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MINISTRY OF ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES OF UKRAINE
35 Mitropolit Vasyl Lypkivskyi Str., Kyiv, 03035, tel .: (044) 206-31-00, (044) 206-31-15, fax: (044) 206-31-07, E-mail: info@mepr.gov.ua, ID 43672853

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3 Nazarivska St., Kyiv 01032
(applicant & address)

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Executive Summary
Environmental Impact Assessment of the Proposed activity:
«Operation of power units at Rivne NPP»

Pursuant to the results of the environmental impact assessment carried out in line with the Law of Ukraine «Environmental Impact Assessment», Articles 3, 6-7, 9 and 14 for the above activity on operation of power units at Rivne NPP, the following was established:

The environmental impact assessment procedure (hereinafter - EIA) commenced 29.01.2018 p. through publishing a Notice of Proposed activity, which shall be assessed for environmental impact (document number in the Unified EIA Register (hereinafter - the Register) is 201812976), the Environmental Impact Assessment Report (hereinafter - the EIA Report) was enrolled in the Register and the Notice of EIA Report Public Discussion was posted on 12.06.2019;

The Notice of Proposed activity was published in the newspapers «Volodymyretsky Vysnik» on 01.02.2018 № 4 and «Energia» on 01.02.2018 № 5, and also posted on bulletin boards, as confirmed by photographic evidence;

Since the date of the official publication of the above Notice of Proposed activity subject to the environmental impact assessment, the Ministry has not received comments and proposals from publice;

The Notice of EIA Report Public Discussion was published in the newspapers «Energia» on 20.06.2019 № 25, «Visti Rivnenshini» on 21.06.2019 and «Nova Doba» on 20.06.2019 № 24, and also posted on bulletin boards, as confirmed by photographic evidence;

the public hearings provided by the Law of Ukraine "On Environmental Impact Assessment", Article 7 conducted on next period:

– 01.07.2019 at 11:00, Rivne regional state administration, address: Maidan Prosvity, 1, Rivne city, Rivne region;

– 02.07.2019 at 10:00, the premises of Budynok Rad, address: Maidan Nazhaleznosti, 2, Khmelnytskyi city, Khmelnytskyi region;

– 03.07.2019 року at 11:00, the building of the Ternopil regional council, address: M. Grushevskogo str., 8, ap.329, Ternopil city, Ternopil region;

– 04.07.2019 at 10:00, the premises of the Volyn regional state administration, address: Kyivska square, 9, Lutsk city, Volyn region;

– 05.07.2019 at 10:00, the premises of the Lviv regional state administration, address: Vinnitchenka str., 16, Lviv city, Lviv region;

– 08.07.2019 at 13:00, the premises of the Ivano-Frankivsk regional state administration, address: M. Grushevskogo str., 21, Ivano-Frankivsk city, Ivano-Frankivsk region;

– 09.07.2019 at 11:00, administrative building, address: Sergiy Korolyov str., 12, Zhytomyr city, Zhytomyr region;

– 10.07.2019 at 14:00, the premises of the Vinnytsia regional council, address: Soborna str., 70/2, ap. 329, Vinnytsia city, Vinnytsia region;

– 11.07.2019 at 12:00, the premises of the Aarhus information and outreach center, address: Mitropolita Vasylya Lypkivskogo, 35, Kyiv city.

The proposals and comments received from the date of the official publication of the Notice of Proposed activity subject to the environmental impact assessment and related to the proposed activity, scope of research and level of details as listed in the EIA Report, as well as proposals and comments received during the proposed activity public discussions after the EIA Report was submitted are reflected in the Public Discussions Report, which is an integral part of this Executive Summary;

the transboundary environmental impact assessment procedure for the proposed activity of the JSC "National Nuclear Energy Generating Company 'Energoatom'" (hereinafter referred to as JSC "NAEK 'Energoatom'") was carried out for the activity "Operation of Power Units at the Rivne NPP" in accordance with the requirements of the findings and recommendations of the Compliance Committee under the Convention on Environmental Impact Assessment in a Transboundary Context (hereinafter referred to as the Espoo Convention) for Ukraine in 2014 under case EIA/IC/CI/4. These findings state that the lifetime extension of the power units beyond the expiration of their initial licenses should be considered a planned activity under paragraph v) Article 1 of the Convention, and therefore falls under its provisions.

On January 29, 2018, the transboundary environmental impact assessment procedure was initiated by submitting a Notification regarding the proposed activity subject to environmental impact assessment.

On January 29, 2018 the General Directorate for Environmental Protection of the Republic of Poland (letter No.5/3-10/966-18), the Ministry of ecology of the Republic of Slovakia (letter No.5/3-10/971-18), the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus (letter No.5/3-10/968-18), the Ministry of Foreign Affairs of Romania and Ministry of Environment, Waters and Forests of Romania (letter No.5/3-10/972-18), the Ministry of Agriculture of Hungary (letter No.5/3-10/969-18), the Ministry of Agriculture, Regional Development and Environment of Moldova (No.5/3-10/967-18), the Ministry of Agriculture, Forestry, Environment and Water Management of Austria (letter No. 5/3-10/970-18) were notifies regarding participation in the transboundary environmental impact assessment procedure for the proposed activity of JSC "NAEK 'Energoatom'";

On January 30, 2018 the Secretariat of the Espoo Convention was notified (letter No.5/3-10/1011-18) regarding the commencement of the transboundary environmental impact assessment procedure for the planned activity of JSC "NAEK 'Energoatom'".

On June 26, 2019 The Ministry of Ecology and natural resources of Ukraine (letter No.5/3-7/6873-19) sent the Environmental Impact Assessment Report for the "Operation of Power Units at the Rivne NPP" for review and comments to the following affected parties: the Republic of Belarus, the Republic of Poland, the Slovak Republic, the Republic of Hungary, the Republic of Romania, the Republic of Moldova, and the Republic of Austria.

On May 21, 2020 a letter was received from the General Directorate for Environmental Protection of the Republic of Poland with proposals regarding the procedure for conducting transboundary consultations.

On May 28, 2020 a letter was received from the Federal Ministry of Austria for Climate, Environment, Energy, Mobility, Innovation, and Technology with proposals regarding the procedure for conducting transboundary consultations.

On June 22, 2020 a letter No. DEICP/3387 was received from the Ministry of Environment, Waters and Forests of Romania with proposals regarding proposed activity.

On January 20, 2020 the Ministry of environment of the Slovak Republic provided comments and suggestions regarding the proposed activity.

On June 18, 2020 the Ministry of Agriculture, Regional Development and Environment of Moldova by letter № 12-12/2532/1 informed that they do not intend to participate in the transboundary consultations regarding this proposed activity.

On June 16, 2020 the Ministry of natural resources and environmental protection of the Republic of Belarus by letter No.11-1-1/188-Ino, expressed a desire to receive the Environmental Impact Assessment Report in the official language of the affected party, the Republic of Belarus.

On August 28, 2020 the Ministry of environment of the Slovak Republic by letter No.45790/2020 informed about the completion of the transboundary consultations regarding this proposed activity and expressed a desire to receive the final decision.

On November 24, 2020 a letter was received from the Ministry of Agriculture of Hungary (No. KmF/121-2/2020), stating that the Hungary considers the transboundary consultations to be completed.

On April 28, 2021 expert consultations were held with the Poland via videoconference, following which an additional response was provided to the questions raised.

On September 27, 2021 the Ministry of environment, waters, and forests of Romania, by letter No.DEICP/26079/27.09.2021 informed Ukraine about the completion of the transboundary consultations regarding this proposed activity and expressed a desire to receive the final decision.

On March 31, 2024 as a result of the provision of additional documentation in the correspondence between the Parties the Poland by letter No. DOOS-TSOOS.442.1.2018.JP.58 notified about the completion of the transboundary consultations.

On October 24, 2023 the Ministry of ecology and natural resources of Ukraine provided responses to the questions and comments from the Austrian side, after which the Austria did not contact Ukraine again regarding this case, indicating the absence of further questions or comments and the completion of the transboundary consultations with the Republic of Austria.

Since the beginning of the full-scale armed aggression of the Russian Federation with the assistance of the Republic of Belarus (on February 24, 2022) against Ukraine, the corresponding consultations with the Belarusian side have been suspended.

On October 17, 2024 a meeting of the Interdepartmental Coordination Council was held, during which a decision was made to take into account the results of the transboundary environmental impact assessment.

Main characteristics and location of the planned activity

The subject of consideration is the «Separate subdivision «Rivne NPP» of the JSC "NAEK 'Energoatom'" (hereinafter referred to as the "Rivne NPP"), which includes operating power units, facilities, and structures that are part of the technological complex located at the industrial site of the NPP, as well as other facilities within the energy complex that impact the environment in the area around the plant (sanitary protection zone and observation zone).

According to the Environmental Impact Assessment (EIA) Report, the work was carried out to assess the environmental impact of the activities conducted by the "Rivne NPP".

The informational data used in the environmental impact assessment includes basic materials, monitoring results, the operational experience of the power units, implemented and planned environmental protection measures, etc., based on which calculations and studies were carried out regarding the impact of the NPP's site on the surrounding natural environment and population, including transboundary context. According to the information provided by the operator, the EIA Report was developed after analyzing, systematizing, and unifying the collected information.

The EIA Report notes that a mandatory element in the operation of power units at all nuclear power plants in Ukraine is the "Complex (Consolidated) Safety Upgrade Program of Power Units of Nuclear Power Plants" approved by the Cabinet of Ministers of Ukraine on December 7, 2011, No. 1270.

The Rivne Nuclear Power Plant (Rivne NPP) is located in the western Polissya, in the northern part of Rivne region, near the Styr River. In 1971, the design of the Western Ukrainian NPP began, which was later renamed the Rivne NPP. The power plant was designed to cover the electrical load in the western part of the country.

According to the Environmental Impact Assessment (EIA) Report, in recent years, the Rivne NPP generates about 11-12 billion kWh of electricity, which accounts for 16% of the production at nuclear power plants.

The primary activity of the Rivne NPP which generates electricity for the needs of Ukraine's national economy, is the generation of electricity and heat.

The Rivne NPP was designed as a six-unit station with a total installed capacity of 4,880 MW. Currently, four power units are in operation at the NPP which, on average, produce over 18.0 billion kWh of electricity.

At the power units of the Rivne NPP water-water energetic reactors (VVER) of two types, VVER-440 and VVER-1000, are installed. The reactors at the power units use two separate, non-interconnected circuits. The operation of the NPP is based on the controlled chain reaction of nuclear fission of uranium-235 (235U), which is part of the nuclear fuel.

The first circuit includes:

- reactor
- steam generator
- main circulation pumps
- volume compensator
- main isolation valves (for VVER-440)

All equipment in the first circuit is installed in hermetically sealed boxes. The coolant and neutron moderator is chemically demineralized water.

The coolant absorbs the heat generated during the fission of uranium atoms in the active zone of the reactor, then it is pumped through the active zone by the main circulation pumps and transfers the heat to the water in the steam generators of the second circuit.

The reactor's active zone consists of hexagonal fuel assemblies (FA), which are made up of fuel elements (TVELs), rods made of zirconium alloy filled with uranium dioxide (UO2) fuel pellets.

The water in the first circuit is heated to 300°C in the reactor but does not boil, as the pressure maintained by the pressure compensators is 12 MPa for VVER-440 and 16 MPa for VVER-1000.

The second circuit is non-radioactive and includes:

- steam generators
- steam pipelines
- steam turbines
- separator-reheaters
- feedwater pipelines with feedwater pumps, deaerators, and regenerative heaters.

The saturated steam generated in the steam generators is supplied to the turbine unit, which drives the electric generator.

The electricity produced at the Rivne NPP is transmitted to the unified power grid of Ukraine via open distribution devices of 110 kV, 330 kV, and 750 kV.

The discharge of low-potential steam energy, which has been used in the turbines, is carried out through a water cooling system that operates on a reverse flow scheme. The cooling system uses spray ponds and cooling towers. The Rivne NPP does not have a natural water reservoir-cooling system. The cooling system of the turbine condensers is replenished with water from the Styr River.

Radioactive emissions into the atmosphere are formed by the release of radioactive gases and aerosols from liquid radioactive environments and occur during the normal operation of the power units through the special ventilation systems via ventilation pipes of the reactor and special buildings.

The solid radioactive waste (SRW) generated during production activities is collected, sorted, and conditioned at the Solid Radioactive Waste Treatment Complex (SRWTC) and temporarily stored in specialized storage facilities until it is transferred to a specialized organization for disposal. SRW is collected at the points of generation, sorted according to activity categories and technological properties.

Chemical elements and substances present in emissions and discharges may have a chemical impact on the surrounding environment. The permissible concentration of harmful components in the environment, depending on the extent of their impact, is regulated by sanitary norms and rules.

The technical water supply system of the nuclear power plant is a closed-loop system, supplemented by water from the Styr River. To remove heat from the circulating water, six tower-type cooling towers with a capacity of 100,000 m^3/hour each are used. Splash basins are used for the heat discharge from critical consumers.

Around the NPP a sanitary protection zone (SPZ) is established. The criteria for defining the SPZ are the boundaries of the annual intake of radioactive substances through the respiratory and digestive organs, the limits of external radiation doses for personnel and the population, as well as the permissible concentration of radioactive substances in atmospheric air and water.

The dimensions of the SPZ are determined based on assessments of the radiation situation in the area around the nuclear power plant during its long-term operation.

The Environmental Impact Assessment (EIA) Report indicates that the size of the SPZ for the Rivne NPP is 2.5 km, while the observation zone (OZ) extends to 30 km. The boundaries and dimensions of the SPZ and OZ were officially established according to the document "Decision on the dimensions and boundaries of the sanitary protection zone and the observation zone of the Rivne NPP" No. 132-1-P-11-CRB.

According to the information provided in the EIA Report, the safety systems of the NPP are designed to protect the population during emergencies, including a design accident with the most severe consequences. These systems are designed in such a way that the equivalent individual doses, calculated for the worst weather conditions at the boundary of the sanitary protection zone (SPZ) and beyond it, do not exceed 3 mSv/year for the thyroid gland of children due to inhalation intake and 1 mSv/year for the whole body due to external radiation exposure.

Currently, for the Rivne NPP the limits of emissions of the main dose-forming radionuclides during normal operation have been established and approved by the Ministry of Health of Ukraine (on 23.02.2012). The values are provided in Table 1.6 of the EIA report (Book 1).

The permissible emission/discharge reflects the requirements for the operation of the NPP from the perspective of radiation safety for the population within the local natural ecological system. The values of Maximum Emission and Discharge Limits do not depend on the number of power units in operation. Exceeding the permissible emission/discharge during normal operation is not allowed.

The observation zone (OZ) covers the area where radioactive discharges and emissions from NPP may affect and where monitoring is conducted.

Within the SPZ and OZ, 13 monitoring posts of the automated radiation control system (ASKRO) are installed.

The EIA report notes that the development of the industrial complex of the Rivne NPP is planned through the reconstruction and modernization of existing production units, which functionally fit into the existing NPP infrastructure exclusively within its territory. Therefore, urban planning restrictions are not considered.

The operational communication of the population about events at the "VPU RAES" and the formation of a positive attitude towards nuclear energy is managed by the Information and Public Relations Department (IPRD).

Operation terms for power units of the Rivne NPP

Table 1

Unit	Reactor type		The date of connection to the power grid	The date of commissioning for commercial operation	Design operation period	Lifetime extension period
R-1	VVER-440	V-213	22.12.1980	22.09.1981	22.12.2010	22.12.2030
R-2	VVER-440	V-213	22.12.1981	29.07.1982	22.12.2011	22.12.2031
R-3	VVER-1000	V-320	21.12.1986	11.12.1987	11.12.2017	22.12.2037
R-4	VVER-1000	V-320	10.10.2004	07.06.2005	07.06.2035	—

Currently, four power units are in operation:

- Unit 1 (VVER-440) with a capacity of 420 MW, since 1980;
- Unit 2 (VVER-440) with a capacity of 415 MW, since 1981;
- Unit 3 (VVER-1000) with a capacity of 1000 MW, since 1986;
- Unit 4 (VVER-1000) with a capacity of 1000 MW, since 2004.

The Units of the Rivne NPP includes the next equipment:

- Reactor VVER-440(V-213) – units 1,2 and VVER-1000(V-320) – units 3,4;
- Turbine K-220-44 – units 1,2 (two per unit) and K-1000-60/3000 – units 3,4;
- Turbogenerator TVV-220 – units 1,2 (two per unit) and TVV-1000 – units 3,4.

The EIA Report states that the lifetime extension of the units is determined by the "Energy Strategy of Ukraine until 2030" and is a priority direction for JSC «NNEGC «Energoatom».

Annual consumption of raw materials, auxiliary materials, fuel, as well as the composition of the gas-air mixture generated, is presented in Table 1.4 of the EIA Report (Book 2).

The connection of the Rivne NPP to the Unified Energy System of Ukraine is ensured through the following power transmission lines:

- two lines with a voltage of 750 kV;
- four lines with a voltage of 330 kV;
- five lines with a voltage of 110 kV.

Description and assessment of the potential environmental impact of proposed activities

The proposed activity involves the assessment of the environmental impact of the Rivne NPP site.

In Book 1 of the EIA Report it is noted that the set of planning, technical, technological, and organizational measures and decisions aimed at limiting negative impacts is directed towards ensuring compliance with environmental protection standards.

The main types of potential environmental impacts during the operation of the power units and the objects and structures that are the part of the technological complex located on the RNPP site, as well as other objects within the energy complex in the vicinity of the station (sanitary protection zone and observation zone), based on the production technology, are: radiation impact, chemical impact, physical impact.

Radiation impact is possible due to the release of radioactive substances into the surrounding environment, which are generated during the operational cycle of the nuclear power plant.

The main types of potential radiation impacts are caused by:

- radioactive emissions into the atmosphere;
- solid radioactive waste (SRW);
- liquid radioactive waste (LRW).

Chemical impacts on the surrounding environment can occur from the chemical elements and substances contained in emissions and discharges. The permissible levels of harmful components in the environment, depending on the extent of their impact, are regulated by sanitary standards and regulations.

The physical impact of the Rivne NPP on the surrounding environment is characterized by:

– thermal impact on the air environment, related to the operation of the cooling systems for technological equipment (basin sprinkler and cooling towers);

– increase in air humidity due to the water evaporation into the atmosphere from the basin sprinkler and cooling towers;

– thermal impact on the aquatic environment, associated with the discharge of blow-off water from the main cooling system into the Styr river, with temperatures: winter – 25°C, summer – 41°C;

– impact on the aquatic environment (Styr river);

– impact of the electric field from the 330/750 kV power transmission lines;

– noise during equipment operation and auto transportation.

MINISTRY OF ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES OF UKRAINE, considered data provided in the Environmental Impact Assessment Report, namely:

–**proposed activity**. The proposed activity involves the lifetime extension of power units without introducing any changes to the current operations of the NPP.

This **EIA Report** and, therefore, the environmental impact assessment procedure, exclusively evaluated the operation of the Rivne NPP units, without introducing changes to the design parameters of the operation. The decommissioning of existing power units was not assessed in this environmental impact evaluation procedure;

- impact on air quality during the planned activities. According to the EIA Report during its production activities, the Rivne NPP emits common pollutants such as carbon monoxide, substances in the form of suspended solid particles, sulfur dioxide and other sulfur compounds, nitrogen compounds, metals and their compounds, non-methane volatile organic compounds, fluorine and its compounds, chlorine and its compounds, freons, and emulsions.

Emissions of pollutants into the atmosphere from stationary sources of the Rivne NPP are carried out based on existing permits.

A description of the sources of pollutant emissions from the plant's site is provided in Appendix G of Book 2 EIA Report.

According to the EIA Report (Book 3) based on the results of numerical modeling of the dispersion of pollutants using mathematical models recommended by the IAEA, it can be concluded that the impact of industrial emission sources located outside the observation zone of the NPP (in the cities of Rivne and Lutsk) on the pollution regime is insignificant.

Annually, stationary sources at the Rivne NPP release from 33 to 37 tons of pollutants into the atmosphere: non-metallic volatile inorganic compounds – 18-25 tons, nitrogen compounds – 5-9 tons, substances in the form of suspended solid particles (micro-particles and fibers) – 1.4-2.7 tons, sulfur compounds – 1.4-2.7 tons, and others.

The EIA Report (Book 3) notes that pollutant emissions from the NPP are 2-3 thousand times lower than those from a coal-fired thermal power station with similar installed capacity.

At the Rivne NPP there are 240 stationary sources of pollutant emissions, 14 of which are equipped with gas purification units. The largest sources of pollution are auxiliary facilities such as the startup boiler, emergency diesel generators and transport.

The Rivne NPP operates 142 diesel and 148 carburetor vehicles, as well as 4 locomotives, 1 railway crane, 1 motor car, and 1 motor-diesel railcar. There is a diagnostic post in the transport department for measure of the toxicity and smokiness from exhaust gases. Diagnostics are conducted quarterly with corresponding entries in the accounting logs. Data on pollutant emissions into the atmosphere from stationary sources in 2017 according to statistical reporting form No.2-TP(air), are presented in table 3.4 of the EIA report.

The total emissions of pollutants from stationary sources in 2017 amounted to 34.785 tons.

In the EIA report (Book 3), it is stated that the permissible emission limits (PEL) are set in such a way that emissions of harmful substances from a given source, in combination with other sources, do not create ground-level concentrations of these substances that exceed their maximum allowable concentrations (MAC). According to the conducted studies, it has been established that the ground-level concentrations of all the ingredients contained in the emissions within the sanitary protection zone (SPZ), and especially in the residential areas outside the SPZ, are below the MAC;

- impact on soils and geological environment during the implementation of proposed activity. A land plot of 217.895 hectares, designated for the servicing of facilities for electricity production and distribution, has been allocated for permanent use by JSC "NAEK Energoatom" and is certified by the state act on the right of permanent land management, series ЯЯ No.252110 dated 01.07.2006, issued based on the decision of the Kuznetsovsk City Council dated 28.04.2005 No.433.

In addition to the land plot for the industrial site, NAEK Energoatom holds permanent land rights for areas designated for the servicing of industrial and social facilities within the territories of the Varash City Council and Volodymyrets and Manevytsky districts, covering a total area of 262.3 hectares.

According to the data from the EIA Report (Book 2) the preservation and rational use of land resources are ensured through the maximum use of the allocated territory. The site has been leveled, the area of the power units is organized and landscaped. No additional land allocation is required for the lifetime extension of the power units.

In the area of the sludge disposal facility and the construction and industrial waste landfill, analysis is conducted by the eco-chemical laboratory, which is accredited to perform measurements of the chemical composition of soils.

The analysis of the monitored characteristics shows that the operation of the nuclear power plant does not cause significant changes in the soils quality.

The geological structure beneath the industrial site consists of a thick layer of sedimentary, metamorphosed, and volcanic rocks that lie on a crystalline foundation. According to geophysical data, the foundation includes metamorphic and intrusive rocks of acidic, basic, and ultrabasic compositions, with a system of tectonic faults of varying orders and extensions being present.

In the southern part of the industrial site there is a zone of the Chartoryisky fault stretches approximately in the east-west direction.

The industrial site of Rivne NPP is located in geomorphological terms within the right-bank watershed of the Styr river valley, on a planned terminal morainic ridge. The absolute elevations of the natural relief before construction ranged from 180.00 to 189.00 meters, with the central part of the industrial site being between 185.00 and 189.00 meters, and in some areas reaching 190.00 to 193.00 meters.

The main factors impacts to the geological environment (within the industrial site and the city of Varash) are presented in Table 1.2 of the third volume of Book 3 of the EIA Report.

The EIA Report states that the set of measures to prevent or limit the possible impact of the nuclear power plant on the geological environment of the industrial site and the city of Varash is effective; the further development of exogenous geological processes directly on the sites where structures and buildings are located in the active zone beneath the foundation bases is not predicted.

According to the data in the EIA Report, the sanitary protection zones of the first belt around the artesian wells in the village of Ostriv have been identified and fenced. Environmental and chemical analysis is conducted by a certified laboratory in the areas where the sludge collector and the construction and industrial waste landfill are located. The analysis of monitored characteristics indicates that the nuclear power plant does not significantly affect the quality of groundwater.

The conclusions of the third volume of Book 3 EIA Report state that the seismic hazard for the NPP's site may only arise from earthquakes in the Vrancea zone (Romania) and local potential earthquake zones. The assessment of seismotectonic potential using a formalized method based on the earthquake catalog for the western part of the East European Platform concludes that there are no zones with high seismotectonic potential near the site; only at a distance of over 40 km north of the site are several zones identified with a seismotectonic potential of $2.8 < M < 3.9$. Based on a general analysis of the seismological and seismotectonic conditions, it can be concluded that the seismic index (SI) and the maximum design earthquake (MDE) are 5 and 6 points respectively under medium soil conditions.

Under normal operational conditions no impact on the geological environment, including groundwater, within the 30-kilometer zone; such impact may only occur within the NPP industrial site.

The conclusions of the third volume of Book 3 EIA Report indicate that a comprehensive analysis of the condition of foundation soils, conducted using current and previous studies, allows the following conclusions to be drawn:

– the physical and mechanical properties of the soils underlying the structures are stable, with some improvements;

– karst-suffusion processes have stabilized and are progressing at a slow rate. The studies identified minor zones of reduced density in chalk and overlying soils. Manifestations of karst processes on the plant's territory have not been observed; however, their activation is possible if the hydrodynamic regime is disrupted;

– settlements and tilts of buildings and structures are within permissible limits;

– the implemented anti-karst measures – such as cementing the foundation soils under major structures and lowering the groundwater dome – have positively contributed to stabilizing the geological environment;

– a comprehensive monitoring program on the plant's territory (soil condition, groundwater regime, settlements and tilts of structures, and terrain relief) has allowed for the timely detection of unfavorable processes and the implementation of measures to eliminate their causes (including the repair of utilities, additional territory planning, etc.).

– **Impact of the proposed activities on the aquatic environment.**

The four-unit Rivne NPP is the largest consumer of water from natural sources in the region. According to the EIA Report (Book 2), the plant, under the conditions of its special water use permit, is entitled to withdraw 73.164 million m³ of water per year from the Styr river without causing harm to the environment. In practice, the plant withdraws smaller volumes of water.

Data on water usage for the NPP's during 2012-2017 are presented in Tables 1.6 and 1.7 of the EIA Report (Book 2). Bottom sediments, algae, and fish from the Styr river are collected annually for research in August. The samples undergo preliminary preparation and γ-spectrometric analysis. There are no technogenic radionuclides in the Styr river's ecosystem, except for 137Cs of Chernobyl origin. The specific activity of 137Cs in fresh fish is hundreds of times lower than the established permissible level.

Water from the first aquifer, which lies at a depth of 10 to 14 meters from the surface, is sampled from 35 monitoring wells.

Part of the water from the cooling system is continuously returned to the river through an industrial stormwater discharge point located 30 meters downstream from the intake of river (additional) water. The industrial stormwater drainage system continuously receives blowdown water from circulation systems and, occasionally, other off-balance waters from the power plant site, provided that discharge norms for pollutants are not exceeded. According to the EIA Report (Book 2), up to 18.409 million m³ of water per year (0.7 m³/s) is allowed for discharge.

The cooling water supply system of the NPP consists of closed-loop circulation systems, as well as cooling systems for critical (safety-related) and non-critical (normal operation equipment) consumers.

Blowdown water from the cooling towers accounts for 0.42% of the recirculated water. Currently, six identical cooling towers are in operation. The circulation water flow rates are 91,000 m³/hour for Units 1 and 2 and 188,920 m³/hour for Units 3 and 4.

To ensure the efficient use of natural resources, provisions are made for the reuse of water after treating wastewater contaminated with oil products and stormwater runoff.

The use of surface water from the Styr river, wastewater discharge depending on electricity generation, recirculated water supply and reused water for the period from 2010 to 2017 are provided in Table 1.9 of the EIA Report (Book 2).

The water intake for Rivne NPP is located at 326.7 km from the source of the Styr river (167.3 km from its mouth) and covers a drainage area of 10,400 km². Within the 30-km zone, the largest tributaries of the Styr river include the Kormyn, Okonka, Stubla, and Zheleznytsia rivers. The remaining river network consists of smaller rivers, tributaries of the first and second orders. The catchment areas of the tributaries flowing into the Styr river are almost entirely within the controlled zone of the NPP.

The total activity of liquid discharges from Rivne NPP is reflected in Table 2.2 of Part Four, Book 3 of the EIA Report.

Summary data on the use of river (technical) and underground (drinking) water by the NPP, as well as wastewater disposal, are provided in Table 2.5 of Part Four, Book 3 of the EIA Report. Drinking water needs for the Bilé Ozero recreation and health complex (ROK) are met from an artesian well. According to Special Water Use Permit No. UKR 454/Rvn dated May 30, 2017, the water extraction limit is 12.8 thousand m³ per year.

Wastewater from the NPP site is discharged through a gravity collector of the industrial-storm sewer system (ISS) into the Styr river via a single outlet, classified as normatively clean and untreated.

Domestic and sanitary wastewater from the NPP site is treated at wastewater treatment facilities with a capacity of 700 m³/day. These facilities consist of a reception chamber, two sand traps, primary sedimentation tanks, aeration tanks, secondary sedimentation tanks, and sludge drying beds. After treatment, the wastewater is sent to the city utility's treatment facilities. Discharges to municipal treatment facilities after cleaning amounted to 120,738 m³ in 2017.

The quantity of pollutants discharged into the water body with the return waters of the NPP is presented in Table 2.6 of Part Four, Book 3 of the EIA Report.

The Styr river receives:

- treated industrial effluents from the NPP,
- treated domestic wastewater from the NPP and the city of Varash, and
- stormwater runoff from the city of Varash.

The conclusions of Part Four, Book 3 of the EIA Report indicate that an analysis of monitored parameters shows that the operation of the NPP does not significantly impact the quality of surface waters. In 2017, the water quality in the Styr river (at the control cross-section) remained at the same level as in previous years. The dynamics of changes in surface water quality in the Styr river (downstream of the NPP) in terms of pollutant concentrations were analyzed over the past five years.

The impact of the Rivne NPP on surface waters may be observed in areas where the technological elements and structures of the NPP directly interact with public water bodies. For the Rivne NPP the Styr river is such a water body. The NPP interacts with the river through its technical water intake facilities and the water discharge facilities of both the NPP and the city of Varash.

During the operation of all four units of the Rivne NPP, there is no water shortage in the downstream sections of the river.

According to the EIA Report, the operation of the NPP has not resulted in a significant increase in radionuclide concentrations in the Styr river over the period of its operation.

To protect the NPP site from atmospheric precipitation, a drainage system for structures and an industrial stormwater drainage system are provided;

- **Impact on flora and fauna, as well as nature reserves during the implementation of proposed activities**. According to geobotanical zoning, the territory of the sanitary protection zone (SPZ) of the Rivne NPP is located in the European broad-leaved region and belongs to four geobotanical districts of the Polissya subprovince.

Within the NPP's SPZ six main types of entomocomplexes have been identified: five terrestrial (forest, shrub, meadow, wetland, and anthropogenic) and one aquatic. Forest entomocomplexes are among the most widespread and valuable in the SPZ.

The fauna of the studied region is represented by complexes typical of Polissya. According to literature, over 60 species of mammals and approximately 200 species of birds inhabit this area.

Among the primary nature conservation sites in the region, which focus on the reproduction and protection of rare and endangered species, are the Rivne Nature Reserve and the Derman-Ostroh National Nature Park. These protected areas conserve natural complexes as a whole, including their faunal components.

The assessment of the impact of the NPP on vegetation cover was conducted in terms of both direct radiation exposure and the impact of industrial activities associated with the NPP's operation within the region's socio-economic development. Radiation effects are observed only at the intra-organism level and do not cause changes at the population, species, or community levels. Radionuclide accumulation is complex, depends on species biology, and shows a direct correlation with soil moisture and an inverse correlation with acidity and salt content, particularly carbonates. Based on this, sensitive bioindicators such as Scots pine, heathers (lingonberry, blueberry, cranberry), mosses, and lichens have been proposed.

According to Part 5 of Book 3 of the EIA Report, under normal operation, with radionuclide emissions not exceeding permissible limits, the accumulation of radionuclides by plants will also remain within permissible limits.

In the case of a maximum design-basis accident or beyond-design-basis conditions, it can be concluded that the distribution of radionuclides will differ significantly from background levels depending on the properties of biological components and specific ecological conditions.

The conclusions of Part 5 of Book 3 of the EIA Report state that the NPP's operation under normal conditions will not have a direct impact on the fauna within the sanitary protection zone (SPZ). Significant disruptions to food sources, shelters, nesting sites, and animal migration paths are not anticipated. Possible disturbances to food sources are primarily associated with changes in the structure of plant cover, as even minor changes in the composition of plant species inevitably affect the species composition and proportions of certain groups of insects, mites, and other animals.

The report notes that in the event of a design-basis accident involving radioactive emissions, no changes in the species composition of invertebrates are expected in the affected zone. However, potential negative population shifts could occur in predatory and parasitic insects, which accumulate radionuclides through food chains.

Under beyond-design-basis conditions, potential changes in wildlife may result from altered land-use practices, potentially leading to significant transformations in phytocenoses (e.g., reduced recreational and grazing pressures or the emergence of large wastelands) and, consequently, in ecosystems as a whole. In the event of a maximum design-basis accident or especially under beyond-design-basis conditions, radionuclide accumulation in food chains is expected. This could lead to negative changes in the structure of higher trophic levels, genetic disruptions in populations, increased mutation rates with long-term genetic consequences, and an intensification of microevolutionary processes.

According to the conclusions of Part 5 of Book 3 of the EIA Report, it is evident that, overall, based on the analysis of changes in the background concentration of radionuclides as the distance from the NPP units increases, the radiation regime of the station under normal operation does not affect the vegetation cover and causes no changes at the species level of plants.

The use of cooling towers and spray ponds instead of a cooling reservoir has significantly minimized the negative impact of the station on ecosystems and has virtually preserved the valuable floodplain of the Styr River, including its meadow, shrub, and forest animal complexes;

- Impact on climate and microclimate during the implementation of proposed activities. Nuclear power plants are sources of heat discharge into the surrounding environment. The thermal impact of the Rivne NPP must be considered in the context of its effect on the microclimate. The microclimate in the NPP area has formed under the influence of additional heat and moisture released into the atmosphere from the cooling towers and spray ponds.

During the cooling of wastewater at the NPP's cooling towers and spray ponds, significant amounts of heat and moisture are released into the atmosphere. Concentrated over a small area near the NPP, these emissions of heat and moisture lead to a number of negative impacts on the microclimatic conditions.

According to the EIA Report (Book 2), approximately 70% of the thermal energy produced in the reactors is not used for generating electricity in the steam turbines but is discharged into the surrounding environment through the cooling systems. This discharged low-potential heat is transferred to technical water, which transports it to the cooling towers and spray ponds. Here, through convective heat exchange and evaporative cooling, the heat is transferred to the final absorber – the atmospheric air.

Part of the heat transferred by the technical water from the cooling system is discharged into the Styr river through the continuously open blow-off of the circulation systems. A small amount of heat from the heated surfaces of equipment, pipelines, and cable products in the production rooms is then vented into the atmosphere through the exhaust ventilation and air conditioning systems.

The impact of the cooling towers and spray ponds on the microclimate is considered for the entire NPP site, as the cooling systems of all the power units are territorially grouped in one location and have a combined effect on the surrounding environment.

The impact of spray ponds on the microclimate is noticeable in the near-surface air layer due to the droplet moisture discharge, which is most pronounced during strong winds and only in close proximity to the ponds (100-500 meters). In the cold period of the year, the spray devices in the ponds are switched off, and the impact of the spray ponds during this period is reduced to zero.

According to the data from the EIA Report (Book 3), the area of the highest warming during the summer period is formed at an altitude of 150-350 meters. The maximum air temperatures in this zone range from 23.2 to 25.3°C and extend up to 3 km from the cooling towers.

In cases of "stagnant" phenomena, the moisture emitted by the cooling towers condenses and accumulates around the NPP site in the form of an isolated "moisture dome", Instances of intense moisture accumulation at the NPP site are also observed when air temperatures are close to 0°C, with 100% relative humidity, light winds, low cloud cover, or at surface-level or low elevated inversions.

The heat and moisture emissions from the spray ponds do not exceed 2% of the corresponding emissions from the cooling towers. These cooling units contribute similarly to the formation of the microclimate at the NPP site.

The EIA Report (Book 3) notes that, as a result of the analysis and assessment of the impact of cooling towers and spray ponds on the microclimate of the NPP area, it can be concluded that the main source of influence on the microclimate is the cooling towers and their steam condensation torches. The impact of cooling towers on the microclimate and the surrounding environment outside the sanitary protection zone (SPZ) is not significant. The only exceptions may be cases of ice formation and frost;

- impact on the social environment during the proposed activities. In the EIA Report, calculations are provided and made justifications of the radiation impact on the NPP and the population due to radioactive emissions from the NPP under normal operation and in the event of emergency situations.

For these calculations, the PC COSYMA software package, developed by the National Radiological Protection Board (NRPB, UK), was used for modeling emergency situations. For simulating the dispersion of radioactive substances in the atmosphere and the formation of doses caused by radionuclide emissions from the NPP under normal operating conditions, the PC CREAM software (developed by NRPB) and CAP-88 (developed by the Environmental Protection Agency, USA) were used. All calculations were performed under conservative conditions for the dispersion of pollutants and the formation of radiation doses (maximum doses).

In the second volume of Book 3 of the EIA Report, it is stated that the maximum permissible radiation criteria for equivalent and absorbed doses in organs and the whole body at the boundary and beyond the sanitary protection zone, as defined by the SP AS-88 and NRBU-97 documents, are met under normal operation of the energy blocks or in the event of a design-basis accident.

According to the conclusions presented in the EIA Report regarding the determination of the radiation factor's impact on atmospheric air, the most hazardous design accident scenarios for humans are as follows: for a 2-day and 2-week period the most dangerous scenario is the "Rupture of the steam generator collector lid – emergency spike" with radiation doses of 86.7 μSv and 155 μSv, respectively, at the boundary of the sanitary protection zone (SPZ). For a 1-year period the most dangerous scenario is the maximum design accident, with a radiation dose of 316 μSv. For a 50-year period the most hazardous scenario is the "Fuel assembly fall into the reactor core" with a radiation dose of 3.18 mSv.

In the second volume of Book 3 of the EIA Report, it is noted that based on the calculated data, under extended project conditions, the lower limits of acceptability are exceeded within 2 weeks at the SPZ boundary (2.5 km). As a result, sheltering, iodine prophylaxis for children, and restrictions on outdoor exposure for both children and adults will be required. At the observation zone boundary (30 km), sheltering and outdoor exposure restrictions will also need to be applied.

In Book 4 of the EIA Report it is noted that under normal operation the radiation state and radiation doses for the population of the region are determined by the existing natural background radiation. The level of radiation exposure to the population and the environment does not exceed 0.05% of the dose level created by natural sources of radiation and does not alter the natural radiation level in the area surrounding the power station.

The risks of hazardous radiation exposure only exist for personnel performing radiation-dangerous tasks. However, when radiation safety rules are followed, these risks are minimized. For other tasks and during non-working hours, there are no risks of hazardous radiation exposure under normal operation.

The observed contribution of the NPP to air, water, and soil pollution does not exceed permissible levels and is insignificant compared to other sources of pollution. Long-term radiation monitoring results indicate the absence of significant radiation impact from the NPP on the environment and, consequently, on the health of the population in the observation zone (OZ).

The greatest contribution to the formation of dose loads in the human body on the territory of the OZ during the normal operation of the station comes from natural radionuclides and their decay products. Artificial radionuclides from global fallout, Chernobyl-origin radionuclides, and especially radionuclides from NPP emissions, have a significantly lesser effect on the radiation dose. In one hour, a person receives a higher dose from natural radionuclides than from the emissions of the NPP over an entire year.

The maximum doses for the population at the boundary of the SPZ caused by design accidents are provided in Tables 2.6 and 2.7 of Book 4 of the EIA Report. According to these tables, even under extended design conditions, the maximum dose loads remain significantly below the threshold for justified evacuation (50 mSv to the whole body), as determined by the applicable regulations.

The locations of settlements within the observation zone of the Rivne NPP are depicted in Figure 2.7 of Book 4 of the EIA Report.

According to the information provided in Book 4 of the EIA Report, public radiation exposure is managed through the regulation and monitoring of environmental objects (such as water and air), as well as gaseous-aerosol emissions and liquid discharges generated during the operation of the NPP. Permissible levels are established for gaseous-aerosol emissions and liquid discharges to ensure that the total annual effective dose for members of the critical group, caused by all radionuclides in these emissions and discharges, does not exceed the dose quota limit. These levels are regularly reviewed and coordinated with the Ministry of Health of Ukraine.

The operator highlights that within the framework of Ukraine's cooperation with the European Commission, a European real-time decision support system – RODOS – has been implemented at all NPPs. This system enables the analysis of radiation conditions at the NPP and in the surrounding environment, meteorological conditions in the near-surface atmosphere and up to an altitude of 3 km, as well as weather forecasts. The implementation of RODOS integrates Ukraine into the global monitoring system, allowing for prompt tracking and response to potential nuclear incidents both domestically and globally.

The conclusions of Book 4 of the EIA Report state that the power units of the Rivne NPP comply with modern nuclear and radiation safety standards. This compliance is evidenced by inspections conducted by the International Atomic Energy Agency (IAEA) in 1988, 1996, 2003, 2005, and 2008, as well as by the World Association of Nuclear Operators (WANO) in 2001, 2004, and 2012.

Book 5 of the EIA Report states that, based on the requirements of Ukraine's environmental and sanitary legislation, as well as regulatory documents on ensuring technogenic safety, and following a comprehensive assessment of the impact on the natural, social, and technogenic environment, considering the natural, social, and technogenic factors and conditions in the area where the Rivne NPP is located, the implemented environmental protection measures and technical solutions are evaluated as optimal.

The list of licenses and permits held by the Rivne NPP in the field of environmental protection (non-radiation impact) is provided in Appendix A of Book 5 of the EIA Report.

- **impact of noise and vibration on the environment during planned activity**. According to the EIA Report, the physical impact of the Rivne NPP's industrial site on the surrounding environment includes noise generated by operational equipment and vehicle traffic.

The EIA Report indicates that a comprehensive set of planning, technical, technological, and organizational measures and solutions aimed at mitigating negative impacts is designed to ensure compliance with regulatory environmental protection standards;

–**waste management during planned activity**. During the operation of a nuclear power plant (NPP), the generation of solid and liquid production waste, including radioactive waste (RAW), is inevitable.

Radioactive Waste (RAW) – these are material objects and substances whose radionuclide activity or radioactive contamination exceeds the limits set by current regulations, provided that their use is not intended. RAW represents a specific category of radioactive materials (in any physical state) that have been determined to be unsuitable for use either presently or in the future. In some cases, no final decision has yet been made regarding how these materials might be utilized in current or future technological processes.

The production of electricity at a nuclear power plant (NPP) generates radioactive waste not only during the main technological processes but also during routine maintenance and repair operations.

Transportation of Solid Radioactive Waste (SRW) in containers to the storage facility in the specialized building at Rivne NPP is carried out using specialized vehicles. The classification of SRW into groups, determined by the clearance level set for specific radionuclides contained in the RAW, is detailed in Table 2.1 of the EIA Report (Book 2). Additionally, the classification of RAW with unknown radionuclide composition and unknown specific activity is based on the criterion of absorbed dose rate in the air at a distance of 0.1 m from the surface of the object (container) and provided in Table 2.3 of the EIA Report (Book 2).

The EIA Report (Book 2) highlights that modern technological equipment for SRW processing at the NPP meets high European standards. The operation of the SRW processing complex at the NPP not only reduces the volume of waste generated during operation but also enhances the safety and environmental performance of the domestic nuclear energy sector as a whole, contributing to the preservation of the environment.

During the normal operation of NPP equipment, radioactive contaminated liquids (effluents), known as trap waters, are collected in special tanks. These radioactive liquid wastes and effluents originate from reactor unit equipment, operations of the special water treatment system (SWT), decontamination of equipment and protective clothing, sanitary wastewater, and laboratory discharges, among other sources.

According to the EIA Report (Book 2) an analysis of the sources and volume of trap water generation has been conducted. This analysis determined the proportional contribution of sources for liquid radioactive waste (LRW) from each power unit, the specialized building, and the NPP as a whole. Measures to minimize the generation of liquid radioactive waste at Rivne NPP were developed and implemented, significantly reducing the annual inflow of trap waters.

The generation and management of non-radioactive waste are detailed in Table 2.6 of the EIA Report (Book 2).

–**spent fuel management during proposed activity**. After being unloaded from the reactor core, spent nuclear fuel (SNF) is transferred to near-reactor spent fuel pools. In these pools, the SNF is stored for a period necessary to reduce the energy release caused by the radioactive decay of fission products to acceptable levels. After being stored in the pools for a limited time, the SNF must be removed from the NPP unit and sent for storage (disposal) or reprocessing. This requirement arises because the capacity of pools at NPP units is limited, and free space must always be available to accommodate the unloading of nuclear fuel from the reactor core or for periodic inspections of the reactor vessel and internal equipment of VVER reactors.

At the time of drafting the EIA Report Ukraine operated two facilities designed for the temporary storage of spent nuclear fuel: a "wet" storage facility for SNF, SFS-1 at the Chornobyl NPP and a "dry" storage facility for SNF (DSSNF) at the Zaporizhzhia NPP.

–**transboundary impact of the proposed activity's facility during proposed activity**. In Book 7 of the EIA Report it is stated that, in accordance with the requirements of the Convention on Environmental Impact Assessment in Transboundary Context, ratified by the Law of Ukraine № 534-XIV on 19.03.99, an assessment of the radiological impact of the Rivne NPP on the surrounding environment in a transboundary context has been carried out. This means evaluating the impact on the territories of neighboring countries. The impact assessment of the Rivne NPP is considered for both normal operating conditions and in the event of emergency situations.

During the operation of the NPP, the formation of gaseous, solid, and liquid products containing radioactive elements is inevitable. The radiological impact of the power unit is associated with the release of these products into the surrounding environment.

According to the information presented in Book 7 of the EIA Report, the distances from the Rivne NPP to the borders of neighboring countries are as follows:

- Republic of Belarus – 60 km;
- Republic of Poland – 130 km;
- Republic of Lithuania – 310 km;
- Slovak Republic – 340 km;
- Republic of Moldova – 360 km;
- Republic of Romania – 370 km;
- Republic of Hungary – 510 km;
- Czech Republic – 510 km;
- Republic of Austria – 700 km;
- Federal Republic of Germany – 720 km.

The calculation of the total expected individual doses received by the population at the borders of neighboring countries during normal operation of the NPP is presented in Table 3.4 of Book 7 of the EIA Report.

The EIA report states that the impact on neighboring countries will be significantly lower than the established dose quotas and the limit for the individual effective annual dose of 1 mSv (1,000,000 nSv) for the population.

To analyze the radiation consequences of accidents at the Rivne NPP, the following maximum design accident (MDA) was studied: an accident caused by a double-sided rupture of the primary circulation loop (loss of coolant accident) at the nominal power level of the nuclear facility.

When determining the release of radionuclides under extended design conditions (EDC), the maximum release of 137Cs into the environment was taken as 30 TBq, in accordance with the safety requirements of European operating organizations for nuclear power plants with light-water reactors. The isotope 137Cs was chosen due to its dominant role in long-term environmental contamination, as well as its impact and consequences for health.

In Table 3.5 of Book 7 of the EIA report, the parameters of radionuclide emissions during the maximum design accident are presented. The duration of the specified accident is assumed to be 60 minutes. All other accidents leading to lower radionuclide emissions were not considered. The main radionuclides and their release during the design accident are provided in Table 3.6 of the EIA report.

The reduction of emissions into the surrounding environment is ensured by the sequential implementation of a deeply layered protection strategy, based on the use of:

- a system of physical barriers to prevent the spread of ionizing radiation and radioactive substances into the surrounding natural environment;

- a system of technical and organizational measures to protect these physical barriers and maintain their effectiveness, with the goal of protecting the population and the surrounding environment.

The Radiation Control System (SRC) is a set of technical tools and organizational measures designed to monitor the main technological environments, radiation conditions in the premises of the NPP, and the adjacent territory. The system is aimed at ensuring compliance with radiation safety standards and determining parameters that characterize the radiation safety of the NPP's operation.

In the conclusions to Book 7 of the EIA report, it is stated that:

– the radiation impact of gas-aerosol emissions during normal operation is significantly lower than the established dose limits for the population in neighboring countries (these limits range from 0.2 to 0.3 mSv/year). Even at the border of the nearest affected country, the annual individual effective dose does not exceed 1.5 nSv/year;

– according to the calculations performed, both under normal operation conditions and in the event of accidents, there is no radiation impact on the surrounding environment in a transboundary context, i.e., in neighboring countries. This is because the regulatory requirements for air pollution and dose limits for the population are not exceeded, and at a distance of 60 km from the NPP, the levels are below the limits, beyond which evacuation or sheltering measures for people are not foreseen;

– there is no significant transboundary impact from the planned activity.

Also, taking into consideration all information, comments, remarks and proposals, which were received during public consultations (a report on public consultations, supplemented with a table making reference to either complete or partial incorporation or well-justified rejection of comments and proposals is an integral part of that conclusion), [we] consider it acceptable /~~inacceptable~~ to carry out the proposed activity in view of the following::

Based on the assessments, given in the EIA report, which address probable impacts on environmental targets (atmospheric air, water and land resources, soils, climate factors, physical structures, landscapes, and levels of noise, thermal and vibration contamination, waste management (including radioactive waste management), spent nuclear fuel management, during MDBA and BDBA, and impacts in a transboundary context), a cumulative impact of the proposed activity, under normal operation, is ecologically acceptable.

Based on outcomes of the EIA report, it has been established that the main impact the proposed activity may produce is expected to affect the water environment and arise from radioactive waste management activities. Given that ecological conditions, prescribed for the proposed activity, are met subject to normal operation of Rivne NPP power units the above-mentioned impacts on environmental targets can be specified as ecologically acceptable.

Ecological Conditions for Pursuing the Proposed Activity:

1. For the planned activities, the following conditions for the use of land and natural resources are established during the preparation and construction works, as well as the implementation of the planned activities:

– conduct studies to determine the noise and vibration impact at the boundaries of the sanitary protection zone and the nearest residential areas from the activities of the Rivne NPP and submit the results to the Ministry of Environmental Protection and natural resources;

– operate the power units in accordance with the deadlines defined in Table 1 of the EIA report;

– ensure the development of measures and a plan for decommissioning the power units within the deadlines established by law (with public involvement), approve the developed program regarding the deadlines for implementation, and strictly adhere to them (publish the results on the company's website and the websites of local self-government bodies of the relevant administrative and territorial units);

– organize the collection, treatment, and discharge of rainwater and meltwater;

– water intake and discharge of wastewater into surface water bodies should be carried out in accordance with the permit for special water use;

– discharge of wastewater into water bodies is allowed only if the limits of maximum permissible concentrations and the established norms for the maximum permissible discharge of pollutants are in place.

– ensure the collection of all unorganized water flows through the special sewerage network;

– prevent the discharge of wastewater, rainwater, and meltwater onto the terrain;

– water use should be carried out in accordance with Article 49 of the Water Code of Ukraine;

– apply water-saving technological processes and organize water recycling;

– emissions of pollutants from stationary sources are possible and provided by a valid emission permit and they do not exceed hygienic standards at the boundary of the sanitary protection zone;

– emissions of pollutants from stationary sources which are not subject to regulation or state accounting, should not exceed hygienic standards at the boundary of the sanitary protection zone and the nearest residential areas;

– ensure instrumental and laboratory measurements of pollutant emission parameters;

– ensure the uninterrupted and efficient operation, as well as the maintenance, of equipment for emission purification and conduct regular control over the effectiveness of gas cleaning systems.

– do not exceed the permissible noise, ultrasound and infrasound levels in production premises as established by state sanitary regulations;

– take measures to reduce noise and vibration during the planned activity;

– implement measures to prevent exceeding the noise limits at the boundary of the nearest residential areas and the sanitary protection zone;

– comply with the requirements of the Land Code of Ukraine regarding the rational use and protection of land;

– ensure the implementation of technical solutions and measures to prevent soil contamination;

– ensure compliance with radiation hygiene regulations regarding background radiation levels at the boundary of the sanitary protection zone;

– ensure the tightness of closed circuits containing radioactive substances and maintain continuous monitoring;

– ensure the purification of air containing radioactive isotopes using aerosol and iodine filters;

– continuously measure the presence of inert gases, aerosols, and iodine in the discharged air.

– ensure the maintenance of negative pressure in the ventilation system in the hermetic zone, which guarantees that, in the event of a leak from the first containment, the air will pass through the filters, with continuous monitoring of its activity;

– organize the purified air emissions from the restricted areas of the reactor compartment and the special building through ventilation chimneys at least 100 meters in height;

– carry out the planned activities with an emission control system in each ventilation pipe, monitored continuously via a centralized system and individual devices;

– ensure control of the concentration of radioactive aerosols and iodine before and after the filters in the ventilation systems;

– provide a special gas purification system for cleaning gas emissions from equipment containing radioactive substances;

– continuously monitor the air discharged from ventilation pipes for radioactive gases;

– ensure control of the specific activity of technical water after heat exchangers in the emergency cooling system, with a warning signal issued to the operator's console;

– treat wastewater that may be contaminated with radioactive substances in a special water treatment system and reuse it in the station's cycle;

– ensure that rooms with special water treatment systems and those for collecting liquid radioactive waste, which contain containers with radioactive materials and waste, are equipped with metal trays or lined with stainless steel to the level of potential flooding;

– ensure the monitoring of the specific activity of technical water after the heat exchangers of the zone emergency cooling system, with a warning signal sent to the operator's console;

– wastewater that may be contaminated with radioactive substances must be treat in the specialized water treatment system and reuse it within the station's cycle;

– the premises for the specialized water treatment system and the liquid radioactive waste collection unit, where tanks containing radioactive sources and waste are located, shall be equip with metal trays or line them with stainless steel up to the level of possible flooding of the premises;

– radioactive water from the reactor department shall be treated at the general station purification facilities located in the special building, and liquid radioactive waste (LRW) must be directed to the special building through a stainless-steel pipeline installed on an overpass, which eliminates the likelihood of transported substances entering to environment;

– all transport and technological operations involving solid radioactive waste must be accompanied by radiation monitoring to ensure the radiation safety of station personnel;

– waste management shall be carried out in accordance with the requirements of the Law of Ukraine "On Waste Management," permit-related documents, and contracts concluded with specialized organizations in the field of waste management, including hazardous waste;

– ensure the classification of waste generated at the enterprise in compliance with the requirements of the National Waste List and the Waste Classification Procedure, considering the List of Properties that make waste hazardous;

– ensure the company's activities are conducted in such a way as to prevent waste generation, reduce its formation, and prevent its negative impact on human health and the natural environment;

– ensure the reduction of waste volumes by implementing the best available technologies and management methods during industrial production processes;

– prevent the mixing of recoverable waste with waste that cannot be recovered.

– ensure the proper sanitary and technical condition of waste generation and storage sites, as well as compliance with established safety and fire protection rules in these areas;

– appoint responsible personnel in the field of waste management;

– ensure the professional training, qualification improvement, and certification of specialists in waste management;

– ensure the transfer of hazardous waste to business entities that hold a permit for waste treatment operations and a license for hazardous waste management activities based on concluded contracts;

– manage radioactive waste in accordance with the requirements of the Law of Ukraine "On Radioactive Waste Management";

– ensure compliance with the Procedure for Exemption of Radioactive Materials from regulatory control within practical activities, approved by the Order of the State Nuclear Regulatory Committee of Ukraine dated July 1, 2010, No. 84, and registered with the Ministry of Justice of Ukraine on August 20, 2010, No. 718/18013;

– carry out the implementation of planned activities only with all required permitting documents in place;

– appoint responsible personnel (with appropriate qualifications) to ensure compliance with environmental protection legislation;

– ensure compliance with explosion and fire safety requirements for planned activities in accordance with Ukrainian legislation;

– ensure reliable sealing of equipment, technological pipelines, and fittings;

– use corrosion-resistant materials for equipment in technological processes;

– operate equipment and networks in a technical and operational conditions;

– if any exceedance of monitored indicators is detected, take measures to bring the technological process back to normal operation, ensure immediate notification of the authorized central body, and implement appropriate response actions;

– ensure an environmental impact assessment (EIA) in the event of changes to planned activities that are subject to EIA, in accordance with the requirements of the Resolution of the Cabinet of Ministers of Ukraine dated December 13, 2017, No. 1010 "On Approval of Criteria for Determining Planned Activities that Are Not Subject to Environmental Impact Assessment and Criteria for Determining Expansions and Changes of Activities and Facilities that Are Not Subject to Environmental Impact Assessment".

2. The following conditions on prevention of emergency situations and elimination of their consequences are established for the proposed activities, namely:

– in case of emergency or abnormal situations, characteristics of quantitative and qualitative impact on environmental components, compensation measures shall be determined according to the procedure as required by applicable legislative regulations and instruments;

– envisage, in case of emergency, a number of logistic and technical measures aimed at confinement and elimination of the situation occurred and exclusion of environment contamination;

– ensure availability of clear regulation and required number of tools for confinement and elimination, in full scope, in order to minimize potential negative impact of any emergency on natural environment;

– maintain the indoor fire water pipeline of the building in due condition, provide it with primary fire extinguishing tools;

– arrange for fire safety training of the staff at the enterprise;

– carry out periodic inspection and repair of the process equipment and structures.

3. The following conditions are established for the panned activity regarding transboundary effect of the proposed activity[1], namely:

– perform necessary analysis of safety, of DBA and BDBA in view of effective international safety standards that have to be applied to Rivne NPP's site;

– carry out periodic safety reassessment of nuclear installations according to the national and international standards in the field of nuclear energy utilization and radiation safety;

– if necessary, increase the capacity of sewage systems to ensure that rainfall intensity with a probability of 10^{-4} per year does not result in water entering buildings housing safety-critical elements or flooding the basements of such buildings;

– if necessary, ensure adequate protection of safety-critical elements to withstand wind loads with a probability of occurrence of 10^{-4} per year;

– take measures to enhance the protection of nuclear power plants against cyberattacks and internal threats;

– ensure periodic seismic monitoring, taking into account the latest scientific and technological advancements in geology, seismology, and paleoseismology. If necessary, modernization measures must be implemented promptly based on the results of hazard assessments;

– perform a dispersion calculation using emission parameters based on the analysis of specific severe accidents at Units 1 and 2 of the Rivne NPP, and submit the results to the Ministry of Environmental Protection;

– ensure consideration of the results of transboundary consultations with affected countries during the operation of Units 1 and 2 of the Rivne NPP and during subsequent safety reassessments of these units;

– it is recommended to apply nuclear and radiation safety regulations in line with WENRA, if implemented at the state level during the next assessments for lifetime extensions of Units 1 and 2 Rivne NPP;

– ensure a comparative analysis of Units 1 and 2 Rivne NPP in accordance with WENRA safety requirements after the implementation of nuclear and radiation safety norms and regulations into national legislation based on WENRA reference levels;

– ensure an additional environmental impact assessment for the decommissioning activities of Units 1 and 2 Rivne NPP.

4. The economic entity is hold responsible for implementation of the following compensatory measures[2], namely:

– carry out activities in compliance with the national law in the field of nuclear energy utilization and radiation safety.

5. The economic entity is hold responsible for prevention, avoidance, mitigation, elimination, restriction of the environmental[2] impact of the proposed activity, namely:

– carry out organizational; economic, ecological and other measures aimed at rational use and protection of lands, their protection from harmful anthropogenic impact;

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[1] If a transboundary impact procedure was carried out

[2] If such a need arises from the environmental impact assessment

– carry out repair of the road surface to reduce infiltration of the surface waste water contaminated with oil products into the soil and ground water ;

– execute (extend the term of) agreements for waste treatment with the other specialized enterprises;

– carry out activities in such way that ensures conservation of natural complexes and facilities (objects), rare and endangered species of flora and fauna;

– ensure ecological safety, rational use of natural resources, compliance with environmental legislation.

6. The business entity is assigned the responsibilities for the post-project monitoring[2], namely:

– ensure continuous automated monitoring of the radiation state at the NPP site and in the observation area with the continuous publication of data online on the official website;

– perform monthly monitoring of quantitative and qualitative indicators of pollutants in the atmospheric air at the border of specified sanitary protection zone and the boundary of the nearest residential area;

– monitor biological objects of surface water, Styr river (monitoring biocenosis and populations) every six months;

– conduct annual radiation monitoring of fish in the Styr River;

– conduct radiation monitoring of the state of sludge and bottom sediments in the Styr River once a year;

– monitor the condition of the foundations of buildings and structures annually (monitoring of building and structure settlement – quarterly);

– conduct annual seismic monitoring in the area of the Rivne Nuclear Power Plant;

– carry out laboratory and instrumental control of emissions of pollutants from stationary controlled sources of emissions with a frequency defined by the permits for the emission of pollutants into the atmospheric air;

– monitor proposed activity impact on the state of soils within sanitary protection zone (once a year);

– carry out hydrogeological monitoring of the groundwater regime, its temperature and chemical composition in the territory of the proposed activity (monthly);

– conduct monitoring of the quality of domestic water discharged from the industrial site to the municipal network and industrial water discharged into the Styr River (quarterly);

– in case of exceedance of any indicator relative to which monitoring is carried out, take appropriate response measures and ensure that the authorized central body is promptly informed.

Post-project monitoring results (Post-project monitoring reports together with copies of laboratory test protocols for environmental parameters conducted as part of post-project monitoring or other materials containing research results) shall be submitted during the next month after the reporting to the authorized central body, as well as to ensure the publication of the results on the own website or send to the local self-government bodies of the relevant administrative-territorial units that may be affected by the planned activity for publication on their websites. The monitoring is conducted annually throughout the operation period of the Rivne NPP.

Note: If during the implementation of economic activity a significant negative impact of this activity on the life and health of the population or the environment is revealed, and if such an impact was not assessed when carrying out an environmental impact assessment and/or significantly changes the results of an assessment of the impact of this activity on the environment, the decision to carry out such a proposed activity is to be cancelled by a court decision, and the activity is to be terminated.

7. The business entity is assigned the responsibility for additional environmental impact assessment at the other design stage[2], namely:

– additional environmental impact assessment for the proposed activity is not envisaged if environmental conditions are met.

The conclusion on the environmental impact assessment is binding for execution. The environmental conditions stipulated in this conclusion are mandatory.

The conclusion on the environmental impact assessment becomes invalid after five years in the event that no decision has been made on the preforming of the proposed activity.

/signed/
Department Deputy Director –
Head of the EIA division of
Department for ecology assessment O.GRITSAK

/signed/
First Deputy Minister O. KRAMARENKO