		Technical document for issuance of MZP SR opinion							
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Projekt Project MOCHOVCE POWER PLANT Completion of Units 3 and 4								Stupeň dôverylosti Security Index	
								P	
Názov Title	Evaluation of the Method of Fulfilment of Conditions Recommended by MZP SR Stated in the Final Opinion No. 395/2010-3.4/hp								
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Scope of issue Účel vydania	I				BT zariadenia alebo systému Component safety class				
Blok/Unit	8	PS/DPS/SO set/subset/c. Structure			00B				
REV	Popis zmeny / Description of Revisions								
00	First issue								
01	Popis zmien/Description of modification								
02	Aktualizácia dokumentu požadovaná listom ÚJD SR/Update of document required by UJD letter								
03	Aktualizácia dokumentu na základe aktualizovaných a spresňujúcich informácií ku dňu 1.2.2019./Update of document based on recent getting and detailed information as at February 1, 2019								
	Aktualizácia dokumentu na základe aktualizovaných a spresňujúcich informácií ku dňu 15.5.2019./Update of document based on recent getting and detailed information as at May 15, 2019								
04	Aktualizácia dokumentu na základe aktualizovaných a spresňujúcich informácií ku dňu 15.11.2019./Update of document based on recent getting and detailed information as of November 15, 2019								
05	Aktualizácia dokumentu – opravy pripomienok ÚJD SR poslané listom ÚJD SR č. 8869/2019/Update of document based on UJD SR remarks in letter 8869/2019								
06									
06	12/12/2019	I	A. Ács	B. Uhnáková	A. Selecká		N. Áč	P. Andraško	
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1. PURPOSE

The document describes the evaluation of the method of fulfilment of conditions recommended by MZP SR stated in the final opinion No. 395/2010-3.4/hp issued on 28/04/2020 for

the project “**Mochovce Nuclear Power Plant, VVER 4x440 MW, Construction 3**” by Slovenské elektrárne, a.s. (hereinafter referred to as SE).

The document was updated after obtaining of newer and more detail information, and it will be used as the material for review by MZP SR during next administration proceedings together with the final opinion No. 395/2010-3.4/hp issued by M ZP SR on 28/04/2010.

All data mentioned in the Chapter 3 present the state of knowledge and facts updated as of **12/12/2019**.

2. LIST OF ABBREVIATIONS

HAEA –state nuclear safety authority of the Hungarian Republic, CHL and CHZ – chemical substances and chemical mixtures

JAVYS – Jadrová a vyrad'ovacia spoločnosť, KU ZP

NR – Regional Authority of ZP Nitra

MZP SR – Ministry of the Environment of the Slovak Republic

MZP MR – Ministry of the Environment of the Hungarian Republic, MV MR – Ministry of Interior of the Hungarian Republic

OU – District Authority

PhaZZ – Presidium of the Fire and Rescue Corps of the Slovak Republic, POO – Population Protection Plan

TDS – Teledosimetry System, measurement system of dosimetry quantities around Mochovce NPP and Bohunice NPP

UJD SR – Nuclear Regulatory Authority of the Slovak Republic,

ZS – Final Opinion


VD and VS – water dam and hydraulic

structure VK – Veľké Kozmálovce

3. EVALUATION OF THE METHOD OF FULFILMENT OF CONDITIONS STATED IN THE FINAL OPINION

Based on assessment of environmental conditions in the affected area, results of the environmental impact assessment of proposed activity, and based on opinions of affected villages, affected authorities, results of cross-border consultancies, requirements and suggestions of domestic and foreign public, the following conditions of execution of the proposed activity were recommended. Every recommended condition for the stage of construction and operation of the proposed activity contains also a method of its fulfilment.

- 3.1 *After licensing of nuclear installation commissioning, ensure fulfilment of all conditions stated in UJD SR Decisions No. 246/2008, 266/2008, and*

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267/2008; after issuance of an UJD SR licence for MO34 commissioning and operation, ensure fulfilment of all conditions mentioned in related UJD SR licences.


Fulfilment: SE MO34 continuously evaluates fulfilment of all requirements defined in individual UJD SR decisions and can document fulfilment of those with the due date of their fulfilment. SE MO34 submitted the evaluation of fulfilment of conditions of subject UJD SR decisions related to the application for licensing the NI commissioning by UJD SR. The current version of evaluation of fulfilment of the subject conditions is mentioned in Annex 1a, b hereto. Conditions defined in the UJD SR Decision No. 267/2008 were reflected in the pre-operation safety analysis report that was reviewed by UJD SR by the letter Ref. No. 768/2018 dated 13/02/2018 within the process of extension of the application for licensing the NI commissioning.

- 3.2 Continue with provision of information and organising of technical workshops in the fields of common interest in nuclear safety with Austrian experts within the related bilateral Slovak-Austrian agreement within the European Community for Atomic Energy, Euratom coordinated by UJD SR, and accept achieved outcomes of these technical consultancies.

Fulfilment: In cooperation with UJD SR, SE provided all information and experts for the following workshops and bilateral meetings organised by UJD SR:

Expert workshops for topics agreed during the 16th SK-AT bilateral meeting in 2008:

- 1st workshop: Severe accidents, including external reasons – 15/12/2009; some issues remained opened; they will be re-discussed when required information is available (see point 7)
2. workshop: Containment and bubbler condenser system – 28/04/2010; all issues of the Austrian side discussed and satisfactorily answered
3. workshop: Seismic activity of the site and seismic reinforcement EMO 3&4 – 14/07/2010; outcomes of this meeting are being commented right now; today (January 2019), a report was re-submitted to UJD SR that was updated by SE MO34 with information related to “seismic concept of the site”. A draft answer was sent to UJD SR by e-mail on 28/01/2019.
4. workshop: Making the preliminary safety assessment report accessible to Austrian experts – the event was organised on 06 – 07/06/2011.
5. workshop: Strength of the reactor pressure vessel – 20/11/2012; all issues of the Austrian side discussed and closed
6. workshop related to the topic Control system – held on 11/12/2015; all questions put in advance and also additional questions answered and evaluated as closed; except for additional questions related to detail specification of an operator’s response at severe accidents, which belong, from the content viewpoint, to the topic of the next meeting – severe accident management systems.

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7. workshop related to the topic severe accidents – 2nd part – held on 27 – 28/04/2016; all questions put in advance and also additional questions answered and evaluated as closed, including the point 1.

The meeting related to severe accidents closed the series of technical workshops; the Austrian side appreciated the particularity of answers and readiness of Slovak experts.

Based on the workshops, the Austrian side prepared “short technical reports” for its government which will not be made accessible because of confidentiality of provided information. After consultancy with the Slovak side, only a short summary – abstract – was prepared and published.


At the close of the series of workshops, the SE representatives satisfied the request of Austrian experts, and ensured that they could have visited the EMO3&4 site; the site visit was organised on 28/06/2016.

The last bilateral meeting was organised on 17 – 19/06/2019. In this meeting, the following topics of the agenda were discussed: Information about hot tests of primary circuit equipment of the Unit 3, Unit 3 commissioning time schedule, Slovak legislation regarding the commissioning. Moreover, the SE technical experts answered technical questions of the Austrian side. No questions remained opened, and all technical questions were answered in detail.

3.3 Ensure participation of statutory representatives and experts on behalf of the applicant, Enel and SE, in technical consultancies regarding issues of MO34 safety not responded during consultancies according to the Espoo convention from the assessment process, together with the Austrian affected side and UJD SR within the licensing process at commissioning of nuclear installation.

Fulfilment: In case of need, SE ensured participation of statutory representatives (e.g. bilateral meetings with Austria were attended by the SE MO34 representative, e.g. MO34 project director, or his nominated deputies), and always also a team of experts in expert meetings organised between the Slovak government represented by UJD SR and the Austrian side. On request, SE provided supporting legal opinions on consultancies within the international conventions Espoo and Aarhus (see the previous point). So far, the last bilateral meeting was held on 07 – 08/06/2018.

The last bilateral meeting was organised on 17 – 19/06/2019. In the meeting, issues and topics agreed in advance were discussed. The SE experts answered all technical questions in detail, and the second side did not have any other questions.

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3.4 In cooperation with regulatory authorities, implement recommendations to the safety documentation stated in the opinion of the European Union Committee pursuant to Art. 43 of the Euratom Treaty [K(2008)3560 dated 15/07/2008]. For this purpose, the Committee recommends to the investor, in close cooperation with internal authorities, to:

- develop a reference scenario containing a deterministic effect from an external source (e.g. impact of small aeroplane) in compliance with the best international practice,
- based on this basis within the design basis of the proposed investment, evaluate and apply sufficient additional elements, functional potential and management strategies to resist potential deterministic effects from the external source (e.g. impact of small aeroplane with bad intentions) so to harmonise the project with the existing best practice.

Moreover, the Committee emphasises an importance of diversification of sources of the project within the aspect of ensured supply of nuclear fuel for the entire EU nuclear industry, as well as correct management of means designated for financing decommissioning of nuclear installations and spent fuel and radioactive waste management, in compliance with its recommendation.

Fulfilment:

Based on risk assessment of an accidental fall of aeroplane according to international methodologies and the current state of air traffic near EMO, endangering of the Mochovce NPP nuclear safety can be considered very low, and not requiring any additional technical and organisational safety measures.

In communication pursuant to Art. 43 of the EURATOM treaty, the European Commission recommended in the MO34 completion project to evaluate the effect from the external source (e.g. intentional impact of small aeroplane) and apply suitable additional corrective actions.


A methodology was developed to solve this issue on the basis of internationally accepted documents which was aimed at proving the ability to fulfil more important safety functions:

- **physical protection of equipment and structures which are important from the nuclear safety viewpoint,**
- **reactor shutdown,**
- **maintaining of the unit in safe shutdown conditions,**
- **prevention of significant radioactive discharges to the NPP environment.**

Analyses were made for total 12 civil structures in the MO34 NPP site, and more than 60 conservatively selected impacts of aeroplanes were analysed. The analyses after the impact of aeroplane on structures were aimed at global effects on civil structures, at local effects on structural components of buildings, vibration effects, secondary effects from fires and explosions of fuel, in current cases also on radiation consequences on population near the NPP.

Objectives of the analyses were achieved because the ability of the MO34 NPP to safely shut down the Unit and remove residual heat from the reactor after every such event was proven (so that necessary modifications of the MO34 NPP design were proposed).

Details on performed safety analyses are not accessible to public since in the Slovak Republic, they belong to the category of classified information.

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3.5 Initiate a respective intergovernmental agreement on exchange of data from 40 radiological monitoring stations situated in the 20 km radius from the Mochovce NPP to the Hungarian national centre, and of provision of measurement results of the Hungarian remote radiation monitoring system

Fulfilment:

- 18/02/2012 – an amendment to MoU (Memorandum of Understanding, see Annex 2) signed between UJD SR and HAEA on provision of data from 20 Mochovce TDS stations to Hungary from Slovakia (see Annex 3/SJ or MJ – means in Slovak or Hungarian language)
- data (exchange of information on TDS measurements) are provided continuously being at assistance of UJD SR by sending measured data from UJD SR by mail to the address of a “contact person” in Hungary. These data are sent weekly.

3.6 Enable Hungarian authorities answering for emergency planning to establish and operate of at least three remote radiological monitoring stations towards the boundary with Hungary in the distance of 30 km from the Mochovce NPP

Fulfilment:

An amendment to the intergovernmental agreement was signed between MZP SR and MZP MR and MV MR on mutual exchange of data from early radiation warning systems about installation of 3 gamma radiation dose rate equivalent detectors that will be situated in SHMU meteorological stations in Hurbanovo, Dudince and Kalná nad Hronom by all relevant departments on 18/02/2016 in Šamorín (Annex 3/SJ or MJ, means in Slovak or Hungarian language)

The amendment was developed in cooperation of UJD SR, MZP SR and SHMU.

In January 2018, the Hungarian side finished a public procurement procedure for purchase of 3 detectors. The information was provided by representatives of the Hungarian authorities in February 2018 in the meeting of the mixed Hungarian/Slovak work group for safety of the environment at MZP SR.


It was necessary to repeatedly solve a technical matter of installation of the detectors since meantime SHMU have upgraded the monitoring network, and alternatives of connection of these detectors have changed. The Slovak side, in cooperation with the Hungarian side, prepared a common technical meeting which was held on 17/07/2018 in stations in Dudince, Hurbanovo and Kalná nad Hronom. At the same time, all technical details of installation were clarified.

Until the end of 2018, the Hungarian side prepares places for installation of the detectors (concrete foundation) using a contractor, and afterwards the detectors will be installed to new meteorological stations. The next bilateral meeting was held in February 2019.

As of today, the dose rate measurement detectors have been installed in the following localities:

- Hurbanovo
- Dudince
- Kalná nad Hronom.

Transmission of data to the centre was put into operation as well

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3.7 Ensure mutual exchange of data of aerosol monitors operated by Austria in the Hungarian and Slovak territories

Fulfilment:


Attached, you can find an affirmative letter of Dr. Kargo (see Annex 5) from the Radiation Protection of the Austrian Federal Ministry of Agriculture, Forest and Water Management and the Environment.

Incorporated in the amendment to the MoU mentioned above (see Annex 3 hereto). Authorisations for access to data from aerosol monitors in the metrological station in Jaslovské Bohunice were assigned by the system administrator represented by Dr. Kargo (Austrian side) for the National Directorate for Management of Emergencies – KATVED (represented by Mr. Atilla Szantoó).

3.8 During implementation of occupational health and safety, complete methodical instructions with employer's duties, in particular with requirements of NV SR No. 391/2006 Coll., NV SR No. 395/2006 Coll., 355/2006 Coll., and NV SR No. 555/2006 Coll.

Fulfilment:

- **SE MO34 has the OH&S management system pursuant to OHSAS 18001 implemented and certified.**
- **Methodical instructions for occupational health and safety have been developed and are regularly reviewed.**
- **SE MO4 was awarded by the Ministry of Social Affairs and Family of the Slovak Republic with the prize "Safe Company".**
- **SE MO34 was awarded by the prize "Good Practice" issued by the National Labour Inspectorate.**
- **NV SR No. 395/2006 Coll. developed in the Guide SE/NA-173.01-08.**
- **Requirements resulting from NV SR No. 355/2006 Coll. and NV SR No. 555/2006 Coll. have been reviewed by the Labour Health Service (PZS). An opinion on the risk, health and sanitary characteristics, categorisation of works has been developed (SE MO34 employees belong max. to the category 2). Employees regularly pass medical preventive examinations.**
- **SE MO34 has the affirmative decision issued by RUVZ dated 19/09/2013 No. D1/2013/01710 for manipulation and storage of chemical carcinogens and mutagens.**

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3.9 Observe all obligations resulting from Act No. 261/2002 Coll. (**currently the Act No. 128/2015 Coll. is valid**) on Prevention of Major Industrial Accidents and on amendments to and modification of certain acts, and adopt all measures needed for prevention of major industrial accidents, and if such accident occurs, or an immediate threat of its existence exists, propose actions needed for its control and limitation of its consequences on life and health of people, the environment and property.

Fulfilment:

- During the construction completion, SE MO34 is inventorying selected dangerous substances in compliance with the Act on prevention of major industrial accidents. MO34 has not been categorised in compliance with this Act during the construction completion.
- The inventorying is made once per quarter – it is made by individual contractors (who have store rooms with **dangerous substances** and selected dangerous substances). Results of the inventorying are sent to an expert for prevention of major industrial accidents for review (expert for prevention of major industrial accidents – C0220 or 20330).
- During completion of Units 3&4, increased inspections of store rooms (monthly), manipulations and execution of works with chemical substances, review of **safety data sheets** in workplaces and familiarisation and observance of rules for **chemical substances** and **chemical mixtures** (weekly).

3.10 During operation, keep limits of factors of the working area and the environment as low as reasonably achievable, and ensure observance of provisions of Act No. 355/2007 Coll. on protection, support and development of public health and on amendments to and modification of certain acts, as amended, and of related legal regulations


Fulfilment:

- The limits of environmental factors are being reviewed. A risk assessment has been developed; individual contractors have integrated the safety plans; medical and sanitary characteristics have been developed, and work tasks have been categorised from the viewpoint of health risks. Based on the already made measurements, employees have been categorised max. to the risk category 2. During operation of the equipment, environmental factors will be measured, assessed, and based on results, they will be categorised.
- In order to minimise concentration of dangerous aerosols, ventilation devices have been installed, which are used in construction completion workplaces operatively as needed.

3.11 Solve conditioning comments of the District Authority for Road Transport and Land Communication in Levice

Fulfilment: Changes were made in compliance with opinions of the District Authority for Road Transport U/2010/007105 dated 07/12/2010 and of the Regional Administration and Maintenance of Roads in Levice 627/2010 dated 25/10/2010 for “determination and use of temporary traffic signs on the regional road III/51110 in the cadastral area Mochovce” at entry and exit to/from the access road to the Mochovce NPP site through the Gate 3. The following traffic signs were installed:

- ☐ Max. allowable speed 70 km/h

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“Other danger”

Supplementary sign E12 “TRUCKS ENTERING AND LEAVING ROADWAY”.

3.12 Apply measures so that irradiation of employees because of discharge of radioactive substances from the complex of nuclear installations in Mochovce to the environment during their operation does not exceed the limit dose 0.25 mSv per calendar year which is defined in the Ordinance of the Government No. 345/2006 Coll. on Basic Safety Requirements for the Protection of Health of Employees and Inhabitants Against Ionising Radiation

Fulfilment:

Ordinance of the Government No. 345/2006 Coll. is currently not valid. Legislation on radiation protection is enacted by Act No. 87/2018 Coll. with related regulations. Art. 91 of the aforementioned Act specifies the following:

Limit dose of representative person for designing, construction and operation of nuclear installation for one nuclear installation operator equals to 0.25 mSv per calendar year; in case of air discharges and surface water discharges the limit dose of representative person is defined separately for individual discharges as follows:

- effective dose 0.2 mSv per calendar year for air discharges, and
- effective dose 0.05 mSv per calendar year for surface water discharges.


If more nuclear installations are present in one locality or region, which are affecting a dose of representative person, the value relates to total irradiation from all nuclear installations in the locality or region.

It results from the aforementioned for the Mochovce site that the limit dose applies to radioactive substance discharges produced at operation of EMO nuclear units as well as at operation of JAVYS nuclear installations in this site.

The representative person is an individual from population representing a group of natural persons who are irradiated from the given source and by the given way the most, except for natural persons with extreme habits or unusual habits. The representative person is demonstrated by calculation, if taking into account ICRP recommendations No. 101 and requirements of Act No. 87/2019 Coll. mentioned in Annex 2 in points C and D.

The limit dose is not a limit for discharge of radioactive substances to the environment from operation of nuclear installation. An optimisation study has to be developed, and based on optimisation, a part of value of reserved in the limit dose. (in this case, operation of EMO1,2,3 Units). It is called an authorised limit. Art. 2 of Act No. 87/2019 Coll. defines the limit as follows:

Authorised limit is a quantitative indicator resulting from optimisation of radiation protection for the given activity leading to irradiation, or an ionising radiation source, which is usually lower than the limit value; authorised limits can be defined in a permission for execution of activity leading to irradiation.

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Authorised limit of irradiation of representative person from discharges from operation of EMO1,2,3 Units was defined on the basis of the optimisation study that respected protection of population and also the necessity of operational flexibility (IAEA reference “Regulatory control of radioactive discharges to the environment”, IAEA 2018). It results from the aforementioned that radiological impact of discharge of radioactive substances to the environment usually does not achieve limit dose values because it is limited by the value lower than the limit dose value. If we take into account that the EIA report specifies the radiological limit as the limit dose 250 mSv/year, definition of the authorised limit 75 mSv/year represents a significant tightening of the radiological limit for radioactive substance discharges to the environment (for the first time, the authorised radiological limit was determined for discharges from the EMO1,2 NPP operation in the UVZ SR permission **OOZPŽ/6773/2011** in 2011 with the value of 50 mSv/year).

The permission for discharge of radioactive substances to the environment produced at operation of nuclear installation (in the current case, operation of EMO1,2,3 NPP) is issued by UVZ SR. The Public Health

Authority of the Slovak Republic defined in the issued **permission No. OOZPŽ/4603/2019 for discharge of radioactive substances produced at operation of EMO1,2,3 NPP** released from administration control by their release to the environment:


The basic authorised limit for limitation of irradiation of population near nuclear installation caused by radioactive substances released from administration control discharged to air and surface water at operation of EMO1,2,3 NPP is the effective dose of representative person 0.075 mSv per calendar year:

- a) effective dose 0.070 mSv per calendar year for air discharges, and
- b) effective dose 0.005 mSv per calendar year for surface water discharges – to the Hron river.

EMO1,2,3 NPP will evaluate irradiation of population near the EMO1,2,3 NPP caused by discharge of radioactive substances released from administration control to the environment by model methods. EMO NPP must use the calculation code RDEMO for model evaluation of irradiation of population caused by discharged radioactive substances during normal operation.

In compliance with the UVZ SR permission, EMO1,2,3 NPP will limit and manage the discharge of radioactive substances to the environment so that:

Activity of radionuclides discharged to air per calendar year does not exceed the annual reference levels for:	Annual reference values for Units 1,2,3
– radioisotopes of rare gases	6.15* 10 ¹⁵ Bq
– iodine (¹³¹ I) sum of gaseous and aerosol forms	1.01* 10 ¹¹ Bq

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– radioisotopes with the half-life of decay longer than 8 days in aerosols (except for ¹³¹ I)	2.55* 10 ¹¹ Bq
Activity of radionuclides discharged in waste water to surface water of the Hron river per calendar year did not exceed the annual reference values for	
– tritium	1.8* 10 ¹³ Bq
– other radionuclides (except for tritium)	1.65* 10 ⁹ Bq

Note: according to the former legislation, the annual reference value was called “guide value”. These values in the table do not comply with values mentioned in the MO34 EIA report and with information presented by the EU Committee according to EURATOM Art. 37. The annual reference values mentioned in the table (for operation of three EMO NPP Units) correspond to 1.5 multiple of the “guide values” valid for operation of two Units. It means that they are identical with values mentioned in the MO34 EIA report.

If some of the defined annual reference values mentioned in the table is exceeded, the EMO1,2,3 NPP must:

- immediately analyse reasons, apply all available measures for limitation of quantity or activity of discharges radioactive substances to the environment, and ensure that the authorised limit is not exceeded,
- evaluate a radiological impact on irradiation of population by model calculation using RDEMO.

For daily monitoring, evaluation and control of discharges, UVZ SR stipulated in the permission the necessity to continuously monitor the level of discharges radioactive substances, compare them with values for normal operation, and operatively adopt measures. For this purpose, daily reference investigation and action values have been defined:


Reference levels for daily discharges for check and control.

- investigation levels for activity of radionuclides discharged to air

- Any radionuclides of rare gases 1.1* 10¹³ Bq/day,
- iodine radioisotope ¹³¹I (gaseous form) 1.8* 10⁸ Bq/day,
- Any radionuclides in aerosols 0.5* 10⁹ Bq/day,

- Action levels for activity of radionuclides discharged to air

- any radionuclides of rare gases 8.25* 10¹³ Bq/day,
- iodine radioisotope ¹³¹I (gaseous form) 1.35* 10⁹ Bq/day,
- any radionuclides in aerosols 3.75* 10⁹ Bq/day

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- c) investigation levels for activity of radionuclides discharged in waste water to surface water of the Hron river
 - i) volume activity of tritium $6.0 \cdot 10^7$ Bq/m³,
 - ii) volume activity of other radionuclides (except for tritium) $4.0 \cdot 10^4$ Bq/m³,
- d) action levels for activity of radionuclides discharged in waste water to surface water of the Hron river
 - i) volume activity of tritium $1.0 \cdot 10^8$ Bq/m³,
 - ii) volume activity of other radionuclides (except for tritium) $4.0 \cdot 10^4$ Bq/m³.

To prevent exceeding of investigation or action level, the EMO1,2,3 NPP must make the analysis and define reasons. Based on defined reasons, measures are adopted to prevent their recurrence. If the action level is exceeded, more detail analyses and evaluation of radiological impact on irradiation of population by model calculation using the RDEMO code have to be performed.

All the aforementioned groups of radioactive substances are continuously monitored by officially certified gauges, redundant monitors as follows:

In radioactive substance discharges to air released to the environment through EMO1,2,3 NPP vent stacks

- i) total volume activity of rare gases,
- ii) total volume activity of aerosols, and
- iii) volume activity of radioisotope of iodine ¹³¹I in gaseous form in waste water discharged to surface water

of the Hron river by waste water pipes

- i) total volume activity of gamma radionuclides.


Radioactivity in waste water is monitored in the laboratory by evaluation of sample taken before taking a decision about draining a reservoir for gamma and tritium radioactivity.

Balances of radioisotopes discharged in waste water are prepared by:

- i) gamma spectrometry of samples,
- ii) alpha spectrometry of samples drained from reservoirs,
- iii) monitoring of tritium in representative samples,
- iv) determination of strontium Sr-89, Sr-90 in samples drained from reservoirs.

As secondary check of correctness of results of monitoring radionuclides in waste water, a laboratory evaluation of representative drained samples taken from water of waste water channel is used; the following is evaluated:

- i) gamma spectrometry of samples,
- ii) monitoring of tritium.

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Stability tests are regularly made at these continuous monitors in compliance with radiation protection quality assurance documentation.

Balances of discharged radioactive substances to the environment are prepared in detail with considering of radioactivity of individual discharged radionuclides (in compliance with EU recommendation on standardised data on radioactive substance discharges to air and water from NPP operation, Recommendation of the EU Committee 2004/2/Euratom).

For balancing and evaluation of an impact of discharged radionuclides, the following is monitored and recorded:

activity of radionuclides discharged to air:

- i) radioisotopes of rare gases ^{41}Ar , ^{85}Kr , $^{85\text{m}}\text{Kr}$, ^{87}Kr , ^{88}Kr , ^{133}Xe , $^{133\text{m}}\text{Xe}$ and ^{135}Xe , (from air samples taken from VK to air cylinders)
- ii) radioisotopes in aerosols ^{51}Cr , ^{54}Mn , ^{59}Fe , ^{57}Co , ^{58}Co , ^{60}Co , ^{65}Zn , ^{89}Sr , ^{90}Sr , ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Rh , $^{110\text{m}}\text{Ag}$, ^{124}Sb , ^{134}Cs , ^{137}Cs , ^{141}Ce and ^{144}Ce , ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am , (from aerosol filters in VK)
- iii) radioisotope of iodine ^{131}I in gaseous and aerosol forms (from aerosol filters and samples of active coal in VK)
- iv) tritium (from special sampling device)
- v) radioisotope of carbon ^{14}C in organic and inorganic forms (from special sampling device)

activity of radionuclides discharged in waste water to surface water of the Hron river:


- i) radionuclides ^{51}Cr , ^{54}Mn , ^{59}Fe , ^{57}Co , ^{58}Co , ^{60}Co , ^{65}Zn , ^{89}Sr , ^{90}Sr , ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Rh , $^{110\text{m}}\text{Ag}$, ^{124}Sb , ^{131}I , ^{134}Cs , ^{137}Cs , ^{141}Ce and ^{144}Ce , ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am , (from water samples from reservoirs)
- ii) tritium. (from water samples from reservoirs)

If other than the aforementioned radionuclides with the half-life of decay longer than 8 days are identified in discharged radioactive substances, they will be included in the balance and evaluation.

Radionuclides that were discharged to the environment in other than standard monitored way will be included in the balance and evaluation as well.

Discharge monitors in VK of the Units 3&4 are of the same type and range of measurement like discharge monitors in VK of the Units 1&2 (of course with newer date of manufacture). Types of used monitors and the entire discharge monitoring system in EMO Units 1&2, including monitoring of radioactivity near the EMO NPP, was verified by an expert group from the European Union in 2014 based on Art. 34 of the EURATOM treaty (the verification report is available on the EU sites).

The mission came to the conclusion that the EMO NPP operation discharge monitoring system and the EMO NPP environment monitoring system are adequate for continuous monitoring

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of radioactive discharges to air and waste water, and for monitoring radioactivity in components of the environment. No comments were presented in relation to the discharge monitoring system and environment radioactivity monitoring system by the experts.

Quality assurance documentation of radiation monitoring of discharges to the environment, check and control of values of discharges, their evaluation and interpretation of values and compiling of reports, as well as keeping records of monitoring has been used in the operated EMO1,2 NPP Units already for many years. For the purposes of execution of these activities also during the Units 3&4 operation, the documentation has been completed with activities for discharge points (MO34 VK and the place of discharge of control tanks from MO34 NASB) and with the MO34 VK monitoring point.


Values of discharges monitored in EMO1,2,3 NPP vent stacks and in the structure 368/1-01 (continuous monitoring of radioactivity, flow rate and sampling of waste water) are displayed in radiation monitoring (DRK) control rooms, which are situated in the common controlled area of the EMO1,2,3 in the electrical building of the Unit 1 and 3. DRK is a permanently attended workplace. Management of radiation protection in the EMO1,2,3 NPP is ensured by the Radiation Protection Unit; in shifts, these activities are ensured by a radiation safety technician. He permanently monitors the parameters and quantities of radiation protection, and records important information and values to logbooks. Values of parameters from radiation monitors (in VK as well as in structure 368/1-01) are presented in computer systems and recorded in data files. Records on discharges and balances of radioactive discharges are kept in SAP database developed specially for this purpose.

The radiation protection technician evaluates daily discharges through the vent stack and the status of discharges once per 24 hours. The discharge group and laboratory measurement technician evaluate balancing of monthly, quarter and annual discharges.

The radiation protection personnel operating the radiation monitoring system in Units 1&2, who will operate the radiation monitoring systems also in the EMO1,2,3 NPP Unit 3 is qualified and with experience resulting from 20-years' safe operation of EMO1,2 Units.

Results of monitoring of radioactive substance discharges to the environment, balances of discharged radioisotopes to the environment, and calculated doses of the representative person are carried out and documented in quarter and annual reports. Results of monitoring of radioactivity in components of the environment near the EMO NPP are also presented, analysed and evaluated in quarter and annual reports. These reports are sent to UVZ SR and UJD SR as well as to mayors of surrounding villages within the 20 km radius.

Results of monitoring of radioactive discharges to the environment during 20 years of operation prove that values of spending the radiological limit for discharges of the representative person ranges at around few thousandths. For instance in 2016, the model calculation using the RDEMO code resulted in the dose of the representative person 153.0 nanoSv, in 2017 it was 203.0 nanoSv, and in 2018 it was 286.9 nanoSv, which corresponds to 3 to 5.5 thousandth of the radiological limit 90 mSv/year for doses from radioactive discharges from operation of both EMO NPP Units.

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3.13 Observe all obligations resulting from Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on amendments to and modifications of certain acts, and manage activities according to provisions of the aforementioned Act

Fulfilment:

The Act No. 541/2004 Coll. specifies obligations of a licensee for all life cycle phases of a nuclear installation, and it applies not only to operation of nuclear power plants. Obligations of a licensee are checked by UJD SR in compliance with this Act, in particular with Art. 4(1)(c), and in compliance with general legal regulations (Regulations of UJD SR). The check is made by inspections in all areas of peaceful use of nuclear energy. In compliance with the Building Act No. 50/1970 Coll. (Building Order), UJD SR employees (nuclear safety inspectors) supervise also the phase of construction of the MO34 project as resident engineers.

3.14 Observe provisions of Regulation of UJD SR No. 50/2006 Coll. on details concerning the nuclear safety requirements for nuclear installations in respect of their sitting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorisation of classified equipment into safety classes.

Fulfilment:


The Regulation of UJD SR No. 50/2006 Coll. has been currently replaced by the new Regulation of UJD SR No. 430/2011 Coll. valid from January 1, 2012. The Regulation of UJD SR defines details on requirements for nuclear safety of nuclear installations that have to be fulfilled in all phases of the nuclear installation life cycle (sitting, design, construction, commissioning, operation and decommissioning). It defines criteria for categorisation of classified equipment into safety classes, and defines other requirements for evaluation of the scope, content and impact of changes and feedback from evaluation of these changes, and details of indicators and parameters of nuclear safety. The UJD SR personnel checks fulfilment of the requirements of this Regulation by:

- *inspections and conformity checks or other examinations,*
- *approving other documentation such as for instance amendments to basic design and their assessment concerning nuclear safety and an impact on the already approved documentation.*
-

3.15 Continue with observance of provisions of Act of NR SR No. 543/2002 Coll. on Nature and Landscape Protection, as amended, and Act of NR SR No. 79/2015 Coll. on Wastes, which replaced the original Act No. 223/2001 Coll. (new act) on Wastes, as amended, and related implementing regulations.

Fulfilment: SE MO34 implemented the following internal rules within the QMS:

- *MO34/MNA-190.02 Management of Environmental Activities,*
- *Requirements of legislation are specified also in the register of legal and other MO34 requirements which is regularly updated,*


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- *Act on Nature and Landscape Protection – it applies to MO34 mainly in the area of potential logging (request, permission, observance of conditions specified in the permission – compensatory greening); the procedure was applied last in 2017; nesting and occurrence of protected species of animals*
- *Act on Wastes – requirements are specified in the register; inspections of observance of these requirements are made regularly by QMS audits, checks made by the environmental unit,*
- *A waste management programme has been developed – approved by the District Office of the Environment in Levice (OU-LV-OSZP-2014/00506-ODP-Z) with consents given by municipalities in Nový Tekov and Kalná nad Hronom dated 07/11/2014.*
- *The municipalities in Nový Tekov and Kalná nad Hronom gave consents to SE to the municipal waste management. The currently valid consents of Nový Tekov and Kalná nad Hronom municipalities for SE to municipal waste management were given in March 2019.*
- *Copies of accompanying sheets of dangerous waste (if dangerous waste is produced) are sent every month to the District Authority, Environmental Protection Department, and once per year also a waste production and management notification is sent (in compliance with valid legislation).*
- *The new decision of the District Authority in Levice, Environmental Protection Department, No. OU-LV-OSZP-2019/015146-003/ODP-Z for operation of a waste recycling centre in the site was issued on 04/10/2019.*

3.16 Observe all obligations resulting from Act No. 364/2004 Coll. on Water, and on amendment to the Act of SNR No. 372/1990 Coll. on Offences, as amended (Water Act)

Fulfilment: These obligations are developed in internal rules such as:

- *MO34/MNA-190.02 Management of Environmental Activities,*
- *They are also ensured through cooperation of SE MO34 represented by the Unit C0220 and SE EMO12 represented by the Unit B0153 who covers all activities related to water management on behalf of the entire Mochovce power plant site.*
- *Requirements from legislation are mentioned also in the register of legal and other requirements which is regularly updated and evaluated.*
- *Discharge of waste water from the site to the water treatment plant in EMO1,2 follows the internal guide MO34/MNA-190.04 Discharge of Waste Water to Sewage Systems,*
- *Discharge of waste water from sewage water treatment plant to the Telinský brook – in compliance with Decision No. OU-NR-OSZP2-2016/002855 dated 13/01/2016 issued by the District Authority in Nitra, Environmental Protection Department, and its change No. OU-NR-OSZP2-2017/004442 issued on 09/02/2017 by the District Authority in Nitra, Environmental Protection Department – follows the defined limits and the periodicity of analyses according to the valid schedule.*

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- *Basic analysis of potable water is made weekly; an overall analysis is made quarterly.*

3.17 *Ensure that limit values of contamination indicators of waste water and special water discharges to surface water are not exceeded pursuant to NV SR No. 296/2005 Coll. (replaced by Act No. 269/2010 Coll.) Laying Down the Requirements for Quality and Qualitative Objectives of Surface Water and Limit Values of Contamination Indicators of Waste Water and Special Water.*

Fulfilment:

- *The following valid Decisions have been issued:*
 - *No. OU-NR-OSZP2-2016/002855 dated 13/01/2016 and No. OU-NR-OSZP2-2017/004442 dated 09/02/2017 discharge of waste water from MO34 water treatment plant*
 - *No. OU-NR-OSZP2-2015/043433 dated 29/12/2015 valid to 31/03/2021 for discharge of waste water to the Hron river related to limit indicators of waste water and special water discharged to surface water for operation of EMO12 as well as for operation of Units 3&4.*
- *Operation of future units has its procedures and physical barriers defined so to prevent exceeding of limits allowed by the aforementioned Decision, similarly as the procedures of already operated Units.*
- *A temporary condition was approved for start-up and testing of equipment in Decision No. OU-NR-OSZP2-2015/043433 dated 26/12/2015 in the regime of informing of measurements in the discharge structure. According to Decision No. OU-NR-OSZP2- 2017/043415, the condition is valid by 31/12/2019. For start-up and testing of equipment, a request for extension of the temporary condition in the Decision by 31/03/2021 in compliance with Ref. No. OU-NR-OSZP2-2015/043433 dated 29/12/2015 has been submitted.*

3.18 *When taking samples from the Hron river for the needs of operation, take into account the flow rate in the river and potential impacts on protected areas in the Hungarian Republic. Solve the issue if because of operation of the Mochovce nuclear power plant, balances in the V. Kozmálovce profile will be increasing in relation to minimal residual flow rates which are currently ecologically unbearable. At the time of minimum flow rates in the Hron river, water requirements of other users can be uncovered, and they can be regulated, and also some stress regarding quality of surface water in problematic indicators can occur, such as for instance $N-NO_3^-$, $N-NH_4^+$, or temperature of water). (Because of construction of the Mochovce nuclear power plant, a decision was issued about minimum flow rate in the V. Kozmálovce profile, which equals to $6.6 \text{ m}^3 \cdot \text{s}^{-1}$, which was defined as the temporary since an objective requirement in this section is app. $11 \text{ m}^3 \cdot \text{s}^{-1}$, which corresponds to Q_{355} of daily water).*

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In relation to improvement of conditions of the flow rate and quality of surface water in Veľké Kozmálovce, a project was implemented to reduce intake of sediments to VD VK as well as for cleaning of the reservoir. Sediments have been removed, and afterwards water structures were installed directing the sediments. The directing structures of groynes were installed in 2011 (12 groynes to more effectively remove sediments from the reservoir). These actions improved conditions for water offtake. The removal of sediments was done from 2008 to 2011, and 130,008 m³ of sediments were removed from the reservoir. Cleaning upstream the EMO inlet structure and the groyne No. 1 has been scheduled to 2019 (probably in April). SE received the technical report "Analysis of Clogging of the VD V. Kozmálovce", which was developed in 2016.

In 2019, the VD V. Kozmálovce was cleaned upstream the racks for raw water offtake for EMO. Today, the riverbed of VD V. Kozmálovce is being cleaned from sediments in the area of the main flow.

"Manipulation Rules of VD Veľké Kozmálovce" was developed and updated for VD V. Kozmálovce in 2017; it regulates the procedures so to optimise also requirements of consumers. By the end of 2019, a revised "Manipulation Rules of VD Veľké Kozmálovce" will be issued.

3.19 Prove assurance of the required volume of water for operation purposes and the for extraordinary situations within the permitting procedure according to special regulations. Respect completely comments and requirements of an administrator of the affected water flows

Fulfilment:

- The balance of water offtake was determined by Decision of the District Authority of ZP Nitra, Reg. No. OU-NR-OSZP2-2018/040543 dated 10/12/2018; it applies to all 4 Units, i.e. requirements for water offtake also at operation of all 4 Units were calculated.

Fulfilment of conditions of the water-related decision is as follows:

Condition – immediate maximum taken volume of surface water is Q_{\max}

=2.4 m³/s:

Fulfilment:

– if surface water is consumed, the taken volume is controlled in EMO NPP by a Hron pumping station operator. Conditions of the Decision are specified in 0/TP-4008, which is binding.


Condition – average taken volume of surface water is 1.5 m³/s, i.e. 129.600 m³/day and 47,304,000 m³/year

Fulfilment:

The calculation is made by an environmental technician from the annual consumed volume, and if the volume is exceeded, he shall inform the respective authority who issued the Decision (till now, the exceeding has not been recorded)

Condition – keep a record of consumption of surface water.

Fulfilment:

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- made by the EMO NPP operation support whose worker uploads data to the SE intranet: B1100_Riadenie prevádzky_Verejnú Evidenciu VH 02 Bilancie VH,
- Informing (within the contract between SVP and SE for consumption of surface water for industrial use) in order to pay for water consumption is made by an EMO environmental technician through intranet I: 16 Životné prostredie Environment SE VODA Indikátory 2019 in the monthly interval. Invoicing is ensured by the SE HQ Environmental Division.

Condition – in compliance with Art. 6(5) of the Water Act, the surface water consumer is obliged to provide data on these offtakes to the authorised person (SHMU) once per year, who will provide them to the administrator of water management of important water flows:

Fulfilment:

- made by an EMO NPP environmental technician by a notification of water consumption and of discharged waste water for the respective year to the address of SHMU Bratislava (using prescribed forms).

Condition – The permission is valid for 10 years from the date of effectiveness of this permission for water using in compliance with currently valid legislation:

Fulfilment: – the fulfilment is evident


Procedure in case of extraordinary situation:

Internal procedures have been determined in case of occurrence of extraordinary events dealing with an effective response also at loss of supply of raw water by 0-HP/3002 Loss of Raw Water Supply. Effectiveness of these procedures has been tested in EMO NPP several times.

3.20 Apply necessary technical measures to ensure the required volume of water for operation purposes and for extraordinary situations at decrease of minimum flow rate in the Hron river at the low-water time and at permanent reduction of wateriness of the Hron river because of climate and other changes (proved reduction of flow rate in the majority of territory of the Hron river basin during the period of 1980 – 2000 by almost 20 %). Consider the possibility of accumulation of water or other method of cooling.

Fulfilment:

- Internal operating regulations have been determined, which define the so called safety limits related to water balance and regime measures so that in case of reduction of raw water offtake because of climate or other changes in the water flow, safe operation is ensured (0-HP/3002 Loss of Raw Water Supply).
- Cooling water reservoirs – reserves – have been constructed, which are usable for extraordinary events for making up service water to safety significant operating systems (0-HP/3003 – Alternative Make-up of Water BOS15).

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3.21 Within the licensing procedure according to special regulations, prove a sufficient capacity of the water intake structure for reliable assurance of take-off of the required volume of water for operation purposes and for control of extraordinary situations in the Mochovce NPP after the construction completion,

Fulfilment:

- Decision of the District Authority in Nitra, Reg. No. OU-NR-OSZP2-2018/040543 dated 10/12/2018, by which the Environmental Protection Department, State Administration of Waters and Selected Components of the Environment, issued a permission for special use of water – take-off of surface water from the Hron river, and permits:

immediate maximum taken-off volume of surface water $Q_{max} = 2.4 \text{ m}^3/\text{s}$;

average taken-off volume of surface water is $1.5 \text{ m}^3/\text{s}$, which is $129,600 \text{ m}^3/\text{day}$, $47,304,000 \text{ m}^3/\text{year}$.


- The permission is valid for 10 years from the date of effectiveness of this permission for water using in compliance with valid legislation.*

- Capacity of the water intake structure was designed so to reliably ensure take-off of the required volume of water for operation purposes as well as for control of extraordinary situations. Water is transported by 8 installed pumps to the water reservoir (with the volume of $2 \times 6,000 \text{ m}^3$) in compliance with the issued permission.) Capacity of each pumps is 600 l/s so the pumps are sufficient for the maximum take-off of surface water. Water is transported to the water reservoir by a steel pipe with dimensions $2 \times 1,200 \text{ mm}$.
- Internal regulations have been determined also in case of extraordinary events dealing with an effective response also at loss of raw water supply.

3.22 Ensure that within the proposed operation, such technical solutions of securing the equipment manipulating with dangerous substances are applied that will enable catching of dangerous substances, which could be released at technical failure or destruction, or which would be washed up at extinguishing of fire by water, and which have been designed in compliance with requirements of Slovak technical standards.

Fulfilment:

- Storage of chemical substances is ensured in store rooms taken over by contractors so the contractors answer for the way and safety of storage of these substances.
- In structures handed over to operation, emergency kits for catching dangerous substances, which could be released at technical failure, are situated.
- MO34 makes regular monthly inspections aimed at fire safety, occupational safety aimed at environmental protection and prevention of leak of chemical substances or occurrence of an accident in relation to storage and manipulation with chemical substances. Daily consumption in the site is checked as well.

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- *All chemical substances must be approved in compliance with the internal document MO34/MNA-190.03 Management of Chemicals for Completion of Units 3&4. For approving purposes, contractors have to supply safety data sheets, technical sheets of the product, attest certificates and other documents, which are needed.*
- *In 2013, leak tests of all retention tanks in warehouses were made, and the tests are valid by 2018.*
- *Re-testing of their leak-tightness together with issuance of a record by an authorised person was made in 2018/2019. In compliance with technical standards STN 75 0905 and STN EN 1508, the leak test of external structures was made (in 2018 and 2019, see the record in annex). Test records of retention tanks in technological structures make a part of ATD of the structure.*

3.23 Complete employer's obligations for assurance of occupational health and safety

Minimum safety and health requirements for a workplace according to Ordinance of the Slovak Government No. 391/2006 Coll.;

Minimum requirements for provision and use of personal protective equipment according to Ordinance of the Slovak Government No. 395/2006 Coll.;

Protection of employees against risks related to exposure by chemical factor at work according to Ordinance of the Slovak Government No. 355/2006 Coll.;

Minimum health and safety requirements for protection of employees against risks related to noise exposure according to Ordinance of the Slovak Government No. 115/2006 Coll., as amended by Ordinance of the Slovak Government No. 555/2006 Coll.

The response identical with point 3.8

3.24 Reassess the system of monitoring the components of the environment (air, surface and underground water) in relation to commissioning and operation of MO34 Units. Adapt the monitoring system, if needed.


Fulfilment:

Monitoring plan of radioactivity in components of the environment near EMO was adapted because of the scheduled commencement of the MO34 operation. The monitoring plan was approved by the Public Health Authority of the Slovak Republic.

- In relation to commissioning of MO34, the following monitoring localities were added to the monitoring plan of the Mochovce NPP vicinity.

- Locality for in-situ measurements, sampling of soil and grass "EMO – Z169", performed analyses – gamma spectrometry, 90 Sr, alpha spectrometry.

- In the MO34 site, complementary wells for underground water were constructed in the MO34 site. "RK 21 to RK 25, RK 27 to RK 28, RK 34 to RK 35", performed analyses – gamma spectrometry and tritium.

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– *The locality – monitoring point for thermoluminescence dosimeter (integral measurement of space dose rate equivalent) – added in the MO34 site.*

– *The space dose rate measurement point – by ionising chamber – was added in the MO34 site.
(exact measurement of the space dose rate equivalent).*

Monitoring in these monitoring points started in 2016; water from TK wells from construction of the wells. The radiation monitoring plan of the Mochovce NPP vicinity (0-PLN/0006) was already updated in past so to contain also monitoring of necessary radiation quantities for evaluation of an impact of the MO34 Unit 3 operation in the MO34 site. In order to assess the impact of MO34 Unit 3 operation, the extent of already performed monitoring for evaluation of radiological impact of the EMO1,2 NPP operation is sufficient.

3.25 *After commissioning, ensure monitoring of quantities in the extent defined by respective regulatory authorities and specialised state administration authorities in the MO34 operation licence. Ensure permanent and detail monitoring of an impact of power plant operation on the environment by correct measurement of discharges and radioactive materials released from control to the environment, and evaluate the dose rate of population caused by operation of the system of nuclear installations in Mochovce during the entire time,*

Fulfilment:


Assurance of monitoring of discharges of radioactive substances from MO34 operation has been designed, tested and operated so to fulfil

1. *legislation of the Slovak Republic and the European Union;*
2. *valid decisions of regulatory authorities;*
3. *internal regulations, ALARA principles;*
4. *international recommendations.*

UVZ SR issued the permission OOPŽ/4603/2019 for discharge of radioactive substances produced at operation of EMO1, 2, 3 NPP (i.e. EMO NPP Units 1, 2, and 3) released from administration control by their discharge to the environment, and stated in the permission that:

in compliance with the UVZ SR permission, the EMO1,2,3 NPP is obliged to limit and control discharge of radioactive substances by their discharging to the environment so that:

Activity of radionuclides discharged to air per calendar year does not exceed the annual reference levels for:	Annual reference values for Units 1,2,3
– radioisotopes of rare gases	6.15* 10 ¹⁵ Bq
– iodine (¹³¹ I) sum of gaseous and aerosol forms	1.01* 10 ¹¹ Bq

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– radioisotopes with the half-life of decay longer than 8 days in aerosols (except for ¹³¹ I)	2.55* 10 ¹¹ Bq
Activity of radionuclides discharged in waste water to surface water of the Hron river per calendar year did not exceed the annual reference values for	
– tritium	1.8* 10 ¹³ Bq
– other radionuclides (except for tritium)	1.65* 10 ⁹ Bq

Note: according to the former legislation, the annual reference value was called “guide value”. These data comply with data in the MO34 EIA and the MO34 information for the European Commission pursuant to Art. 37 of the EURATOM treaty.

If some of the defined annual reference values mentioned in the table is exceeded:

- a) immediately analyse reasons, apply all available measures for limitation of quantity or activity of discharges radioactive substances to the environment, and ensure that the authorised limit is not exceeded,
- b) evaluate a radiological impact on irradiation of population by model calculation using RDEMO.

For daily monitoring, evaluation and control of discharges, UVZ SR stipulated in the permission the necessity to continuously monitor the level of discharges radioactive substances, compare them with values for normal operation, and operatively adopt measures. For this purpose, daily reference investigation and action values have been defined:

Reference levels for daily discharges for check and control.

- a) investigation levels for activity of radionuclides discharged to air


- iii) Any radionuclides of rare gases 1.1* 10¹³ Bq/day,
- iv) iodine radioisotope ¹³¹I (gaseous form) 1.8* 10⁸ Bq/day,
- v) Any radionuclides in aerosols 0.5* 10⁹ Bq/day,

- e) Action levels for activity of radionuclides discharged to air

- i) any radionuclides of rare gases 8.25* 10¹³ Bq/day,
- ii) iodine radioisotope ¹³¹I (gaseous form) 1.35* 10⁹ Bq/day,
- iii) any radionuclides in aerosols 3.75* 10⁹ Bq/day

- f) investigation levels for activity of radionuclides discharged in waste water to surface water of the Hron river

- i) volume activity of tritium 6.0* 10⁷ Bq/m³,
- ii) volume activity of other radionuclides (except for tritium) 4.0* 10⁴ Bq/m³,

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- g) action levels for activity of radionuclides discharged in waste water to surface water of the Hron river
- i) volume activity of tritium $1.0 \cdot 10^8$ Bq/m³,
 - ii) volume activity of other radionuclides (except for tritium) $4.0 \cdot 10^4$ Bq/m³.

To prevent exceeding of investigation or action level, the EMO1,2,3 NPP must make the analysis and define reasons. Based on defined reasons, measures are adopted to prevent their recurrence. If the action level is exceeded, more detail analyses and evaluation of radiological impact on irradiation of population by model calculation using the RDEMO code have to be performed.

All the aforementioned groups of radioactive substances are continuously monitored by redundant monitors as follows:

In radioactive substance discharges to air released to the environment through EMO1,2,3 NPP vent stacks

- i) total volume activity of rare gases,
- ii) total volume activity of aerosols, and
- iii) volume activity of radioisotope of iodine ¹³¹I in gaseous form in waste water discharged to surface water

of the Hron river by waste water pipes


- i) total volume activity of gamma radionuclides.

Balances of discharged radioactive substances to the environment are prepared in detail with considering of radioactivity of individual discharged radionuclides (in compliance with EU recommendation on standardised data on radioactive substance discharges to air and water from NPP operation, Recommendation of the EU Committee 2004/2/Euratom).

For balancing and evaluation of an impact of discharged radionuclides, the following is monitored and recorded:

activity of radionuclides discharged to air:

- i) radioisotopes of rare gases ⁴¹Ar, ⁸⁵Kr, ^{85m}Kr, ⁸⁷Kr, ⁸⁸Kr, ¹³³Xe, ^{133m}Xe and ¹³⁵Xe,
- ii) radioisotopes in aerosols ⁵¹Cr, ⁵⁴Mn, ⁵⁹Fe, ⁵⁷Co, ⁵⁸Co, ⁶⁰Co, ⁶⁵Zn, ⁸⁹Sr, ⁹⁰Sr, ⁹⁵Zr, ⁹⁵Nb, ¹⁰³Ru, ¹⁰⁶Rh, ^{110m}Ag, ¹²⁴Sb, ¹³⁴Cs, ¹³⁷Cs, ¹⁴¹Ce and ¹⁴⁴Ce, ²³⁸Pu, ²³⁹⁺²⁴⁰Pu, ²⁴¹Am,
- iii) radioisotope of iodine ¹³¹I in gaseous and aerosol forms,
- iv) tritium,
- v) radioisotope of carbon ¹⁴C in organic and inorganic forms,

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activity of radionuclides discharged in waste water to surface water of the Hron river:

- i) radionuclides ^{51}Cr , ^{54}Mn , ^{59}Fe , ^{57}Co , ^{58}Co , ^{60}Co , ^{65}Zn , ^{89}Sr , ^{90}Sr , ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Rh , $^{110\text{m}}\text{Ag}$, ^{124}Sb , ^{131}I , ^{134}Cs , ^{137}Cs , ^{141}Ce and ^{144}Ce , ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am ,
- ii) tritium.

If other than the aforementioned radionuclides with the half-life of decay longer than 8 days are identified in discharged radioactive substances, they will be included in the balance and evaluation.

Radionuclides that were discharged to the environment in other than standard monitored way will be included in the balance and evaluation as well.


Monitoring of discharges in the Units 3&4 VK is made by metrologically certified defined gauges (based on requirements of the act on metrology, the monitors were certified by authorised organisations. The EMO NPP Radiation Protection Department regularly takes part in laboratory comparative measurements, including the international, to review the correct methodology, measurement and evaluation of measured samples.) This ensures that monitored values of radioactive discharges and monitoring of radioactivity in components of the environment are exact and correct. Based on measured values of discharges of radioactive substances and other input data, the radiological impact of discharges from the EMO NPP operation will be evaluated by calculation of radiation dose on a representative person from the population using the approved radiological model RDEMO. Calculated values of radiation exposure of population near the EMO1,2,3 NPP and results of radiation monitoring of components of the environment near the EMO1,2,3 NPP are included in radiation protection reports. These reports are sent to the state regulatory authorities UVZ SR and UJD SR and environmental authorities as well as to mayors of surrounding villages.

Discharge monitors in VK of the Units 3&4 are of the same type as discharge monitors in VK of the EMO Units 1&2. Types of used monitors and the entire discharge monitoring system in EMO Units 1&2, including monitoring of radioactivity near the EMO NPP, was verified by an expert group from the European Union in 2014 (the verification report is available on the EU sites). **The mission came to the conclusion that the monitoring system of discharges from the EMO NPP operation and the radioactivity monitoring system near the EMO NPP are adequate for continuous monitoring of radioactive discharges to air and water. No comments were presented in relation to the EMO NPP discharge monitoring system and environment radioactivity monitoring system by the experts.**

Other radioactive materials can be released from the EMO1,2,3 NPP controlled area to the environment only if legislative conditions are fulfilled. It means:

- a) qualified personnel according to the approved procedure of monitoring, i.e. according to the radiation protection quality assurance documentation
- b) based on the permission issued by UVZ SR
- c) if the result of material monitoring fulfilled the criterion for discharge to the environment
- d) only by metrologically verified specific gauges.

The EMO NPP owns the permission issued by the Public Health Authority for discharge of radioactive-contaminated materials to the environment, and metrologically verified monitors, and it has

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regulations for discharge of radioactive-contaminated materials to the environment in the quality assurance system approved by UVZ SR. Information about quantity, type and radioactivity of discharged radioactive materials to the environment are mentioned in quarter and annual reports on radiation protection. These reports are sent to the state regulatory authorities UVZ SR and UJD SR. UVZ SR makes inspections related to assurance of radiation protection in the EMO NPP. Equipment, regulations and procedures for discharge of radioactive-contaminated materials to the environment, including equipment supplied within the MO34 – elementary system

12 – radiation protection, mentioned in this paragraph are used for monitoring of radioactive-contaminated materials for their discharge to the environment.

These activities and management of radiation protection for EMO1,2,3 are ensured by the single Radiation Protection Department, who applies experience and good practice from operation of EMO1,2 NPP using the same approach also in the operated MO34 Unit 3.

*3.26 Regularly evaluate all proposed monitoring activities.
affected state administration authorities and the public.*

Regularly provide the results of monitoring to

Fulfilment:


Monitoring of discharges of radioactive substances to the environment from the EMO1,2,3 NPP operation is made continuously in the radiation monitoring control room shift workplace. Results of the monitoring are recorded, presented and archived in the radiation monitoring computer system. The system presents the results in the form of tables, mnemocircuits and diagrams so that the system operator has permanent information about values of discharges and the rate of discharging. The system generates audio-visual alarms if set values of concentration and rate of discharging per time unit are exceeded. Moreover, it permanently checks the technical condition of monitors. Correctness of response of the monitors is periodically checked using control means if the monitor response is correct.

Evaluation of discharges per calendar units, such as days, months, quarters, years, is made so that the results can be checked (minimisation of human error).

Monitors used for continuous monitoring of discharges and instruments for laboratory evaluation of discharges in the EMO NPP VK and in the MO34 VK fulfil requirements for such monitors:

- technical standards, including the international, redundancy of systems,
- these are gauges with type test and official certification in compliance with the Act on Metrology,
- the sampling system of air from VK for discharge monitors has been designed and constructed so to be representative and isokinetic.

The EMO1,2,3 NPP makes a systematic monitoring of an impact of radioactive substances released from administration control by discharge on radioactivity of components of the environment according to the monitoring plan of the nuclear installation vicinity so that

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check of exposure routes and model calculations is ensured. It means that the check of discharge of radioactive substances from the EMO1,2,3 NPP operation to the environment is checked not only in discharge points but also in components of the environment. This ensures permanent check and control of their discharge together with correct evaluation of the impact of discharge on surrounding environment and population not only by evaluation using model calculations but also check of correctness of such evaluation with measured values of radionuclides in the environment.

Reports sent to UVZ SR (and their frequency) are:

- a) Immediate – notification if annual reference levels (RRU), reference investigation or action levels, or an authorised limit are exceeded
- b) Within 30 days – reports on investigation of reasons and consequences of their exceeding in point a)
- c) Reports on discharges to the environment, including continuous evaluation of their impact on the dose rate of population by 60 days after the end of quarter
- d) Report on annual balances of discharged radionuclides, including evaluation of their impact on the dose rate of population by 31st March of the next year
- e) Notification of changes of data (e.g. demography, agricultural data etc.) used in the calculation code by 15 days from the date of change
- f) Report on results of investigation of reasons and consequences, if RRU, investigation and action levels are exceeded, by 30 days from their notification
- g) Non-functionality of any monitoring system for the given type of monitored quantities for continuous or balance measurement: immediately
- h) Report of results of monitoring, analyses and evaluation of results of radioactivity monitoring in components of the environment near the EMO1,2,3 NPP are submitted in compliance with the UVZ SR decision:
 - Report for 1st Quarter – by the end of May
 - Report for 2nd Quarter – by the end of August
 - Report for 3rd Quarter – by the end of November
 - Report for 4th Quarter – by the end of February of the next year
 - Annual report – by the end of March of the next year

Reports on results of monitoring of radioactive discharges to the environment and monitoring of the EMO NPP vicinity are sent to state administration authorities (UVZ SR and UJD SR) as well as to public (mayors of villages) in the surrounding.

Results of monitoring of discharges are accessible to the general public through the website in annual reports of EMO and EBO NPP activities. In order to improve informing of the public, a civil information committee is operating in EMO since 2005. The task of the committee consisting of public representatives, who are active and known in the public and social life, is to present to the public through its independent members

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qualified and current information in the area of informing the public and in compliance with the Act on Free Access to Information.

3.27 During periodical evaluation of nuclear safety that will be performed during operation according to UJD SR regulation No. 49/2006 Coll. on Periodical Evaluation of Nuclear Safety, evaluate also an impact on the state of health of the population

Fulfilment:

- *The originally cited Regulation of UJD SR No. 49/2006 Coll. on Periodical Evaluation of Nuclear Safety lies down in its wording the requirement for evaluation of an impact on the environment. It relates in particular to Art. 16 Impact of operation of nuclear installation on the environment, where requirements are formulated in par. (1) and (2).*
- *The amended Regulation of UJD SR No. 33/2012 Coll. on Regular, Complex and Systematic Evaluation of Nuclear Safety of Nuclear Installations requires evaluation of an impact on the environment in Art. 17 "Radiological impact on the environment". The requirements are formulated in par. (1) and (2).*
- *The valid Methodology for Periodical Evaluation of EMO12 Nuclear Safety – EMO12 PSR Project does not require a special evaluation of the state of health of population.*


The mentioned recommendation has not been actually implemented because of the fact that the evaluation of impact on the state of health of population requires a complex assessment of this requirement, and the mentioned recommendation is by its extent currently exceeding requirements of legislation and internal regulations. After the SE MO34 commissioning, fulfilment of the requirement will be repeatedly reviewed before execution of the periodical safety assessment proper.

3.28 In the area of radiation protection, reassess the method and formulation of limits of discharges from individual nuclear installations in the locality in cooperation with the licensing authority so that the following is evident:

- *what annual load of the effective dose represented the upper optimisation limit for their deduction,*
- *what are locality-specific recalculation activity/dose coefficients,*
- *what are requirements for monitoring of discharges in relation to limits, which have to reflect the necessity of evaluation of discharges from the viewpoint of dose loads for population,*
- *what kind of method (content and frequency of reporting) is selected for communication with regulatory authorities in relation to the given issue*

Fulfilment:

In compliance with provisions of Act No. 87/2018 Coll. on Radiation Protection, the "upper optimisation limit" – limit dose of representative person for operation of nuclear

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installation of operators of nuclear installations in the Mochovce locality – equals to 0.25 mSv per calendar year.

In case of discharges to air and to surface water, the value of limit dose of representative person is determined separately for individual discharges as follows:

- effective dose 0.2 mSv per calendar year for air discharges, and
- effective dose 0.05 mSv per calendar year for surface water discharges.

The limit dose is not a limit for discharge of radioactive substances to the environment from operation of nuclear installation. Based on the optimisation study, the Public Health Authority defined a **basic authorised limit** for operation of the EMO1,2,3 NPP from the limit dose 0,25 mSv/year in the permission **issued with the Ref. No. OZPŽ/4603/2019 for discharge of radioactive substances produced at operation of EMO1, 2, 3 NPP released from administration control** by their discharge to the environment. The authorised limit for limitation of irradiation of population near nuclear installation caused by radioactive substances released from administration control discharged to air and surface water at operation of EMO1,2,3 NPP is **the effective dose of representative person 0.075 mSv per calendar year:**


- a) effective dose 0.070 mSv per calendar year for air discharges, and
- b) effective dose 0.005 mSv per calendar year for surface water discharges – to the Hron river.

- *For calculation of radiological impact from MO34, recalculation coefficients will not be used; directly the radiological model will be used. UVZ SR in the aforementioned permission defined: Irradiation of population near the EMO1,2,3 NPP caused by discharge of radioactive substances released from administration control to the environment will be evaluated by model calculations. The calculation code RDEMO must be used for model evaluation of irradiation of population caused by discharged radioactive substances during normal operation of EMO NPP.*

- Requirements for monitoring discharges in the UVZ SR permission are as follows:

In compliance with the UVZ SR permission, EMO1,2,3 NPP will limit and manage the discharge of radioactive substances to the environment so that:

Activity of radionuclides discharged to air per calendar year does not exceed the annual reference levels for:	Annual reference values for Units 1,2,3
– radioisotopes of rare gases	6.15* 10 ¹⁵ Bq
– iodine (¹³¹ I) sum of gaseous and aerosol forms	1.01* 10 ¹¹ Bq
– Radioisotopes with the half-life of decay longer than 8	

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days in aerosols	2.55* 10¹¹ Bq
Activity of radionuclides discharged in waste water to surface water of the Hron river per calendar year did not exceed the annual reference values for	
– tritium	1.8* 10¹³ Bq
– other radionuclides (except for tritium)	1.65* 10⁹ Bq

Note: according to the former legislation, the annual reference value was called “guide value”.
These values comply with data in the MO34 EIA and information pursuant to Art. 37 of the EURATOM treaty.


If some of the defined annual reference values mentioned in the table is exceeded:

- immediately analyse reasons, apply all available measures for limitation of quantity or activity of discharges radioactive substances to the environment, and ensure that the authorised limit is not exceeded,
- evaluate a radiological impact on irradiation of population by model calculation using RDEMO.

For daily monitoring, evaluation and control of discharges, UVZ SR stipulated in the permission the necessity to continuously monitor the level of discharges radioactive substances, compare them with values for normal operation, and operatively adopt measures. For this purpose, daily reference investigation and action values have been defined:

Reference levels for daily discharges for check and control.

- investigation levels for activity of radionuclides discharged to air
 - Any radionuclides of rare gases $1.1 * 10^{13}$ Bq/day,
 - iodine radioisotope ^{131}I (gaseous form) $1.8 * 10^8$ Bq/day,
 - Any radionuclides in aerosols $0.5 * 10^9$ Bq/day,
- Action levels for activity of radionuclides discharged to air
 - any radionuclides of rare gases $8.25 * 10^{13}$ Bq/day,
 - iodine radioisotope ^{131}I (gaseous form) $1.35 * 10^9$ Bq/day,
 - any radionuclides in aerosols $3.75 * 10^9$ Bq/day
- investigation levels for activity of radionuclides discharged in waste water to surface water of the Hron river
 - volume activity of tritium $6.0 * 10^7$ Bq/m³,
 - volume activity of other radionuclides (except for tritium) $4.0 * 10^4$ Bq/m³,
- action levels for activity of radionuclides discharged in waste water to surface water of the Hron river

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- i) volume activity of tritium $1.0 \cdot 10^8$ Bq/m³,
- ii) volume activity of other radionuclides (except for tritium) $4.0 \cdot 10^4$ Bq/m³.

To prevent exceeding of investigation or action level, the EMO1,2,3 NPP must make the analysis and define reasons. Based on defined reasons, measures are adopted to prevent their recurrence. If the action level is exceeded, more detail analyses and evaluation of radiological impact on irradiation of population by model calculation using the RDEMO code have to be performed.

All the aforementioned groups of radioactive substances are continuously monitored by officially certified gauges, redundant monitors as follows:

In radioactive substance discharges to air released to the environment through EMO1,2,3 NPP vent stacks

- i) total volume activity of rare gases,
- ii) total volume activity of aerosols, and
- iii) volume activity of radioisotope of iodine ¹³¹I in gaseous form in waste water discharged to surface water

of the Hron river by waste water pipes

- ii) total volume activity of gamma radionuclides.

Radioactivity in waste water is monitored in the laboratory by evaluation of sample taken before taking a decision about draining a reservoir for gamma and tritium radioactivity.

Balances of radioisotopes discharged in waste water are prepared by:


- i) gamma spectrometry of samples,
- ii) alpha spectrometry of samples drained from reservoirs,
- iii) monitoring of tritium in representative samples,
- iv) determination of strontium Sr-89, Sr-90 in samples drained from reservoirs.

As secondary check of correctness of results of monitoring radionuclides in waste water, a laboratory evaluation of representative drained samples taken from water of waste water channel is used; the following is evaluated:

- i) gamma spectrometry of samples,
- ii) monitoring of tritium.

Stability tests are regularly made at these continuous monitors in compliance with radiation protection quality assurance documentation.

Balances of discharged radioactive substances to the environment are prepared in detail with considering of radioactivity of individual discharged radionuclides (in compliance with EU recommendation on standardised data on radioactive substance discharges to air and water from NPP operation, Recommendation of the EU Committee 2004/2/Euratom).

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For balancing and evaluation of an impact of discharged radionuclides, the following is monitored and recorded:
activity of radionuclides discharged to air:

- i) radioisotopes of rare gases ^{41}Ar , ^{85}Kr , $^{85\text{m}}\text{Kr}$, ^{87}Kr , ^{88}Kr , ^{133}Xe , $^{133\text{m}}\text{Xe}$ and ^{135}Xe , (from air samples taken from VK to air cylinders)
- ii) radioisotopes in aerosols ^{51}Cr , ^{54}Mn , ^{59}Fe , ^{57}Co , ^{58}Co , ^{60}Co , ^{65}Zn , ^{89}Sr , ^{90}Sr , ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Rh , $^{110\text{m}}\text{Ag}$, ^{124}Sb , ^{134}Cs , ^{137}Cs , ^{141}Ce and ^{144}Ce , ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am , (from aerosol filters in VK)
- iii) radioisotope of iodine ^{131}I in gaseous and aerosol forms (from aerosol filters and samples of active coal in VK)
- iv) tritium (from special sampling device)
- v) radioisotope of carbon ^{14}C in organic and inorganic forms (from special sampling device)

activity of radionuclides discharged in waste water to surface water of the Hron river:


- i) radionuclides ^{51}Cr , ^{54}Mn , ^{59}Fe , ^{57}Co , ^{58}Co , ^{60}Co , ^{65}Zn , ^{89}Sr , ^{90}Sr , ^{95}Zr , ^{95}Nb , ^{103}Ru , ^{106}Rh , $^{110\text{m}}\text{Ag}$, ^{124}Sb , ^{131}I , ^{134}Cs , ^{137}Cs , ^{141}Ce and ^{144}Ce , ^{238}Pu , $^{239+240}\text{Pu}$, ^{241}Am , (from water samples from reservoirs)
- ii) tritium. (from water samples from reservoirs)

If other than the aforementioned radionuclides with the half-life of decay longer than 8 days are identified in discharged radioactive substances, they will be included in the balance and evaluation.

Radionuclides that were discharged to the environment in other than standard monitored way will be included in the balance and evaluation as well.

Monitors used for continuous monitoring of discharges and instruments for laboratory evaluation of discharges in the EMO NPP VK and in the MO34 VK fulfil requirements for such monitors (technical standards, redundancy, these are gauges with type test and official certification in compliance with the Act on Metrology, the sampling system of air from VK for discharge monitors has been designed and constructed so to be representative and isokinetic).

The EMO1,2,3 NPP makes a systematic monitoring of an impact of radioactive substances released from administration control by discharge on radioactivity of components of the environment according to the monitoring plan of the nuclear installation vicinity so that check of exposure routes and model calculations is ensured. It means that the check of discharge of radioactive substances from the EMO1,2,3 NPP operation to the environment is checked not only in discharge points but also in components of the environment. This ensures permanent check and control of their discharge together with correct evaluation of the impact of discharge on surrounding environment and population not only by evaluation using model calculations but also check of correctness of such evaluation with measured values of radionuclides in the environment.

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– Reports sent to UVZ SR (and their frequency) are:


- a) Immediate – notification if annual reference levels (RRU), reference investigation or action levels, or an authorised limit are exceeded
- b) Within 30 days – reports on investigation of reasons and consequences of their exceeding in point a)
- c) Reports on discharges to the environment, including continuous evaluation of their impact on the dose rate of population by 60 days after the end of quarter
- d) Report on annual balances of discharged radionuclides, including evaluation of their impact on the dose rate of population by 31st March of the next year
- e) Notification of changes of data (e.g. demography, agricultural data etc.) used in the calculation code by 15 days from the date of change
- f) Report on results of investigation of reasons and consequences, if RRU, investigation and action levels are exceeded, by 30 days from their notification
- g) Non-functionality of any monitoring system for the given type of monitored quantities for continuous or balance measurement: immediately
- h) Report of results of monitoring, analyses and evaluation of results of radioactivity monitoring in components of the environment near the EMO1,2,3 NPP are submitted in compliance with the UVZ SR decision:
 - Report for 1st Quarter – by the end of May
 - Report for 2nd Quarter – by the end of August
 - Report for 3rd Quarter – by the end of November
 - Report for 4th Quarter – by the end of February of the next year
 - Annual report – by the end of March of the next year

- Reports on results of monitoring of radioactive discharges to the environment and monitoring of the EMO NPP vicinity are sent to state administration authorities (UVZ SR and UJD SR) as well as to public in the 20 km radius.

3.29 Maintain protection zones of existing and new power facilities in the subject area according to Art. 36 of Act No. 656/2004 Coll. on Energy and consequential amendments, and apply such measures to prevent damage of the existing power facilities.

Fulfilment:

- ***The mentioned recommendation relates to protection zones of power grid facilities, where in addition to technical requirements are explicitly cited also requirements for what is prohibited to do in the protection zone of external overhead power lines, for instance to set up constructions, structures and dumps, plant and grow perennial crops etc.***
- ***Fulfilment of the recommendation belongs to the authority of SEPS. Facilities situated in the Mochovce NPP site (Units 1, 2, 3, and 4) fulfil the requirements of this Act amended by Act No. 251/2012 Coll., and Regulation of MH SR No. 271/2012 Coll. which***

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stipulates details of the scope of the technical conditions of access and connection to the system and network and operating rules of the system and network.

3.30 *Propose such technical solution for overhead power lines in the next phases of design documentation that prevents killing of birds*

Fulfilment:

SE MO34 ordered an analysis of an impact of high voltage lines on mortality of birds. and the results of this analysis are as follows:

Accidents of birds on HV lines occur mainly on 22 kV and 35 kV lines, and right at these types of lines, the reasons are as follows:

- *An electrical accident at ground connection caused for instance by the wingspan or when birds are alighting on or taking off from power line pylons.*
 - *The measures are for instance “crests with peaks” or use of pylon heads of the “talon” type that do not lure the birds to alight.*
- *An accident by collision of a flying bird with lines or the structure.*
 - *Measures applied in critical points such as run corridors and places with an increased density of risk factors are different “visual” objects.*

In extra HV lines (110 kV, 220 kV, and 400 kV), the situation is completely different and more favourable (e.g. the Czech legislation does not require application of protection).

An electrical accident at ground connection caused for instance by the wingspan or when birds are alighting on or taking off from power line pylons.

- *With regard to larger distances between individual lines and insulation distances, this type of accident is little probable. It applies absolutely also to the 400 kV lines.*

An accident by collision of flying birds with lines or the structure.


- *Extra HV and especially HV lines are more robust and better visible, and this applies absolutely also to 400 kV lines with bundle conductors and spreaders.*
- *From the visibility viewpoint, and in case of those existing already for a longer time the position of which is known by birds, the situation is groundless, and it is not necessary to solve it.*

In some risky areas (reservations and on areas with high density of birds, so called protected bird areas), local measures can be applied in order to protect nature, but these have to be reviewed also by protection authorities after consultancy with non-governmental organisations and ornithologists.

The SE MO34 project has only these types of lines in the NPP site, and a part connecting the EHV line with the Veľký Ďúr substation belongs to the SEPS competency.

3.31 *During operation of the installation, carefully observe all legal regulations and ordinances related to treatment and dispose of non-radioactive waste produced during operation of the installation. Ensure regular removal of dangerous, other and municipal waste by authorised organisations. Ensure the waste management in compliance with Act No. 223/2001 Coll. replaced by Act No. 79/2015 Coll. on Waste, as amended, and VZN (general binding order) of Kalná nad Hronom.*

Fulfilment:

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- *Requirements from legislation are mentioned also in the register of legal and other requirements which is regularly updated and evaluated. It contains also VZN of related villages.*
- *Inspection and audits (inspections also from other plants) are performed.*
- *Waste removal is ensured through contracts (with Marius Pedersen and by an internal contract concluded with the EMO1,2 waste management). After commencement of the power plant operation, waste management will be ensured by a central contract concluded between the contractor and SE HQ (one contract for all plants).*
- *Waste management in offices is ensured in cooperation with EMO*
- *12. The construction site is equipped with a waste recycling centre operated by MO34 in cooperation with company authorised to manipulate dangerous and other waste.*
- *The waste recycling centre provides for collection vessels for municipal waste, separated collection of waste, and also provides services for contractors producing waste according to the waste originator. The contractors submit papers on production and management of waste every month to the related department in MO34.*
- *They elaborate and send also an annual report on waste production. They send a copy of this report to the MO34 Environment Department. MO34 elaborates an annual report on waste production only for waste at which it is considered the waste originator.*
- *Operation of the waste recycling centre was approved by the District Authority in Levice, Environment Protection Department, by its Decision No. OU-LV-OSZP-2019/015146- 003/ODP-Z dated 04/10/2019.*

In compliance with the Act, the waste management programme has been developed.

3.32 Ensure training of workers aimed at occupational safety, prevention of accidents and control of emergency situations

Fulfilment:

- *Our employees pass regular trainings – introductory, periodical and on-the-job trainings.*
- *The trainings of employees are carried out at hiring of new workers in the extent required by internal regulations of Slovenské Elektrárne, and cover also training in OH&S, FP, moving on the site, environment protection, prevention of accidents and control of emergency situations, and implementation of the security system in the plant.*
- *The trainings are performed periodically every two years in compliance with respective legislation. Contractors are trained in regular annual intervals by an external company.*
- *Every year a plant-wide drill, a cooperation environmental drill and a fire evacuation drill are carried out, where cooperation of all rescue services – firemen, rescuers, emergency groups and plant employees and contractors – is reviewed. After each drill a report is developed, which contains also determination*

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of corrective actions, and thus improvements in the field of control of potential emergency situations.

3.33 *Solve infrastructural issues of spent nuclear fuel management in the Mochovce site (construction of an intermediate spent nuclear fuel repository).*


Fulfilment: *Within preparation of the project, the Environmental Impact Assessment Plan (EIA process) was developed for the project – 06/2013.*

- *After submission of the Plan to the Ministry of Environment (MZP), the meeting was held in MZP on 07/02/2014 where the scope of the assessment report for cross-boundary assessment of the proposed activity was agreed – MZP SR letter Ref. No. 3431/2014-3.4/hp dated 07/02/2014.*
- *The environmental impact assessment report (EIA) was finished as of 03/2015.*
- *According to current legislation (Atomic Act) and pursuant to Art. 3(9), SE is not an authorised person for RAW and SNF storage. Because of the aforementioned, all SE activities within design preparation of dry repository of SNF in the Mochovce site finished as of 04/2015.*
- *The authorised legal entity (Art. 3(9) of Act No. 541/2004 Coll. – JAVYS) is currently preparing an increase of storage capacity for SNF in the Jaslovské Bohunice site. Detail information can be seen at: <https://www.enviroportal.sk/sk/eia/detail/dobudovanie-skladovacej-kapacity-medziskladu-vyhoreteho-jadroveho-pali>*
- *JAVYS does not consider construction of a storage capacity for SNF in the Mochovce site. SNF from MO34 operation will continue to be transported to storage capacities in Jaslovské Bohunice.*

3.34 *To solve the issue of ASAP implementation of the nuclear power industry back-end cycle strategy in the field of final stage of management of spent fuel and radioactive waste, which cannot be deposited in the existing republic repository.*

Fulfilment:

- *In compliance with Art. 3(9) of Act No. 541/2004 Coll., as amended (Atomic Act), radioactive waste or spent nuclear fuel can be deposited on the basis of permission issued by the Authority only by a legal entity founded, established or authorised by the Ministry of Economy of the Slovak Republic (hereinafter referred to as “Ministry of Economy”). The legal entity pursuant to the first sentence must have a licence for operation of the repository granted, and the Slovak Republic must have a 100 % interest in this entity, and this entity must not be a holder of licence for operation of nuclear installation pursuant to Art. 2(f), the first paragraph.*
- *SE is not such legal entity and in compliance with the aforementioned, it cannot be.*
- *Because of this, we are not competent to implement the nuclear power industry back-end cycle strategy in the field of final stage*

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of management of spent fuel and radioactive waste, which cannot be deposited in the existing republic repository.

- *SE fulfils its obligations in the field of nuclear power industry back-end cycle, which as the nuclear installation operator has to do in compliance with the Atomic Act and the Act on the National Nuclear Fund. Mainly payment of obligatory fees to the National Nuclear Fund designated for assurance of activities of the National Radioactive Waste and Spent Nuclear Fuel Programme (originally the nuclear power industry back-end cycle strategy).*

3.35 *Solve the issue of construction of a bridge over the Hron river between Nový Tekov and Starý Tekov, which would serve as an escape route for Nový Tekov inhabitants in case of extraordinary events (request of the Nový Tekov mayor and of the Starý Tekov inhabitant, Ján Pacala)*

Fulfilment: *SE evaluated the possibility of construction of such infrastructure and based on meetings with MV SR technical departments responsible for protection of population (commission for control of emergency situations in NP and in its vicinity), SE did not receive any request for evaluation of such bridge as another evacuation route at discharge of RAL from NPP to the environment in case of occurrence of an event in the MO34 NPP connected with discharge of RAL to the environment. The mentioned bridge was constructed through the investment project:*

“Bridge between Nový Tekov and Starý Tekov”

Investor: Most Tekov s.r.o., Markušovská cesta 22, 052 01 Spišská Nová Ves Final

inspection: 03/06/2015, Reg. No. 311/2015


- *Evacuation routes from the mentioned villages belong to Protection Plans of Population of related district authorities, and statutory authority at the municipality level has been familiarised with these plans.*
- *Despite the fact that the bridge was constructed between these two villages, this fact was not incorporated in the Protection Plan of Population at the Nitra region level.*

4. CONCLUSION

The mentioned document describes in detail the evaluation of the method of fulfilment of conditions recommended by MZP SR mentioned in the Final Opinion No. 395/2010-3.4/hp for SE in relation to the project (construction) *“Mochovce Nuclear Power Plant VVER 4x440 MW, Construction 3”*. *Since the MO34 Unit 3 will be operated, and the MO34 Unit 4 will be under construction, fulfilment of the conditions is described from such viewpoint.*

The technical document represents evaluation of the method of fulfilment of conditions recommended by MZP SR by several legal entities involved in their fulfilment, such as UJD SR, SHMU, SE MO34, SE EMO12, and Starý Tekov on the basis of knowledge as of the date mentioned in the document introduction.

The Annex A in Chapter 6 contains decisions of authorities, consents of local authorities, technical reports cited in points 3.8, 3.15 to 3.18.

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5. ANNEXES

Annex 1 – Table 1a – Evaluation of conditions in UJD SR Decisions No. 246/2008, Annex 1 – Table 1b – Evaluation of conditions in UJD SR Decisions No. 266/2008,

Annex 2 – Memorandum of Understanding (copy) in the field of cooperation and exchange of data in nuclear safety between UJD SR and HAEA, and on transfer of data from 20 TDS Mochovce stations,

Annex 3 – Amendment 1 to the Agreement between the Ministry of the Environment of the Slovak Republic and the Ministry of the Environment of the Hungarian Republic and the Ministry of Interior of the Hungarian Republic on mutual exchange of data from early radiation warning systems signed on 25 April 2001 in Budapest (copy),

Annex 4 – Notes to the installation of gamma dose rate devices in the monitoring network of SHMI (May 2016),

Annex 5 – Scan of the affirmative letter of Dr. Kargo for exchange of data from aerosol measurements between the Hungarian and the Slovak Republics,

6. ANNEX A TO DOCUMENT PNM34481619

Decision No. D1/2013/01710 issued by the Regional Public Health Authority in Levice,

Decision No. OU-LV-OSZP-2017 00506–ODP-Z issued by the District Authority in Levice, consents of Nový Tekov and Kalná nad Hronom for municipal waste management

Decision No. OU-NR-OSZP2-2016/002855 issued by the District Authority in Nitra

Decision No. OU-NR–OSZP2-2017/004442 issued by the District Authority in Nitra

Decision No. OU-NR–OSZP2-2017/043415 issued by the District Authority in Nitra

Decision No. OU-NR–OSZP2-2015/043433 issued by the District Authority in Nitra

Decision No. OU-NR-OSZP2-2018/040543 issued by the District Authority in Nitra

Decision of UV SR No. OOPŽ/4603/2019 issued by the Public Health Authority of the Slovak Republic,

Analysis of clogging the VD V. Kozmálovce from 2016,

Manipulation order of VD V. Kozmálovce from 2017,

Leak test records of reservoirs, pits and retention tanks of external structures carried out in 2018/2019

Decision of the District Authority in Levice OU-LV-OSZP-2019/015146-003/ODP-Z dated 04/10/2019