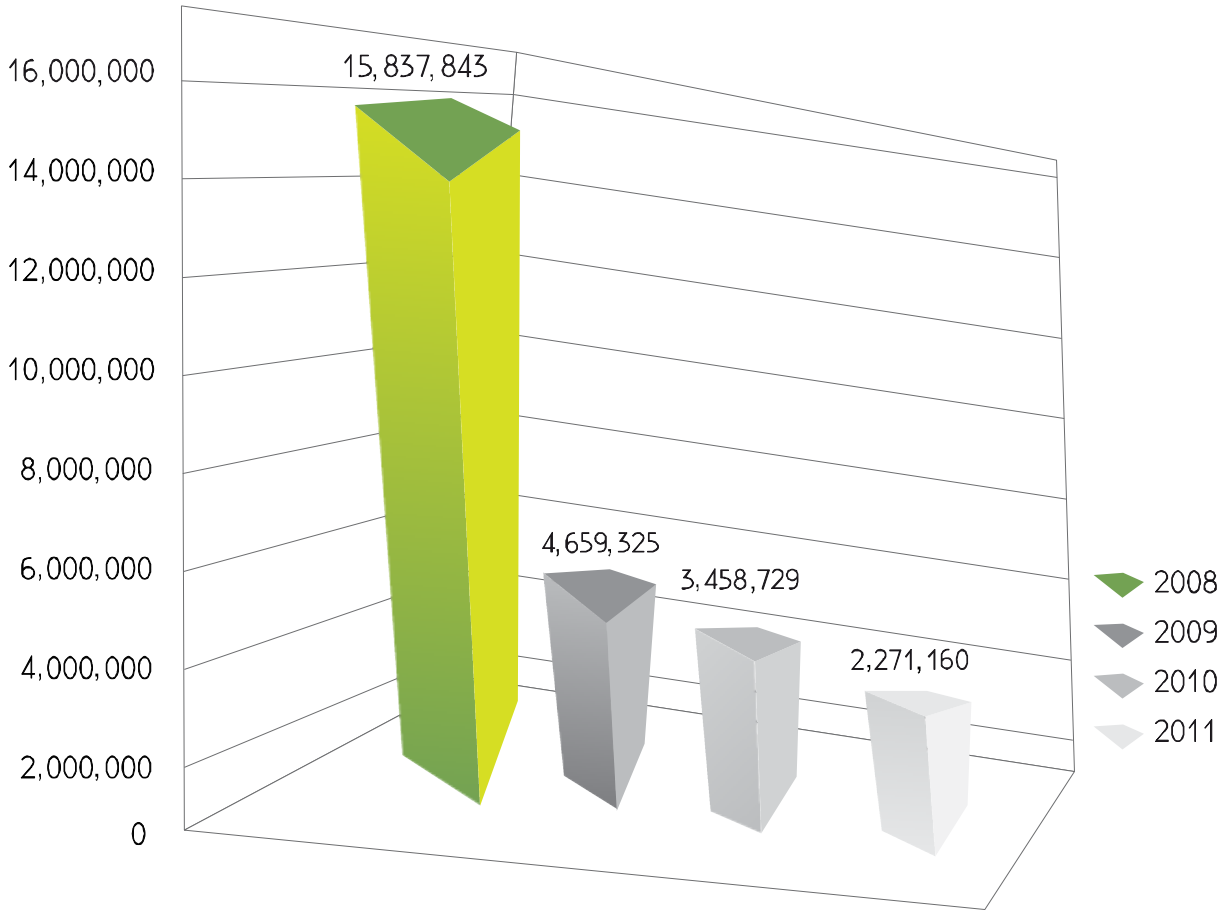
Jaslovské Bohunice

Surface water from the Sĺňava water reservoir is used for cooling in Jaslovské Bohunice. Cooling water is supplied by SE-EBO.
Surface (raw) water from the Váh River is used for cooling the NPP V1 safety and emergency systems, and for cooling radioactive waste processing and repository operations. Until the end of 2009 supplied water was filtered through sand filters in Pumping and filtration station in Pečeňady. Since January 1st 2010, SE-EBO has been supplying surface water not treated in sand filters. Cooling water consumption has been decreasing since 2009.

Cooling water consumption during the period of years 2008 – 2011

Year	Cooling water consumption – water from the Váh River (m^3)		
	V1 Site	A1 Site	JAVYS
2008	15,755,053	82,790	15,837,843
2009	4,612,000	47,325	4,659,325
2010	3,436,698	22,031	3,458,729
2011	2,236,568	34,592	2,271,160

Cooling water consumption - water from the Váh River during 2008 – 2011 (m^3)



FP LRW Mochovce

The FP LRW technology lines (bitumenisation plant and thickening evaporator) are linked to a pipeline supplying unimportant technical water from the SE-EMO distribution pipelines, which provide circulating cooling water. The consumption of cooling water recorded and measured for invoicing purposes was 18,269 m^3 during the reporting period from January until December 2011. Volume activity is measured non-stop in FP LRW cooling water, and if the defined activity limits are exceeded, the operation is stopped until the source of activity is identified. Active cooling water is then pumped to active wastewater. No increased activity of cooling water was recorded during the reporting period.

Wastewater

Jaslovské Bohunice

In the JAVYS Site at Jaslovské Bohunice the below specified pipelines are operated:

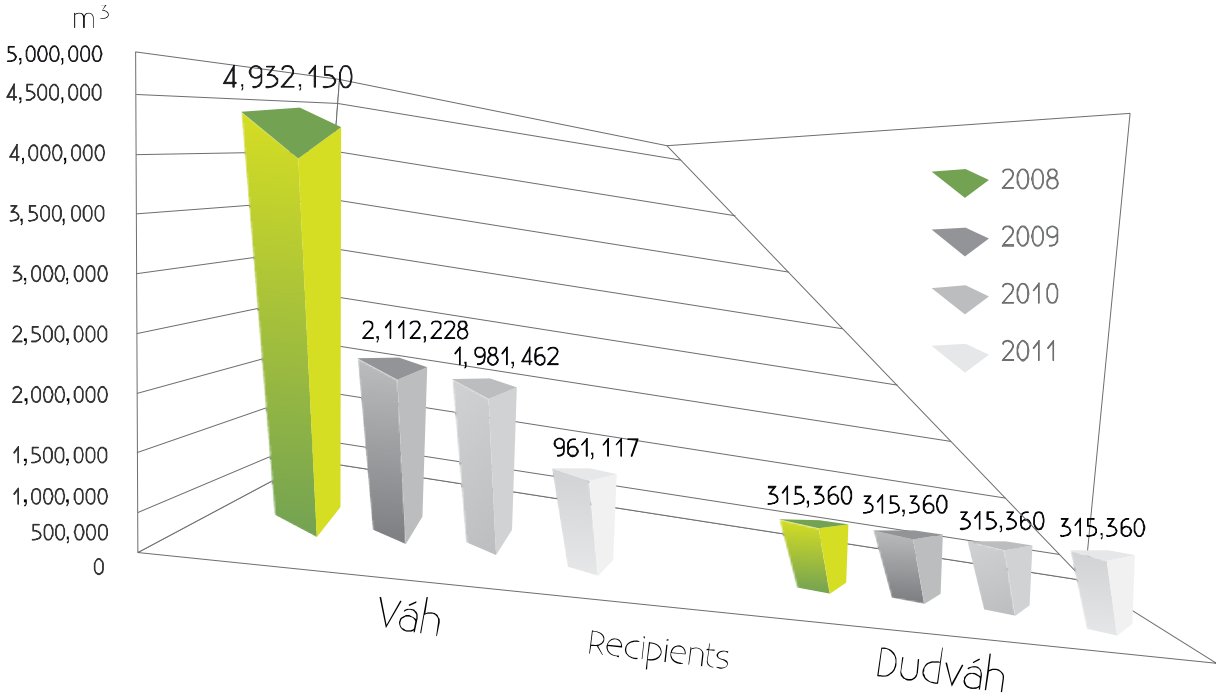
- Rain water pipeline runs into the Dudváh River through the open Manivier Canal
- Sewage flows into wastewater treatment plant – BIOCLAR, and then to the Váh River through the SOCOMAN pipelines collector
- Industrial wastewater – water polluted with crude oil flows into a central gravitational oil separator; the cleaned water then runs to a coagulation unit for supplementary cooling water treatment in SE-EBO.
- The special sewer runs to special tanks collecting active wastewater from individual sites for further processing. It is treated, checked and then discharged (in an organized way)
- The trunk sewage collector SOCOMAN drains other wastewater, including low-radiation wastewater from RAW processing and treatment technology units, to the Váh River.

Discharged wastewater balance

Wastewater discharge permit No. KÚŽP-1/2006/00273/Fr (č. KÚŽP-1/2008/00582/Gl) from JAVYS, a.s. Jaslovské Bohunice site issued by the Regional Environmental Authority in Trnava was valid until December 31st 2010; its validity was prolonged until December 31st 2014 by the decision of the Regional Environmental Authority in Trnava No. KÚŽP-1/2010/00465/Mj.
By Decision No. KÚŽP-1/2011/00451/Gl the permit was changed regarding the previous decisions. The limits determined in the changed permit fall within the permitted limits for activities of radionuclides discharged in wastewater to the Váh River from V1 NPP and to the Dudváh River from V1 NPP. Within the context of decommissioning of V1 NPP the annual values of tritium activity released to the Váh and Dudváh River were decreased in this decision compared to the previous decision.
KŠP and H volume activity is monitored in wastewater released from the JAVYS, a.s. site, as well as chemical pollution indicators defined in the respective decisions issued for the company. No approved pollutant limits were exceeded during the reporting period in wastewaters. In accordance with Government Regulation No. 269/2010, establishing the requirements to achieve a good condition of water, wastewater ecotoxicity tests were done. According to summary results of ecotoxicological tests water discharged to the Váh and Dudváh River was identified as non-toxic.

Volume of wastewater discharged to the recipients Váh and Dudváh during the period 2008 – 2011 (m^3)

Recipient	2008	2009	2010	2011
Váh	4,932,150	2,112,228	1,981,462	961,117
Dudváh	315,360	315,360	315,360	315,360



Average concentration of chemical pollutants discharged to the recipient - the Váh River

Chemical indicators	Average concentration of the discharged pollution in 2011	Maximum concentration limit (Decision No. 1/2006/00273/Fr issued by the KÚ ŽP)
mg/l	**mg/l**	**mg/l**
Acidity, alkalinity – pH	7.819	9.00
Biochemical oxygen consumption – BSK_5	4.558	8.00
Chemical oxygen consumption – $CHSK_{Cr}$	11.458	30.00
Insoluble solids – NL	14.167	20.00
Soluble solids – RL	376.333	1,000.00
Ammonia – N-NH_4^+	1.387	4.00
Nitrates – NO_3^-	17.886	50.00
Sulphates – SO_4^{2-}	31.504	150.00
Chlorides – CL^-	20.478	100.00
Non-polar extract. solids – NEL	0.035	0.35
Total phosphate – $P_{celk.}$	0.456	2.00
Iron – Fe	0.161	2.00
Hydrazine hydrate – N_2H_4	0.000	NA
Detergents – PAL	0.051	0.50

Average concentration of chemical pollutants discharged to the recipient – the Dudváh River

Chemical indicators	Average concentration of the discharged pollutants in 2011	Maximum concentration limit (Decision No.1/2006/00273/Fr of issued by the KÚ ŽP)
(mg/l)	mg/l	mg/l
Acidity, alkalinity – pH	8.445	9.00
Chemical oxygen consumption – $CHSK_{Cr}$	13.917	30.00
Insoluble solids – NL	16.667	40.00
Soluble solids – RL	368.833	1,000.00
Sulphates – SO_4^{2-}	78.550	150.00
Chlorides – CL-	21.142	100.00
Non-polar extract. solids – NEL	0.033	0.35
Total phosphate – $P_{celk.}$	0.292	2.00
Iron – Fe	0.366	2.00
Hydrazine hydrate – N_2H_4	0.020	2.00

Low-radiation water discharged (including water from remediation pumping in A1) to the Váh River

2011	Activity of radionuclides in wastewater dischared into the Váh River							
	V1 Site				A1 Site			
	KŠP (MBq)	Tritium (GBq)	% of KŠP* limit utilisation	% of ^3H* limit utilisation	KŠP (MBq)	Tritium (GBq)	% of KŠP** limit utilisation	% of ^3H** limit utilisation
Total	**22.747**	**576.614**	**0.17**	**28.83**	**102.593**	**346.423**	**0.85**	**3.46**
* limit of KŠP is 13,000 MBq; limit of tritium is 2,000 GBq (since July 20th 2011)								
** limit of KŠP is 12,000 MBq; limit of tritium is 10,000 GBq								

Low-radiation water discharged into the Dudváh River

2011	Activity of radionuclides in wastewater discharged into the Dudváh River							
	V1 Site				A1 Site			
	KŠP (MBq)	Tritium (GBq)	% of KŠP limit utilisation	% ^3H of limit utilisation	KŠP (MBq)	Tritium (GBq)	% of KŠP* limit utilisation	% of ^3H* limit utilisation
Total	**0**	**0**	**0**	**0**	**0.357**	**0.002**	**0.297**	**0.005**
*limit of KŠP is 120 MBq; limit of tritium is 37 GBq								

From August 1st to November 20th 2011 low-radiation surface (rain) water was discharged from A1 Site into the Dudváh River based on implementation of PRG-82/5110/A1/2009 "Programme for Selection, Sorting, and Disposal of Waste from Low-Active Soil Repository Pool".

NRWR Mochovce

The NRWR Mochovce rain water pipeline runs through rain water collection tanks to the Telinský Creek. The Public Health Officer of the Slovak Republic issued Decision No. OOZPŽ/6573/2011 for JAVYS, a.s., approving activities leading to radiation, which also includes "activity limits for radionuclides released into water from surface water running from the NRWR Mochovce". The decision concerning discharge of surface water was issued by the Environmental Department of the Regional Authority in Nitra. In 2011, 4,458 m^3 of surface water was discharged into the Telinský Creek from NRWR.
Volume activity limits of radionuclides in discharged water defined in the Decision of the Public Health Officer of the Slovak Republic were not exceeded during the reporting period.

Quality of drain water discharged from NRWR

Radionuclide	Limit (Bq/year)	Released Activity (Bq)	% of limit utilisation
Tritium	$1.88x10^{10}$	$<5.99x10^{6}$	0.032
Cs-137	$2.28x10^{7}$	$<1.52x10^{5}$	0.666
Co-60	$2.24x10^{7}$	$<1.80x10^{5}$	0.804
Sr-90	$2.44x10^{8}$	$<3.18x10^{5}$	0.130
Pu-239	$5.56x10^{5}$	$<2.90x10^{4}$	5.179

FP LRW Mochovce

Sewage from the FP LRW runs into the SE-EMO sewer that leads to the wastewater treatment plant, and after treatment it is discharged into the environment together with other SE-EMO water.
The volume of rain water is calculated from the overall surface area of the roofs of the FP LRW building and annual rainfall (1.7 mm/day). Rain water runs into the SE-EMO rain water pipeline together with other rain water caught in other SE-EMO buildings. The rain water is collected in retention basins, measured, and then discharged into the environment. Rain water and sewage services are managed by SE, a.s.

Radioactive releases into the hydrosphere

The JAVYS nuclear facilities only release small portions of the limits approved for liquid releases into the environment, and these are subject to multiple control measurements. The approved limits for releases guarantee that under standard or specific operating conditions the annual radiation limit for a person – 0.25mSv/year, is not exceeded as a consequence of overall releases of radioactive substances into the hydrosphere from nuclear power plant

operation and from all sources. Limit values for radioactive releases are defined in JAVYS Limits and Terms (RAW PTT, A1 NPP, ISFS, and V1) and were determined by decisions of the Public Health Authority of the Slovak Republic and approved by the Nuclear Regulatory Authority of the Slovak Republic.
The volume activity of tritium and corrosive and fission products is measured to check the activity of released wastewater, as well as the volume of water in collection tanks for NPP A1 and V1; water in the measured buildings is also monitored to supplement the monitoring of the discharged water. Low-radiation water is discharged together with water pumped out during the standard operation of remediation pumping of underground water from the drill No. N-3 (SO 106) that is governed by the permit issued by the Regional Authority in Trnava under the Water Act No. 364/2004 Coll.

Liquid releases into the hydrosphere – RAW PTT, A1 NPP and ISFS

Recipient Váh	Release activity	Annual limit	% of the annual limit
Corrosive and fission products	102.593 MBq	1.2×10^4 MBq	0.855
Tritium	346.423 GBq	1×10^4 GBq	3.464
Volume of discharged water	195,577 m^3		

Recipient Dudváh	Release activity	Annual limit	% of the annual limit
Corrosive and fission products	0.699 MBq	1.2×10^2 MBq	0.582
Tritium	0.002 GBq	3.7×10^1 GBq	0.005
Volume of discharged water	66 m^3		

From August to November 2011 discharge of rain water trapped during excavation work related to PRG-82/5110/A1/2009 "Programme for Selection, Sorting and Disposal of Waste from Low-Active Soil Repository Pool".

Liquid releases into the hydrosphere – V1 NPP

Wastewater from V1 NPP runs through the pipeline collector SOCOMAN to the Váh River through the Drahovský Kanal;
The volume activity of tritium and corrosive and fission products is measured to check the activity of the released wastewater, as well as the volume of water in the collection tanks for RAW PTT, A1 NPP, ISFS a JE V1.

Recipient Váh	Release activity	Annual limit	% of the annual limit
Corrosive and fission products	19.286MBq	13,000 MBq	0.148
Tritium (limit decreased since July 20th 2011)	576.6 GBq	2,000 GBq	28.831
Volume of discharged water	9,175 m^3		

Recipient Dudváh	Release activity	Annual limit	% of the annual limit
Tritium (limit decreased since July 20th 2011)	0.000 GBq	20 GBq	0.000
Volume of discharged water	0.000 m^3		

Liquid releases into the hydrosphere – NRWR and FP LRW

NRWR

Only surface water was discharged from the NRWR, and no limit indicators were exceeded during the reporting period. The measured values (Tritium, ^{60}Co, ^{137}Cs, ^{90}Sr, $^{239,240}Pu$) were ranging around detection limits. Water in volume of 4,458 m^3 with total activity of $6.698x10^6$ Bq was released to hydrosphere, i.e. to the Telinský Creek.

Total radionuclides activity in surface water

Radionuclide	Release activity Bq	Annual limit Bq	% of the annual limit
^{3}H	5.99×10^{6}	1.88×10^{10}	0.03
^{137}Cs	1.52×10^{5}	2.28×10^{7}	0.67
^{60}Co	1.80×10^{5}	2.24×10^{7}	0.80
^{90}Sr	3.41×10^{5}	2.44×10^{8}	0.14
^{239}Pu	0.31×10^{5}	5.60×10^{5}	5.54

FP LRW

Two types of secondary radioactive liquid waste are generated in the FP LRW. These active media (wastewater, vapour condensate) are not released into the environment (active releases) but are pumped to the SE-EMO system for further treatment and processing.

Radionuclide	Wastewater	Vapour condensate V = 199.2 m^3	Total activity	Limit Bq	% of the limit
Tritium (Bq)	1.18×10^{9}	15.46×10^{9}	1.664×10^{10}	3.0×10^{11}	5.55
Corrosive and fission products (Bq)	0.1689×10^{9}	0.4385×10^{9}	0.607×10^{9}	3.9×10^{9}	15.56

Note: Wastewater and vapour condensate are cleansed in SE-EMO, so releases into the environment are lower.

In 2011 the JAVYS Company did not exceed the tritium activity limit in the released water, and parameters of other corrosive and fission products in wastewater were far lower than the approved limits.

Underground water monitoring and protection

A1 Site

Underground and soil water monitoring and protection in the Jaslovské Bohunice Site and its surrounding have been performed since 1997 by means of suppliers under the monitoring program and 8-PLN-010 Emergency Actions Plan against pollution of surface and underground water in JAVYS in part "Underground Water", in cooperation with EKOSUR Company. Radiation in underground water within the A1 site is stabilised at the moment; long term and regular monitoring is in place. Since 2000, there is ongoing remediation pumping system operating that removes contaminated underground water from the geological surroundings, and the movement of residual contamination outside of the area is thus mitigated. Activities to gradually remove soil and subsequently underground water contamination sources are performed within the project to decommission the NPP A1. Independent study was prepared entitled "The need of remediation pumping in A1 NPP site" in order to assess the efficiency and suitability of underground water remediation pumping from building N° 106 (drill N-3), which recommended to continue with the non-stop remediation pumping of underground water without any further adjustments in the approach already applied.

Assessment of the standard operation of underground water remediation pumping from N-3 drill

Remediation pumping 2011	Spent KŠP activity	KŠP* limit utilisation	Spent tritium activity	3H* limit utilisation	Volume of pumped water in m³
	MBq	%	GBq	%	
Total	5.22	0.044	130.06	1.301	189,644.87

* The values in columns "limit utilisation" are those defined by the respective decision, KŠP limit = $1{,}2.10^4$ MBq, ^{3}H limit = $1{,}0.10^4$ GBq

Besides monitoring inside the company premises, also the surrounding environment is monitored. Monitoring of underground water results around the Bohunice site has led to a significant improvement of the radiation situation near the villages of Malženice and Žlkovce (tritium volume activity lowered to insignificant level reaching the background values).

NRWR Mochovce

There are 52 monitoring drills (underground water) within and around the NRWR, from which samples were taken in accordance with the approved time schedule in 2011, and then chemical and radiochemical analyses were done.
Besides underground water, drainage water is also monitored in the NRWR, where the volume activity of radionuclides was below the limits approved by the Public Health Officer of the Slovak Republic for the year 2011 in Decision No. OOZPŽ/6573/2011.
Rain water collection tanks are used to discharge drainage water that is analysed together with the discharged water.

Results of chemical and radiochemical analyses of water

Measured parameter	Activity value (Bq/l)
^{3}H	< 2.2
total beta activity	< 1
^{137}Cs	< 0.27
^{60}Co	< 0.26
^{90}Sr	< 1
^{239}Pu	< 0.06

The results of radiochemical measurements show only background values, and no adverse environmental impacts were recorded during the operation in the NRWR or its surroundings.

4. Waste Management (non-active waste)

JAVYS observes the key law governing the waste management (non-active waste) - the National Council of the Slovak Republic Act No. 223/2001 Coll. on Waste as amended and all directly or indirectly linked legislation.

Jaslovské Bohunice

Waste management in JAVYS includes collection, sorting, and storage of waste in premises assigned for those purposes – the waste collection centre. Waste classified as "hazardous" is temporarily stored in adequate and technologically secured premises in order to avoid any adverse impact or danger to the life and assets of people and the environment. The types of generated waste result both directly and indirectly from business activities of JAVYS.
According to the Waste Catalogue (the Ministry of Environment of the Slovak Republic Ordinance No. 284/2011 Coll.) JAVYS generated waste in the following categories: other (O), hazardous (N), municipal, and biodegradable waste.

Volume and type of other waste generated in 2011

Catalogue No.	Type of waste	Waste characteristics	Volume (kg)	Reused (kg)	Disposed (kg)
170904	O	Mixed construction and demolition waste	9,150		•
170604	O	Insulation materials other than those mentioned in 170601a 3	99,160		•
170411	O	Cables – aluminium made	3,050	•	
170407	O	Iron scrap	224,200	•	
170402	O	Aluminium	38,837.9	•	
170401	O	Copper	320.8	•	
170101	O	Concrete	575,903		•
160214	O	Discarded equipment other than those mentioned in 160209-13	8,160	•	
160104	O	Old vehicles not containing liquids and other dangerous parts	1,560	•	
160103	O	Used tyres	340	•	
150106	O	Mixed packaging	1,170		•
150102	O	Plastic packaging	440	•	
150101	O	Paper and cardboard	2,660	•	
		Total volume	**964,951.7**	**279,568.7**	**685,383**

Volume and type of hazardous waste generated in 2011

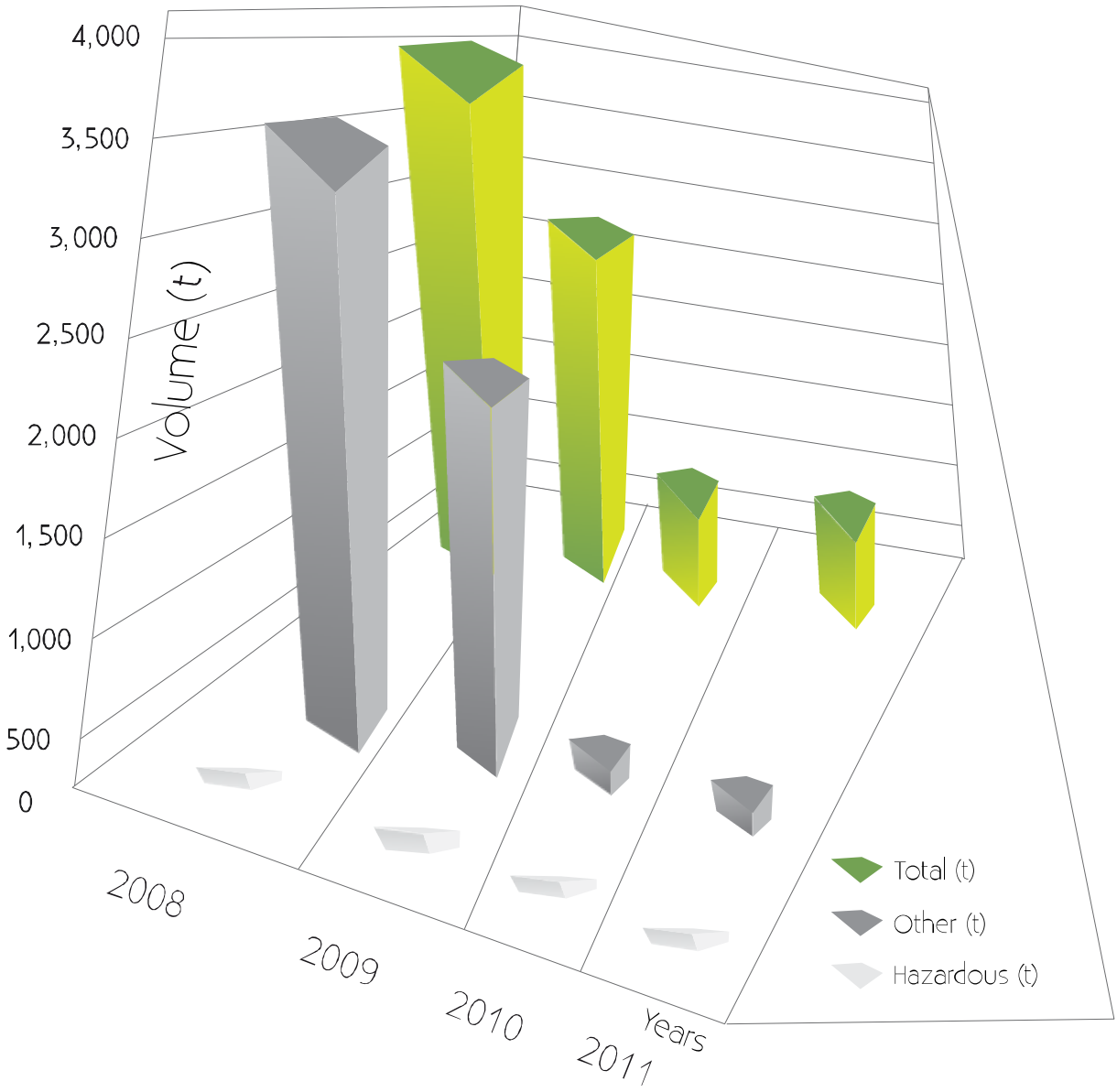
Catalogue No.	Type of waste	Waste characteristics	Volume (kg)	Zhodnotené (kg)	Zneškodnené (kg)
180108	N	Cytotoxic and cytostatic drugs	14		•
170503	N	Soil and aggregates containing hazardous substances	570		•
160601	N	Lead batteries	2,080	•	
160506	N	Laboratory chemicals	490		•
160213	N	Discarded equipment containing hazardous parts	1,250	•	
150202	N	Absorbents, filtration materials, clothes containing hazardous substances	130		•
150110	N	Packages containing hazardous substances	1,740		•
130802	N	Other emulsions	550		•
130502	N	Oil/water separator sludge	8,160		•
130208	N	Other motor, gear, and lubrication oils	45,800	•	
90104	N	Fixing agent solutions	780	•	
80409	N	Waste glues and sealing materials containing hazardous substances	530	•	
80317	N	Waste toner	410		•
60404	N	Waste containing mercury	140		•
		Total volume	**62,644**	**49,130**	**13,514**

Compared to 2010 the total volume of other waste generated in 2011 is **1,954.1 kg** lower. The volume of hazardous waste generated in 2011 was higher by **40,780 kg**. This increase was caused by disposal of waste turbine oil related to the decommissioning of V1 NPP.

Volumes of municipal and biodegradable waste generated in 2011

Catalogue No.	Type of waste	Waste characteristics	Volume (kg)	Reused (kg)	Disposed (kg)
200301	O	Mixed municipal waste	98,620		•
200201	O	Biodegradable waste	196,740	•	
		Total	295,360		

Volumes of other and hazardous waste generated in the period 2008 – 2011



Waste disposal and recycling is supplied by companies that were granted the relevant permits and authorisations to dispose of individual types of waste. Municipal waste is disposed by the respective municipalities (Trnava, Bratislava, and Jaslovské Bohunice) in compliance with their generally binding regulations.

Mochovce Site

0.375 tons of mixed municipal waste and 90 m^3 of waste from cleaning of septic tanks were generated in the Mochovce site from the NRWR and FL PWR. SE - EMO is in charge of waste disposal and transportation from Mochovce site.

5. Major industrial accidents

JAVYS observes the key law concerning the major industrial accidents – the National Council of the Slovak Republic Act No. 261/2002 Coll. on Prevention of Major Industrial Accidents as amended, as well as all directly and indirectly linked regulations and legislation.

Classification of JAVYS with regard to the valid legislation governing the major industrial accidents (ZPH)

From January 23rd 2007 to February 28th 2011 JAVYS belonged to the "A" category under the Section 5 of Act No. 261/2002 Coll. on Prevention of Major Industrial Accidents.

Due to termination of power generation, decommissioning of both units of V1 NPP and changes of modes during termination of the operation of the V1 NPP JAVYS stopped using and storing the classified hazardous substance (VNL) – hydrazine hydrate (commercial name Levoxin) in 2010. New notification regarding the company's classification was prepared based on the inventory control and reassessed calculations of VNL presence, which resulted in no obligation to classify it under the Act No. 261/2002 Coll. anymore.

Even after release from "A" category the company, in compliance with Act No. 261/2002 Coll., is obliged to monitor regularly the volume, fire characteristics, and type of hazardous substances present in the plant and in case any change related to facility is needed a notification must be sent to the District Environmental Authority.

With regard to the requirements to monitor the treatment of particularly harmful substances under the Water Act, and the requirements to monitor the presence of selected hazardous substances in order to classify the company under the Act on Prevention of Major Industrial Accidents, "Management of Chemical Substances" software is applied.

By means of application it is also possible to monitor the intake of chemical substances and mixtures to the plant and in cooperation with SAP application the requirements for arrangement or permit of new chemical substances and mixtures are controlled. The list of permitted, limited, and prohibited chemical substances and mixtures is maintained in the SAP application.

This system – software provides for comprehensive monitoring and evaluation of data related to the treatment of the so called "dangerous substances" not only from the point of view of prevent major industrial accidents but also from the point of view of protection of soil, water and its related environment, as well as protection of the life and assets of people.

6. Environmental Impact Assessment according to Act No. 24/2006 Coll.

With regard to environmental impact assessment JAVYS Company observes the key legislation – the National Council of the Slovak Republic Act No. 24/2006 Coll. on Environmental Impact Assessment and on amendment and supplement of certain acts as amended. Pursuant to the requirements of the Act the environmental impact assessment processes related to the newly proposed activities categorised under Annex No. 8 of the Act and assessment of changes of the existing activities based on Notification of change of the proposed activity take place.

Environmental Impact Assessment processes in the Jaslovské Bohunice site

In the Jaslovské Bohunice site several independent processes of environmental impact assessment take place with respect to the following BIDSF projects: C7-A2 Increasing Activity of Existing Fragmentation and Decontamination Facilities, C7-A3 Erection of New Large-Capacity F&D Facility V1 NPP and C7-B Treatment of Historical Waste - Sludges and Sorbents. In 2011, environmental impact was assessed for the newly proposed activity – C8 Project "Integral Radioactive Waste Storage". The project was worked out by the ETIAM, a.s. Company, on the basis of which the Ministry of Environment of the Slovak Republic determined the scope of evaluation. The report was developed by the project team consisting of JAVYS employees supervised by a professionally competent person. The assessment process still continues in 2012 in the form of publication and making comments to the report.

Environmental Impact Assessment processes in the Mochovce site

In 2011, environmental impact was assessed with respect to the newly proposed activity IRAW and CRAM Management Facility and to the existing NRWR entitled Extension of the NRWR in Mochovce for LMA RAW Disposal and Construction of VLA RAW Repository.

IRAO and CRAM Management Facility

In 2011, EKOS PLUS, s.r.o. Company in cooperation with the submitter prepared the assessment report, which was subsequently submitted to the Ministry of Environment of the Slovak Republic in March 2011. After public negotiations held on June 22nd 2011 the report was completed and submitted to the Ministry of Environment of the Slovak Republic again on October 14th 2011. As no other comments were made to the report, the Ministry of Environment of the Slovak Republic appointed Ing. Peter Salzer to work out the expert's opinion. The expert's opinion, which recommends implementation of the proposed activity – Variant No.1, was worked out and sent to the Ministry of Environment of the Slovak Republic. The Ministry of Environment of the Slovak Republic did not issue a final opinion by the end of 2011.

Extension of the NRWR in Mochovce for LMA RAW Disposal and Construction of VLA RAW Repository

In March 2011, VÚJE, a.s., Company prepared the project, which was submitted to the Ministry of Environment of the Slovak Republic by the submitter. Under the scope of evaluation No. 1806/2011 – 3.4/hp the designer in cooperation with the submitter developed the environmental impact assessment report, which was submitted to the Ministry of Environment of the Slovak Republic in December 2011. The process of public assessment is taking place at the present.

7. Environmental Management System

The Environmental Management System (EMS) is one of the progressive management tools JAVYS applies for environmental protection. It is implemented and certified under ISO 14001:2004 Standard - Environmental Management Systems, Requirements and Instructions for Use. The environmental policy and goals of the company are directed towards ongoing enhancement of its environmental behaviour and adherence to the environmental pollution prevention obligation.

Since its establishment in 2006 JAVYS has been successful to fully adhere to the standard requirements, which is also confirmed by internal audits by the DNV Company and documented by the Environmental Management System certificate. Periodical and re-certification audits prove the fact that JAVYS deserves to hold the EMS Certificate.

One finding, eight opportunities for improvement and eight positive findings were identified during the last periodical audit. Zero findings identified as major and small insufficiencies represent an important efficiency indicator in enhancing the EMS introduced and operated in JAVYS.

8. List of Abbreviations

AC	Administrative Centre
As	Arsenic
Bq	Bequerel
BIDSF	Bohunice International Decommissioning Support Fund
BSC RAO	Bohunice Radioactive Waste Processing and Treatment Centre
$C_{org.}$	Organic carbon
Cd	Cadmium
CO	Carbon dioxide
Co	Cobalt
Cr	Chromium
Cu	Copper
EU	European Union
FS KRAO	Final processing of liquid radioactive waste (FP LRW)
GBq	Gigabequerel
HCl	Hydrogen chloride
HF	Hydrogen fluoride
Hg	Mercury
ISM	Integrated Management System
JAVYS	Jadrová a vyraďovacia spoločnosť, a.s.
JESS	Jadrová energetická spoločnosť Slovenska, a.s.
JE A1	A1 NPP
JE V1	V1 NPP
KÚ ŽP	Regional Environmental Authority
KŠP	Corrosive and fission products
LaP	Limits and terms
MBq	Megabequerel

Mn	Manganese
MSVP	Interim spent fuel storage facility (ISFS)
MŽP SR	Ministry of Environment of the Slovak Republic
NaRK	Auxiliary boiler plant
Ni	Nickel
NL	Hazardous substance
NO_x	Nitrogen oxides
NV SR	Ordinance of the Government of the Slovak Republic
ObÚ ŹP	District Environmental Authority
Pb	Lead
P_{celk}	Total phosphorus
RAO	Radioactive waste (RW)
RÚ RAO	National Repository of Radioactive Waste (NRWR)
SO_2	Sulphur dioxide
SE, a.s.	Slovenské elektrárne, a.s.
SE-EBO	Slovenské elektrárne, a.s., NPP in Bohunice
SE-EMO	Slovenské elektrárne, a.s., NPP in Mochovce
SIŽP	Slovak Environmental Inspection
TBq	Terabequerel
Tl	Tellurium
TSÚ RAO	Radioactive Waste Processing and Treatment Technology (RAW PTT)
TZL	solid pollutants
ÚVZ SR	Public Health Authority of the Slovak Republic
VVBK	Fibre-concrete container (FCC) production
Zb	Collection of Laws
ZPH	Major industrial accidents
ŽP	Environment