State Enterprise «National Nuclear Energy Generating Company «Energoatom»

SE NNEGC «Energoatom»

APPROVED

Acting First Vice President – Chief

Technical Officer

SE NNEGC «Energoatom»

_____ Yurii Sheiko

«___»_____2023

REPORT

On the Environmental Assessment of the Comprehensive (Consolidated) Safety Upgrade Program for Ukrainian Nuclear Power Plants

for the period 2017-2022

(previous)

APPROVED:	DEVELOPED:

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THE PURPOSE OF THE REPORT

According to the Energy Strategy of Ukraine for the period until to 2050, approved by the of the Cabinet of Ministers of Ukraine № 373-r of 21 April 2023, (https://zakon.rada.gov.ua/laws/show/373-2023-%D1%80?lang=en#Text) SE NNEGC "Energoatom" with the purpose steady of further improvement of nuclear safety, ensuring efficient and reliable performance in the energy branch, bringing safety of Ukrainian nuclear power plants to the level that meets international requirements to nuclear safety and environmental protection, implements the Complex (Consolidated) Safety Upgrade Program of Power Units of Nuclear Power Plants (CCSUP).

The purpose of the CCSUP is:

- improving the level of safety of operation of power units of nuclear power plants and the reliability of their operation;

- reducing the risk of accidents at nuclear power plants during natural disasters or other extreme situations;

- improving the efficiency of managing design and off-design accidents at nuclear power plants and minimizing their consequences.

The Complex (Consolidated) Safety Upgrade Program of Power Units of Nuclear Power Plants was approved by the Decree of the Cabinet of Ministers of Ukraine № 1270 of 07.12.2011.

The Complex (Consolidated) Safety Upgrade Program of Power Units of Ukrainian Nuclear Power Plants (CCSUP) was approved by the Decree of the Cabinet of Ministers of Ukraine № 1270 of 07.12.2011. Amendments to this resolution in 2023 (Resolution of the Cabinet of Ministers of Ukraine № 479 of May 12, 2023) set a deadline for completion of its implementation by the end of 2025. (https://zakon.rada.gov.ua/laws/show/1270-2011-%D0%BF?lang=en#Text)

According to the Resolution of the CMU № 1270 of 07.12.2011, the costs for the implementation CCSUP are covered by the tariffs for electricity and thermal energy of the SE NNEGC "Energoatom", as well as at the expense of loans funds the European Bank for Reconstruction and Development and Euratom. The estimated of funding for the CCSUP amounting of 39553 million UAH (excluding value added tax), as well as 600 mil. Euros, the loans provided by the European Bank for Reconstruction and Development and Euratom. (hereinafter referred to as EBRD/Euratom).

The amount of costs required to implement the CCSUP is determined annually when developing the investment program for the planned year in accordance with the duly approved schedule, including the calculation of the costs of implementing the CCSUP activities.

Efforts to raise loan funds for the CCSUP implementation began in 2010 after the successful completion of the Post-Commissioning Upgrade and Safety Upgrade Program for № 2 KhNPP and № 4 RNPP, which was also co-financed by EBRD/Euratom loans, and continued until 2014.

The Law of Ukraine № 1267-VII of 15.05.2014 was ratified by the "Guarantee Agreement (Ukraine: Comprehensive (Consolidated) Safety Upgrade Program for Nuclear Power Plants) between Ukraine and the European Bank for Reconstruction and Development", which provides for the provision of a loan of 300,000,000 (three hundred million) euros.

Also, the Law of Ukraine № 1268-VII of 15.05.2014 was ratified the Guarantee Agreement between Ukraine as Guarantor and the European Atomic Energy Community as Lender in respect of the Agreement on the Loan Facility in the amount of 300,000,000 (three hundred million) euros, of 7 August 2013 between the National Nuclear Energy Generating Company Energoatom and the European Atomic Energy Community for the implementation of the project Comprehensive (Consolidated) Safety Upgrade Program for Nuclear Power Plants.

Loan and guarantee agreements with EBRD and Euratom for the above amount of 600 mil. Euros were signed of 25 March 2013 and 7 August 2013, correspondingly. The loan is provided under the state guarantees. Of 01.06.2014, the laws on ratification of the guarantee agreements entered into force. The loan and guarantee agreements entered into force: with the EBRD - of December 19, 2014, and with Euratom – of May 28, 2015.

In pursuance of loan and guarantee agreements with the EBRD and Euratom on co-financing the CCSUP, international bidding for the purchase of equipment to implement the CCSUP measures were held and all contracts for the purchase of equipment with EBRD/Euratom loan funds were concluded (70 contracts).

The costs for the CCSUP implementation for the period 2017-2022

Financing of the CCSUP measures for 2017-2022

thousand/UAH (with VAT)

SS NPP	Financed By for 2017	Financed By for 2018	Financed by for 2019	Financed by for 2020	Financed by for 2021	Financed By for 2022
Capital expenditure measures						
SS ZNPP	1497443	3609116	2529369	2063089	1449695	830965
SS RNPP	1026443	2699564	1056996	1024600	1354712	752462
SS KhNPP	314423	1087566	2143899	1448390	866517	973673
SS SUNPP	507196	972643	2387064	872403	1369208	1043957
Directorate	72222	53188	35439	24580	23469	19477
NNEGC	3546007	8422077	8152767	5433062	5063601	3620535
Non-capital expenditure measures						
SS ZNPP	52644	10411	14350	6018	6622	6439
SS RNPP	35166	9220	3350	5297	6487	3325
SS KhNPP	280	1880	2433	785	1652	695
SS SUNPP	5157	4034	6327	3374	3048	5661
Directorate	2632	5618	4443	3761	7998	5656
NNEGC	95879	31163	30902	19236	25807	21776
TOTAL						
SS ZNPP	1678367	3619527	2543719	2069107	1456317	837404
SS RNPP	1061609	2708784	1060345	1029897	1361199	755787
SS KhNPP	314703	1089446	2146331	1449175	868169	974368
SS SUNPP	512353	976677	2393391	875777	1372256	1049618
Directorate	74854	58806	39882	28341	31467	25133
NNEGC	3641886	8453240	8183668	5452298	5089408	3642311

The mentioned international agreements stipulate the need to implement the Environmental and Social Action Plan (Annex L). One of the environmental measures is to conduct an environmental assessment (hereinafter - EA) of the CCSUP implementation every 5 years.

In accordance with the Law of Ukraine "On Environmental Impact Assessment" of 23.05.2017 № 2059-VIII (as amended), the activities related to the implementation of the CCSUP are subject to environmental impact assessment.

But the realization of the CCSUP does not change the main design indicators of power units and is carried out at operating NPPs within the existing buildings and structures, and does not provide for changes in the functional purpose of systems and elements of nuclear power plants. The performance of systems and components is improved by introducing advanced equipment and technologies, and provides for the replacement of equipment that has reached its technical life or is obsolete with more efficient equipment.

That's why, in accordance with clause 4.5 of State Building Standards DBN A.2.2-1:2021 "Composition and Content of Environmental Impact Assessment (EIA) Materials", taking into account the criteria for determining expansions and changes in activities and facilities that are not subject to environmental impact assessment, approved by the CMU Resolution № 1010 of December 13, 2017, EIA for the relevant CCSUP measures should be developed in a reduced scope.

The process of CCSUP EA is regulated by a separate regulatory act of the Company - SOU NAEK 004:2011 "Environmental Assessment of Nuclear Power Units. General Requirements for the Composition and Content of Assessment Materials" (available at the link: _____).

The environmental assessment is aimed at reviewing the environmental impacts resulting from the implementation of the CCSUP measures. The EA does not include the issue of assessing the impact of new construction of nuclear facilities, capacity increase of existing nuclear facilities, and lifetime extension of power units of operating NPP.

The first EA of the CCSUP was performed during 2011 by an independent international team with the participation of the experts from the company «Poyry» (Finland, France, Switzerland, Germany), the Ukrainian Center for Environmental and Water Projects, and the company «AESKAR» (Ukraine). CCSUP EA was carried out in accordance with the EBRD Environmental and Social Policy, environmental legislation of the European Union, in particular EU Directive 2001/42/EU, and took into account the best world practices. The Stakeholder Engagement Plan (hereinafter referred to as the SEP), Report on works scoping, Report on CCSUP EA and the corresponding Statement on the envirinmental consequences of CCSUP implementation were published and remain available on the official website of the State Enterprise «NNEGC «Energoatom» under the link: https://www.energoatom.com.ua/app-eng/security-culture.html .

The previous EA of the CCSUP was performed during 2017 by the State Institution "State Environmental Academy of Postgraduate Education and Management".

This Report contains the results of the reassessment of the environmental impacts as a result of the implementation of the CCSUP (taking into account the changes made to the CCSUP during 2017-2022, its measures implemented during this period, as well as actual changes in the operating state of NPP units, environment and its monitoring procedures that have occurred since the completion of the previous CCSUP EA)

1.GENERAL INFORMATION

1.1 Terms and definitions

Terms related to environmental protection and public health, nuclear and radiation safety are used in this document in the meanings defined by the legislation of Ukraine.

Terms related to environmental/social documents and standards of the EBRD and EC are used in this document in the meanings defined in the acts of the EBRD and EC.

In this report, the term "impact" refers to the direct consequences of events that cannot be avoided. The term "risk" refers to the possible consequences of events that are related to the probability of their onset.

1.2 Abbreviations

LOCA	The Loss-of-Coolant Accident
NPP	Nuclear Power Plant
SFSP	Spent fuel storage pool
BOD	Biological oxygen demand
VVER – в PHX 2022 (or WWER)	Water-water energetic reactor
SF	Spent fuel
SFA	Spent fuel assembly
SS ZNPP	Separated subdivision «Zaporizhzhya NPP»
SS RNPP	Separated subdivision «Rivne NPP»
SS KhNPP	Separated subdivision «Khmelnytskyy NPP
SS SUNPP	Separated subdivision «South Ukraine NPP»
SNF	Spent Nuclear Fuel
MPE	Maximum permissible emissions
MPC	Maximum permissible concentration
SNRIU	State Nuclear Regulatory Inspectorate of Ukraine
NDA	Non-disclosure agreement
SE NNEGC «Energoatom», Company	State Enterprise «National Nuclear Energy Generating Company «Energoatom»
DENR	Department of Ecology and Natural Resources of the Regional State Administration
SESU	State Emergency Service of Ukraine
EBRD	European Bank for Reconstruction and Development
Euratom	European Atomic Energy Community
EA	Environmental assessment
USSPR	Unified state system for preventing and responding to emergencies caused by human factors or natural conditions
EC	European Commission
EU	European Union
SAR	Security assessment report
SI	Statement of intent

STDs	Sexually transmitted diseases
PS	Polluting Substance
SA	Surveillance area
CCSUP	The Complex (Consolidated) Safety Upgrade Program of Power Units of Ukrainian Nuclear Power Plants
IAEA	International Atomic Energy Agency
MOU	Memorandum of understanding
MinEnergo of Ukraine	Ministry of Energy of Ukraine
MEPNR	Ministry of Environmental Protection and Natural Resources of Ukraine
SESU	State Emergency Service of Ukraine
MDBA	Maximum design basis accident
MDE	Maximum design earthquake
IFIs	International financial institutions
INES	International Nuclear Event Scale
NR	Norms and rules
NR NRS	Norms and rules on nuclear and radiation safety
NRBU-97	Radiation Safety Standards of Ukraine
NGO	Non-Governmental Organization
EIA	Environmental Impact Assessment
EIA	Environmental impact assessment
LP	Labor protection
ESAP	Environmental and Social Action Plan
SEP	Stakeholder engagement plan
GHGs	Greenhouse gases
SMEs	Small and medium-sized enterprises
ULP	Unit of the labor protection
RS	Radioactive substances
LRW	Liquid radioactive waste
RDPP	Reserve diesel power plant
RI	Reactor installation
ECSZ	Emergency cooling system of the zone
DFADS	Damaged fuel assembly detection system
SPZ	Sanitary protection zone
SEA	Strategic Environmental Assessment
DSFSF	Dry spent fuel storage facility
FS	Feasibility study
SRW	Solid Radioactive Waste
COD	Chemical oxygen demand
FSE	Frequency of significant emissions
LERF	Large early release frequency
CDF	Core damage frequency
CSFSF	Centralized spent fuel storage facility
IEC the IAEA	Incident and Emergency Centre the IAEA

1.3 Documents that are the basis for the EA

1.3.1 International acts

The general information provided in this paragraph has not changed compared to paragraph 1.3.1 of the 2017 CCSUP EA Report.

Energoatom and the Energy Community Secretariat signed a Memorandum of Understanding.

While continuing to support Ukraine and in accordance with the signed Memorandum, the Energy Community will coordinate legal activities regarding compensation for damage to Ukraine's energy infrastructure caused by the russian federation.

The signed Memorandum will remain in effect until January 1, 2026.

1.3.2 National regulatory and legal framework of Ukraine

The general information provided in this paragraph has not changed compared to paragraph 1.3.2 of the 2017 CCSUP EA Report.

The legislative framework and regulatory control system in the field of nuclear energy fully embrace all safety principles and provisions of Article 7 of the Convention on Nuclear Safety. In connection with the signature of the Association Agreement between Ukraine and the European Union in 2015, work began on the implementation of the provisions of EU legislation on nuclear energy safety and radiation protection into the Ukrainian legislation.

During 2017-2022, in accordance with the implementation plans approved by the Government of Ukraine, a significant amount of work was done to implement such acts of EU legislation:

- Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to radiation;

- Council Directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel;

- Council Directive 2014/87/Euratom establishing a Community framework for the nuclear safety of nuclear installations.

The following regulations were adopted during the reporting period:

Laws:

1. Law of Ukraine «On Amendments to Certain Laws of Ukraine in the Field of Nuclear Energy Use», № 107-IX of September 18, 2019.

2. Law of Ukraine «On Amendments to Certain Laws of Ukraine on the Safety of Nuclear Energy Use», № 613-IX of May 19, 2020.

3. Law of Ukraine «On Environmental Impact Assessment», № 2059 of May, 23, 2017.

Acts of the Cabinet of Ministers of Ukraine:

Resolution of the Cabinet of Ministers of Ukraine of November 18, 2020 № 1141 «Some issues in establishing the unified state system for accounting and control of individual doses».

Resolution of the Cabinet of Ministers of Ukraine of December 13, 2017 № 1026 «On Approval of the Procedure for Transferring Documentation for Providing an Environmental Impact Assessment Conclusion and Financing an Environmental Impact Assessment and the Procedure for Maintaining the Unified Register of Environmental Impact Assessment»

Resolution of the Cabinet of Ministers of Ukraine of December 13, 2017 № 1010 «On Approval of Criteria for Determining Planned Activities Not Subject to Environmental Impact Assessment and Criteria for Determining Expansions and Changes in Activities and Facilities Not Subject to Environmental Impact Assessment»

Resolution of the Cabinet of Ministers of Ukraine of December 13, 2017 № 989 «On Approval of the Procedure for Conducting Public Hearings in the Process of Environmental Impact Assessment»

Order of the Ministry of Environmental Protection and Natural Resources of Ukraine

Order of the Ministry of Environment of September 03, 2020 № 117 «On Approval of the Amount of Payment for Public Discussion in the Process of Environmental Impact Assessment»

SNRIU orders:

SNRIU Order №508 of 25.11.2019 «Amendments to the nuclear and radiation safety requirements for instrumentation and control systems important to NPP safety», registered in the Ministry of Justice of Ukraine on 24 December 2019 under № 1280/34251.

SNRIU Order № 57 of 14.02.2020 «On Approval of the Regulation on the Functional Subsystem of Nuclear and Radiation Safety of the Unified State Civil Protection System», registered in the Ministry of Justice of Ukraine on 13 April 2020 under № 340/34623.

SNRIU Order № 319 of 4.08.2020 «General safety requirements for the design and operation of NPP equipment and piping», registered in the Ministry of Justice of Ukraine on 30 September 2020 under № 955/35238.

SNRIU Order № 440 of 28.10.2020 «General safety provisions for decommissioning of nuclear facilities», registered in the Ministry of Justice of Ukraine on 30 December 2020 under № 1311/35594.

SNRIU Order № 263 of 30.04.2021 «Requirements for NPP safety assessment in terms of external natural hazards», registered in the Ministry of Justice of Ukraine on 20 May 2021 under № 670/36292.

SNRIU Order № 290 of 17.05.2021 «Requirements for NPP emergency documents», registered in the Ministry of Justice of Ukraine on 30 June 2021 under №. 864/36486.

SNRIU Order № 411 of 12.07.2021. «Provisions on the procedure for investigation and accounting of NPP operational events», registered in the Ministry of Justice of Ukraine on 8 September 2021 under № 1182/36804.

SNRIU Order № 223 of 22.03.2022 «On Approval of the Requirements for Cybersecurity of Information and Control Systems of Nuclear Power Plants to Ensure Nuclear

and Radiation Safety», registered in the Ministry of Justice of Ukraine on 7 April 2022 under № 395/37731.

1.3.3 International recommendations

The general information provided in this paragraph has not changed compared to paragraph 1.3.3 of the 2017 CCSUP EA Report.

Due to the war against Ukraine, launched by the Russian Federation, the implementation of most of the CCSUP measures planned for 2022, as well as the further implementation of some measures of the CCSUP ESAP and the CCSUP SEP, have been postponed to later years.

Since the beginning of 2022, the Energoatom Company has been implementing the following programs and projects under the International Technical Assistance program:

- Instrument for Nuclear Safety Cooperation (INSC – funded of the EC);

- Within the framework of the Group of Seven's Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (G7 GP): - Trilateral initiative of Sweden-Norway-Ukraine, cooperation with the United States and Canada (DOE/NNSA, ONL and others), cooperation with Germany (GRS);

- Projects in the field of improving nuclear safety with the support of the US Government.

A crucial part of the Company's foreign policy is membership in international organizations (WANO, WNA, FORATOM (through membership in the Ukrainian Nuclear Forum Association), IFNEC, EUR), cooperation with the IAEA, EC, EBRD, EURATOM as well as bilateral cooperation with companies from countries with developed nuclear capabilities. The purpose of such cooperation is to maintain the competitive state of nuclear power generation, attract scientific, technical, and financial assistance, raise investment, implement international experience to carry out the strategic objectives of «Energoatom» and ensure the safe operation of nuclear power units. (https://www.energoatom.com.ua/app-eng/international-cooperation.html)

1.3.4 Company Documents

The general information provided in this paragraph has not changed compared to paragraph 1.3.4 of the 2017 CCSUP EA Report.

The CCSUP measures are implemented in accordance with the annual schedule of measures of the Comprehensive (Consolidated) Safety Upgrade Program for NPPs, which, in accordance with the Resolution of the Cabinet of Ministers of Ukraine № 1270 of 07.12.2011, is approved by the SNRIU, the Ministry of Energy and the State Emergency Service of Ukraine.

On 24 February 2022, the russian federation launched a large-scale armed aggression against Ukraine and throughout Ukraine by the Law of Ukraine of February 24, 2022 № 2102-

IX "On Approval of the Decree of the President of Ukraine "On the imposition of martial law in Ukraine" № 64/2022 (as amended) martial law was introduced. Russia's military aggression imposed a direct effect on the activities and condition of NNEGC "Energoatom", in particular, for the implementation of all investment projects, including the CCSUP.

Force majeure circumstances related to the military aggression of the Russian Federation against Ukraine resulted in significant damage to industrial enterprises and infrastructure, disruption of logistics, reduction in the number of personnel of design, construction, installation and commissioning organizations due to mobilization and forced evacuation, which made it impossible to fulfill obligations under the concluded contracts for the supply of necessary equipment, materials, cable and wire products and other goods, as well as failure to perform works and services.

Due to force majeure, the scope of scheduled preventive maintenance of almost all power units was revised and significantly reduced. In connection with the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, all investment projects at ZNPP, including CCSUP activities, were suspended for security reasons.

Thus, due to the above-mentioned force majeure circumstances, it was no longer possible to complete the implementation of the CCSUP by the end of 2023.

The Company has worked to determine the deadlines for the implementation of the remaining CCSUP measures, which resulted in the need to extend the CCSUP until the end of 2025, for which purpose, starting in March 2022, work was carried out to amend the Resolution of the Cabinet of Ministers of Ukraine № 1270 of 07.12.2021, which ended with the approval of the CMU Resolution № 479 of 12.05.2023.

In the period from February 6 to 17, 2023 in the SE "NNEGC "Energoatom" conducted a certification audit of the integrated management system Company.

The purpose of the audit was to confirm that the functioning of the quality management, environmental management, health and safety management systems at Energoatom in 2022 meets the requirements of international standards.

In particular, we are talking about compliance with the standards of ISO 9001:2015 "Quality management systems. Requirements", ISO 14001:2015 "Environmental management systems. Requirements and guidelines for use", and ISO 45001:2018 "Occupational health and safety management system".

The audit results confirmed that the Company promptly adapted to work under martial law and ensured social protection of its personnel in these conditions. In addition, the audit concluded that the personnel of the Company's separate divisions were efficient and properly organized in the context of partial blackout.

The audit was carried out remotely at the structural units of the Company's Directorate and separate subdivisions - Rivne NPP, Khmelnytsky NPP, Atomenergomash,

Atomproektengineering, Atomremontservis, Emergency and Technical Center, Scientific and Technical Center, Business Management, Centralized Procurement and Energoatom-Trading.

1.4 Information on the executors of the EA CCSUP

The CCSUP EA was performed under an agreement concluded between the SE NNEGC «Energoatom» Company and the Limited Liability Company «Scientific Production Enterprise «UKREKOPROEKT».

Table 1 - Experts involved in the EA

Area of expertise	Name, patronymic, surname
General questions	Dmytro Volodymyrovych Bolbat - Director of LLC "SPE "UKREKOPROEKT". Diploma NK № 28561651 Specialization: Industrial and civil construction. Professional qualification: Master's degree. Certificate № 230 of 15.11.2019 on advanced training on the topic "Implementation of environmental impact assessment (EIA) in Ukraine: features and first experience of implementation. Strategic environmental assessment".
Environmental certification issues	Alina Volodymyrivna Bolbat - Design Engineer. Diploma M18 № 095635. Degree of higher education: Master's degree; Specialty: Law; Educational program: Environmental policy and law; Qualification certificate of the responsible contractor of certain types of work (services) related to the creation of architectural objects Series AR №016058 Categories: design engineer of the 1st category; Certificate № KEA-18-277 on advanced training "Implementation of environmental impact assessment (EIA) in Ukraine: features and experience of implementation.Strategic environmental assessment"
Environmental management and audit issues	Anastasia Volodymyrivna Bulgak - Ecologist. Diploma M 20 №110255 Degree of higher education: Master's degree. Specialty: "Ecology". Educational and professional program "Environmental control and audit". Certificate № 227 dated 15.11.2019 on the completion of advanced training on the topic "Implementation of Environmental Impact Assessment (EIA) in Ukraine: features and first experience of implementation. Strategic environmental assessment"
Issues of non-radioactive waste management	Natalia Vitalyivna Voloshyna - Ecologist. Diploma NK № 45541737 Degree of higher education: Specialist. Specialty: Ecology and environmental protection. Educational and professional program Environmental Geology. Certificate № 231 dated 15.11.2019 on advanced training on the topic "Implementation of environmental impact assessment (EIA) in Ukraine: features and first experience of implementation. Strategic environmental assessment".

Radiation safety issues and radioecology	Sergey Viktorovich Ataev - Design Engineer. Diploma RV 23428294 Degree of higher education: Master's degree. Specialty: "Ecology and environmental protection". Qualification: master ecologist. Qualification certificate of the responsible executor of certain types of works (services) related to the creation of architectural objects Series AR 012978. Category: leading design engineer.
General environmental issues	Marina Viktorovna Nosik - Ecologist. Diploma NK №34961915. Degree of higher education: Specialist. Specialty: Ecology and environmental protection. Professional qualification: specialist in ecology and environmental protection.
Social, health and safety and public relations issues	Yan Stanislavovich Bilous - Ecologist. Diploma M21 №010704. Degree of higher education: Master's degree. Field of study: Ecology, environmental protection and balanced nature management. Professional qualification: Organizer of nature management.

1.5 Objectives of CCSUP

1.5.1 Electricity in Ukraine

Electricity generation in Ukraine is provided mainly by operating NPPs and thermal power plants (see Table 2 for the distribution of electricity generation).

Table 2 - Electricity generation in Ukraine*

	Production (billion kWh)						**Share, %**					
	2022	**2021**	**2020**	**2019**	**2018**	**2017**	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**
NPP	**	86,20	76,20	83,00	84,40	85,58	**	55,61	51,21	53,9	53,0	55,1
TPP, CHP	**	45,83	52,34	55,79	58,81	55,84	**	29,57	35,17	36,2	36,9	35,9
HPP, PSPP	**	10,45	7,58	7,87	12,01	10,56	**	6,74	5,09	5,1	7,5	6,8
Non-traditional sources of electricity (WPP, SPP, biomass)	**	12,52	12,69	7,32	4,13	3,43	**	8,08	8,53	4,7	2,6	2,2
Total	**	155,0	148,81	153,97	159,35	155,41						

Notes: In some cases, the sum of the components may not equal the total due to data rounding.

** excluding the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol and part of the temporarily occupied territories in Donetsk and Luhansk regions*

***2022 data will be released after the end of timing for submission of statistical and financial reporting set by Ukraine`s law On protection of interests of entities that submit reporting and other documents during the period of martial law or state of war.*

Electricity consumption in 2017-2022 is shown in Table 3. During the period 2017-2019, electricity consumption fluctuated, which does not allow us to conclude a certain trend

in consumption. In 2020, there is a downward trend in electricity consumption due to the economic downturn and the crisis in recent years.

Table 3 - Electricity consumption in Ukraine during 2017-2022 years*

		Units of measurement	2017	2018	2019	2020	2021	2022
1	Total final consumption	ktoe	49911	51408	49665	47773	**	**
2	Industrial	ktoe	15098	16487	16122	15956	**	**
3	in % of the total	%	30,2	32,1	32,5	33,4	**	**
4	Transportation	ktoe	9624	9453	10026	8012	**	**
5	in % of the total	%	19,3	18,4	20,2	16,8	**	**
6	Households	ktoe	16487	16201	14007	13601	**	**
7	in % of the total	%	33,0	31,5	28,2	28,5	**	**
8	Services sector	ktoe	4337	4742	4831	4863	**	**
9	in % of the total	%	8,7	9,2	9,7	10,2	**	**
10	Agriculture, forestry and fisheries	ktoe	1847	1880	1882	1662	**	**
11	in % of the total	%	3,7	3,7	3,8	3,5	**	**
12	Other types of activities	ktoe	0	0	0	0	**	**
13	in % of the total	%	0,0	0,0	0,0	0,0	**	**
14	Non-energy use of energy	ktoe	2515	2645	2796	3679	**	**
15	in % of the total	%	5,0	5,1	5,6	7,7	**	**

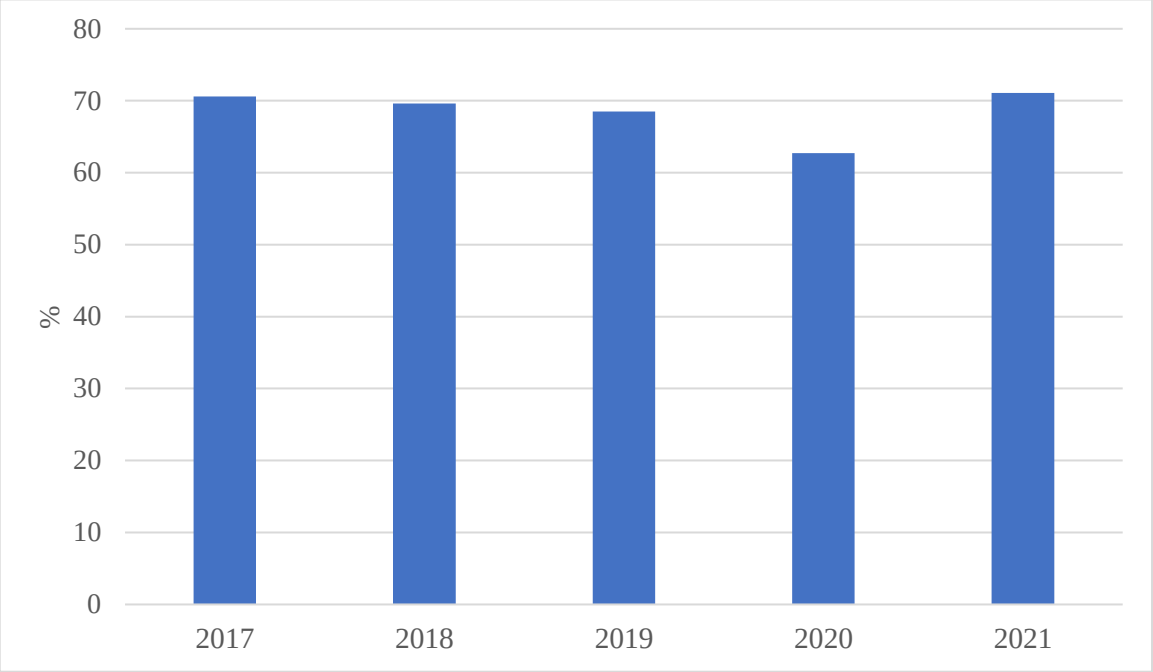
** excluding the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol and part of the temporarily occupied territories in Donetsk and Luhansk regions*

***Data for 2021and 2022 will be released after the end of timing for submission of statistical and financial reporting set by Ukraine`s law On protection of interests of entities that submit reporting and other documents during the period of martial law or state of war.*

1.5.2 Description of nuclear power in Ukraine

The general information provided in this paragraph has no fundamental changes compared to paragraph 1.5.2 of the 2017 CCSUP EA Report.

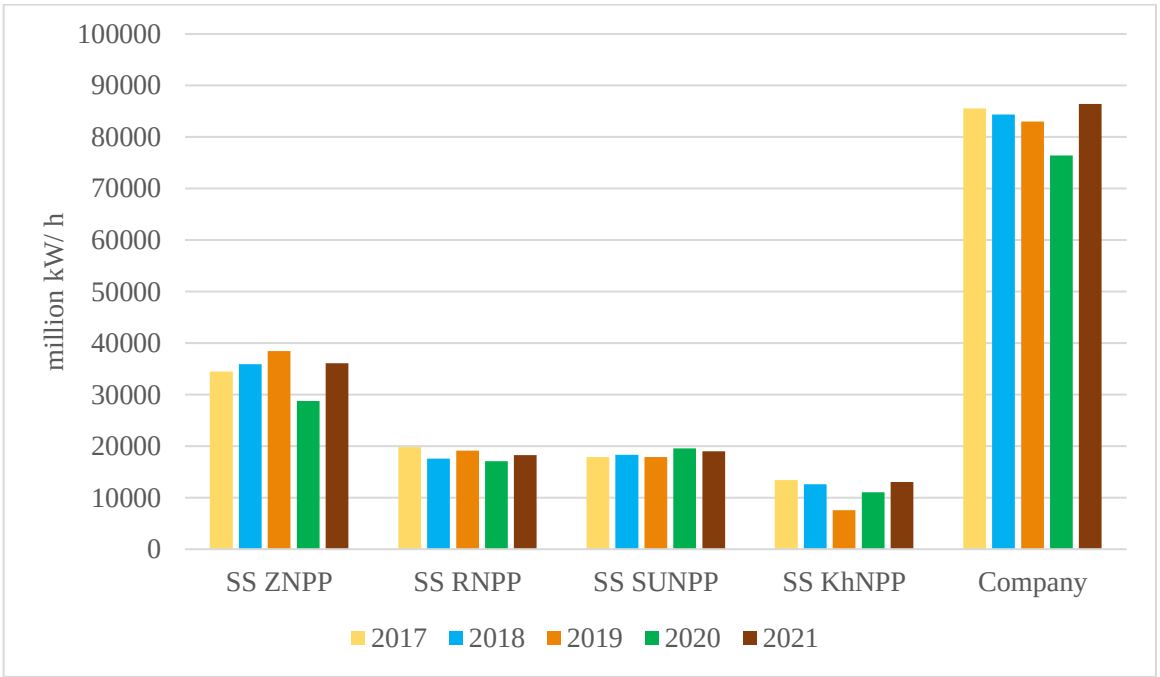
Diagram 1 - Dynamics of changes in the installed capacity utilization rate of operating NPPs.



*Notes:*2022 data will be released after the end of timing for submission of statistical and financial reporting set by Ukraine`s law On protection of interests of entities that submit reporting and other documents during the period of martial law or state of war.*

Information on the volume of electricity generation during 2017-2021 is presented in Diagram 2.

Diagram 2 - Volumes of electricity generation by operating NPPs in Ukraine



Notes: - 2022 data will be released after the end of timing for submission of statistical and financial reporting set by Ukraine`s law On protection of interests of entities that submit reporting and other documents during the period of martial law or state of war.*

During 2017-2022 the Company extended the lifetime of 6 NPP power units (Table 4).

Table 4 - Continued operation of power units at existing NPPs

NPP power unit	**End of service life, provided by the source project**	**Terms of further operation**
№ 3 SS «Zaporizhzhya NPP»	05.03.2017	05.03.2027
№ 4 SS «Zaporizhzhya NPP»	04.04.2018	04.04.2028
№ 5 SS «Zaporizhzhya NPP»	27.05.2020	27.05.2030
№ 3 SS «Rivne NPP»	11.12.2017	11.12.2037
№ 3 SS «South-Ukraine NPP»	10.02.2020	10.02.2030
№ 1 SS «Khmelnytska NPP»	13.12.2018	13.12.2028

Currently, Energoatom has extended the lifetime of 12 NPP units. For this purpose, the Company has created appropriate structures, developed and approved regulatory, methodological and technical documentation with the regulatory authority. Preparations are carried out in accordance with the Programs of Preparation for Operation Extension, which are developed for each power unit separately.

For the first time in the 37-year history of the enterprise, in December 2021, Zaporizhzhya NPP carried a load equal to 100% of its installed capacity, allowing it to generate a historical maximum of electricity for the needs of the population and industry of Ukraine. This mode of operation made it possible to generate 4 billion 532 million kWh of electricity per month. This is an absolute record since the start of the power plant's operation. ZNPP's six power units operated at their rated capacity without any grid restrictions with a record total capacity of 6,155 MW.

In 2021, the Atomenergomash plant, which is a separated subdivision of NNEGC «Energoatom», started works on launching nuclear fuel (fuel assemblies) manufacturing using Westinghouse technology in order to completely replace fuel of russian origin. Detailed information is available on the official website of the Energoatom Company at the link: https://www.energoatom.com.ua/app-eng/setting-up-production.html

1.5.3 The purpose of the CCSUP

The general information provided in this paragraph has not changed compared to paragraph 1.5.3 of the 2017 CCSUP EA Report.

In Ukraine, in 2011, following the recommendations of the Council of the European Union, an extraordinary comprehensive safety review of all NPP units was conducted, which resulted in the development and inclusion of additional measures in the CCSUP. The safety assessment of the operating power units showed, the sequence of events that took place at the Fukushima Daichi NPP is practically impossible for any operating NPP of Ukraine.

Implementation of the CCSUP will eliminate certain inconsistencies of operating NPP units with the later introduced national safety standards and improve the safety of all units to the level that meets modern international safety requirements. In particular, the Program will allow implementing the IAEA recommendations based on the results of the design safety assessment of Ukrainian NPPs conducted in 2008-2010 within the framework of the Joint EC-IAEA-Ukraine Project. In addition, the implementation of the CCSUP will increase the ability of Ukrainian NPPs to withstand extreme natural impacts and prevent accidents similar to the Fukushima Daichi accident.

1.6 Structure of CCSUP measures

The general information provided in this paragraph has not changed compared to paragraph 1.6 of the 2017 CCSUP EA Report.

The Complex (Consolidated) Safety Upgrade Program of Power Units of Ukrainian Nuclear Power Plants (CCSUP) was approved by the Decree of the Cabinet of Ministers of Ukraine No1270 of 07.12.2011. In 2012 the CCSUP was supplemented with additional measures according to conclusions of the National Report of Ukraine on results of specific reevaluation of nuclear facilities situated on NPP sites (“stress-tests”), taking into account the lessons from Japanese NPP “Fukushima-Daichi” accident of March, 2011.

The current version of the CCSUP envisages implementation of 1295 measures at power units of operating NPPs, of which 1082 measures are initially planned and 213 are additional measures.

Detailed information on all additional measures can be found in the relevant cards published by the link: _____

The status of CCSUP measures implementation is published on a quarterly basis on the official website of the Energoatom Company. The latest Non-Technical Summary of the CCSUP Implementation is available here: https://www.energoatom.com.ua/parts/pdf-file/NTR%20CCSUP%20ESAP%20implementation%202022-en.pdf

In the reporting period of 2017-2022, 417 activities were implemented.

The delay in the implementation of CCSUP measures is mainly determined by the war that the Russian Federation started on February 24, 2022. In particular, as a result of the war, the territory of the ZNPP is currently occupied, and SNRI of Ukraine has lost regulatory control over this plant. The ZNPP continues to be operated part of its personnel. Most of the ZNPP staff who did not agree to cooperate with the occupiers are not allowed to work or perform their duties.

1.7 Linkage of the CCSUP to other programs

The general information provided in this paragraph has not changed compared to paragraph 1.7 of the 2017 CCSUP EA Report.

In addition to the implementation of the CCSUP measures, Energoatom is currently implementing a number of additional projects defined by state programs and government decisions on the development of nuclear energy in Ukraine and related issues, in particular:

Completion of KhNPP Units 3 and 4. The construction of these power units is carried out on the basis of the following regulatory acts of Ukraine:

- The Energy Strategy of Ukraine for the period up to 2050, approved by the Order of the Cabinet of Ministers of Ukraine № 373-p of April 21, 2023, (https://zakon.rada.gov.ua/laws/show/373-2023-%D1%80?lang=en#Text)

- Resolution of the Cabinet of Ministers of Ukraine № 118 "On Priority Measures for the Construction of Units 3 and 4 of Khmelnytsky NPP" of February 18, 2009;

- Order of the Cabinet of Ministers of Ukraine of July 26, 2018, № 579-r "On Approval of the Feasibility Study "Construction of Khmelnytskyi NPP Units 3, 4" (Netishyn, Enerhetykiv Street) (Adjustments)".

Pursuant to the provisions of the Law of Ukraine "On Environmental Impact Assessment", on 04.10.2021, the Ministry of Ecology officially published the EIA in the Unified Register:

- "Report on Public Discussion of the Planned Activity "Construction of Khmelnytskyi NPP Units 3, 4" (№ 21/01-201811232231/2 of 01.10.2021);

- "Conclusion on the Environmental Impact Assessment of the Planned Activity "Construction of Khmelnytskyi NPP Units 3, 4" (№ 21/01 of 01.10.2021- 201811232231/1).

One of the main events of 2021 regarding the construction of nuclear power units was the signing of a memorandum of understanding on August 31, 2021 in Washington, DC, in the presence of President of Ukraine Volodymyr Zelenskyy, by President of SE NNEGC Energoatom Petro Kotin and President and CEO of Westinghouse Patrick Fragman, which provides for the deployment of Westinghouse AP1000 reactors in Ukraine.

Currently, the possibility of siting and constructing two new power units (№. 5, №. 6) with an AP1000 reactor unit with estimated commissioning dates of 2027 and 2029 is being considered for the Khmelnytsky NPP site.

The possibility of constructing six new AP1000 power units at ZNPP, RNPP and SUNPP sites is also being considered. The estimated commissioning date is 2032.

In addition, one of the prospects for the development of the Company and the industry is the construction of four power units with AP1000 at new NPP sites.

Estimated commissioning dates are 2035-2040.

In pursuance of the memorandum signed with Westinghouse Electric Company, a coordination committee was set up, the next steps with implementation deadlines were determined, and a number of bilateral agreements are being prepared and approved.

The following agreements have been concluded so far:

- Agreement on Proprietary Information between SE NNEGC «Energoatom» and Westinghouse Electric Company of 04.08.2021;

- Agreement for the purchase of a simulator and equipment with a long delivery time between SE NNEGC «Energoatom» and Westinghouse Electric Company in support of a long-term procurement for the AP1000 nuclear power unit at Khmelnytsky NPP of 22.11.2021;

- Service Agreement between SE NNEGC «Energoatom» and Westinghouse Electric Company to support the development of the AP1000 nuclear power unit at Khmelnytsky NPP of 22.11.2021.

Works have begun on preparing the initial data for the "feasibility study" stage of the construction of KhNPP Units 5 and 6 with the AP1000 reactor unit. The Ministry of Energy is working to agree on the text of the draft intergovernmental agreement with the central executive authorities of Ukraine.

The condition of the mutual impacts of the implementation of these tasks and the CCSUP does not differ from the information provided to paragraph 1.7 of the 2017 CCSUP EA Report.

1.8 Alternatives to the realization of the CCSUP

The general information provided in this paragraph has not changed compared to paragraph 1.8 of the 2017 CCSUP EA Report.

1.9 State policy on environmental protection and public health

The general information provided in this paragraph has no fundamental changes compared to paragraph 1.9 of the 2017 CCSUP EA Report.

This section should be supplemented with the following information:

- No new investment projects requiring an EIA were launched during the reporting period;

- At the end of 2018, in connection with the entry into force of the EIA Law, the EIA Report and the Announcement on the public discussion of the EIA Report for the construction of KhNPP Units 3 and 4 were published in the Unified Register of Environmental Impact Assessment (http://eia.menr.gov.ua/places/view/2231, case № 201811232231 dated 26.11.2018). At the end of 2018 (08.10.2018), an agreement was concluded with the Ministry of Environment to organize and conduct a public discussion. Public hearings in Ukraine were held in 8 regions and the city of Kyiv on February 11-21, 2019;

- Based on the results of public discussion and transboundary consultations, the Ministry of Ecology issued on 01.10.2021 the Conclusion on the Environmental Impact Assessment of the planned activity «Construction of Khmelnytskyi NPP Units 3, 4» № 21/01-201811232231/1, which was published in the Unified Register of EIA on 04.10.2021.

- The EIA procedure for the RNPP site was initiated in accordance with the Law of Ukraine «On Environmental Impact Assessment» dated 23.05.2017 № 2059-VIII and, in particular, the requirements of the Espoo Convention, including in the transboundary context.

- The Ministry of Environment's transboundary consultations on the EIAs of ZNPP and RNPP and the EIA of RNPP are suspended until the end of the war unleashed by Russia;

- successfully conducted 9 internal audits of the environmental management system;

- in compliance with the Law of Ukraine "On Radioactive Waste Management" and in accordance with the Strategy for Radioactive Waste Management in Ukraine, RW NPP radioactive waste was transferred, namely the first batch of 60 containers with salt bitumen compound from RNPP for processing and disposal to the State Specialized Enterprise «Central Radioactive Waste Management Enterprise» (SSE CRME);

The activities of SE NNEGC «Energoatom» in the field of environmental protection are carried out in accordance with the requirements of Ukrainian legislation and international requirements. Legislative and regulatory acts in the field of environmental protection, which apply to the activities of SE NNEGC «Energoatom», are included in the «Separate List of Legislative and Regulatory Acts in the Field of Environmental Protection».

Environmental protection measures were envisaged in the Environmental Protection Programs for 2017-2020 and 2020-2022.

An integrated management system (IMS) based on the requirements of state norms and rules on nuclear and radiation safety has been implemented in SE «NNEGC «Energoatom». The integrated management system covers (combines) the management of nuclear and radiation safety, production, quality, health and safety, environmental impact, physical safety, human and organizational factors, social development, information protection, finance and economics in such a way that safety is given unconditional priority over other objectives. (https://www.energoatom.com.ua/app-eng/goals.html)

1.10 Safety management at the level of NPPs

1.10.1 Labor protection (LP)

The general information provided in this paragraph has not changed compared to paragraph 1.10.1 of the 2017 CCSUP EA Report.

The implementation of occupational safety measures was envisaged by the Program of Specific Actions Aimed at Establishing and Developing a Safety Culture at SE NNEGC Energoatom in 2017-2018; 2019-2020; 2021-2022, and the Company's standard SSU NAEK 111:2021 «Formation of a Safety Culture. Maintenance and Development of Safety Culture

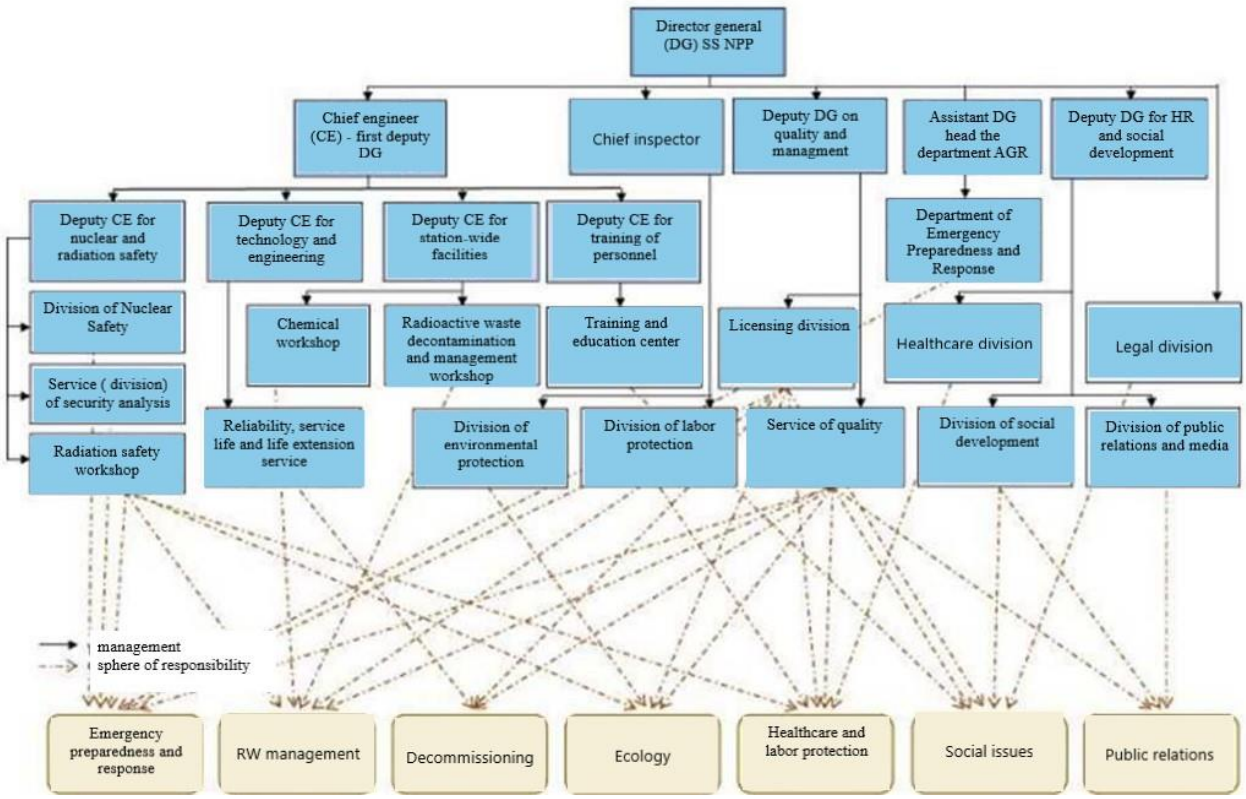
at SE NNEGC Energoatom. General Provisions»; SOU NAEK 180:2020 «Organization of Management Processes. Classifier of activities of SE NNEGC Energoatom».

The Company's requirements for working conditions are determined not only by Ukrainian legislation, but also by the recommendations of the international management and occupational safety and health system OHSAS 18001:2007.

Energoatom has established and operates a fire safety service, which includes the Labor Protection and Fire Safety Department of the Safety Oversight Directorate, fire safety departments of NPPs and individual officials of other separate units. Indicators for assessing the effectiveness of occupational safety management are provided in the annual reports on the results of work on occupational safety at SE NNEGC Energoatom. The main indicators are:

- level of occupational injuries;
- implementation of comprehensive labor protection measures;
- the state of financing of labor protection;
- provision of employees with personal protective equipment; training and knowledge testing;
- certification of workplaces in terms of working conditions, etc.

SE NNEGC «Energoatom» became the first state-owned enterprise to present a non-financial report according to GRI (Global Reporting Initiative) standards. The company has developed a gender policy, compliance policy, and a safety culture management system. SE NNEGC «Energoatom» implements the policy of compliance of its activities with the goals of sustainable development.The system of environmental, social and occupational safety management at the level of each SS NPP is shown below:



1.10.2 Early warning and emergency preparedness

The general information provided in this paragraph has changed slightly compared to paragraph 1.10.2 of the 2017 CCSUP EA Report.

The military aggression of the Russian Federation, which began with a full-scale invasion of Ukraine on 24 February 2022,, with the corresponding introduction of martial law by Presidential Decree № 64/2002 of 24.02.2022 "On the introduction of martial law in Ukraine", directly affected all areas of the Company's activities.

Given the current situation, the SNRIU developed and approved the SNRIU Civil Protection Plan for a Special Period and the SNRIU Employee Action Procedure Instruction in the Event of Receiving the Air Alert Signal for the Period of Martial Law to protect the life and health of employees.

To ensure the functioning of the single national point of contact in accordance with the Convention on Early Notification of Nuclear Accidents, the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and the Convention on the Physical Protection of Nuclear Material and Nuclear Facilities, the SNRIU maintains 24/7 duty and constant communication with licensees, the emergency service of the State Emergency Service, other authorities, the IAEA Incident and Emergency Center (IAEA IEC), competent authorities of other countries within the framework of the inter.

The proper level of readiness of the civil protection subsystem of Energoatom's facility of the unified state civil protection system was confirmed during a comprehensive inspection of technogenic and fire safety by the SES commission in June 2021.

In the period from 31.05.2021 to 02.06.2021, the SNRIU conducted a scheduled inspection of compliance with the requirements of legislation, norms, rules on nuclear and radiation safety by the operating organization of nuclear facilities of the SE NNEGC «Energoatom».

The inspection found that the activities of the EA in terms of implementing a management system, forming and maintaining a safety culture, ensuring emergency preparedness and response at the EA level generally comply with the requirements of the legislation and the terms of the permits issued by the SNRIU to the nuclear operator.

In accordance with the Order of the Cabinet of Ministers of Ukraine №179-r of 24.02.2022 "On Organization of Functioning of the Unified State Civil Protection System under Martial Law", Energoatom and the NPPs have put into effect their own civil protection plans for a special period (with a restricted access stamp) with the readiness level "FULL READY" and implemented the measures provided for in the civil protection plans.

SE NNEGC «Energoatom» ensures planning of the emergency response system and implementation of measures to ensure NPP operation in case of a threat and/or occurrence of emergencies in a special period.

At the same time, taking into account the SNRIU requirements (in the letter of 24.06.2022 №15-23/03/6880-7611), the safety assessment of the SS ZNPP site was performed under the conditions of occupation and military operations in the area of NPP location. Based on the results of the assessment, Energoatom proposed measures to ensure safe operation of SS ZNPP under occupation and military actions. The main risks in such conditions were identified:

- disconnecting ZNPP from the Ukrainian power grid;
- disconnection of the dedicated power unit from the ZNPP auxiliary power grid (complete de-energization);
- radiation accident at the ZNPP site;
- uncontrolled and unpredictable actions of the occupiers towards the station personnel;
- insufficient number of licensed personnel to staff the control panel shifts.

Experts of the Energoatom Company identified risks related to the safety assessment of ZNPP in the conditions of hostilities and occupation in 5 groups:

1) Assessment of ZNPP vulnerability, initial events that may occur during military operations (damage to power lines, SS-750, block and standby transformers, etc.) and their consequences.

2) Determination of the safe configuration of ZNPP power units under occupation.

3) Providing assistance to ZNPP in an emergency situation at the national and international levels (as part of emergency response measures in case of a radiation accident). Expediency of amending the ZNPP Emergency Plan.

4) Psychological pressure on the staff (in particular, on the operational staff and those who directly control the reactor unit).

5) Loss (outflow) of licensed personnel of the plant as a result of evacuation from the occupation zone.

Conclusions on the vulnerability of the ZNPP site as a result of military operations and safety assessment of power units in the conditions of hostilities and occupation:

- Threats from military operations to NPPs are similar to threats from external natural and man-made hazards.
- The initial events of such hazards, scenarios and consequences of events are considered in safety analysis reports (SARs), periodic safety review reports (in particular, in the safety factors "Analysis of Internal and External Impacts" and "Probabilistic Safety Analysis"), and reports on the targeted safety review conducted after the Fukushima Daichi accident.

Based on the military and socio-political situation in and around Ukraine in recent years, pursuant to the orders of the Cabinet of Ministers of Ukraine (the management entity) and instructions of the authorized management body, SE NNEGC «Energoatom» and its separate divisions have taken a number of measures to improve emergency preparedness and civil protection. The main ones are:

- in accordance with the Order of the Cabinet of Ministers of Ukraine № 47-r of 26.01.2015 "On Establishment of High Alert and Emergency Regimes", the high alert regime was established for the civil protection system of SE NNEGC "Energoatom" and the relevant subsystems of its separate subdivisions (Order of SE NNEGC "Energoatom" № 124 of 10.02.2015), in which these systems continue to operate;
- civil defense plans for the facilities were updated;
- the functioning of special, local and object warning systems was checked;
- - the state of readiness of civil defense facilities was checked;
- continuous radiation monitoring of the industrial site, the sanitary protection zone and the observation zone was strengthened;
- employees and staff are provided with personal protective equipment in the required quantities;
- additional measures were taken to strengthen industrial and fire safety and the sustainable operation of high-risk facilities;
- material reserves are provided to the facility for the prevention and elimination of emergencies and their consequences;
- staff lists were updated and warning and evacuation drills were conducted;

- additional briefings were held and other necessary measures were taken to ensure that the staff and organizational structures of civil protection (emergency preparedness and response) are clearly functioning, and that they coordinate their interaction with the relevant governing authorities and forces of the unified state civil protection system in the context of a possible transition of this system from functioning in the high alert mode to higher modes, as well as taking into account the introduction of temporary emergency measures in the electricity market introduced by the Resolution of the Cabinet of Ministers of Ukraine № 103-r of 15.02.2017, and the enactment of the Decision of the National Security and Defense Council of Ukraine of February 16, 2017 "On Urgent Measures to Neutralize Threats to the Energy Security of Ukraine and Strengthen the Protection of Critical Infrastructure" by the Decree of the President of Ukraine № 37/2017.

1.11 List of environmental and sanitary-epidemiological restrictions

The general information provided in this paragraph has not changed compared to paragraph 1.11 of the 2017 CCSUP EA Report.

1.12 List of analyzed sources of potential environmental impact

The general information provided in this paragraph has not changed compared to paragraph 1.12 of the 2017 CCSUP EA Report.

1.13 List of analyzed types of environmental impacts of operating NPPs in Ukraine

The general information provided in this paragraph has not changed compared to paragraph 1.13 of the 2017 CCSUP EA Report.

1.14 List of potential objects of impact of Ukrainian NPPs

The general information provided in this paragraph has not changed compared to paragraph 1.14 of the 2017 CCSUP EA Report.

1.15 Approaches, methods and assumptions EA CCSUP

The regular EA does not consider environmental protection issues outside the CCSUP, for example, those related to the implementation of other measures of the Energy Strategy of Ukraine, in particular, construction of new reactors or alternatives to this construction, increase of capacities and lifetime extension (excluding the lifetime actually extended as of the end of 2022) of power units of operating NPPs, etc.

The key environmental and social aspects to be considered during the EA are defined by the requirements of the Company's standard, SOU NAEK 004:2011 "Environmental Assessment of Nuclear Power Units. General Requirements for the Composition and Content of Assessment Materials".

1.16 Previous and planned approvals and reviews of the CCSUP and the CCSUP EA Report

The process of review, approval and approval of the EA Report by the CCSUP includes the following:

1. The CCSUP EA Report (preliminary) is submitted for public discussion, in particular, through meetings with the public in the areas of each NPP location and in Kyiv. Both the Ukrainian and foreign public can participate in the public discussion.

2. The CCSUP EA Report (preliminary) is finalized (if necessary) based on questions, comments and observations from the public.

3. The CCSUP EA Report (final) is published on the Company's official website.

1.17 Main sources of information used in the development of the EA of the CCSUP

The main sources of information used for the EA are data from previously conducted EIAs, environmental impact assessments, Safety Feasibility Studies, Safety Analysis Reports of NPP units, reports of the operating organization on the results of environmental monitoring in the NPP observation areas, reports of the operating organization on radiation safety, reports on radioactive waste management, reports on the impact of non-radiation factors on the environment, and reports on periodic safety reassessment of power units. Reports on the implementation of the CCSUP ESAP and CCSUP SEP.

Field or laboratory studies, as well as dose calculations during the EA were not envisaged and were not carried out, as well as analysis and validation of the approaches and models used in dose assessments, since all key calculation data were taken from official previously developed documents, which were subject to relevant state reviews.

The list of source documents is provided in Annex A.

2. EA results of the CCSUP implementation at SS ZNPP.

2.1 General characteristics of NPPs

2.1.1 Region and location of the SS ZNPP

The general information provided in this paragraph has not changed compared to p. 2.1.1 of the 2017 Report of the EA the CCSUP.

Since March 4, 2022, the Russian military has occupied and held Zaporizhzhia NPP. As a result of the outbreak of a full-scale war against Ukraine, the invasion of Zaporizhzhia NPP by the Russian military and shelling of ZNPP power units and the site, an external threat arose to the lives of ZNPP personnel, the population living in the observation zone, and other equipment and buildings that ensure the operation of the NPP.

2.1.2 Brief description of the manufacturing of the SS ZNPP

The general information provided in this paragraph has not changed compared to p. 2.1.2 of the 2017 Report of the EA the CCSUP.

On November 3, 2017, the SNRIU Board decided to extend the lifetime of Zaporizhzhya NPP Unit 3 until March 5, 2027.

At the beginning of 2021, SE NNEGC «Energoatom» received a license from the SNRIU for the right to carry out activities at the life cycle stage «operation of the nuclear facility of power unit № 5 Zaporizhzhya NPP» with the date of the next periodic safety review on May 27, 2030.

2.1.3 Brief description of the production of the SS ZNPP

The general information provided in this paragraph has not changed compared to p. 2.1.3 of the 2017 Report of the EA the CCSUP.

2.1.4 Data on raw materials, land, water, energy and other resources used

The general information provided in this paragraph has not changed compared to p. 2.1.4 of the 2017 Report of the EA the CCSUP.

2.1.5 Short description of the technological process SS ZNPP

The general information provided in this paragraph has not changed compared to p. 2.1.5 of the 2017 Report of the EA the CCSUP.

2.1.6 Technical solutions of the CCSUP aimed at eliminating or reducing the negative impact on the environment

The CCSUP EA assessed the impact of implemented or ongoing measures and made assumptions on the possibility of reducing or mitigating the risk of harmful impact based on the dynamics of current volumes of radioactive and pollutant emissions or discharges, their concentration in the air, water bodies, and soil both at the NPP site and in the SPZ and SA.

This primarily applies to the following activities:

10101	Development of materials and qualification of power unit elements	Reduction of dose loads and thermal effects	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
10102	Investigation of the need and possibility of upgrading the qualification of power unit elements that can be involved in severe accident management for "harsh conditions" of the environment	Reduction of dose loads and thermal effects	At the stage of implementation
11302	Implementation of equipment and methodology for the sipping-method of controlling the tightness of shells «CTS» in the working boom of a reloading machine during the transportation of fuel assemblies	Reduction of dose loads and thermal effects	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
11305	Ensure fueling up and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout	Reduction of dose loads and thermal effects	Implemented
12102	Implementation of the concept of «leak before destruction» for the hot circulation pipeline (HCP) of the 1st contour	Reduction of dose loads and thermal effects	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
12202	Implementation of an improved h/e diagnostic system (ECCS)	Reduction of dose loads and thermal effects	Implemented
12302	Implementation of equipment to improve the sealing of the main reactor connector	Reduction of dose loads and thermal effects	Implemented
13302	Ensuring the operability of BRU-A at the end of the steam-water mixture, water, as well as ensuring reliable performance of the emergency pressure relief function	Reduction of dose loads and thermal effects	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
13304	Ensuring the possibility of commissioning the purge-recharge system in case of localization of the containment and ensuring automatic commissioning	Reduction of dose loads, emissions of RS	Implemented at power units № 1 - № 5

	of the boron concentrate system (TV 10) in case of leakage of the 1st contour		At the stage of implementation at power unit № 6
13307	Ensuring GHG supply in conditions of prolonged complete NPP blackout	Reduction of dose loads, emissions of RS	Implemented
13308	Analysis of the need for feeding the first contour	Reduction of dose loads, emissions of RS	Implemented
13403	Upgrading of the ECCS for NT to provide the ability to control the flow rate when the system pump is operating on the 1st contour	Reduction of dose loads, emissions of RS	Implemented
13501	Replacement of stand-alone air conditioners with air conditioners qualified for harsh environments and seismic impacts	reduction of RS emissions	Implemented at power units № 1, № 3 - № 5 At the stage of implementation at power unit № 2; № 6
13502	Implementation of a comprehensive system for diagnostics of Reactor Plant systems	Reducing dose loads, emissions of RS	Implemented at power units № 2 - № 5 At the stage of implementation at power unit № 1; № 6
13503	Organization of new boron-10 concentration monitoring sites in systems related to the 1st contour	reduction of RS emissions	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
13504	Installation of "Disk" type valves in condensate-feed and steam distribution systems	reduction of RS emissions	Implemented at power units № 1 - № 5 At the stage of implementation at power unit № 6
13509	Implementation of an "industrial" television system for fire/explosion hazardous and unattended premises	Prevention of explosions, accidental releases of RS	Implemented at power units № 1,2,4,5 At the stage of implementation at power unit № 3, 6
13510	Implementation of high-tight plugs in GHG collectors during repair works	Reducing dose loads, emissions of RS	At the stage of implementation
13511	Ensuring the operability of consumers of the group "A" process water system when dehydrating splash pools	Reducing dose loads, emissions of RS	Implemented

14101	Instrumentation during and after accidents (PAMS)	Reducing dose loads, emissions of RS	Implemented
14102	Implementation of the pipeline movement control system for the 1st contour	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14103	Modernization of the power unit's ITT with integration of ASRK, ASKRO and SPPB systems	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14105	Modernization of the normal operation system important for the safety of the reactor compartment (NOS of NO ISRC) (control and measuring devices...)	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14106	Modernization of the normal operation system important for the safety of the turbine compartment (NOS IS TC) (control and measuring devices...)	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14202	Modernization Neutron flux control equipment with integration of the SCP system and a reactometer	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14204	Modernization of ARM, ROM in order to bring it into compliance with the requirements of the RTD	Reducing dose loads, emissions of RS	Implemented
14205	Modernization of the drive control system of the PMS, including the power supply system	Reducing dose loads, emissions of RS	Implemented
14301	Modernization of security control systems with replacement (of a USTM)	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6

14401	Modernization of NPP radiation monitoring systems (RMS)	Reducing dose loads, emissions of RS	Implemented at power units № 4 - 5 At the stage of implementation at power unit № 1,2,3,6
14403	Implementation of a system to ensure the safety of information in the event of design and project accidents («black box»)	Prevention of emergency situations	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14405	Modernization of the control system of the reloading machine	reduction of RS emissions	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14406	Modernization of the AHK-1,2 system. Improvement and automation of the water-chemical regime of the 1st and 2nd contours	Reducing dose loads, emissions of RS	Implemented at power units № 2 - 5 At the stage of implementation at power unit № 1, № 6
14408	Development of the Concept of the Unified State Automated Radiation Monitoring System in Ukraine (CUSARMSU)	Reducing dose loads, emissions of RS	At the stage of implementation
15103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Preventing power outages and emergencies	Implemented at power units № 1 - 5 At the stage of implementation at power unit № 6
15201	Replacement of 6kV circuit breakers in the SS channels and on the SIS, station-wide and block circuits of the SN	Preventing power outages and emergencies	At the stage of implementation
15202	Modernization of the Emergency Power Supply System of the 1st reliability group (including replacement of the uninterruptible power supply unit, DC switchboard, Batteries, etc.)	Preventing power outages and emergencies	Implemented
15204	Modernization of Relay Protection and Automation circuits of the 6kV auxiliary power supply system	Preventing power outages and emergencies	Implemented at power units № 1,2,4,5;

			At the stage of implementation at power unit № 3, 6
15205	Modernization (of SCS) with replacement of 6 and 0.4 kV electric motors	Preventing power outages and emergencies	Implemented
15206	Modernization of 0.4 kV switchgear	Reducing dose loads, emissions of RS	At the stage of implementation
15207	Modernization of power and control pressure penetration through Containment	Reducing dose loads, emissions of RS	Implemented at power units № 1-3; At the stage of implementation at power unit № 4- 6
15208	Modernization of relay protection schemes for automation using microelectronic-based relays	Preventing power outages and emergencies	Implemented
15212	Modernization of the generator excitation system	Preventing power outages and emergencies	Implemented
15213	Installation of RTWP-5.6 to improve the reliability of power supply for own needs	Preventing power outages and emergencies	Implemented
16101	Prevention of early bypass of the containment due to molten core masses from the reactor shaft outside the containment volume	Prevention of explosions, emissions of RS	Implemented
16201	Implementation of a system for monitoring the hydrogen concentration in the pressure vessel for designed accidents	Prevention of explosions, emergency resetting of RS	Implemented
16202	Equipping SS NPP units with remote control systems for forces in the reinforcing rope of the containment overstress system	Prevention of explosions, emissions of RS	Implemented
16203	Development and implementation of measures to reduce the hydrogen concentration in the containment for projected accidents	Prevention of explosions, emissions of RS	Implemented
16205	Implementation of a forced pressure relief system gas cleaning system	Prevention of explosions, emissions of RS	Implemented at power units № 1; № 2; № 4, №5, At the stage of implementation at power unit № 3; № 6
17101	Modernization of the automatic fire alarm system for NPP safety systems	Prevention of explosions, emissions of RS	Implemented at power units № 1-4; At the stage of implementation at power unit № 5- 6

17102	Development and implementation of a smoke protection system for the premises and evacuation corridors of the Reactor Department (RD), which have no restrictions on communication with the environment	Prevention of explosions, emissions of RS	At the stage of implementation
17103	Equipping NPP premises containing electrical and electronic equipment with stationary automatic gas fire extinguishing systems	Prevention of explosions, emissions of RS	Implemented at power units № 1-4; № 6 At the stage of implementation at power unit № 5
17104	Equipping with automatic control units for power oil-filled equipment of the main NPP power output circuit	Prevention of explosions, emissions of RS	Implemented at power units № 1-5; At the stage of implementation at power unit № 6
17105	Modernization of the automatic fire alarm system for the premises of the RD, DD, EETU, ER, SC	Prevention of explosions, emissions of RS	Implemented at power units № 1-4; At the stage of implementation at power unit № 5, 6
17107	Installation of fire retardant valves on air ducts in fire partitions of ventilation centers, battery rooms, cable facilities and rooms containing electrical and electronic equipment, separating them from rooms of other categories for explosion and fire safety	Prevention of explosions, emissions of RS	At the stage of implementation
17109	Equipping NPP power units with automatic fire extinguishing units for auxiliary transformers	Prevention of explosions, emissions of RS	Implemented at power units № 1-5; At the stage of implementation at power unit № 6
17201	Ensuring the operability of the (fast-acting shut-off valve) for the purpose of resistance to internal and external influences	Preventing emissions and discharges of RS	Implemented at power units № 1-5; At the stage of implementation at power unit № 6
18101	Implementation of Measure 18101 without taking into account the results of seismological monitoring of the NPP area Ensuring seismic resistance of systems and building structures	Preventing emergencies	Implemented at power units № 1-5; At the stage of implementation at power unit № 6
18102	Implementation of seismological monitoring systems for NPP areas	Preventing emergencies	Implemented

19102	Development of operational PSA	Preventing emergencies	Implemented
19103	Accounting for the full range of initial events for all regulatory states of the RF and the SFP in PSA	Preventing emergencies	Implemented
19105	Analyze the feasibility of implementing the melt localization strategy in the reactor vessel	Preventing emergencies	At the stage of implementation
19106	Development of seismic PSA	Preventing emergencies	Implemented at power units № 1-3; At the stage of implementation at power unit № 4-6
19203	Improvement of instructions for eliminating accidents that occur during power reduction and SPM	Preventing emergencies	Implemented
19204	Analysis of severe accidents. Development of SAMG	Preventing emergencies	Implemented

2.1.7 Summary of the SNF Management Scheme. Volumes of SNF

The general information on the SNF management scheme has not changed compared to paragraph 2.1.7 of the 2017 Report of the EA the CCSUP.

The DSFSF at Zaporizhzhya NPP is designed for 380 ventilated storage containers that can accommodate more than 9,000 spent fuel assemblies. In 2021, 10 (ten) containers of WWER VSCs with spent FA were shipped to the DSFSF site. A total of 173 WWER VSCs were installed at the DSFSF site at the end of 2021.

Due to the seizure of the city of Enerhodar, including the Zaporizhzhya NPP site, by Russian military groups in early March 2022, there is no data on WWER spent fuel assemblies FA located at the SFSF site as of the end of 2022.

2.1.8 Brief description of the radioactive waste management scheme. Volumes of RW

2.1.8.1 Solid radioactive waste

The general information on the type of solid radioactive waste, its nomenclature, and management procedure has not changed compared to paragraph 2.1.8.1 of the 2017 Report of the EA the CCSUP.

Since 2018, the Radioactive Waste Treatment Plant has been in operation, consisting of the following facilities:

- incineration unit;
- fragmentation unit;
- pressing unit.

In addition, the facility for retrieval of SRW from storage facilities and the facility for certification of RW are in operation.

The volumes of solid radioactive waste generated and stored in storage facilities at ZNPP are shown in Table 5.

Table 5 - Volumes of solid radioactive waste generation and storage, cubic meters

	Low-active		**Medium active**		**Highly active**	
	Formed by	**Stored**	**Formed by**	**Stored**	**Formed by**	**Stored**
2017	516,36	8213,37	22,84	889,22	0,33	99,75
2018	582,78	8242,75	28,92	876,99	1,92	101,66
2019	638,89	8175,02	1,84	878,83	1,61	103,28
2020	636,16	7920,69	57,61	903,44	1,93	105,21
2021	549,98	7824,70	194,2	6537,6354	2,36	107,56
2022	*	*	*	*	*	*

**Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data*

The volumes of solid radioactive waste processed at the pressing and incineration facilities are shown in Table 6.

Table 6 - Processing volumes of solid radioactive waste at ZNPP

	Processed, cubic meters	
	incinerated solid radioactive waste	**solid radioactive waste, pressed/pressed (on a super press)**
2017	265,9	542,95/-
2018	365,5	684,6/-
2019	122,05*/65,31[1; *]	589,15*/232,8 (1164КТРО-200)
2020	561,6	466,0**/421,8 (2109 КТРО-200); 15,47 (91 ПУ-0,17)
2021	433,14	216,1/286,6 (with packing 429,9)
2022	***	***

Note [1] waste incinerated at the Advanced Radioactive Waste Treatment Facility

**The volumes are indicated taking into account reprocessing of retrieved radioactive waste from cells 3-101/8-10 and C-187/3*

*** Volumes are given taking into account reprocessing of retrieved radioactive waste from cells 3-101/1-9, 3-101/1-11, C-187/*

****Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data*

2.1.8.2 Liquid radioactive waste

The general information on the type of liquid radioactive waste, its nomenclature, sources of generation, processing methods, and management procedure provided in this paragraph has not changed compared to 2.1.8.2 of the 2017 Report of the EA the CCSUP.

The volumes of liquid radioactive waste generated, processed and stored in storage facilities at ZNPP are shown in Table 7.

Table 7 - Generation, processing and storage of liquid radioactive waste at ZNPP, cubic meters

	Cubic residual			Spent sorbents, sludge		Filter materials		Salt float *	
	formed	recycled	stored	formed	stored	formed	stored	formed	stored
2017	671	931	2957	5,5	175	5,5	344,4	179,4	4932,6
2018	764	809	3115	3,2	175	3,2	347,4	140	5072,6
2019	723	932	2880	1	175	1	348,6	180,8	5253,4
2020	777,0	911	2476	0	175	0	348,6	186,6	5440,0
2021	741,0	678,0	2693,0	0	175	8,0	356,6	-	-
2022	-**	-**	-**	-**	-**	-**	-**	-**	-**

**Since 2021, the salt float has been classified as solid radioactive waste*

***Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data*

2.1.9 Short description of the waste management scheme (including hazardous waste). Waste volumes

The general information on the type of waste, its nomenclature, sources of generation, processing methods, and the procedure for its management has not changed compared to paragraph 2.1.9 of the 2017 Report of the EA the CCSUP.

The structure of waste generation is dominated by hazard class IV waste. Their generation volumes for this period ranged from 93.3% to 98.5%, while the generation volumes of hazard classes I-III waste ranged from 0.06% to 5.7%. The dynamics of waste generation is shown in Table 8.

Table 8 - Waste generation dynamics at ZNPP

Indicator	2017	2018	2019	2020	2021	2022
Waste generated, tons, including:	7809,75	9488,69	8437,90	10458,77	6895,05	-*
I hazard class	8,65	7,8	9,58	6,34	5,3	-*

II hazard class	46,44	145,52	75,74	102,59	14,27	-*
III hazard class	57,73	541,74	227,6	592,33	84,09	-*
IV hazard class	7696,92	8993,63	8124,98	9757,51	6791,4	-*

**Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data*

For the period from 2017 to 2021, the total volume of waste generation of all hazard classes ranged from 7.8 to 6.89 thousand tons, which does not allow us to conclude a certain trend in their generation.

The analysis of the indicators presented in the table from 2017 to 2022 shows a tendency to increase the total amount of non-radioactive waste generation in the period 2018-2020.

Such waste generation is due to the implementation of construction and installation works for capital and current construction, medium and major repairs of power units, namely the increase in waste in the class «4510.2.9.09 mixed waste from construction and demolition of buildings and structures (waste of construction materials)».

Implementation of the CCSUP measures does not affect the overall waste generation.

Construction and installation works on capital and current construction and medium and major overhauls of ZNPP power units by years of operation:

In 2018:

1. In 2018, the Training Center Building G was commissioned at ZNPP;
2. In 2018, the Radioactive Waste Treatment Facility was commissioned at ZNPP;
3. Preparatory construction works were started at the ZNPP site under the project «Construction of a 13.2 MW SPP in the area of the Zaporizhzhya NPP cooling pond» (construction site of the SPP Stage I - 34.7 ha).

In 2019:

1. Medium overhaul of ZNPP Unit 3;
2. Medium outage of ZNPP Unit 6;
3. Medium outage of ZNPP Unit 4;
4. Medium outage of ZNPP Unit 5;
4. Unscheduled outage of ZNPP Unit 3;
5. Unscheduled outage of ZNPP Unit 1;
6. Overhaul of ZNPP Unit 1.

In 2020:

1. On December 23, 2020, the project for the reconstruction of 750 kV SS to connect 750 kV OHL Zaporizka-Kakhovska of ZNPP was completed" The reconstruction of 750 kV SS of ZNPP and its connection to the 750 kV OHL was carried out;

2. In 2020, all design, survey and construction works on the project «Completion of construction and commissioning of Zaporizhzhya NPP as a whole" were completed. Gas Building, including Nitrogen Oxygen Plant No. 2 and Electrolysis Plant No. 2. New Construction (Adjustments)»;

3. Preparatory works on the construction of the ZNPP auxiliary water pumping station were carried out;

4. Construction works were performed at the facility «Lightweight Storage Facility for Temporary Storage of Conditioned Radioactive Waste in Reinforced Concrete Containers at ZNPP».

Mixed municipal solid waste and certain other wastes were transferred for disposal at the landfill in Enerhodar under the agreements concluded. The dynamics of waste management is shown in Table 9.

Table 9 - Waste management dynamics at ZNPP

Indicator	2017	2018	2019	2020	2021	2022
Placed waste, tons	6169,22	5398,87	5175,93	8150,54	4297,75	-*
Transferred waste, tons	1418,7	4155,24	3197,61	1427,77	2653,72	-*

**Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data*

2.1.10 Technical solutions of the CCPD aimed at reducing waste volumes and improving environmental safety of waste management (if any)

The CCSUP does not envisage measures for ZNPP aimed at reducing the amount of process waste or improving the waste management scheme. Waste management meets the requirements of the legislation.

2.1.11 Short description of the analyzed design and beyond design accidents

General information has not changed compared to paragraph 2.1.11 of the 2017 Report of the EA the CCSUP.

2.1.12 An abbreviated description of design solutions aimed at reducing the likelihood and consequences of accidents (excluding CCSUP measures)

General information has not changed compared to paragraph 2.1.12 of the 2017 Report of the EA the CCSUP.

2.1.13 Technical solutions of the CCSUP aimed at reducing risks and consequences of accidents

General information has not changed compared to paragraph 2.1.13 of the 2017 Report of the EA the CCSUP. The list of measures is given in Section 2.1.6 of this Report. Achieved

safety criteria - core meltdown frequency and frequency of maximum accidental release for power units' subject to periodic safety review are given in paragraph 2.5.15.

2.1.14 Sanitary protection zone and NPP surveillance areas

General information has not changed compared to paragraph 2.1.14 of the 2017 Report of the EA the CCSUP.

2.2 Assessment of environmental impacts

2.2.1 Climate and microclimate

2.2.1.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 2.2.1.1 of the 2017 Report of the EA the CCSUP.

2.2.1.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

Implementation of the CCSUP does not affect the climate and microclimate characteristics in the area of Zaporizhzhya NPP location. The main conclusions are similar to those made in Section 2.2.1.2 of the 2017 Report of the EA the CCSUP.

2.2.2 The air environment

2.2.2.1 Brief description of the current situation within the SA

General information in comparison with paragraph 2.2.2.1 of the 2017 EA Report of the CCSUP during 2017-2022 has no fundamental changes.

In 2021, an inventory of emissions from stationary sources of the new facility: the landfill for disposal of unrecycled industrial waste (LDUIW), as well as for sewage pumping stations (SPS) of the ZNPP Central Treatment Plant (CTP) was carried out. The number of stationary sources of air pollution at ZNPP increased.

In 2021, Zaporizhzhya NPP units 1-6 underwent scheduled preventive maintenance. Compared to 2020, emissions increased by 1,686 tons, and carbon dioxide emissions increased by 255,862 tons. This increase in emissions is due to an increase in the operating time of the SDPP of the power units and, accordingly, an increase in diesel fuel consumption. In 2021, the volume of pollutant emissions into the air does not exceed the established potential volumes.

The dynamics of pollutant emissions is presented in Annex K.1.

Detailed information on radioactive air contamination is provided in paragraph 2.5.11.1 and Annex K.1.

Observations of the state of atmospheric air in the ZNPP for the period 2017-2021 (due to the capture of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, no data are available) indicate the following:

- the content of pollutants and radionuclides in the air does not exceed the maximum permissible concentrations established by the regulations;

- emissions of pollutants do not exceed the maximum permissible limits established by the relevant permits;

- emission levels of pollutants and radionuclides do not lead to a deterioration in air quality;

- the direct implementation of the CCSUP measures did not lead to an increase in the anthropogenic load on the air.

2.2.2.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of accidents at NPPs)

Under normal operating conditions, ZNPP facilities are not expected to increase the negative impact on the air. In the event of emergencies and accidents, and depending on their nature, significant amounts of both radioactive and non-radioactive contaminants could potentially be released into the atmosphere.

In 2022, massive rocket attacks by Russian military groups on substations, power lines, and other facilities of Ukraine's energy system caused emergencies at nuclear power plants, the so-called «blackouts» - complete power outages. Due to damage to the power grid, ZNPP lost its main and backup power sources, and an emergency system was activated, switching the plant to emergency power from diesel generators. As a result of their prolonged operation, emissions of pollutants, in particular carbon dioxide, dioxide and other sulfur compounds, etc. temporarily increased into the air.

Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, there is no data on air pollutant emissions from stationary sources for 2022 according to the statistical reporting form No. 2 -TP (air).

Therefore, it is impossible to draw a conclusion on the impact on the air and air pollutant emissions from stationary sources for 2022, taking into account the operation of standby diesel generators.

2.2.2.3 Impact of CCSUP measures on projected changes in the condition

The general conclusions on the future impact of the CCSUP measures have not changed and are similar to those made in paragraph 2.2.2.3 of the 2017 Report of the EA the CCSUP.

2.2.3 The geological environment

2.2.3.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 2.2.3.1 of the 2017 Report of the EA the CCSUP.

2.2.3.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

General information has not changed compared to paragraph 2.2.3.2 of the 2017 Report of the EA the CCSUP.

CCSUP measure 18102 "Implementation of seismological monitoring systems for NPP sites" was implemented.

2.2.4 Water environment (groundwater, open water)

2.2.4.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 2.2.4.1 of the 2017 Report of the EA the CCSUP.

The parameters of the chemical state of surface water bodies in the ZNPP site area are presented in Annex K.1.

The results of long-term monitoring of water bodies show the following:

- There is no significant chemical negative impact of ZNPP on the groundwater system;
- The concentration of radionuclides and pollutants in water is at the background level and does not exceed the maximum permissible levels.

Characterizing the water quality of the Kakhovka Reservoir in the dynamics for 2017-2021 (due to the capture of the city of Enerhodar, including the site of the Zaporizhzhia NPP, by Russian military groups in early March 2022, no data are available), it should be noted that the chemical indicators in the studied samples of the Kakhovka Reservoir maintain its stable chemical composition.

The comprehensive analytical control carried out by the environmental and chemical laboratory of the ZNPP during this period established that during the period of blowdown of the cooling pond into the Kakhovka Reservoir, the production activities of the ZNPP did not affect the deterioration of the chemical composition and water quality of the water area bordering the Kakhovka Reservoir.

2.2.4.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Without taking into account the CCSUP and in the absence of emergencies/accidents related to radionuclide releases, no significant negative impact of the ZNPP on changes in the water environment of the Kakhovka Reservoir is expected.

In the event of an accident, and depending on the nature of the accident, significant amounts of radioactive contaminants could potentially be released into the water environment.

2.2.4.3 Impact of CCSUP measures on projected changes in the state

The general conclusions regarding the absence of future impacts of the CCSUP measures on water resources have not changed and are similar to the conclusions made in paragraph 2.2.4.3 f the 2017 Report of the EA the CCSUP.

The purpose of the CCSUP is not to increase electricity generation, so it is not expected to increase NPP water consumption, nor to change the volume of thermal, chemical and radioactive discharges to water bodies. The CCSUP will reduce the risk of accidents at NPPs and, consequently, the risk of radioactive contamination of the water environment, which is a positive impact of the CCSUP.

2.2.5 Soils

2.2.5.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 2.2.5.1 of the 2017 Report of the EA the CCSUP.

The results of radionuclide content in the soils of the SS ZNPP SA are presented in Annex K.1.

There are practically no natural landscapes in the ZNPP surveillance area. All of them are transformed by humans and used to produce industrial and agricultural products. The territory adjacent to the sanitary protection zone consists of soddy soils with slightly humified sands and sandy loam soils of natural and artificial origin.

Soil sampling is carried out twice a year - in spring, after the snow cover melts, and in autumn, after the vegetation has wilted. The results of the chemical analysis are compared with the maximum permissible concentrations (MPC). The level of contamination of hazardous indicators for which MPCs are not currently established is assessed in comparison with the background values of these substances in the soil. The analysis of the chemical condition of soils showed that in 2017-2021 (due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, no data are available), there were no exceedances of background chemical indicators and MPCs.

Information on radioactive contamination of SS ZNPP SA soils is provided in Annex K.1.

2.2.5.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

General information has not changed compared to paragraph 2.2.5.2 of the 2017 Report of the EA the CCSUP.

2.2.5.3 Impact of CCSUP measures on projected changes in the state

General information has not changed compared to paragraph 2.2.5.3 of the 2017 Report of the EA the CCSUP.

2.2.6 Flora and fauna, natural reserves

2.2.6.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 2.2.6.1 of the 2017 Report of the EA the CCSUP.

2.2.6.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

General information has not changed compared to paragraph 2.2.6.2 of the 2017 Report of the EA the CCSUP.

2.2.6.3 Impact of CCSUP measures on projected changes in the state

The general conclusions on the absence of future impacts of the CCSUP measures on flora and fauna, protected areas have not changed and are similar to the conclusions made in paragraph 2.2.6.3 of the 2017 Report of the EA the CCSUP.

2.3 Assessment of impacts on the social environment

2.3.1 Brief description of the state of the social environment within the SA

The general information has partially changed compared to paragraph 2.3.1 of the 2017 Report of the EA the CCSUP.

Brief information on the socio-economic status of the ZNPP location area is presented in Tables 10 and 11.

Tables 10 - Socio-economic status of the ZNPP location area as of January 1, 2012 (for 2021)

The city	Gender.	Age category	Average monthly salary 2021 (UAH)	Unemployment rate	Total population	Migration growth of the population (compared to 2021)	Natural population growth
Nikopol (Dnipropetrovska region)	Male: 45,66% Females:54,34%	0-14:15,1% 15-64:67,3% >65:17,6%	13669,0 (region)	9,1% (region)	105160	–195	–2109
Manganese (Dnipropetrovska region)					44980	64	-802
Enerhodar (Zaporizhzhia region)	Male: 43,21% Females:56,79%	0-14: 14,2% 15-64: 67,3% >65: 18,5%	13782,0 (region)	11,4%	52237	17	-233
Kamianka Dniprovska (Zaporizhzhia region)					12117	-	-
Average in Ukraine (2021)	Male:46,36% Females:53,64%	0-14: 14,9% 15-64: 67,4% >65: 17,7%	14014,0	10,3 %	41167335	21261	- 442280

Tables 11 - Causes of death in the region of ZNPP location (2021)

	Cardiovascular diseases	The tumors	External reasons	The digestive system	The respiratory system	Infections and parasites	Others
Dnipropetrovs'k region	61.68%	10.90 %	4.41%	3.89%	3.34%	1.61%	14.17 %
Zaporizhzhia region	54.74%	12.03 %	4.41%	3.15%	4.02%	0.90%	20.75 %
Ukraine	60.10%	10.41 %	4.04%	3.48%	3.70%	0.88%	17.39 %

2.3.2 Forecast of impacts on public health in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

General information has not changed compared to paragraph 2.3.2 of the 2017 Report of the EA the CCSUP.

Based on the results of the analysis of expected doses to human organs and tissues in design basis accidents, the following conclusions can be made:

- the levels of unconditionally justified emergency intervention for acute exposure are not exceeded, the levels of averted doses do not exceed the levels of unconditional justification, there is no need to plan basic emergency countermeasures, and it is not advisable to implement auxiliary countermeasures at this level of averted doses;
- the equivalent individual doses for 1 year under the most unfavorable conditions within and outside the sanitary protection zone to the thyroid gland of children through inhalation and to the whole body through external exposure do not exceed the threshold values.

The results of long-term radiation monitoring and calculated data indicate that there is no significant radiation impact of the NPP on the environment and, accordingly, on the health of the population in the surveillance area. Thus, it can be stated that the operation of SS ZNPP under normal conditions and design basis radiation accidents does not and will not have a negative radiation impact on public health in the future.

In the event of a project accident, the levels of unconditional justification for countermeasures are exceeded, and all types of countermeasures, including evacuation, will need to be applied.

2.3.3 Impact of CCSUP measures on the results of the population health forecast

2.3.3.1 Impact during the implementation of the CCSUP

General information has not changed compared to paragraph 2.3.3.1 of the 2017 Report of the EA the CCSUP.

2.3.3.2 Impact after the implementation of the CCSUP

Implementation of the CCSUP measures will lead to reduction of emergency risks (see paragraph 2.5.15) and accidents or mitigation of their consequences, which entails increasing the level of protection of the population living in the area of SS ZNPP impact and minimizing the damage that may be caused to their health.

In addition, reducing the risk of accidents should reduce the level of stress associated with working or living near a nuclear power plant, which will have a positive impact on the psychological state of workers and the population of the surrounding areas.

2.3.4 Possible impacts of the CCSUP implementation on social conditions and satisfaction of the needs of the local population

2.3.4.1 Impact during the implementation of the CCSUP

General information has not changed compared to paragraph 2.3.4.1 of the 2017 Report of the EA the CCSUP.

2.3.4.2 Impact after the implementation of the CCSUP

General information has not changed compared to paragraph 2.3.4.2 of the 2017 Report of the EA the CCSUP.

Implementation of the CCSUP measures will ensure safe operation of the nuclear power plant. This directly concerns further financing of socio-economic risk compensation for the population living in the SS ZNPP surveillance zone. Funds for such compensation are provided by a levy of 1% of the volume of electricity sold by NPPs (excluding value added tax). Thus, the amount of subventions to local budgets to finance social and economic compensation measures in the SS ZNPP surveillance zone amounted to:

Name of the administrative-territorial unit	**Subvention amount, thousand UAH**	
	2019	**2020**
Zaporizhzhia region	7163,3	6483,235
Dnipropetrovs'k region	11272,6	10166,821
Kherson region	44	39,886
Vasylivskyi district (Zaporizhzhia region)	3007,1	2691,847
Velykobilozerskyi district (Zaporizhzhia region)	935,7	834,79
Zaporizhzhia district (Zaporizhzhia region)	8,5	7,685
Kamiansko-Dniprovskyi district (Zaporizhzhia region)	4940,5	4537,025
Nikopol district (Dnipropetrovska oblast)	2905,7	2759,734
Tomakivskyi district (Dnipropetrovs`k region)	1144,7	1024,711
Verkhnorohachytskyi district (Kherson region)	97,2	88,032
Nikopol city (Dnipropetrovs'k region)	14418,3	12890,401
Marhanets city (Dnipropetrovs'k region)	6422,1	5764,001
Enerhodar city (Zaporizhzhia region)	9240	8344,971

In total	**61599,7**	**55633,139**

2.4 Assessment of impacts on the man-made environment

2.4.1 Brief description of the existing situation within the Surveillance Area

General information has not changed compared to paragraph 2.4.1 of the 2017 Report of the EA the CCSUP.

It should be noted that the Zaporizhzhia Heat and Power Plant of DTEK Dniproenergo, which is one of the largest air polluters in the Zaporizhzhia region, is located within the ZNPP SPZ.

2.4.2 Forecast of impacts on the state of the technogenic environment in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Existing emissions of pollutants and radioactive substances into the air, their discharges into water bodies, thermal impact of SS ZNPP, as well as consumption of water resources in the current state of NPP operation do not significantly affect the surrounding man-made environment.

In the event of design-basis accidents, the negative impact on the environment will not exceed permissible limits and will not require any special measures outside the ZNPP SPZ.

2.4.3 Impact of CCSUP measures on the predicted changes in the state of anthropogenic environment objects

Compared to the conclusions made in paragraph 2.4.3 of the 2017 Report of the EA the CCSUP on the possibility of additional waste generation during the growth of CCSUP activities, there is an increase in waste generation (see paragraph 2.1.9).

Such waste generation is caused by the implementation of construction and installation works for capital and current construction, medium and major repairs of power units, namely the increase in waste in the class «4510.2.9.09 waste of mixed construction and demolition of buildings and structures (waste of construction materials)».

Implementation of the CCSUP measures does not affect the overall waste generation.

Implementation of the CCSUP measures should lead to an increase in the safety of power units, thus reducing the risks of SS ZNPP impact on the environment in the event of emergencies/accidents (probability of their occurrence) and the scale of their consequences, which, in turn, will also lead to a reduction in the damage caused.

Thus, the expected long-term impact of the implementation of the CCSUP on the man-made environment is positive.

2.4.4 Forecast of possible negative impacts on NPPs from anthropogenic objects in case of refusal to implement and implementation of the CCSUP

Due to the seizure of the city of Enerhodar by Russian military groups in early March 2022, including the Zaporizhzhia NPP site, deployment of ammunition and military equipment, mining of ZNPP and DSFSF, massive missile attacks on ZNPP and power grid facilities, and as a result of constant blackouts and emergency operation of power units, conditions of increased nuclear hazard were created.

The occupation and military aggression of the Russian Federation does not allow implementing the planned CCSUP measures. Failure to implement the CCSUP may result in significant negative impacts on ZNPP from man-made objects.

2.5 Comprehensive measures to ensure the regulatory state of the environment and its safety

2.5.1 Brief description of resource-saving measures implemented at SS ZNPP excluding CCSUP

The resource-saving measures listed in paragraph 2.5.1 of the 2017 of the 2017 Report of the EA the CCSUP remained relevant in 2017-2021.

The use of environmentally friendly technologies (use of equipment with ozone-depleting substances, purchase of LED lamps instead of mercury-containing lamps, optimization of cooling pond blowdown, etc.) is included in the Environmental Protection Program of the Energoatom Company.

2.5.2 Justification of the absence of the need for additional resource-saving measures in connection with the implementation of the CCSUP

All CCSUP measures implemented at SS ZNPP do not involve an increase in natural resource consumption, so no additional resource-saving measures are required.

2.5.3 Brief description of protective measures implemented at SS ZNPP excluding the CCSUP

General information has not changed compared to paragraph 2.5.3 of the 2017 Report of the EA the CCSUP.

2.5.4 Changes in the complex of protective measures as a result of the implementation of the CCSUP

The implementation of the CCSUP measures will not lead to significant changes in the system of occupational health and safety management and social protection of personnel and the public.

General information has not changed compared to paragraph 2.5.4 of the 2017 Report of the EA the CCSUP.

2.5.5 Brief description of remediation measures taken during NPP construction

General information has not changed compared to paragraph 2.5.5 of the 2017 Report of the EA the CCSUP.

2.5.6 Justification of the absence of the need for additional remediation measures in connection with the implementation of the CCSUP

None of the CCSUP measures require the implementation of restoration measures in addition to those already implemented.

2.5.7 Brief description of compensatory measures implemented during SS ZNPP operation

General information has not changed compared to paragraph 2.5.7 of the 2017 Report of the EA the CCSUP.

2.5.8 Justification of the absence of the need for additional compensatory measures in connection with the implementation of the CCSUP

During 2017-2022, there were no grounds to change the compensation measures described in paragraph 2.5.7 based on the results of the implementation of the CCSUP.

2.5.9 Brief description of safety measures implemented during NPP operation

2.5.9.1 Protective measures against radiation exposure

General information has not changed compared to paragraph 2.5.9.1 of the 2017 Report of the EA the CCSUP.

2.5.9.2 Protective measures against non-radiation exposure

During the preparation and conduct of a supervisory audit by the international certification body TUV NORD CERT in October-November 2020, a high level of continuous readiness, in particular the emergency preparedness and response (civil protection) system of SE NNEGC Energoatom, for quick and effective actions in the event of nuclear and radiation accidents and other types of emergencies was confirmed.

The same high performance was confirmed by the Emergency Preparedness and Response Department of the Company's Directorate during the post-certification surveillance audit by the international certification body TUV NORD CERT from January 10 to 19, 2022. The functioning of such a system made it possible to reduce the overall water consumption and minimize the generation of radioactive and non-radioactive waste.

The company meets the requirements of international standards:

ISO 9001:2015 «Quality management systems. Requirements»;

ISO 14001:2015 «Environmental management systems. Requirements and guidelines for use»;

ISO 45001:2018 "Occupational Health and Safety Management System".

2.5.10 Changes in the complex of security measures due to the implementation of the CCSUP

No additional specific environmental protection measures are required as a result of the implementation of the CCSUP.

2.5.11 List and characterization of residual impacts from NPPs under normal operating conditions (excluding CCSUP measures)

2.5.11.1 Residual radiation exposure

The radiation impact of the SS ZNPP is characterized by the levels of radiation doses to personnel and the public in the SPZ and the Observation Zone, emissions of Radioactive Substances into the air and discharges of Radioactive Substances into water bodies, and concentrations of Radioactive Substances in the environment.

Total annual releases of inert radioactive gases (IRGs), long-lived radionuclides (LLRs) and iodine radionuclides from SS ZNPP are presented in Annex K.1.

Estimated data on average annual surface concentrations of radionuclides and estimated annual doses from gas and aerosol emissions from SS ZNPP facilities in 2021 at the border of the SS ZNPP sanitary protection zone at the maximum point (2.5 km "ZPdZ") are presented in Table 12. The total effective dose may be 0.0935 μSv/year, which will not exceed 0.23% of the dose limit quota formed by NPP emissions, which, according to NRS-97, is 40 μSv/year.

Table 12 - Annual dose to the critical population group formed due to gas and aerosol emissions, μSv/year

Year	Dose from the cloud	Dose from the soil	Inhalation dose	Dose from food consumption	Total effective dose	Ratio to quota, %.
2021	5.3E-02	1.5E-03	3.2E-03	3.6E-02	9.4E-02	0,23

The annual estimated individual dose to the critical population from radionuclide discharges from SS ZNPP facilities to the cooling pond for 2021 is given in Table 13. The total dose to the fish food chain will be 0.2 μSv/year at the critical point (directly at the outlet of the blowdown equipment), which is 2.0% of the dose limit quota due to the critical type of water use, which is 10 μSv/year according to NRBU-97.

Table 13 - Annual dose to the critical population group generated by liquid discharges, μSv/year

Year	Discharge of radionuclides, Bq	Calculated values of the radiation capacity of the cooling pond in relation to the Kakhovka Reservoir, m^3-year*1	Total effective dose	Ratio to quota, %.
2021	2.49E+13	8,14E+08	2.0E-01	2,0

In general, the level of radiation impact of SS ZNPP on both the public and the environment does not exceed 0.04% of the dose generated by natural sources, and therefore does not change the natural radiation level in the region where the NPP is located.

2.5.11.2 Residual non-radiation impact

General information has not changed compared to paragraph 2.5.11.2 of the 2017 Report of the EA the CCSUP.

The results of monitoring the state of the Kakhovka Reservoir in 2021 are presented in Annex K.1.

2.5.11.3 Possible changes in residual impacts as a result of the implementation of tasks set by government programs and government decisions

General information has not changed compared to paragraph 2.5.11.3 of the 2017 Report of the EA the CCSUP.

2.5.12 Changes in residual impacts due to the implementation of the CCSUP

Implementation of the CCSUP will not lead to significant changes in the amount of heat and chemical components emitted by NPPs into water bodies and the atmosphere.

In addition, the CCSUP measures will not lead to any significant changes in the amount of noise, heat, electromagnetic impacts of NPPs. Thus, changes in residual impact as a result of the CCSUP implementation can be neglected.

2.5.13 Comprehensive Assessment of Changes in Environmental Impacts of SS ZNPP from NPPs under Normal Operating Conditions as a Result of CCSUP Implementation

General information has not changed compared to paragraph 2.5.13 of the 2017 Report of the EA the CCSUP.

According to the assessment, CCSUP measures implemented at SS ZNPP units did not lead to environmental degradation or increase in emissions and discharges of both radioactive and non-radioactive pollutants.

2.5.14 Comprehensive assessment of environmental risks in the event of accidents at SS ZNPP without taking into account the CCSUP

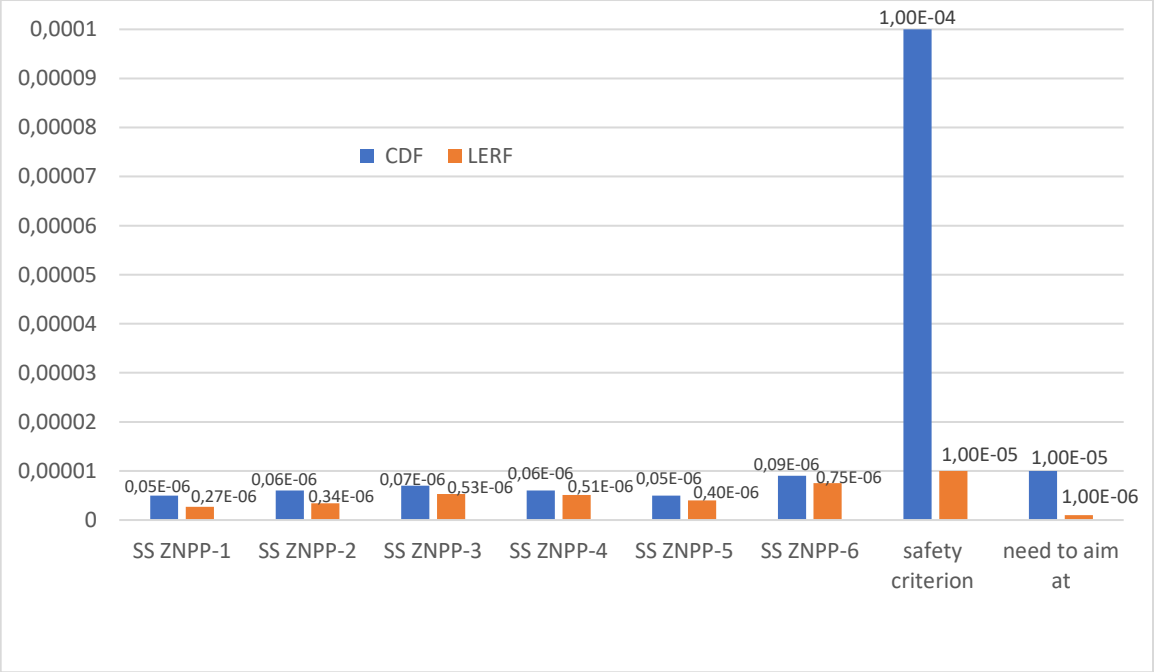
Design basis accidents at SS ZNPP will not lead to significant environmental risks outside the containment of the power unit and the NPP area.

2.5.15 Comprehensive assessment of changes in environmental risks (in case of accidents at SS ZNPP) as a result of CCSUP implementation

The overall conclusions remain unchanged and are similar to those made in paragraph 2.5.15 of the 2017 Report of the EA the CCSUP.

As a result of the implementation of CCSUP measures and safety reassessment of SS ZNPP Units 1-6, the main safety criteria were reduced, as shown in Diagram 3.

Diagram 3 - Indicators of safety criteria



CDF - Core damage frequency; LERF - Large early release frequency

2.5.16 Assessment of economic efficiency from the implementation of the CCSUP in terms of environmental and health impacts

The general information has not changed and is similar to that set out in paragraph 2.5.16 of the 2017 Report of the EA the CCSUP.

2.6 Justification of no changes in environmental impacts during the implementation of the CCSUP measures

As a result of the implementation of the CCSUP, the risk of negative impacts related to emergencies will decrease either due to a decrease in the probability of such a situation occurring and/or because the NPP will be able to limit the negative impact of such a situation.

	Air and atmosphere*	Water bodies		Soils	Flora and fauna	Social environment*
		surface waters	underground waters			
1 Radiation impact						
1.1 Radiation exposure to gases and aerosols	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
1.2 Assessment of transboundary impacts	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
1.3 Liquid radioactive waste	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact,	additional negative impact no additional negative impact, risks reduced
1.4 Periodic inflows from the cooling pond and splash ponds	additional influence no effect	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional influence no effect
1.5 Solid radioactive waste	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect
2 Chemical exposure						
2.1 Emissions from fuel combustion*	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional impact is acceptable, risks are reduced	additional influence no effect	additional impact is acceptable, risks are reduced
2.2 Penetration into groundwater	additional influence no effect	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional influence no effect	additional influence no effect	additional negative impact no additional negative impact, risks reduced
2.3 Non-radioactive liquid waste	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect
2.4 Non-radioactive solid waste	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect
3 Physical impact						

3.1 Thermal impact	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect
3.2 Noise and electromagnetic radiation*	additional impact is acceptable, risks are reduced	additional influence no effect	additional influence no effect	additional influence no effect	additional influence no effect	additional impact is acceptable, risks are reduced
Conclusions.	additional negative impact is temporary, risks are mitigated	additional negative impact is temporary, risks are mitigated	additional negative impact is temporary, risks are mitigated	additional negative impact is temporary, risks are mitigated	additional negative impact is temporary, risks are mitigated	additional negative impact is temporary, risks are mitigated
*General conclusions are reassessed taking into account the case of a design-basis accident, i.e. complete NPP blackout in 2022						

3 EO OF THE RESULTS OF THE CCSUP IMPLEMENTATION AT THE SS Rivne NPP

3.1 General characteristics of the SS RNPP

3.1.1 Region and location of the SS RNPP

General information has not changed compared to paragraph 3.1.1 of the 2017 Report of the EA the CCSUP.

3.1.2 Brief description of SS RNPP production, hazard classes

General information has not changed compared to paragraph 3.1.2 of the 2017 Report of the EA the CCSUP.

Four power units are in operation at SS RNPP:

– I unit (WWER -440/V-213) with a capacity of 420 thousand kW since 1980;
– II unit (WWER -440/V-213) with a capacity of 415 thousand kW since 1981;
– III unit III (WWER -1000/V-320) with a capacity of 1 million kW since 1987;
– IV unit (WWER -1000/V-320) with a capacity of 1 million kW since 2005.

Facilities at the stage of completion of construction and commissioning:

– Radioactive waste processing complex;
– Additional water treatment facility.

3.1.3 Brief description of SS RNPP products

General information has not changed compared to paragraph 3.1.3 of the 2017 Report of the EA the CCSUP.

3.1.4 Data on raw materials, land, water, energy and other resources used

General information has not changed compared to paragraph 3.1.4 of the 2017 Report of the EA the CCSUP.

3.1.5 Short description of the SS RNPP technological process

General information has not changed compared to paragraph 3.1.5 of the 2017 Report of the EA the CCSUP.

3.1.6 Technical solutions of the CCSUP aimed at eliminating or reducing harmful emissions, discharges, leaks, radiation into the environment (if any)

The EA CCSUP assessed the impact of implemented or ongoing measures and made assumptions about changes in the risks of harmful impact based on the dynamics of current volumes of radioactive and pollutant emissions or discharges, their concentration in the air, water bodies, and soil both at the SS RNPP site and in the SPZ and the SZ.

First of all, this applies to the following measures:

For WWER -440/V-213:

30101	Development of materials and qualification of power unit elements	Reducing dose loads	Implemented
31103	Implementation of an external cooling system for the reactor vessel	Reduction of thermal effects	Implemented
31301	Modernization of the cladding of the spent fuel pool at the power unit and installation of compacted fuel storage racks	Reduction of dose loads, emissions of RS	Implemented
31302	Modernization of the transport container management system at SS RNPP Units 1 and 2	Reduction of dose loads, emissions of RS	Implemented
31305	Ensure fueling and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout	Reduction of dose, heat loads, and radiation emissions	Implemented at power units RNPP № 1, 2
33307	Ensuring steam generator feeding in conditions of prolonged complete NPP blackout	Reduction of dose loads, emissions of RS	Implemented at power units RNPP № 1, 2
33308	Analysis of the need for feeding the first contour	Reduction of dose loads, emissions of RS	Implemented
33501	Replacement of stand-alone air conditioners with air conditioners qualified for "harsh" conditions and seismic impacts	Reduction of dose loads, emissions of RS	Implemented
33503	Ensuring the operability of the Block Control Panel and the Backup Control Panel in case of design and beyond design accidents (installation of iodine filters)	Reduction of dose loads, emissions of RS	Implemented
33509	Implementation of an "industrial" television system for fire/explosion hazardous and unattended premises	Preventing emergencies	Implemented at power units RNPP № 1, At the stage of implementation

			at power unit RNPP № 4
33511	Ensuring the operability of consumers of the group «A» process water system when dehydrating splash pools	Reduction of heat loads, discharges of radioactive substances	Implemented at power units RNPP № 1, 2
34101	Instrumentation during and after accidents (PASM)	Reduction of dose, heat loads, emissions of RS	Implemented
34102	Modernization (NOS of NO ISRC (subsystems of TPI and S, ACS and RC, including primary sensors and transducers)	Reduction of dose, heat loads, emissions of RS	Implemented at power units RNPP № 1, At the stage of implementation at power unit RNPP № 4
34401	Modernization of the CIMSRM central information and measurement system for radiation monitoring	Prevention of radioactive contamination, emissions of RS	Implemented
34405	Implementation of a vibration control system for DCP	Preventing emergencies	Implemented
35102	Modernization of the battery facilities of the SS	Power failure warning	Implemented
35103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Preventing power outages and emergencies	Implemented
35212	Modernization of the generator excitation system	Preventing power outages and emergencies	Implemented
36203	Development and implementation of measures to reduce the hydrogen concentration in the HV for beyond design basis accidents	Prevention of explosions, accidental releases of RS	Implemented
36205	Implementation of a forced pressure relief system from the GTS	Prevention of explosions, accidental releases of RS	Implemented
37101	Modernization of the automatic fire alarm system of the premises RD, MD, DD, EDS, SB	Prevention of fires, accidental releases of RS	Implemented at power units RNPP № 1, At the stage of implementation at power unit RNPP № 4
37111	Bringing the fire resistance limit of load-bearing metal building structures of EDS to the normalized value	Prevention of fires, accidental releases of RS	Implemented
38101	Ensuring seismic resistance of systems and building structures	Prevention of emergencies and accidental releases of RS	At the stage of implementation at power unit RNPP № 1-2 Measure from the 2025 plan
39103	Consideration of the full range of initial events for all regulatory states RF and the SFP in the PSA	Preventing emergencies	Implemented
39105	Analyze the feasibility of implementing the melt localization strategy in the reactor vessel	Prevention of emergencies and accidental releases of RS	Implemented

39203	Improvement of instructions for eliminating accidents occurring at reduced capacity and during SPM	Prevention of emergencies and accidental releases of RS	Implemented
39204	Analysis of severe accidents. Development of the SAMG	Prevention of emergencies and accidental releases of RS	Implemented

For WWER -1000/V-320:

10101	Development of materials and qualification of power unit elements	Prevention of emergencies and accidental releases of RS	Implemented
11305	Ensure fueling and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout	Reduction of dose, heat loads, emissions of RS	Implemented
12203	Inspection of check valves on hot steam pipelines to determine the remaining service life and replace them (if necessary) based on the inspection results	Reduction of dose, heat loads, emissions of RS	Implemented
12301	Assessment of the technical condition and service life of reactor vessels in operation	Reduction of dose loads, emissions of RS	Implemented
13302	Ensuring the operability of the FRU-A during the end of the steam-water mixture, water, as well as ensuring the reliable performance of the emergency pressure relief function	Reduction of dose loads, discharges of RS	Implemented
13307	Ensuring SG feeding in conditions of prolonged complete NPP blackout	Prevention of emergency situations, emissions of RS	Implemented
13308 33308	Analysis of the need for feeding the first contour	Prevention of emergency situations, emissions of RS	Implemented
13402	Modernization of the ECS HPZ to provide the ability to control the pressure at the head when the system pump is operating on the 1st contour	Reducing emissions of radioactive substances	Implemented at power units RNPP № 4, At the stage of implementation at power unit RNPP № 3 for 2025.
13501	Replacement of stand-alone air conditioners with air conditioners qualified for "harsh" conditions and seismic effects	Prevention of emergency situations, emissions of RS	Implemented
13502	Implementation of a comprehensive system for diagnostics of reactor systems RS	Prevention of emergency situations,	Implemented
13504	Installation of «Disk» type valves on condensate-feed and steam distribution systems	Prevention of emergency situations,	Implemented
13507	Implementation of an on-the-fly cleaning system for process water splash pools of responsible consumers	Reducing pollutant discharges, improving water quality	Implemented
13509	Implementation of an "industrial" television system for fire/explosion hazardous and unattended premises	Prevention of emergency situations, emissions of RS	Implemented
13510	Implementation of high-tight plugs in the steam generator (SG)collectors during repair work	Prevention of emergency situations, emissions of RS	Implemented
13511	Ensuring the operability of consumers of the group «A» process water system when dehydrating splash pools	Reduction of dose loads and thermal effects	Implemented

14101	Instrumentation during and after accidents (NPP Post-Accident Monitoring System)	Reduction of dose loads	Implemented
14102	Implementation of the pipeline movement control system for the 1st contour	Reduction of dose loads, discharges of RS	Implemented
14105	Modernization of the system of normal operation of the reactor compartment important for safety (NOS of the RCIS) (control and measuring instruments (CMI), process protection, interlocking and alarm (PPI&A), automatic control and remote control system (ATS and RC), equipment of special enclosures of safety class ZN)	Prevention of emergency situations,	Implemented
14106	Modernization of the Normal Operation System Important for Safety of the Turbine Compartment (NOS IS TC)) (instrumentation...)	Prevention of emergency situations,	Implemented
14205	Modernization of the drive control system of the PMS, including the power supply system	Prevention of emergency situations,	Implemented
14301	Modernization of security control systems with replacement (of a USTM)	Prevention of emergency situations, emissions of RS	Implemented
14401	Modernization of NPP radiation monitoring systems (RMS)	Prevention of emergency situations, emissions of RS	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
14404	Modernization of the control system for backup diesel generators	Preventing power outages and emergencies	Implemented
14406	Modernization of the AHK-1,2 system. Improvement and automation of the water-chemical regime of the 1st and 2nd contours	Reduction of dose loads, discharges of radioactive substances	Implemented
15103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Preventing power outages and emergencies	Implemented
15201	Replacement of 6kV circuit breakers in the SS channels and on the SIS, station-wide and block circuits of the SN	Preventing power outages and emergencies	Implemented
15202	Modernization of the Emergency Power Supply System of the 1st reliability group (including replacement of the uninterruptible power supply unit, DC switchboard, Batteries, etc.)	Preventing power outages and emergencies	Implemented
15203	Modernization of the cable management of security systems	Prevention of fires and emergencies	Implemented
15204	Modernization of Relay Protection and Automation circuits of the 6kV auxiliary power supply system	Preventing power outages and emergencies	Implemented
15205	Modernization of the Safety Critical System with replacement of 6 and 0.4 kV electric motors	Preventing power outages and emergencies	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
15206	Modernization of 0.4 kV switchgear	Preventing power outages and emergencies	Implemented at power units RNPP № 3, At

			the stage of implementation at power unit RNPP № 4
15207	Modernization of power and control seals through contraction	Prevention of fires and emergencies	Implemented
15208	Modernization of relay protection schemes for automation using microelectronic-based relays	Preventing power outages and emergencies	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
15211	Optimization of the power supply of TG, TX valves to ensure the channel principle	Preventing power outages and emergencies	Implemented
15212	Modernization of the generator excitation system	Preventing power outages and emergencies	Implemented
16101	Prevention of early bypassing of the containment due to molten core masses from the reactor shaft outside the containment volume	Reduction of RS emissions	Implemented
16201	Implementation of a hydrogen concentration monitoring system in the containment vessel for beyond design basis accidents	Prevention of explosions, accidental releases of RS	Implemented
16202	Equipping SS NPP units with remote control systems for forces in the reinforcing rope of the containment overstress system	Prevention of explosions, accidental releases of RS	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
16203	Development and implementation of measures to reduce hydrogen concentration in the containment vessel for beyond design basis accidents	Prevention of explosions, accidental releases of RS	Implemented
16205	Implementation of the measure 16205 on unfiltered pressure discharge from the gas cleaning system	Prevention of explosions, accidental releases of RS	Implemented
17102	Development and implementation of a smoke protection system for the premises and evacuation corridors of the Reactor Department, which have no environmental restrictions	Prevention of fires and accidental releases of RS	Implemented
17104	Equipping with automatic control units for power oil-filled equipment of the main NPP power output circuit	Prevention of fires and emergencies	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
17105	Modernization of the automatic fire alarm system for the premises of the RD, DD, EETU, ER, SC	Prevention of fires and emergencies	Implemented at power units RNPP № 3, At the stage of implementation at power unit RNPP № 4
17106	Equipping NPP premises containing electrical and electronic equipment with stationary non-automatic gas fire extinguishing systems	Prevention of fires and emergencies	Implemented at power units RNPP № 3, At the stage of

			implementation at power unit RNPP № 4
17107	Installation of fire retardant valves on air ducts in fire partitions of ventilation centers, battery rooms, cable facilities and rooms containing electrical and electronic equipment, separating them from rooms of other categories for explosion and fire safety	Prevention of fires, accidental releases of radioactive substances	Implemented
17108	Bringing the fire resistance limit of removable non-combustible structures of cable ducts and raised floors of NPP premises containing electrical and electronic equipment to the standardized value	Prevention of fires, accidental releases of radioactive substances	Implemented
17110	Replacing the fuel insulation of the engine room roof	Preventing accidents	Implemented
17201	Ensuring the operability of the (fast-acting shut-off valve) for the purpose of resistance to internal and external influences	Preventing accidents	Implemented at power units RNPP № 3,4
18101	Ensuring seismic resistance of systems and building structures	Preventing accidents	At the stage of implementation at power unit RNPP № 3,4 Measure from the 2025 plan
18102	"Implementation of seismological monitoring systems for NPP sites"	Preventing accidents	Implemented
19103	Consideration of the full range of initial events for all regulatory states of the Reactor Facility and the spent fuel pool in the Probabilistic Safety Analysis	Preventing accidents	Implemented
19203 39203	Improvement of instructions for eliminating accidents occurring at reduced capacity and during scheduled preventive maintenance	Preventing accidents	Implemented
19204	Analysis of severe accidents. Development of the Severe Accident Management Guidelines	Preventing accidents	Implemented

3.1.7 Short description of the SNFMS. Volumes of SNF.

The general information on the SNF management scheme has not changed compared to paragraph 3.1.7 of the 2017 Report of the EA the CCSUP.

3.1.8 Brief description of the RW management scheme. Volumes of RW

3.1.8.1 Solid radioactive waste

The general information on the type of solid radioactive waste, its nomenclature, and management procedure has not changed compared to paragraph 3.1.8.1 of the 2017 Report of the EA the CCSUP.

In 2019, SS RNPP commissioned the Radioactive Waste Treatment Plant, which consists of the following facilities:

- extraction setting;
- setting up fragmentation and sorting;
- pressing installation;
- radioactive waste activity measurement unit;

– installation of cementation.

The complex also includes a unit for metal decontamination using electrochemical etching, chemical decontamination with ultrasonic process activation and aero-hydrodynamic decontamination, as well as a radioactive oil purification unit.

The volumes of solid RW generated and stored in storage facilities at SS RNPPs are shown in Table 14.

Table 14 - Volumes of solid radioactive waste generation and storage, cubic meters

	Low-active		Medium active		Highly active	
	formed	stored	formed	stored	formed	stored
2017	279,69	7741,52	14,31	387,27	3,72	91,65
2018	308,244	8014,07	16,22	403,50	1,18	92,82
2019	290,698	8053,75	24,72	428,22	2,26	95,08
2020	434,275	8345,49	17,66	442,28	5,45	100,53
2021	228,04	8346,05	45,371	3113,552	0,68	101,20
2022	264,93	8392,75	38,19	3151,242	4,25	101,99

The volumes of solid radioactive waste processed at compression and incineration facilities are shown in Table 15.

Table 15 - Solid radioactive waste processing volumes at SS RNPPs

	Processed, cubic meters	
	Incinerated solid radioactive waste	**Pressed solid radioactive waste**
2017	6,1	203,491
2018	5,9	169,65
2019	3,6	215,3
2020	234,7	79,35
2021	103,4	60,7
2022	136,8	76,4

3.1.8.2 Liquid radioactive waste

The general information on the type of liquid radioactive waste, its nomenclature, sources of generation, processing methods, and management procedure provided in this paragraph has not changed compared to paragraph 3.1.8.2 of the 2017 Report of the EA the CCSUP.

The volumes of liquid radioactive waste generated, processed and stored in storage facilities at SS RNPPs are presented in Table 16.

Table 16- Liquid radioactive waste generation, processing and storage at SS RNPPs, cubic meters

	Cubic residual			Spent sorbents, sludge		Filter materials		Saltwater float*	
	formed	recycled	stored	formed	stored	formed	stored	formed	stored
2017	380	903	3037	5	20,8	3,6	577,3	77,6	2507,8
2018	312	877	2976	3,2	24	1,2	578,5	57,2	2565,2
2019	321	699	2813	3,8	27,8	9,15	557,5	45,8	2611,0
2020	229	235	2879	0,6	28,4	6,5	563,95	13,14	2626,8
2021	202	549	2810	2,0	30,4	2,0	565,95	-	-
2022	214	486	2733,0	2,2	32,6	3	568,95	-	-

**Since 2021, salt float is classified as solid radioactive waste*

3.1.9 Short description of the waste management scheme (including hazardous waste). Waste volumes

The general information on the type of waste, its nomenclature, sources of generation, processing methods, and the procedure for its management has not changed compared to paragraph 3.1.9 of the 2017 Report of the EA the CCSUP.

The dynamics of waste generation by hazard class is shown in Table 17.

Table 17 - Dynamics of waste generation at SS RNPPs

Indicator.	2017	2018	2019	2020	2021	2022
Waste generated, tons, including:	28549,7	51244,799	35263,26	30507,25	24380,04	14056,89
I hazard class	14,0	31,679	42,99	38,87	83,22	22,42
II hazard class	26,26	62,76	98,26	159,85	75,36	81,2
III hazard class	6,64	11,66	21,51	9,50	6,72	5,81
IV hazard class	28502,8	51138,7	35100,5	30299,02	24214,75	13947,46

Total waste generation in 2022 decreased by 42.3% compared to 2021, including hazard class IV waste by 42.4%, hazard class III waste by 13.5%, and hazard class I waste by 73%, while hazard class II waste generation increased by 7.8%.

SS RNPP operates its own waste disposal facilities, in particular:

– SS RNPP industrial and construction waste landfill;

– sludge storage facility.

The dynamics of waste accumulation at these facilities is shown in Table 18.

Table 18 - Dynamics of Non-Radioactive Waste Accumulation at the SS RNPP Sludge SF and Landfill

	2017	2018	2019	2020	2021	2022
Sludge SF, thousand tons	133,64	163,72	158,1	178,19	191,18	201,05
Landfill, thousand tons	42,19	47,74	56,50	62,89	66,35	69,62

3.1.10 Technical solutions of the CCSUP aimed at reducing waste volumes and improving the environmental safety of waste management

The CCSUP does not envisage measures for SS RNPPs aimed at reducing the amount of process waste or improving the waste management scheme. Waste management meets the requirements of the legislation.

3.1.11 Short description of the analyzed design and beyond design accidents

The general information has not changed compared to clause 3.1.11 of the 2017 Report of the EA the CCSUP.

Design accidents that may cause radiation consequences at SS RNPP and are taken into account during the environmental impact assessment:

– maximum design basis accident (MDBA) - an accident caused by a two-sided rupture of the cooling system (nuclear reactor accident with loss of coolant, NRALC) at the rated energy level;

– accidents caused by leaks in the spent fuel pool (accidents during transportation or technological operations with fuel);

– accidents caused by the fuel assembly falling into the spent fuel pool (accidents during transportation or technological operations with fuel);

– accidents caused by the fall of the water gate into the spent fuel pool (accidents during transportation or technological operations with fuel).

The assessment of accidental releases beyond the containment volume was performed during the analysis of design basis accidents and took into account the limit cases, which are accidents with a two-sided rupture of the main circulation pipeline (MCP) and with the separation of the steam generator (SG) header cover when the HSRU-A on the emergency SG jammed in the open position.

According to the results, for all the above design accidents that lead to the release of radioactive substances into the environment (all leaks of the first circuit coolant and accidents related to leakage of the second circuit coolant beyond the containment volume), compliance with the dose criteria specified in NRSU-97 was confirmed.

3.1.12 Short description of design technical solutions aimed at reducing the likelihood and consequences of accidents (excluding CCSUP measures)

General information has not changed compared to paragraph 3.1.12 of the 2017 Report of the EA the CCSUP.

3.1.13 Technical solutions of the CCSUP aimed at reducing the likelihood and consequences of accidents

General information has not changed compared to paragraph 3.1.13 of the 2017 Report of the EA the CCSUP. The list of measures is given in Section 3.1.6 of this Report. Achieved safety criteria - core meltdown frequency and frequency of maximum accidental release for power units' subject to periodic safety review are given in paragraph 3.5.15.

3.1.14 Sanitary protection zone and observation zone of SS RNPP

General information has not changed compared to paragraph 3.1.14 of the 2017 Report of the EA the CCSUP.

3.2 Assessment of environmental impacts

3.2.1 Climate and microclimate

3.2.1.1 Brief description of the existing situation within the SA

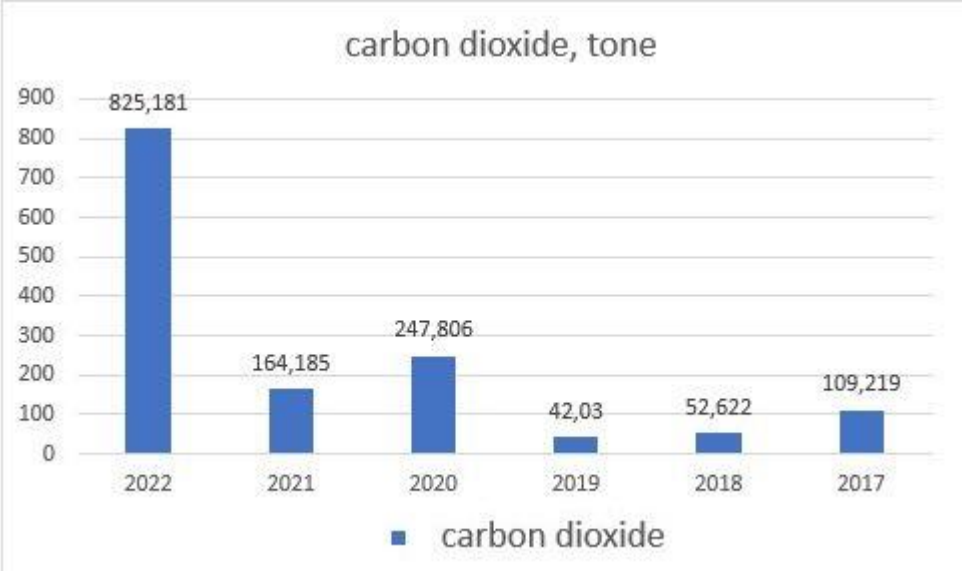
General information has not changed compared to paragraph 3.2.1.1 of the 2017 Report of the EA the CCSUP.

3.2.1.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

The implementation of the CCSUP does not affect the climate and microclimate characteristics in the SS RNPP location area.

The CCSUP will also not affect the amount of greenhouse gases emitted into the atmosphere annually as a result of NPP operation, so no impact on the global climate is expected. The dynamics of greenhouse gas emissions is shown in Diagram 4.

Diagram 4 - Dynamics of carbon dioxide emissions at SS RNPP



3.2.2 The air environment

3.2.2.1 Brief description of the existing situation within the SA

The general information compared to clause 3.2.2.1 of the 2017 Report of the EA the CCSUP has no fundamental changes during 2017-2022.

On November 23, 2022, as a result of missile attacks on the Ukrainian power system by Russian troops, RNPP Units 1, 2, 3, 4 were disconnected from the grid with emergency protection activated. To ensure steam supply for own needs, boiler units No. 1 and No. 3 of the startup and standby boiler house (SSB) were put into operation, which resulted in the burning of fuel (fuel oil). The emissions of pollutants and carbon dioxide for the year (2022) did not exceed the reasonable potential emissions, volumes and values established by the supporting documents.

The data on pollutant emissions into the atmosphere from stationary sources for 2022 according to the statistical reporting form No. 2 -TP (air) are presented in Annex K.2 in Table 51. The dynamics of changes in air emissions for 6 years is presented in Annex K.2, Table 52.

The dynamics of emissions of pollutants (non-radioactive substances) is presented in Annex K.2.

Detailed information on radioactive substances emissions into the atmosphere is provided in Annex K.2.

Observations of the atmospheric air condition within the industrial site, the SZ and the SPZ of the SS RNPP in 2017-2022 indicate the following:

– the content of pollutants and radionuclides in the air does not exceed the maximum permissible concentrations established by the regulations;

– the volume of pollutant emissions does not exceed the maximum permissible limits established by the relevant permits;

– emission levels of pollutants and radionuclides do not lead to deterioration of air quality;

– the direct implementation of the CCSUP measures did not lead to an increase in the anthropogenic load on the air.

3.2.2.2 Forecast of state changes in case of failure to implement the CCSUP (under normal conditions and in case of accidents at SS RNPP)

Under normal operating conditions, no negative radiation impact of SS RNPP on the air environment is expected.

In the event of emergencies/accidents and depending on their nature and scale, significant amounts of radioactive contaminants and dust may potentially be released into the air. Radiological consequences of air pollution in case of design and beyond design basis accidents are considered in paragraph 3.3.2.

3.2.2.3 Impact of CCSUP measures on projected changes in the state

The general conclusions on the future impact of the CCPD measures have not changed and are similar to those made in paragraph 3.2.2.3 of the 2017 Report of the EA the CCSUP.

3.2.3 Geological environment

3.2.3.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 3.2.3.1 of the 2017 Report of the EA the CCSUP.

3.2.3.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

General information has not changed compared to paragraph 3.2.3.2 of the 2017 Report of the EA the CCSUP.

In order to monitor seismological activity at the RNPP site, the measure CCSUP 18102 «Implementation of seismological monitoring systems for NPP sites» was implemented.

3.2.4 Water environment (groundwater, open water)

3.2.4.1 Brief description of the current situation within the SA

General information has not changed compared to paragraph 3.2.4.1 of the 2017 Report of the EA the CCSUP.

Water is supplied to RNPP for recycling systems and other technical needs from the Styr River.

Domestic and drinking water is supplied from the water intake of Ostrov village of the Rafalivske-1 field. The water intake has 9 artesian wells.

Indicators of the state of surface waters in the RNPP site area are presented in Annex K.2.

The analysis of the monitored indicators shows that SS RNPP operation does not significantly affect surface water quality. The state of water in the Styr River (control section) remains at the level of previous years and has no significant deviations.

3.2.4.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 3.2.4.2 of the 2017 Report of the EA the CCSUP.

Without taking into account the CCSUP and in the absence of emergencies/accidents related to radionuclide releases, no significant negative impact of RNPP on changes in the state of water bodies is expected. In the event of an accident and depending on the nature of the accident, significant amounts of radioactive contaminants may potentially enter water bodies.

3.2.4.3 Impact of CCSUP measures on projected changes in the state

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 3.2.4.3 of the 2017 Report of the EA the CCSUP.

The CCSUP is not aimed at increasing electricity production, and therefore it is not expected to increase NPP water consumption, changes in the volume of thermal, chemical and radioactive discharges to water bodies. The CCSUP will reduce the risk of accidents at NPPs and, consequently, the risk of radioactive contamination of the water environment, which is a positive impact of the CCSUP.

3.2.5 Soil and landscape

3.2.5.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 3.2.5.1 of the 2017 Report of the EA the CCSUP.

The results of radionuclide content in the soils of the SS RNPP SA are presented in Annex K.2.

SS RNPP uses 417.1533 ha of land in Varash city and 60.7609 ha of land in Varash district. General information on the land used is presented in Table 19.

Table 19 - The state of land use*

Types of land	ha
In total	478,1246
Types of land	ha
Built-up land	466,5992
Among them:	
Land for construction and maintenance of residential buildings	11,9379

Public lands	7,4242
Land for commercial use	0,3455
Land used for technical infrastructure	425,3466
Land used for recreation and other open land	33,0704

The areas allocated by SS RNPP outside the city limits for the automatic radiation monitoring system (ARMS) in the Varsky district are shown in Table 20.

Table 20 - Areas allocated to SS RNPP outside the city limits

№	Name	Total area, ha	Permanent use	According to which document is allocated
1.	Lozkivska village council	0,0684	0,0684	The state act ЯЯЯ № 272079 from 29.06.2006 y.
2.	Polytska village council	0,0400	0,0400	The state act II-РВ № 001898 from 20.11.2000 y.
3.	Velykozholudske village council	0,1100	0,1100	The state act II-РВ №001899 from 20.11.2000 y.
4.	Lyubakhivska village council	0,0770	0,0770	The state act II-РВ №001900 from 20.11.2000 y.
5.	Bilsko-Vilska village council	0,0519	0,0519	The state act ЯЯЯ № 272073 from 29.06.2006 y.
6.	Sopachivska village council	0,0520	0,0520	The state act II-РВ №001901 from 20.11.2000 y.
	In total:	0,3993	0,3993	

3.2.5.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

General information has not changed compared to paragraph 3.2.5.2 of the 2017 Report of the EA the CCSUP.

3.2.5.3 Impact of CCSUP measures on projected changes in the state

General information has not changed compared to paragraph 3.2.5.3 of the 2017 Report of the EA the CCSUP.

The implementation of the measure CCSUP 18102 did not lead to any changes in the condition of the soil under the sites of seismological monitoring stations. Due to the fact that these posts do not emit or discharge pollutants, the condition of the land plots has not changed.

3.2.6 Flora and fauna, protected areas

3.2.6.1 Brief description of the current situation within the SA

General information has not changed compared to paragraph 3.2.6.1 of the 2017 Report of the EA the CCSUP.

The implementation of the CCSUP measures during 2017-2022 did not lead to changes in the relative distribution of flora or fauna species.

3.2.6.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Under normal operating conditions, SS RNPP does not have a negative impact on flora, fauna and protected areas.

3.2.6.3 Impact of CCSUP measures on projected changes in the state

The general conclusions regarding the absence of future impacts of the CCSUP measures on flora and fauna, protected areas have not changed and are similar to the conclusions made in paragraph 3.2.6.3 of the 2017 Report of the EA the CCSUP.

3.3 Assessment of impacts on the social environment

3.3.1 Brief description of the current situation within the SA

A summary of the socio-economic status of the SS RNPP site in 2021 is presented in Tables 21 and 22.

Tables 21 - Socio-economic status of the SS RNPP location area in 2021

The city	Gender.	Age category	Average monthly salary 2021 (UAH)	The unemployment rate	Total population	Migration growth of the population	Natural population growth
Varash (Rivne region)	Male: 47,52% Females: 52,48%	0-14: 20,1% 15-64: 67,0% >65: 12,9%	12762,0	10,5 %	41711	-	-
Volodymyrets (Rivne region)					9315	-	-
Rafalivka (Rivne region)					3434	-	-
Manevychi (Volyn region)	Male: 47,21% Females: 52,79%	0-14: 19,3% 15-64: 67,2% >65: 13,5%	11445,0	13,0 %	11657	-	-
On average in Ukraine (2021)	Male: 46,36 % Females: 53,64 %	0-14: 14,9% 15-64: 67,4% >65: 17,7%	14014,0	10,3 %	41167335	21261	- 442280

Tables 22 - Causes of death in the region of SS RNPP location (2021)

	Cardiovascular diseases	Tumors	External causes	Digestive system	Respiratory system	Infections and parasites	Other
Rivne region	65.38%	10.54%	4.20%	3.50%	2.22%	0.66%	13.50%
Volyn region	62.84%	9.51%	4.78%	4.10%	2.89%	1.01%	14.87%
Ukraine	60.10%	10.41%	4.04%	3.48%	3.70%	0.88%	17.39%

3.3.2 Forecast of impacts on public health in case of refusal to implement the CCSUP (under normal conditions and in case of accidents at SS RNPP)

The general information has not changed compared to paragraph 3.3.2 of the 2017 Report of the EA the CCSUP.

The results of long-term radiation monitoring and calculated data indicate that there is no significant radiation impact of the NPP on the environment and, accordingly, on public health in the observation area. Thus, it can be stated that operation of SS RNPP under normal conditions and design basis radiation accidents does not and will not have a negative radiation impact on public health in the future.

In the event of an off-design basis accident, the levels of unconditional justification for countermeasures are exceeded, and all types of countermeasures, including evacuation, will need to be applied.

3.3.3 Impact of CCSUP measures on the results of the population health forecast

3.3.3.1 Impact during the implementation of the CCSUP

The general information has not changed compared to paragraph 3.3.3.1 of the 2017 Report of the EA the CCSUP.

3.3.3.2 Impact after the implementation of the CCSUP

Implementation of the CCSUP measures will reduce the risks of emergencies and accidents or mitigate their consequences, which entails an increase in the level of protection of the population living in the SS RNPP impact area and minimization of damage that may be caused to their health.

3.3.4 Possible impacts of the CCSUP implementation on social conditions and satisfaction of the needs of the local population

3.3.4.1 Impact during the implementation of the CCSUP

The general information has not changed compared to paragraph 3.3.4.1 of the 2017 Report of the EA the CCSUP.

3.3.4.2 Impact after the implementation of the CCSUP

The general information has not changed compared to paragraph 3.3.4.2 of the 2017 Report of the EA the CCSUP.

Implementation of the CCSUP measures may lead to an increase in the time of uninterrupted operation of a nuclear power plant. This directly relates to the increase in funding for socio-economic risk compensation for the population living in the SS RNPP surveillance area. The funds for such compensation are provided by a fee of 1% of the electricity sold by NPPs (excluding value added tax). Thus, the amount of subventions to local budgets to finance socio-economic compensation measures in the SS RNPP observation area amounted to:

Name of the administrative-territorial unit	**Amount of subvention, thousand UAH**	
	2019	**2020**
Rivne region	6427,8	6410,63
Volyn region	2564,7	2521,405
Volodymyrets district (Rivne region)	9073,5	8994,738
Sarny district (Rivne region)	558,8	650,491
Kostopil district (Rivne region)	141	144,809
Manevychi district (Volyn region)	6712,9	6585,36
Varash (Rivne region)	4496,2	4466,018
In total	**29974,9**	**29773,451**

3.4 Assessment of releases to the man-made environment

3.4.1 Brief description of the current situation within the SS RNPP SA

The general information has not changed compared to paragraph 3.4.1 of the 2017 Report of the EA the CCSUP.

3.4.2 Forecast of impacts on the state of the technogenic environment in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Existing emissions of pollutants and radioactive substances into the atmosphere, their discharges into water bodies, thermal impact of SS RNPP, as well as consumption of water resources in the current state of NPP operation do not significantly affect the environment.

In the event of design basis accidents, the negative impact on the environment will not exceed permissible limits and will not require any special measures in the SS RNPP SPZ.

3.4.3 Impact of CCSUP measures on the projected changes in the state of anthropogenic environment objects

Compared to the conclusions made in paragraph 3.4.3 of the 2017 Report of the EA the CCSUP on the possibility of additional waste generation during the growth of CCSUP activities, a decrease in waste generation is noted (see paragraph 3.1.9).

It should be noted that the implementation of CCSUP measures should lead to an increase in the safety of power units, thus reducing the risks of SS RNPP impact on the environment in case of emergencies/accidents (probability of their occurrence) and the scale of their consequences, which may also lead to a reduction in the damage caused. Thus, the expected long-term impact of the CCSUP implementation on the anthropogenic environment is positive.

3.4.4 Forecast of possible negative impacts on NPPs from anthropogenic objects in case of refusal to implement and implementation of the CCSUP

The general conclusions on the absence of anthropogenic environmental impact on RNPP activities have not changed and are similar to the conclusions made in paragraph 3.4.4 of the 2017 Report of the EA the CCSUP.

Based on the assessment results, it can be concluded that there are no potential negative impacts of man-made facilities located within the 30-km surveillance zone that could cause disruptions in SS RNPP operation.

3.5 Comprehensive measures to ensure the regulatory state of the environment and its safety

3.5.1 Brief description of resource saving measures implemented at SS RNPP excluding CCSUP

The resource-saving measures listed in paragraph 3.5.1 of the 2017 Report of the EA the CCSUP remained relevant in 2017-2022. The use of environmentally friendly technologies (use of equipment with ozone-depleting substances, purchase of LED lamps instead of mercury-containing lamps, optimization of water resources uses, etc.) is included in the Environmental Protection Program of the Energoatom Company.

3.5.2 Justification of the absence of the need for additional resource-saving measures in connection with the implementation of the CCSUP

All CCSUP measures implemented at SS RNPP do not involve an increase in natural resource consumption, so no additional resource-saving measures are required.

3.5.3 Brief description of protective measures implemented at SS RNPP without taking into account the CCSUP

The general information has not changed compared to paragraph 3.5.3 of the 2017 Report of the EA the CCSUP.

3.5.4 Changes in the set of protective measures as a result of the implementation of the CCSUP

The implementation of the CCSUP measures will not lead to significant changes in the system of occupational health and safety management and social protection of personnel and the public.

It should be noted that in 2016, the Company received a certificate of compliance with the requirements of the ONSAS 18000 standard for the occupational health and safety management system, which applies to all separate divisions of the Company.

3.5.5 Brief description of remediation measures implemented during SS RNPP construction

The general information has not changed compared to paragraph 3.5.5 of the 2017 Report of the EA the CCSUP.

3.5.6 Substantiation of the absence of the need for additional remedial measures in connection with the implementation of the CCSUP

None of the CCSUP measures require the implementation of restoration measures in addition to those already implemented.

3.5.7 Brief description of compensatory measures implemented during SS RNPP operation

The general information has not changed compared to paragraph 3.5.7 of the 2017 Report of the EA the CCSUP.

3.5.8 Justification of the absence of the need for additional compensatory measures in connection with the implementation of the CCSUP

During 2017-2022, there were no grounds to change the compensation measures described in paragraph 3.5.7 based on the results of the implementation of the CCSUP.

3.5.9 Brief description of safety measures implemented during SS RNPP operation

3.5.9.1 Protective measures against radiation exposure

The general information has not changed compared to paragraph 3.5.9.1 of the 2017 Report of the EA the CCSUP.

In 2019, SS RNPP implemented a project for the construction of the Radioactive Waste Treatment Facility consisting of an extraction and sorting unit, a fragmentation unit, a pressing unit, and a RW certification unit. This project made it possible to reduce the amount of RW stored in storage facilities and currently generated, prepare RW to the state required for its disposal, and process RW during the decommissioning of SS RNPP units in the future.

3.5.9.2 Protective measures against non-radiation exposure

During the preparation and conduct of a supervisory audit by the international certification body TUV NORD CERT in October-November 2020, a high level of continuous readiness, in particular the emergency preparedness and response (civil protection) system of SE NNEGC Energoatom, for quick and effective actions in the event of nuclear and radiation accidents and other types of emergencies was confirmed.

The same high performance was confirmed by the Emergency Preparedness and Response Department of the Company's Directorate during the post-certification surveillance audit by the international certification body TUV NORD CERT from January 10 to 19, 2022. The operation of this system allowed to reduce the overall water consumption and minimize the generation of radioactive and non-radioactive waste.

The company meets the requirements of international standards:

ISO 9001:2015 «Quality management systems. Requirements»;

ISO 14001:2015 «Environmental management systems. Requirements and guidelines for use»;

ISO 45001:2018 «Occupational Health and Safety Management System».

3.5.10 Changes in the complex of security measures due to the implementation of the CCSUP

No additional specific environmental protection measures are required for the implementation of the CCSUP.

3.5.11 List and characterization of residual impacts of SS RNPP under normal operating conditions (excluding CCSUP measures)

3.5.11.1 Residual radiation exposure

The radiation impact of the RNPP is characterized by dose levels for personnel and the public in the SPZ and the SA, emissions of RS into the air and discharges of RS into water bodies, and concentrations of RS in the environment.

In general, the level of radiation impact of SS RNPP on both the public and the environment does not exceed 0.1% of the dose generated by natural sources, and therefore does not change the natural radiation level in the region where the NPP is located.

3.5.11.2 Residual non-radiation impact

The general information has not changed compared to paragraph 3.5.11.2 of the 2017 Report of the EA the CCSUP.

3.5.12 Changes in residual impacts due to the implementation of the CCSUP

The overall conclusions remain unchanged and are similar to those made in paragraph 3.5.12 of the 2017 Report of the EA the CCSUP.

The implementation of the CCSUP did not lead to any significant changes in the amount of heat and chemical components released by NPPs into water bodies and the atmosphere.

In addition, the CCSUP measures did not lead to any significant changes in the amount of noise, heat, and electromagnetic impacts of NPPs. Thus, changes in the residual impact as a result of the CCSUP implementation can be neglected.

3.5.13 Comprehensive assessment of changes in environmental impacts of SS RNPP under normal operating conditions due to CCSUP implementation

The overall conclusions remain unchanged and are similar to those made in paragraph 3.5.13 of the 2017 Report of the EA the CCSUP.

According to the assessment, the CCSUP measures implemented at SS RNPP power units did not lead to environmental degradation and did not increase emissions and discharges of radioactive and non-radioactive pollutants.

3.5.14 Comprehensive assessment of environmental risks in case of accidents at SS RNPP (excluding CCSUP)

Massive missile attacks by Russian military groups on substations, power lines, and other facilities of Ukraine's energy system in 2022 resulted in so-called "blackouts" at nuclear power plants, which meant a complete shutdown of the power grid.

On November 23, 2022, as a result of missile attacks on the Ukrainian power system by Russian troops, RNPP Units 1, 2, 3, 4 were disconnected from the grid with emergency protection activated. To ensure steam supply for own needs, boiler units No. 1 and No. 3 of the startup and standby boiler house (SSB) were put into operation, which resulted in the burning of fuel (fuel oil). The emissions of pollutants and carbon dioxide for the year (2022) did not exceed the reasonable potential emissions, volumes and values established by the supporting documents.

The data on air pollutant emissions from stationary sources for 2022 according to the statistical reporting form No. 2 -TP (air) are presented in Annex K.2, Table 51. The dynamics of changes in air emissions for 6 years is presented in Annex K.2, Table 52.

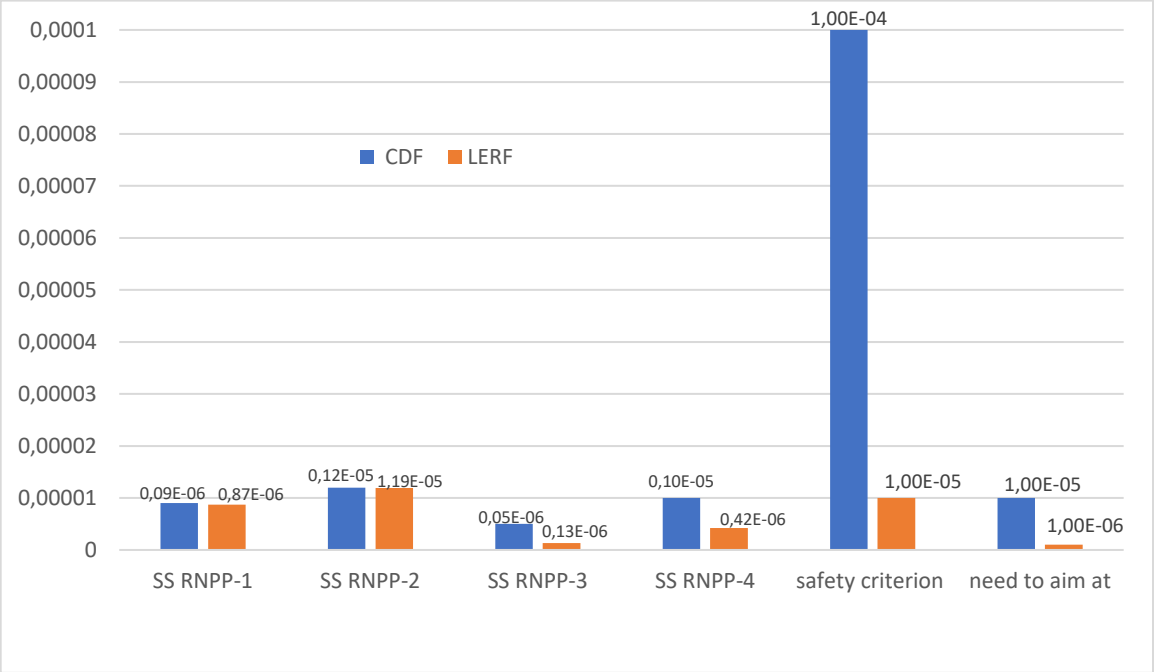
Design-basis accidents at SS RNPP will not lead to significant environmental risks outside the containment volume of the power unit and the NPP site.

3.5.15 Comprehensive assessment of changes in environmental risks (in case of accidents at SS RNPP) as a result of CCSUP implementation

The overall conclusions remain unchanged and are similar to those made in paragraph 3.5.15 of the 2017 Report of the EA the CCSUP.

Based on the results of implementation of CCSUP measures and safety reassessment of SS RNPP Units 1-4, a decrease in key safety criteria is observed, as shown in Diagram 5.

Diagram 5- Indicators of safety criteria



CDF - Core damage frequency; LERF - Large early release frequency.

3.5.16 Assessment of economic efficiency from the implementation of the CCSUP in terms of environmental and health impacts

The general information has not changed and is similar to that set out in paragraph 3.5.16 of the 2017 Report of the EA the CCSUP.

3.6 Changes in environmental impact in the process of implementation of the CCSUP

As a result of the implementation of the CCSUP, the risk of negative impacts related to emergencies will decrease either due to a decrease in the probability of such a situation occurring and/or because the NPP will be able to limit the negative impact of such a situation.

	Air and atmosphere *	**Water bodies**		**Soils**	**Flora and fauna**	**Social environment*.**
		surface waters	**underground waters**			
1 Radiation exposure						
1.1 Radiation exposure to gases and aerosols	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
1.2 Assessment of transboundary impacts	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact,	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact,	additional negative impact no additional negative impact,	additional negative impact no additional negative impact, risks reduced

		risks reduced		risks reduced	risks reduced	
1.3 Liquid radioactive waste	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional negative impact	additional negative impact no additional negative impact, risks reduced
1.4 Periodic inflows from splash ponds	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
1.5 Solid radioactive waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2 Chemical exposure						
2.1 Emissions from fuel combustion *	additional impact is acceptable, risks are reduced	no additional impact	no additional impact	no additional impact	no additional impact	additional impact is acceptable, risks are reduced
2.2 Penetration into groundwater	no additional impact	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional impact	no additional impact	additional negative impact no additional negative impact, risks reduced
2.3 Non-radioactive liquid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2.4 Non-radioactive solid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3 Physical impact						
3.1 Thermal impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3.2 Noise and electromagnetic radiation *	additional impact is acceptable, risks are reduced	no additional impact	no additional impact	no additional impact	no additional impact	additional impact is acceptable, risks are reduced
Conclusions*	additional negative impact is temporary, risks are mitigated	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
*General conclusions are reassessed taking into account the case of a design-basis accident, i.e. complete NPP blackout in 2022						

4 EO OF THE RESULTS OF THE IMPLEMENTATION OF THE CCSUP AT SS «KHMELNYTSKA NPP»

4.1 General characteristics of the SS KhNPP.

4.1.1 Region and location of the SS KhNPP site

The general information provided in this paragraph has not changed compared to paragraph 4.1.1 of the 2017 Report of the EA the CCSUP.

4.1.2 Brief description of SS KhNPP production, safety classes

Two power units are in operation at SS KhNPP:

– I unit (WWER -1000/V-320) with a capacity of 1 million kW since 1987;

– II unit (WWER -1000/V-320) with a capacity of 1 million kW since 2005.

Facilities at the stage of completion of construction and commissioning:

– Completion of power units № 3 and № 4;

– Construction of the RW Treatment Plant.

4.1.3 Brief description of products manufactured by SS KhNPP

The general information provided in this paragraph has not changed compared to paragraph 4.1.3 of the 2017 Report of the EA the CCSUP.

4.1.4 Data on raw materials, land, water, energy and other resources used

The general information provided in this paragraph has not changed compared to paragraph 4.1.4 of the 2017 Report of the EA the CCSUP.

4.1.5 Short description of SS KhNPP technological process

The general information provided in this paragraph has not changed compared to paragraph 4.1.5 of the 2017 Report of the EA the CCSUP.

4.1.6 CCSUP technical solutions aimed at eliminating or reducing harmful emissions, discharges, leaks and radiation into the environment

The CCSUP EA assessed the impact of implemented or ongoing measures and made assumptions about the possibility of reducing or mitigating the risk of a harmful release based

on the dynamics of current volumes of radioactive and pollutant emissions or discharges, their concentration in the air, water bodies, and soil both at the NPP site and in the SPZ and the SZ.

First of all, this applies to the following measures:

10101	Development of materials and qualification of power unit elements	Reducing dose loads	Implemented
11303	Reducing the risk of core damage in the "fuel overload" condition	Reduction of dose loads, emissions of RS	Implemented
11305	Ensure fueling and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout	Reduced heat load	Implemented
12203	Inspection of check valves on hot steam pipelines to determine the remaining service life and replace them (if necessary) based on the inspection results	Reducing emissions of RS	Implemented
13302	Ensuring the high-speed pressure reducing unit's operability during the end of the steam-water mixture and water, as well as ensuring reliable performance of the emergency pressure relief function	Reduction of dose loads, emissions of RS	Implemented
13307	Ensuring steam generator feeding in conditions of prolonged complete NPP blackout	Power failure warning	Implemented
13402	Upgrading of the High Pressure Zone Emergency Cooling System to provide the ability to control the head pressure when the system pump is operating on the 1st contour	Reducing emissions of RS	At the stage of implementation
13501	Replacement of stand-alone air conditioners with air conditioners qualified for «harsh» conditions and seismic impacts	Reducing emissions of RS	Implemented
13502	Implementation of a comprehensive system for diagnostics of RPU systems	Preventing emergencies	Implemented
13503	Organization of new boron-10 concentration monitoring sites in systems related to the 1st contour	Reduction of dose loads, emissions of RS	Implemented
13509	Implementation of an «industrial» television system for fire/explosion hazardous and unattended premises	Preventing emergencies	Implemented
13510	Implementation of high-tight plugs in the steam generator collectors during repair work	Prevention of emergencies and releases of RS	At the stage of implementation
13511	Ensuring the operability of consumers of the group "A" process water system when dehydrating splash pools	Reduction of dose loads and thermal effects	Implemented
14101	Instrumentation during and after accidents (PAMS)	Reduction of dose loads, emissions of RS	Implemented
14102	Implementation of the pipeline movement control system for the 1st contour	Prevention of emergencies and discharges of RS	Implemented
14104	Modernization of the hydrogen cooling control system for the generator	Prevention of emergencies and emissions of RS	Implemented
14105	Modernization of the system of normal operation of the reactor compartment important for safety (NOS of the RCIS) (control and measuring instruments (CMI), process protection, interlocking and alarm (PPI&A), automatic control and remote control system (ATS and RC), equipment of special enclosures of safety class ZN)	Preventing emergencies	Implemented

14106	Modernization of the system of normal operation important for the safety of the turbine compartment (SNE of the TC) (control and measuring instruments (CMI), turbine mechanical value control system (TMVCS), technological protection, interlocks and signaling (TPI&S), automatic regulation and remote control system (ARRCS))	Preventing emergencies	Implemented
14205	Modernization of the drive control system of the PCS, including the power supply system	Preventing emergencies	Implemented
14301	Modernization of security control systems with the replacement of UTEC	Preventing emergencies	Implemented at power units № 1 KhNPP. At the stage of implementation at power unit № 2 KhNPP
14401	Modernization of NPP radiation monitoring systems (RMS)	Prevention of emergencies and emissions of RS	Implemented
14404	Modernization of the control system for backup diesel generators	Prevention of emergencies and emissions of RS	Implemented
14405	Modernization of the control system of the reloading machine	Reducing emissions of RS	Implemented
14406	Modernization of the automated chemical control system 1,2. Improvement and automation of the water and chemical regime of the 1st and 2nd circuit	Prevention of emergencies and discharges of RS	Implemented at power units № 1 KhNPP. At the stage of implementation at power unit № 2 KhNPP
14407	Reconstruction of the control system of the K-1000-60 /3000 turbine	Prevention of emergencies and emissions of RS	Implemented
15103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Prevention of emergencies and emissions of RS	Implemented
15201	Replacement of 6kV circuit breakers in the channels of the Safety System and Safety Important System, station-wide and block diagrams of Internal Fires	Preventing power outages and emergencies	Implemented
15202	Modernization of the Emergency Power Supply System of the 1st reliability group (including replacement of the Uninterruptible Power Supply, DC Shield, Batteries, etc.)	Prevention of emergency situations,	Implemented
15203	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Prevention of fires and emergencies	Implemented
15204	Modernization of Relay Protection and Automation circuits of the 6kV auxiliary power supply system	Prevention of fires and emergencies	Implemented
15205	Modernization of the Safety Critical System with replacement of 6 ha 0.4 kV electric motors	Prevention of fires and emergencies	Implemented
15206	Modernization of 0.4 kV switchgear	Prevention of fires and emergencies	Implemented

15207	Modernization of power and control seals through contraction	Prevention of fires and emergencies	Implemented
15208	Modernization of Relay Protection and Automation schemes with the introduction of relays based on microelectronics	Prevention of fires and emergencies	Implemented
15212	Modernization of the generator excitation system	Preventing power outages and emergencies	Implemented
16101	Prevention of early containment bypass as a result of molten core masses from the reactor shaft outside the containment volume	Reducing emissions of RS	Implemented
16201	Implementation of a system for monitoring the hydrogen concentration in the containment vessel for off-design accidents	Prevention of explosions, accidental emissions of RS	Implemented
16202	Equipping SS NPP power units with remote control systems for forces in the containment pretensioning system armor cables	Preventing emergencies	Implemented at power units № 1 KhNPP. At the stage of implementation at power unit № 2 KhNPP
16203	Development and implementation of measures to reduce hydrogen concentration in the containment vessel for beyond design basis accidents	Prevention of explosions, accidental emissions of RS	Implemented
16205	Implementation of a forced pressure relief system from the Gas Treatment System	Prevention of explosions, accidental emissions of RS	Implemented
17102	Development and implementation of a smoke protection system for the premises and evacuation corridors of the RD, which have no restrictions on communication with the environment	Prevention of fires, emissions of RS	Implemented at power units № 2 KhNPP. At the stage of implementation at power unit № 1 KhNPP
17104	Equipping the main NPP power supply circuit with automatic control units for oil-filled power equipment	Prevention of fires, emissions of RS	Implemented at power units № 1 KhNPP. At the stage of implementation at power unit № 2 KhNPP
17105	Modernization of the automatic fire alarm system for the premises of the RD, DD, EETU, ER, SC	Prevention of fires, emissions of RS	Implemented
17106	Equipping NPP premises containing electrical and electronic equipment with stationary non-automatic gas fire extinguishing systems	Prevention of fires, emissions of RS	Implemented at power units № 1 KhNPP. At the stage of implementation at power unit № 2 KhNPP
17107	Installation of fire-retardant valves on air ducts in fire partitions of ventilation centers, battery rooms, cable facilities and rooms containing electrical and electronic equipment, separating them from rooms of other categories for explosion and fire safety	Prevention of fires, emissions of RS	Implemented at power units № 1 KhNPP. At the stage of implementation

			at power unit № 2 KhNPP
17108	Bringing the fire resistance limit of removable non-combustible structures of cable ducts and raised floors of NPP premises containing electrical and electronic equipment to the normalized value"	Prevention of fires, emissions of RS	Implemented
17110	Replacement of combustible roof insulation in the engine room	Prevention of fires, emissions of RS	Implemented
17201	Ensuring the performance of a fast-acting shut-off valve for resistance to internal and external influences	Prevention of releases and discharges of RS	Implemented
18101	Ensuring seismic resistance of systems and building structures	Preventing emergencies	Stage 1 implemented at power units 1 and 2 KhNPP
18102	Implementation of seismological monitoring systems for NPP sites	Preventing emergencies	Implemented
19102	Development of operational probabilistic security analysis	Preventing emergencies	Implemented
19103	Consideration of the full range of initial events for all regulatory states of the Reactor Facility and the spent fuel pool in the probabilistic safety analysis	Preventing emergencies	Implemented
19203	Improvement of instructions for eliminating accidents arising from reduced power and preventive maintenance	Reducing emissions and discharges of RS	Implemented
19204	Performs analysis of severe accidents. Developing a guide for managing severe accidents	Preventing emergencies	Implemented

4.1.7 Short description of the SNF management scheme. Volumes of SNF

The general information on the SNF management scheme has not changed compared to paragraph 4.1.7 of the 2017 Report of the EA the CCSUP.

4.1.8 Short description of the RW management scheme. Volumes of RW

4.1.8.1 Solid radioactive waste

The general information on the type of solid radioactive waste, its nomenclature and management procedure has not changed compared to paragraph 4.1.8.1 of the 2017 Report of the EA the CCSUP.

The volumes of solid radioactive waste generated and stored in the storage facilities at SS KhNPP are shown in Table 23.

Table 23 - Volumes of solid radioactive waste generation and storage, cubic meters

	Low-active		Середньоактивні		Високоактивні	
	formed	stored	formed	stored	formed	stored
2017	134,2	5474,74	3,33	133,06	0,35	10,72
2018	157,6	5632,34	2,21	135,27	0,18	10,9

2019	208,25	5840,59	1,32	136,59	0,08	10,98
2020	130,98	5971,57	0,31	136,9	0,19	11,17
2021	185,02	6156,59	24,61*	1343,11	0,135	11,302
2022	121,33	6277,91	26,71	1369,82	0,208	11,51

* Increased levels of radioactive waste generation and storage are associated with the classification of salt melt as solid radioactive waste

There are no facilities for solid radioactive waste processing at SS KhNPP.

4.1.8.2 Liquid radioactive waste

The general information on the type of liquid radioactive waste, its nomenclature, sources of generation, processing methods, and management procedure provided in this paragraph has not changed compared to paragraph 4.1.8.2 of the 2017 Report of the EA the CCSUP.

The volumes of liquid radioactive waste generated, processed and stored in storage facilities at SS KhNPP are shown in Table 24.

Table 24 - Generation, processing and storage of liquid radioactive waste at SS KhNPPs, cubic meters

	Cubic residual			Spent sorbents, sludge		Filter materials		Saltwater float*	
	formed	Revised	Stored	formed	Stored	formed	Stored	formed	Stored
2017	86,00	100,00	368,2	5,6	76,8	-	180,8	24,00	1276,3
2018	113,4	100,00	381,6	9,4	90,9	5,00	185,8	24,00	1315,2
2019	153,2	80,00	460,8	16,00	114,9	6,00	185,8	20,4	1344,4
2020	95,6	150,00	406,4	12,2	133,2	-	185,8	36,00	1398,4
2021	107,2	98,00	414,8	14,4	154,8	-	185,8	-	-
2022	89,6	110,00	394,4	6,00	163,8	-	185,8	-	-

**Since 2021, salt float is classified as solid radioactive waste*

4.1.9 Short description of the waste management scheme (including hazardous waste). Waste volumes

The general information on the type of waste, its nomenclature, sources of generation, processing methods, and the procedure for its management has not changed compared to paragraph 4.1.9 of the 2017 Report of the EA the CCSUP.

The dynamics of waste generation by hazard class is shown in Table 25.

Table 25 - Dynamics of non-radioactive waste generation at SS KhNPP

Indicator.	2017	2018	2019	2020	2021	2022
Waste generated, tons, including:	1937,062	1638,85	3044,02	2703,89	3872,94	4837,64
I class, hazards	2,53	2,98	2,494	3,153	2,011	3,67
II class, hazards	51,46	33,28	280,33	72,304	360,56	157,944
III class, hazards	86,07	54,71	54,79	198,21	96,54	54,13
IV class, hazards	1797,005	1547,884	2706,411	2430,22	3416,84	4621,9

For the period from 2017 to 2019, the total volume of waste generation of all hazard classes ranged from 1.9 to 3.0 thousand tons, which does not allow us to conclude a certain trend in their generation.

The analysis of the indicators presented in the table from 2019 to 2022 shows a tendency to increase the total amount of non-radioactive waste generation from 2.7 thousand tons in 2020 to almost 4.8 thousand tons in 2022, i.e. the total amount of waste generation increased by 1.7 times.

Such waste generation is due to the implementation of construction and installation works for capital and current construction, medium and major repairs of KhNPP power units, namely the increase in waste in the class «4510.2.9.09 waste of mixed construction and demolition of buildings and structures (waste of construction materials)».

Implementation of the CCSUP measures does not affect the overall waste generation.

Construction and installation works on capital and current construction and medium and major repairs of KhNPP power units by years of implementation:

In 2019:

1. Construction of KhNPP Units 3 and 4;
2. Repairs of KhNPP Unit 1.

In 2020:

1. Dismantling of structures according to the project Construction of a radioactive waste treatment complex at KhNPP by SE NNEGC Energoatom has been started;
2. Construction of KhNPP Units 3 and 4.

In 2021:

1. Construction of KhNPP Units 3 and 4;
2. Medium repairs of KhNPP Unit 2;
3. Overhaul of KhNPP Unit 1;
4. Unscheduled outage of KhNPP Unit 2;
5. Construction of the radioactive waste treatment facility at KhNPP (installation of foundations and building frame).

In 2022:

1. Construction of KhNPP Units 3 and 4;
2. Construction of the radioactive waste treatment facility at KhNPP.

Waste of hazard class IV prevails in the overall structure of waste generation, with a share of up to 95.5% (in 2022).

Waste generation of hazard class I is less than 1%, hazard class II ranges from 2% to 9.3%, and hazard class III ranges from 1.12% to 7.33%.

The following facilities are organized for the disposal and processing of industrial waste generated in the course of SS KhNPP production activities:

– Sludge SF: is used to receive sludge generated from water clarification of the pretreatment unit of the chemical shop and sludge generated from the regeneration of ion exchangers of the municipal drinking water deironment plant. The sludge pond is located 50 meters east of the SS KhNPP industrial site perimeter.

– Composting site: serves for aging and maturation of sludge from municipal (city) wastewater treatment; sludge that does not contain oil products (sludge from splash pools); waste fire extinguishing agents.

4.1.10 Technical solutions of the CCSUP aimed at reducing waste volumes and improving the environmental safety of waste management

The CCSUP does not provide for measures for SS KhNPPs aimed at reducing the amount of process waste or improving the waste management scheme. Waste management meets the requirements of the legislation.

4.1.11 Short description of the analyzed design and beyond design accidents

General information has not changed compared to paragraph 4.1.11 of the 2017 Report of the EA the CCSUP.

The list of design and beyond design basis accidents and their radiation consequences is typical for WWER-1000/V-320 power units operated at SS KhNPP and is presented in paragraph 2.1.11 of this Report.

4.1.12 Short description of design technical solutions aimed at reducing the likelihood and consequences of accidents (excluding the CCSUP measures)

General information has not changed compared to paragraph 4.1.12 of the 2017 Report of the EA the CCSUP.

4.1.13 Technical solutions of the CCSUP aimed at reducing the likelihood and consequences of accidents

General information has not changed compared to paragraph 4.1.13 of the 2017 Report of the EA the CCSUP. The list of measures is given in paragraph 2.1.6 of this Report.

Achieved safety criteria - core meltdown frequency and frequency of maximum emergency release are given in paragraph 4.5.15.

4.1.14 Sanitary protection zone and observation zone of SS KhNPP

General information has not changed compared to paragraph 4.1.14 of the 2017 Report of the EA the CCSUP.

4.2 Assessment of environmental impacts

4.2.1 Climate and microclimate

4.2.1.1 Brief description of the existing situation within the SA

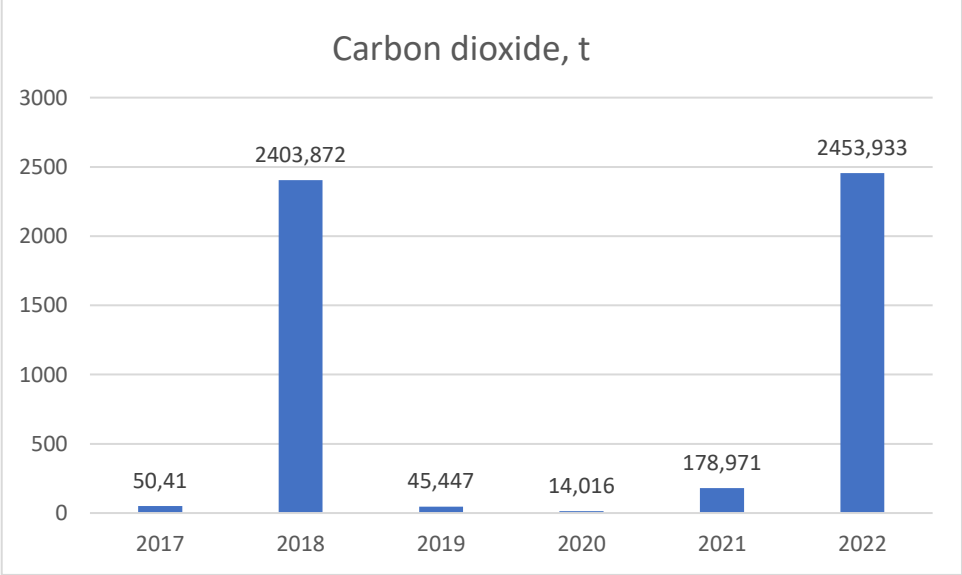
General information has not changed compared to paragraph 4.2.1.1 of the 2017 Report of the EA the CCSUP.

4.2.1.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

Implementation of the CCSUP did not affect the climate and microclimate characteristics in the area of SS KhNPP location.

The CCSUP also did not affect the amount of greenhouse gases emitted into the atmosphere annually as a result of NPP operation, and therefore no impact on the global climate is expected. The dynamics of greenhouse gas emissions is shown in Diagram 6.

Diagram 6 - Dynamics of carbon dioxide emissions at SS KhNPPs



4.2.2 The air environment

4.2.2.1 Brief description of the existing situation within the SA

The general information compared to paragraph 4.2.2.1 of the 2017 Report of the EA the CCSUP has no fundamental changes during 2017-2022.

As of January 1, 2023, the total number of sources of air pollution amounted to 219 units, including 97 organized sources (44%) and 122 unorganized sources (56%).

In April and November 2022, design basis accidents occurred at KhNPP, namely, a complete blackout of the NPP as a result of a power grid accident caused by missile attacks on the Ukrainian power system by Russian troops. KhNPP power units were disconnected from the grid with emergency protection activated. To ensure the supply of steam for own needs, the boilers of the start-up and standby boiler house (SSB) were put into operation, which resulted in the burning of a larger amount of fuel (fuel oil).

The data on air pollutant emissions from stationary sources for 2022 are presented in Appendix K.3 in Table 61. The emissions of pollutants and carbon dioxide for the year (2022) exceeded the reasonable potential emissions, volumes and values established by the supporting documents.

The dynamics of changes in air emissions for 6 years are shown in Annex K.3, Table 62.

Compared to the minimum emissions achieved over the past five years (in 2020), according to the data in Annex K.3, Table 62, the gross emissions increased by 41.6% in 2022 due to objective reasons (unforeseen power unit outages).

The dynamics of emissions of pollutants (non-radioactive) substances and radionuclides is presented in Annex K.3.

Observations of the atmospheric air condition within the industrial site, the SZ and the SPZ of the SS KhNPP for the period 2017-2022 indicate the following:

– the content of pollutants and radionuclides in the air does not exceed the maximum permissible concentrations established by regulations (Annex K.3, Tables 63-66);

– the volume of pollutant emissions does not exceed the maximum permissible limits established by the relevant permits;

– emission levels of pollutants and radionuclides do not lead to a deterioration in air quality;

– the direct implementation of the CCSUP measures did not lead to an increase in the anthropogenic load on the air.

4.2.2.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Under normal operating conditions, no negative radiation impact of SS KhNPP on the air environment is expected.

In the event of emergencies/accidents and depending on their nature and scale, significant amounts of radioactive contaminants and dust may potentially be released into the air. Radiological consequences of air pollution in case of design and beyond design basis accidents are considered in paragraph 4.3.2.

4.2.2.3 Impact of the CCSUP measures on the projected changes

The overall conclusions on the future impact of the CCSUP measures have not changed and are similar to those made in paragraph 4.2.2.3 of the 2017 Report of the EA the CCSUP.

4.2.3 The geological environment

4.2.3.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 4.2.3.1 of the 2017 Report of the EA the CCSUP.

4.2.3.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

General information has not changed compared to paragraph 4.2.3.2 of the 2017 Report of the EA the CCSUP.

In order to monitor seismological activity at the SS KhNPP site, the measure CCSUP 18102 "Implementation of seismological monitoring systems for NPP sites" is being implemented.

4.2.4 Water environment (groundwater, open water)

4.2.4.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 4.2.4.1 of the 2017 Report of the EA the CCSUP.

Drinking (underground) water is used from the Netishyn groundwater deposit owned by SS KhNPP and operated since 1981. The water is taken from 16 wells with a depth of 220-240 meters, which are located in a planar manner.

Technical water supply to SS KhNPP is provided by water accumulated in the 120 million m3 long-term cooling pond. Water intake from the Goryn River is provided to replenish the cooling pond, and the runoff of the Hnylyi Rih River is fully accumulated in the pond.

The dynamics of water use by SS KhNPP is presented in Table 26.

Table 26 - Water consumption by SS KhNPP Units

Name of the water supply source	Water used, thousand cubic meters.					
	2017	2018	2019	2020	2021	2022
Artesian water	1245,9	1281,0	1471,4	1277,7	1378,3	1060,6
Technical	37673,4	18332,8	14471,8	30664,0	39660,8	22882,8
Gnilyi Rih River	10975,0	10479,5	10909,2	7889,2	16253,1	15986,4
Goryn River	26698,4	7853,3	3562,6	22774,8	23407,7	6896,4

The average indicators of surface and groundwater quality for 2022 are presented in Annex K.3.

The analysis of the monitored indicators shows that the operation of the SS KhNPP does not significantly change the quality of surface water. The state of water in the Goryn River (control section) remains at the level of previous years and has no sharp deviations.

4.2.4.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 4.2.4.2 1 of the 2017 Report of the EA the CCSUP.

Without taking into account the CCSUP and in the absence of emergencies/accidents related to radionuclide releases, no significant negative impact of SS KhNPP on changes in the state of water bodies is expected. In the event of an accident and depending on its nature, significant amounts of radioactive contaminants may potentially enter the water environment.

4.2.4.3 Impact of CCSUP *measures on projected changes in the state*

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 4.2.4.3 of the 2017 Report of the EA the CCSUP.

The CCSUP is not aimed at increasing electricity generation, therefore, it is not expected to increase NPP water consumption, changes in thermal chemical and radioactive discharges to water bodies. The CCSUP will reduce the risk of accidents at NPPs and, consequently, the risk of radioactive contamination of the water environment, which is a positive impact of the CCSUP.

4.2.5 Soils

4.2.5.1 Brief description of the current situation within the SA

General information has not changed compared to paragraph 4.2.5.1 of the 2017 Report of the EA the CCSUP. The results of radionuclide content in the soils of the SS KhNPP SA are presented in Annex K.3.

4.2.5.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

The general information has not changed compared to clause 4.2.5.2 of the 2017 Report of the EA the CCSUP.

4.2.5.3 Impact of CCSUP measures on projected changes in the state

The general information and conclusions have not changed compared to paragraph 4.2.5.3 of the 2017 Report of the EA the CCSUP.

4.2.6 Flora and fauna, nature reserves

4.2.6.1 Brief description of the existing situation within the SA

General information has not changed compared to paragraph 4.2.6.1 of the 2017 Report of the EA the CCSUP.

The implementation of the CBNRP measures during 2017-2022 did not lead to changes in the relative distribution of flora or fauna species.

4.2.6.2 Predicted state changes in case of failure to implement the CCSUP (under normal conditions and in case of NPP accidents)

Under normal operating conditions, SS KhNPP does not have a negative impact on flora, fauna and protected areas.

4.2.6.3 Impact of CCSUP measures on projected changes in the state

The general conclusions regarding the absence of future impacts of the CCSUP measures on flora and fauna, protected areas have not changed and are similar to the conclusions made in paragraph 4.2.6.3 of the 2017 Report of the EA the CCSUP.

4.3 Assessment of impacts on the social environment

4.3.1 Brief description of the current state of the social environment within the SA

A summary of the socio-economic status of the SS KhNPP site in 2021 is presented in Tables 27 and 28.

Table 27 - Socio-economic status of the SS KhNPP site area

The city	Gender.	Age category	Average monthly salary 2021 (UAH)	Unemployment rate	Total population	Migration growth of the population	Natural population growth
Netishyn (Khmelnytsky region)	Male: 46,52% Females.:53,48%	0-14: 15,5% 15-64: 66,9% >65: 17,6%	12326,0	10,0 %	36492	-	38
Slavuta (Khmelnytsky region)					34918	-	-146
Iziaslav (Khmelnytsky region)					15996	-	-
Ostroh (Rivne region)	Male: 47,52% Females.: 52,48%	0-14: 20,1% 15-64: 67,0% >65: 12,9%	12762,0	9,6 %	14894	-	-
On average in Ukraine (2021)	Male: 46,36 % Females.: 53,64 %	0-14: 14,9% 15-64: 67,4% >65: 17,7%	14014,0	10,3 %	41167335	21261	- 442280

Table 28 - Causes of death in the region of SS KhNPP location (2021)

	Cardiovascular	Tumors	External causes	Digestive system	Respiratory system	Infections and parasites	Other
Khmelnytsky region	54.97%	10.06%	3.85%	3.02%	2.87%	0.59%	24.64%
Rivne region	65.38%	10.54%	4.20%	3.50%	2.22%	0.66%	13.50%
Ukraine	60.10%	10.41%	4.04%	3.48%	3.70%	0.88%	17.39%

4.3.2 Forecast of impacts on public health in case of refusal to implement CCSUP measures (under normal conditions and in case of NPP accidents)

General information has not changed compared to paragraph 4.3.2 of the 2017 Report of the EA the CCSUP. The conclusions on the expected doses to human organs and tissues are similar to those given in paragraph 2.3.2 of this Report in view of the operation of similar power units.

4.3.3 Impact of CCSUP measures on the results of population health forecasts

4.3.3.1 Impact during the implementation of the CCSUP

General information has not changed compared to paragraph 4.3.3.1 of the 2017 Report of the EA the CCSUP.

4.3.3.2 Impact after the implementation of the CCSUP

Implementation of the CCSUP measures will reduce the risks of accidents and emergencies or mitigate their consequences, which entails an increase in the level of protection of the population living in the area of SS KhNPP impact and minimization of damage that may be caused to their health. In addition, reducing the risk of accidents reduces the level of stress associated with working or living near a nuclear power plant, which has a positive impact on the psychological state of workers and the population of the surrounding areas.

4.3.4 Possible impacts of the CCSUP implementation on social conditions and satisfaction of the needs of the local population

4.3.4.1 Impact during the implementation of the CCSUP

General information has not changed compared to paragraph 4.3.4.1 of the 2017 Report of the EA the CCSUP.

4.3.4.2 Impact after the implementation of the CCSUP

General information has not changed compared to paragraph 4.3.4.2 of the 2017 Report of the EA the CCSUP.

Implementation of the CCSUP measures may lead to an increase in the uninterrupted operation time of the nuclear power plant. This directly relates to the increase in funding for socio-economic compensation of the risk of the population living in the SS KhNPP observation zone. Funds for such compensation are provided by a fee of 1% of the electricity sold by NPPs (excluding value added tax). Thus, the amount of subventions to local budgets to finance socio-economic compensation measures in the SS KhNPP observation area amounted to

Name of the administrative-territorial unit	**Subvention amount, thousand, UAH**	
	2019	**2020**
Khmelnytsky region	3501,2	4289,616
Rivne region	1531,3	1860,13
Slavuta district (Khmelnytskyi region)	1116	1403,07
Izyaslav district (Khmelnytsky region)	2177,1	2641,796
Bilohirskyi district (Khmelnytskyi region)	219	249,938
Shepetivka district (Khmelnytskyi region)	64,3	78,014
Ostroh district (Rivne region)	1728,7	2066,702
Hoshcha district (Rivne region)	531,1	646,558
Zdolbuniv district (Rivne region)	311,4	378,367
Slavuta (Khmelnytsky region)	2160,8	2669,322
the city of Ostroh (Rivne region)	917,9	1140,767
Netishyn (Khmelnytsky region)	2516,2	3074,873
In total	**16775**	**20499,153**

4.4 Assessment of impacts on the man-made environment

4.4.1 Brief description of the existing situation within the SA SSKHNPP

General information has not changed compared to paragraph 4.4.1 of the 2017 Report of the EA the CCSUP.

4.4.2 Forecast of impacts on the state of the technogenic environment in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Existing emissions of pollutants and RS into the atmosphere, their discharges into water bodies, thermal impact of SS KhNPP, as well as consumption of water resources under the current state of NPP operation do not significantly affect the surrounding anthropogenic environment.

In the event of design basis accidents, the negative impact on the environment will not exceed the permissible limits and will not require any special measures in the SS KhNPP SPZ.

4.4.3 Impact of implementation of CCSUP measures on the predicted changes in the state of anthropogenic environment objects

Compared to the conclusions made in paragraph 4.4.3 of the 2017 Report of the EA the CCSUP on the possibility of additional waste generation during the growth of CCSUP activities, an increase in waste generation is noted (see paragraph 4.1.9).

Such waste generation is due to the implementation of construction and installation works for capital and current construction, medium and major repairs of KhNPP power units, namely the increase in waste in the class «4510.2.9.09 waste of mixed construction and demolition of buildings and structures (waste of construction materials)».

Implementation of the CCSUP measures does not affect the overall waste generation.

It should be noted that the implementation of CCSUP measures will lead to an increase in the safety of power units, thus reducing the risks of SS KhNPP impact on the environment in the event of emergencies/accidents (probability of their occurrence) and the scale of their consequences, which may also lead to a reduction in the damage caused. Thus, the expected long-term impact of the CCSUP implementation on the anthropogenic environment is positive.

4.4.4 Forecast of possible negative impacts on NPPs from anthropogenic objects in case of refusal to implement and implementation of the CCSUP

The general conclusions on the absence of anthropogenic environmental impact on SS KhNPP activities have not changed and are similar to the conclusions made in paragraph 4.4.4 of the 2017 Report of the EA the CCSUP.

According to the results of the regular assessment, it can be concluded that there are no potential negative impacts of man-made facilities that could cause disruptions in the operation of SS KhNPP.

4.5 Comprehensive measures to ensure the regulatory state of the environment and its safety

4.5.1 Brief description of resource saving measures implemented at SS KhNPP excluding CCSUP

The resource-saving measures listed in paragraph 4.5.1 of the 2017 Report of the EA the CCSUP remained relevant during 2017-2022. The use of environmentally friendly technologies (use of equipment with ozone-depleting substances, purchase of LED lamps instead of mercury-containing lamps, optimization of water resources uses, optimization of cooling pond blowdown, conservation and plugging of artificial wells, etc.) is included in the Environmental Protection Program of SE NNEGC Energoatom.

4.5.2 Justification of the absence of the need for additional resource-saving measures in connection with the implementation of the CCSUP

All CCSUP measures implemented at SS KhNPP did not involve an increase in natural resource consumption, so no additional resource-saving measures were required.

4.5.3 Brief description of social protection and labor protection measures implemented at SS KhNPP excluding the CCSUP

General information has not changed compared to paragraph 4.5.3 of the 2017 Report of the EA the CCSUP.

Information on the new civil protection system in connection with the entry into force of the Civil Protection Code of Ukraine in 2012 is provided in paragraph 2.5.3.

4.5.4 Changes in the complex of protective measures as a result of the implementation of the CCSUP

The implementation of the KPWC measures did not lead to any significant changes in the system of occupational health and safety management and social protection of personnel and the public.

4.5.5 Brief description of remediation measures implemented during the construction of SS KhNPP

General information has not changed compared to paragraph 4.5.5 of the 2017 Report of the EA the CCSUP.

4.5.6 Justification of the absence of the need for additional remediation measures in connection with the implementation of the CCSUP

None of the CCSUP measures require the implementation of restoration measures in addition to those already implemented.

4.5.7 Brief description of compensatory measures implemented during SS KhNPP operation

General information has not changed compared to paragraph 4.5.7 of the 2017 Report of the EA the CCSUP.

4.5.8 Justification of the absence of the need for additional compensatory measures in connection with the implementation of the CCSUP

During 2017-2022, there were no grounds to change the compensation measures described in paragraph 4.5.7 based on the results of the implementation of the CCSUP.

4.5.9 Brief description of safety measures implemented during operation of SS KhNPP

4.5.9.1 Protective measures against radiation exposure

General information has not changed compared to paragraph 4.5.9.1 of the 2017 Report of the EA the CCSUP.

In 2016, measures were taken to build a radioactive waste treatment complex that will include the following facilities:

- fragmentation and sorting unit;
- incineration unit;
- pressing installation;
- decontamination unit;
- installation of cementation.

SS Khmelnytsky NPP is in operation:

- deep steaming unit (cube residue processing);
- centrifugation unit (gangway water processing).

4.5.9.2 Protective measures against non-radiation exposure

During the preparation and conduct of a supervisory audit by the international certification body TUV NORD CERT in October-November 2020, a high level of continuous readiness, in particular the emergency preparedness and response (civil protection) system of SE NNEGC Energoatom, for quick and effective actions in the event of nuclear and radiation accidents and other types of emergencies was confirmed.

The same high performance was confirmed by the Emergency Preparedness and Response Department of the Company's Directorate during the post-certification surveillance audit by the international certification body TUV NORD CERT from January 10 to 19, 2022. The operation of this system allowed to reduce the overall water consumption and minimize the generation of radioactive waste.

The company complies with the requirements of international standards:

ISO 9001:2015 «Quality Management Systems. Requirements»;

ISO 14001:2015 «Environmental management systems. Requirements and guidelines for use»;

ISO 45001:2018 «Occupational Health and Safety Management System».

4.5.10 Changes in the complex of security measures due to the implementation of the CCSUP

No additional specific environmental protection measures are required for the implementation of the CCSUP.

4.5.11 List and characterization of residual impacts from SS KhNPP under normal operating conditions (excluding CCSUP))

4.5.11.1 Residual radiation exposure

The radiation impact of the SS KhNPP is characterized by the levels of radiation doses to personnel and the public in the SPZ and SA, emissions of radioactive substances into the air and discharges of radioactive substances into water bodies, and concentrations of radioactive substances in the environment.

Total annual emissions of inert radioactive gases (IRG), long-lived radionuclides (LLR) and iodine radionuclides from SS KhNPP are presented in Annex K.3.

In general, the level of radiation impact of SS KhNPP on both the public and the environment does not exceed 0.1% of the dose generated by natural sources, and therefore does not change the natural radiation level in the region where the NPP is located.

4.5.11.2 Residual non-radiation impact

General information has not changed compared to paragraph 4.5.11.2 of the 2017 Report of the EA the CCSUP.

The SS KhNPP monitors the state of atmospheric air in the SPZ and the AS. The monitoring is carried out based on the content of nitrogen and sulfur oxides in the air. The average annual content of pollutants on the boundary of the SPZ is as follows:

- Sulfur oxides - less than 0.05 mg/dm^3 (<10% of the MPC (0.5 mg/dm^3),
- Nitrogen oxides - less than 0.02 mg/dm^3 (<10% of the MPC (0.2 mg/dm^3).

The following should be noted with regard to the cooling pond blowdown procedure aimed at improving the cooling water. In 2014, for the first time, SS KhNPP developed the Regulations for Discharge of Cooling Water from the Khmelnytskyi NPP Cooling Pond to a Water Body (Viliya River) for the period until 27.11.2019.

In 2019, the cooling ponds purging regime was adjusted in accordance with the company's standard SOU NNEGC 058:2015 «Environmental Protection». Procedure for Development of the Regulations for NPP Cooling Ponds Purging. Guidelines". As of today, SS KhNPP does not blow down the cooling pond. In general, there are no violations of water quality indicators (thermal, chemical, biological) of the cooling pond.

4.5.12 Changes in residual impacts as a result of the implementation of the CCSUP

The overall conclusions remain unchanged and are similar to those made in paragraph 4.5.12 of the 2017 Report of the EA the CCSUP.

4.5.13 Comprehensive assessment of changes in environmental impacts of SS KhNPP under normal operating conditions as a result of CCSUP implementation

The overall conclusions remain unchanged and are similar to those made in paragraph 4.5.13 of the 2017 Report of the EA the CCSUP.

According to the results of the assessment, CCSUP measures implemented at SS KhNPP units did not lead to environmental degradation or increase in emissions and discharges of both radioactive and non-radioactive pollutants.

4.5.14 Comprehensive assessment of environmental risks in case of accidents at SS KhNPP without taking into account CCSUP measures

Massive missile attacks by Russian military groups on substations, power lines, and other facilities of Ukraine's energy system in 2022 resulted in so-called "blackouts" at nuclear power plants, which meant a complete shutdown of the power grid.

In April and November 2022, design basis accidents occurred at KhNPP, namely, a complete blackout of the NPP as a result of a power grid accident caused by missile attacks on the Ukrainian power system by Russian troops. KhNPP power units were disconnected from the grid with emergency protection activated. To ensure the supply of steam for own needs, the boilers of the start-up and standby boiler house (SSB) were put into operation, which resulted in the burning of a larger amount of fuel (fuel oil).

The data on air pollutant emissions from stationary sources for 2022 are presented in Annex K.3 in Table 61. The emissions of pollutants and carbon dioxide for the year (2022) exceeded the reasonable potential emissions, volumes and values established by the supporting documents.

The dynamics of changes in air emissions for 6 years is presented in Annex K.3, Table 62.

Compared to the lowest level achieved in the last five years (in 2020), according to the data in Annex K.3 in Table 62, gross emissions increased by 41.6% in 2022 due to objective reasons (unforeseen power unit shutdowns).

Design basis accidents at SS KhNPP did not lead to significant environmental risks outside the containment volume of the power unit and the NPP site.

The maximum calculated dose loads on the population at the MPL will not exceed the limit of justified evacuation of the population (50 mSv for the whole body in accordance with NRSU-97). At a distance of more than 3 kilometers from the source of emission, there is no need to take countermeasures in accordance with the lowest justification limit. In this zone, the dose burden on the population does not exceed the limits established by NRBU-97 under unfavorable meteorological conditions and emission heights.

Based on the results of calculations and analyzes of the impact of beyond-design-basis accidents, the following conclusions can be drawn:

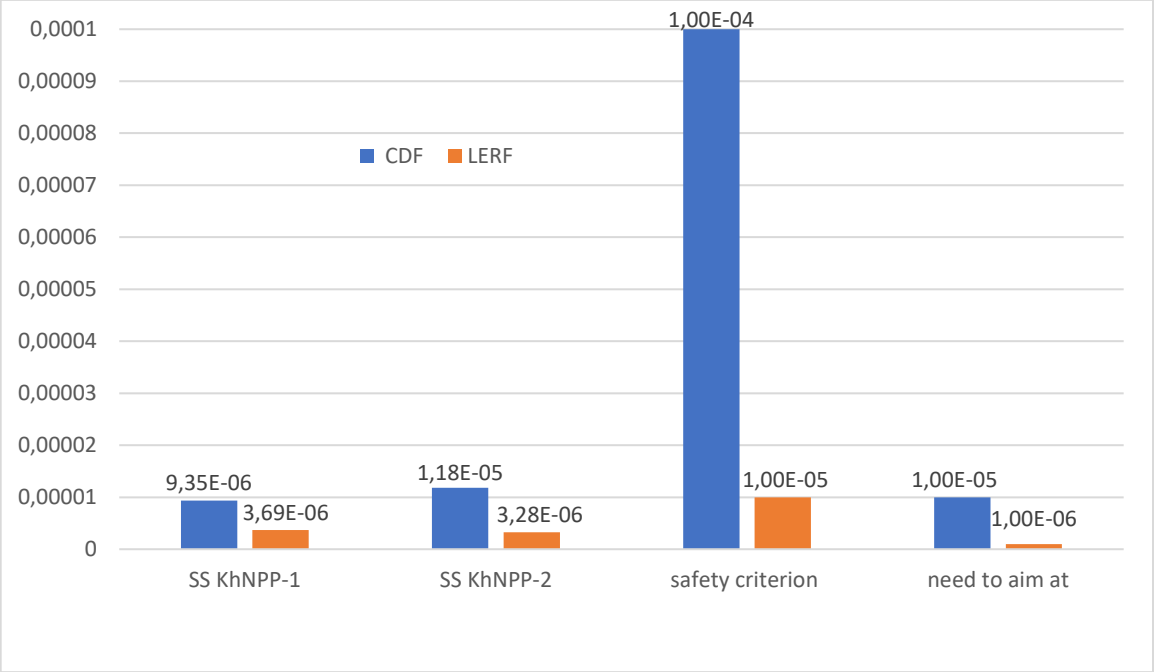
– for beyond design basis accidents with 10 and 100% core meltdown, the risk of deterministic effects is zero;

– radiation safety of the population in terms of risk criteria is ensured with a large margin under the most conservative calculation approaches.

4.5.15 Comprehensive assessment of changes in environmental risks (in case of accidents at SS KhNPP) due to implementation of the CCSUP

The overall conclusions remain unchanged and are similar to those made in paragraph 4.5.15 of the 2017 Report of the EA the CCSUP.

Based on the results of the implementation of the CCSUP measures, we have the following key safety criteria:



CDF - Core damage frequency; LERF - Large early release frequency.

4.5.16 Assessment of economic efficiency from the implementation of the CCSUP in terms of environmental and health impacts

The overall conclusions remain unchanged and are similar to those made in paragraph 4.5.16 of the 2017 Report of the EA the CCSUP.

4.6 Justification of no changes in environmental impacts during the implementation of the CCSUP measures

As a result of the implementation of the CCSUP, the risk of negative impacts related to emergencies will decrease either due to a decrease in the probability of such a situation occurring and/or because the NPP will be able to limit the negative impact of such a situation.

	Air and atmosphere *	**Water bodies**		**Soils**	**Flora and fauna**	**Social environment ***
		surface waters	**underground waters**			
1 Radiation exposure						
1.1 Radiation exposure to gases and aerosols	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative

	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced
1.2 Assessment of transboundary impacts	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
1.3 Liquid radioactive waste	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional negative impact,	additional negative impact no additional negative impact, risks reduced
1.4 Periodic inflows from splash ponds	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
1.5 Solid radioactive waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2 Chemical exposure						
2.1 Emissions from fuel combustion *	additional impact acceptable, risks reduced	no additional impact	no additional impact	no additional impact	no additional impact	additional impact acceptable, risks reduced
2.2 Penetration into groundwater	no additional impact,	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional impact	no additional impact	additional negative impact no additional negative impact, risks reduced
2.3 Non-radioactive liquid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2.4 Non-radioactive solid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3 Physical impact						
3.1 Thermal impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3.2 Noise and electromagnetic radiation *	additional impact acceptable, risks reduced i	no additional impact	no additional impact	no additional impact	no additional impact	additional impact acceptable, risks reduced
Conclusions	additional negative impact is temporary, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
* The general conclusions are reassessed taking into account the case of a design-basis accident, namely, complete NPP blackout in 2022						

5 EO OF THE RESULTS OF THE CCSUP IMPLEMENTATION AT SS SOUTH UKRAINE NPP

5.1 General characteristics of NPPs

5.1.1 Region and location of the SUNPP site

The general information provided in this paragraph has not changed compared to paragraph 5.1.1 of the 2017 Report of the EA the CCSUP.

5.1.2 Brief description of SUNPP production

There are three power units in operation at the SUNPP:

– Unit I (WWER-1000/V-302) with a capacity of 1 million kW since 1983;
– Unit II (WWER-1000/V-338) with a capacity of 1 million kW since 1985;
– Unit III (WWER-1000/V-320) with a capacity of 1 million kW since 1990.

On June 1, 2021, the first two pools and a water supply pumping station were put into operation as part of the project «Reconstruction of the technical water supply system at the Tashlyk Reservoir and SUNPP splash pools». The splash pools are designed to cool the Tashlyk Reservoir during the warm season, which in turn will improve the environmental situation in the region and remove power restrictions during the hot season.

On December 22, 2021, the Tashlyk Pumped Storage Power Plant, which is part of the South Ukrainian Energy Complex, successfully completed the first test run of the hydraulic unit № 3. The operation of the 3rd hydroelectric unit creates new opportunities for balancing and more efficient operation of the Ukrainian nuclear generation, which is especially important during winter peak loads.

5.1.3 Brief description of SUNPP products

General information has not changed compared to paragraph 5.1.3 of the 2017 Report of the EA the CCSUP.

5.1.4 Data on raw materials, land, water, energy and other resources used

General information has not changed compared to paragraph 5.1.4 of the 2017 Report of the EA the CCSUP.

5.1.5 Short description of the technological process of the SUNPP

General information has not changed compared to paragraph 5.1.5 of the 2017 Report of the EA the CCSUP.

5.1.6 Technical solutions of the CCSUP aimed at eliminating or reducing harmful emissions, discharges, leaks and radiation into the environment

The CCSUP EA assessed the impact of implemented or ongoing measures and made assumptions about the possibility of reducing or mitigating the risk of harmful impact based on the dynamics of current volumes of radioactive and pollutant emissions or discharges, their concentration in the air, water bodies, and soil both at the NPP site and in the SPZ and the SZ.

This primarily concerns the following measures:

For WWER-1000/V-302, WWER-1000/V-338:

22401	Development and implementation of organizational and technical measures to manage the accident: coolant leakage from the 1st circuit to the 2nd circuit with an equivalent cross-section of D 100	Reducing emissions of RS	At the stage of implementation
23201	Acquisition and commissioning of an automated eddy current inspection system for metal of heat exchange tubes and collector bridges of steam generators PGV-1000	Prevention of radioactive contamination and emergencies	Implemented
22302	Implementation of equipment to improve the sealing of the main reactor connector	Reducing dose burdens and RS	Implemented
23307	Measures for feeding the exposure pool, steam generator, splash pool using mobile pumping units (MPU)	Preventing power outages and emergencies	Implemented
23308	Analysis of the need for feeding the first contour	Preventing power outages and emergencies	Implemented
23402	Upgrading of the High Pressure Zone Emergency Cooling System to provide the ability to control the pressure at the discharge when the system pump is operating on the 1st contour	Preventing emergencies	Implemented
23403	Upgrading of the Low Pressure Zone Emergency Cooling System to provide flow control capability during the operation of the system pump on the 1st contour	Preventing emergencies	Implemented
23501	Replacement of stand-alone air conditioners with air conditioners qualified for «harsh» conditions and seismic impacts	Prevention of emergencies and releases of RS	Implemented
23502	Implementation of a comprehensive system for diagnostics of RS systems	Prevention of emergencies and releases of RS	Implemented
23509	Implementation of an "industrial" television system for fire/explosion hazardous and unattended premises	Prevention of emergencies and releases of RS	Implemented
24101	Instrumentation during and after beyond design basis accidents	Preventing emergencies	Implemented
25201	Replacement of 6 kV circuit breakers in sections of the SS	Preventing power outages and emergencies	Implemented

25202	Modernization of SAE of the 1st reliability group (including replacement of the DC switchboard)	Preventing power outages and emergencies	Implemented
25204	Modernization of the 6 kV auxiliary power supply system	Preventing power outages and emergencies	Implemented
25205	Modernization of the Safety Critical System with replacement of 6 and 0.4 kV motors	Preventing power outages and emergencies	Implemented
25208	Modernization of RPA circuits using microelectronic-based relays	Preventing power outages and emergencies	Implemented
26101	Prevention of early containment bypass as a result of molten core masses from the reactor shaft outside the containment volume	Reducing emissions of RS	Implemented
26201	Implementation of a system for monitoring the hydrogen concentration in the containment vessel for off-design accidents	Prevention of explosions and accidental releases of RS	Implemented
26205	Implementation of a forced pressure relief system from the Gas Treatment System	Prevention of explosions and accidental releases of RS	Implemented
27102	Implementation of a smoke removal system from evacuation corridors Deaerator department	Reducing emissions of RS	Implemented
27103	Equipping NPP premises containing electrical and electronic equipment with stationary gas fire extinguishing systems	Prevention of fires and emergencies	At the stage of implementation
27104	Equipping the main NPP power supply circuit with automatic control units for oil-filled power equipment	Prevention of fires and RS	Implemented at power units № 1 SUNPP At the stage of implementation at power unit №2 SUNPP
27105	Modernization of the automatic fire alarm system for premises DD, ER, SC	Prevention of fires and emergencies	Implemented
27106	Implementation of redundancy of water fire extinguishing systems of security systems	Prevention of emergencies and discharges of RS	Implemented
27107	Installation of fire retardant valves with a standardized fire resistance limit in places where supply and exhaust ventilation ducts cross fire barriers in battery rooms, rooms containing electrical and electronic equipment, cable structures, and the Backup Diesel Power Plant	Prevention of emergencies and emissions of RS	Implemented
27112	Bringing the fire resistance limit of transit air ducts and process pipelines passing through the premises of security systems and normal operation systems to the normalized value	Prevention of fires and emissions of RS	At the stage of implementation
27113	Bringing the fire resistance limit of the enclosing structures of the premises of switchgear, DC switchboard and relay panels of the deaerator room to the normalized value	Prevention of fires and emissions of RS	Implemented
27201	Ensuring the operability of high-speed shut-off valves for resistance to internal and external influences	Preventing emergencies	Implemented

28101	Ensuring seismic resistance of systems and building structures	Preventing emergencies	Implemented
29102	Development of operational probabilistic security analysis	Preventing emergencies	Implemented
29103	Consideration of the full range of initial events for all regulatory states of the Reactor Unit and B-Well in the Probabilistic Safety Analysis	Preventing emergencies	Implemented
29204	Analysis of severe accidents. Development of the Severe Accident Management Guidelines	Preventing emergencies	Implemented
30101	Development of materials and qualification of power unit elements	Preventing emergencies	Implemented

For WWER-1000/V-320

10101	Development of materials and qualification of power unit elements	Preventing emergencies	Implemented
11303	Reducing the risk of core damage in the "fuel overload" condition	Reducing dose burdens and radioactive emissions	Implemented
11305	Ensure fueling and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout	Reducing the heat load	Implemented
12102	Implementation of the "leak before failure" concept for the Main Circulation Pipeline of the 1st contour	Reducing dose burdens and radioactive emissions	Implemented
12401	Development and implementation of organizational and technical measures to manage the accident "coolant flow from the 1st contour to the 2nd and 1st equivalent section of D 100"	Reducing emissions of RS	At the stage of implementation
13102	Modernization of the algorithm for launching the Safety System channels upon the "Break Protection" signal of the 2nd circuit in order to timely introduce negative reactivity and prevent the repeated criticality mode (launching TQ channels 14-34)	Reducing dose burdens and radioactive emissions	Implemented
13302	Ensuring the availability of the high-speed pressure reducing unit-A during the end of the steam-water mixture, water, as well as ensuring the reliable performance of the emergency pressure relief function	Reducing dose burdens and radioactive emissions	Implemented
13304	Ensuring the possibility of commissioning the purge-recharge system in case of containment localization and ensuring automatic commissioning of the boron concentrate system (TV 10) in case of leakage of the 1st contour	Reducing emissions of radioactive substances	Implemented
13307	Ensuring steam generator feeding in conditions of prolonged NPP blackout	Preventing emergencies	Implemented
13308	Analysis of the need for feeding the first contour	Prevention of emergencies and releases of RS	Implemented

13402	Modernization of the emergency cooling system of the high-pressure zone to provide the ability to control the head pressure when the system pump is operating on the 1st contour	Reducing emissions of RS	At the stage of implementation
13403	Modernization of the emergency cooling system of the low-pressure zone to provide the ability to control the flow rate during the operation of the system pump to the 1st contour	Reducing emissions of RS	Implemented
13501	Replacement of stand-alone air conditioners with air conditioners qualified for "harsh" conditions and seismic effects	Reducing emissions of RS	Implemented
13502	Implementation of a comprehensive system for diagnostics of the Reactor Unit systems	Preventing emergencies	Implemented
13505	Fire protection of cable routes above assemblies closed, serviced current distributor	Preventing power outages and emergencies	Implemented
13507	Implementation of an on-the-fly cleaning system for process water splash pools of responsible consumers	Reduction of pollutant discharges, improvement of water quality	Implemented
13509	Implementation of an "industrial" television system for fire/explosion hazardous and unattended premises	Preventing emergencies	At the stage of implementation
13510	Implementation of high-tight plugs in the steam generator collectors during repair work	Prevention of emergencies and emissions of RS	At the stage of implementation
13511	Ensuring the operability of consumers of the group "A" process water system when dehydrating splash pools	Reduction of dose loads and thermal effects	Implemented
14101	Instrumentation during and after accidents (PAMS)	Reducing emissions and discharges of RS	Implemented
14102	Implementation of the pipeline movement control system for the 1st contour	Prevention of emergencies and discharges of RS	Implemented
14103	Modernization of the CCS of the power unit with integration of the ARMS, the ARMS and the SPPS	Preventing emergencies	At the stage of implementation
14104	Modernization of the hydrogen cooling control system for the generator	Prevention of emergencies and emissions of RS	Implemented
14105	Modernization of the system of normal operation important for the safety of the reactor compartment (NOSR) (instrumentation, process protection, interlocks and alarms (PP&A), automatic control and remote control system (ACRS), equipment of special safety class containment vessels)	Preventing emergencies	Implemented

14106	Modernization of the system of normal operation important for the safety of the turbine compartment (NOS of the TBT) (instrumentation and control devices (ICD), turbine mechanical value control system (TMCS), technological protection, interlocks and signaling (TPP&S), automatic regulation and remote control system (ARCS))	Preventing emergencies	At the stage of implementation
14204	Modernization of the APR, PLR in order to bring them into compliance with the requirements of the RTD	Preventing emergencies	Implemented
14205	Modernization of the drive control system Control and protection system, including power supply system	Preventing emergencies	Implemented
14301	Modernization of security control systems with the replacement of unified technical equipment complexes	Preventing emergencies	At the stage of implementation
14401	Modernization of NPP radiation monitoring systems (RMS)	Prevention of emergencies and emissions of RS	At the stage of implementation
14402	Modernization of the In-Reactor Control System with an integrated reactor simulator system and expansion of core monitoring and diagnostics functions	Prevention of emergencies and emissions of RS	At the stage of implementation
14403	Implementation of a system to ensure the safety of information in the event of design and off-design accidents ("black box")	Preventing emergencies	Implemented
14404	Modernization of the control system for backup diesel generators	Prevention of emergencies and emissions of RS	At the stage of implementation
14405	Modernization of the control system of the reloading machine	Reducing emissions of RS	Implemented
14406	Modernization of the automatic chemical control system 1,2. Improvement and automation of the water and chemical regime of the 1st and 2nd contours	Prevention of emergencies and emissions of RS	Implemented
15101	Development of methods and equipment for determining the residual life of NPP cables	Preventing emergencies	Implemented
15103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout	Preventing power outages and emergencies,	Implemented
15202	Modernization of the Emergency Power Supply System of the 1st reliability group (including replacement of the Uninterruptible Power Supply Unit, DC Shield, Battery, etc.)	Prevention of fires and emergencies	Implemented
15205	Modernization of the Safety Critical System with replacement of 6 and 0.4 kV motors	Prevention of fires and emergencies	Implemented
15211	Optimization of the power supply of TG, TX valves to ensure the channel principle	Preventing emergencies	Implemented
15212	Modernization of the generator excitation system	Preventing power outages and emergencies	Implemented

16101	Prevention of early containment bypass as a result of molten core masses from the reactor shaft outside the containment volume	Reducing emissions of RS	Implemented
16201	Implementation of a system for monitoring the hydrogen concentration in the containment vessel for off-design accidents	Prevention of explosions and accidental emissions of RS	Implemented
16203	Development and implementation of measures to reduce hydrogen concentration in the containment vessel for beyond design basis accidents	Prevention of explosions and accidental emissions of RS	Implemented
16205	Implementation of a forced pressure relief system from the Gas Treatment System	Prevention of explosions and accidental emissions of RS	Implemented
17101	Modernization of the automatic fire alarm system for NPP safety systems	Prevention of fires, accidental emissions of RS	At the stage of implementation
17102	Development and implementation of a gyrotydimine protection system for the premises and evacuation corridors of the Reactor Department, which have no restrictions on communication with the environment	Prevention of fires, emissions of RS	At the stage of implementation
17103	Equipping NPP premises containing electrical and electronic equipment with stationary automatic gas fire extinguishing systems	Prevention of fires, accidental emissions of RS	Implemented
17104	Equipping the main NPP power supply circuit with automatic control units for oil-filled power equipment	Prevention of fires, releases of RS	At the stage of implementation
17105	Modernization of the automatic fire alarm system for the premises of the RD, DD, EETU, ER, SC	Prevention of fires, accidental releases of RS	At the stage of implementation
17106	Equipping NPP premises containing electrical and electronic equipment with stationary non-automatic gas fire extinguishing systems	Prevention of fires, accidental releases of RS	At the stage of implementation
17110	Replacement of combustible roof insulation in the engine room	Prevention of fires, accidental releases of RS	At the stage of implementation
17107	Installation of fire retardant valves on air ducts in fire partitions of ventilation centers, battery rooms, cable facilities and rooms containing electrical and electronic equipment, separating them from rooms of other categories for explosion and fire safety	Prevention of fires, accidental releases of RS	Implemented
17108	Bringing the fire resistance limit of removable non-combustible structures of cable ducts and raised floors of NPP premises containing electrical and electronic equipment to the standardized value	Prevention of fires, accidental releases of RS	Implemented

17109	Equipping NPP power units with automatic fire extinguishing units for auxiliary transformers	Prevention of fires, accidental releases of RS	Implemented
17201	Ensuring performance A fast-acting shut-off valve for resistance to internal and external influences	Preventing emergencies	Implemented
18101	Ensuring seismic resistance of systems and building structures	Preventing emergencies	Implemented
18102	Implementation of seismological monitoring systems for NPP sites	Preventing emergencies	Implemented
19102	Development of operational probabilistic security analysis	Preventing emergencies	Implemented
19103	Consideration of the full range of initial events for all regulatory states of the Reactor Facility and the spent fuel pool in the probabilistic safety analysis	Preventing emergencies	Implemented
19204	Analysis of severe accidents. Development of the Severe Accident Management Guidelines	Preventing emergencies	Implemented

5.1.7 Short description of the SNF management scheme. SNF volumes

General information on the SNF Management Scheme has not changed compared to paragraph 5.1.7 of the 2017 Report of the EA the CCSUP.

5.1.8 Short description of the RW management scheme. Volumes of RW

5.1.8.1 Solid radioactive waste

The general information on the type of solid RW, its nomenclature, and management procedure has not changed compared to paragraph 5.1.8.1 of the 2017 Report of the EA the CCSUP.

The volumes of solid radioactive waste generated and stored in storage facilities at PUNS are shown in Table 29.

Table 29 - Volumes of solid radioactive waste generation and storage, cubic meters

	Low-active		Medium active		Highly aquatic	
	formed	stored	formed	stored	formed	stored
2017	338,2	15985,1	8,0	1703,6	0,3	16,5
2018	179,6	16088,4	8,0	1756,8	0,4	16,9
2019	245,0	16124,8	8,0	1764,8	0,4	17,3
2020	238,0	16142,8	10,8	1775,6	0,35	17,65
2021	226,4	16101,4	10,0	1785,6	0,68	18,33
2022	157,3	16071,6	10,0	1795,6	0,6	18,93

The volumes of solid radioactive waste processed at the pressing facility are shown in Table 30.

Table 30 - Volumes of solid radioactive waste processing at the SS SUNPP

	Processed, cubic meters	
	incinerated solid radioactive waste	pressed solid radioactive waste
2017	90	119
2018	67	54
2019	75	63
2020	81	64
2021	69,5	125,2
2022	83,1	37,0

5.1.8.2 Liquid radioactive waste

The general information on the type of liquid radioactive waste, its nomenclature, sources of generation, processing methods, and management procedure provided in this paragraph has not changed compared to paragraph 5.1.8.2 of the 2017 Report of the EA the CCSUP.

The volumes of liquid radioactive waste generated and stored in storage facilities at SS SUNPP are shown in Table 31.

Table 31 - Generation and storage of liquid radioactive waste at SS SUNPP, cubic meters

	Cubic residual			Spent sorbents, sludge			Filter materials		Saltwater float*.	
	formed	recycled	stored	formed	recycled	stored	formed	stored	formed	stored
2017	73	-	2727	-	-	-	-	427,0	-	-
2018	116	-	2736	-	-	-	-	427,0	-	-
2019	92	-	2755	-	-	-	-	427,0	-	-
2020	103	-	2752	-	-	-	-	427,0	-	-
2021	95	-	2784	-	-	-	-	427,0	-	-
2022	77	-	2799	-	-	-	-	427,0	-	-

*Since 2021, salt float is classified as solid radioactive waste

5.1.9 Short description of the waste management scheme (including hazardous waste)

The general information on the type of waste, its nomenclature, sources of generation, processing methods, and the procedure for its management has not changed compared to paragraph 5.1.9 of the 2017 Report of the EA the CCSUP.

The dynamics of waste generation by hazard class is shown in Table 32.

Table 32 - Waste generation dynamics by hazard class

Indicator.	2017	2018	2019	2020	2021	2022
Waste generated, tons, including:	2036,91	1801,184	2574,609	2330,440	3498,487	1923,3004
I class, hazards	16,148	21,306	4,522	6,320	6,925	3,518
II class, hazards	142,013	88,726	65,125	34,557	84,646	60,570
III class, hazards	1004,830	870,485	789,195	1039,723	941,027	146,595
IV class, hazards	873,919	820,667	1715,767	1249,840	2465,889	1712,6174

The structure of total waste generation is dominated by hazard class IV waste, with their share ranging from 66.6% in 2019, 53.6% in 2020, and 70.5% in 2021, 89% in 2022.

The total amount of waste generated at the SS SUNPP during 2017-2022 ranged from 1.8-3.4 thousand tons, which does not allow us to conclude on a certain trend in waste generation.

However, the indicators of waste generation in 2022 show a decrease compared to 2021: the volume of waste generation of hazard class I decreased by 49.2%, the volume of waste generation of hazard class II decreased by 28.4%, the volume of waste generation of hazard class III decreased by 84.4%, the volume of waste generation of hazard class IV decreased by 30.5%.

Such waste generation is due to the implementation of organizational and technical environmental protection measures, improvement of waste management operations (organization of separate collection of certain categories of waste: plastic waste, plastic and metal containers, waste batteries, waste paper, plastic bottles), transfer of some waste for reuse as secondary raw materials, purchase and replacement of LED lamps instead of mercury-containing ones.

5.1.10 Technical solutions of the CCSUP aimed at reducing waste volumes and improving the environmental safety of waste management

The CCSUP did not envisage measures for the SS SUNPP aimed at reducing the amount of process waste or improving the waste management scheme. Waste management meets the requirements of the legislation.

5.1.11 Short description of the analyzed design and beyond design accidents

The general information has not changed compared to paragraph 5.1.11 of the 2017 Report of the EA the CCSUP. The description of design accidents and radiological consequences is similar to the information provided in paragraph 2.1.11 of this Report.

5.1.12 Short description of design technical solutions aimed at reducing the likelihood and consequences of accidents (excluding CCSUP measures)

The general information has not changed compared to paragraph 5.1.12 of the 2017 Report of the EA the CCSUP.

5.1.13 Technical solutions of the CCSUP aimed at reducing the risks of probability and consequences of accidents

The general information has not changed compared to paragraph 5.1.13 of the 2017 Report of the EA the CCSUP. The list of measures is given in paragraph 2.1.6 of this Report. Achieved safety criteria - core meltdown frequency and frequency of maximum accidental release for power units' subject to periodic safety review are given in paragraph 5.5.15.

5.1.14 Sanitary protection zone and observation zone of the SS SUNPP

The general information has not changed compared to paragraph 5.1.14 of the 2017 Report of the EA the CCSUP.

5.2 Assessment of environmental impacts

5.2.1 Climate and microclimate

5.2.1.1 Brief description of the existing situation within the SA

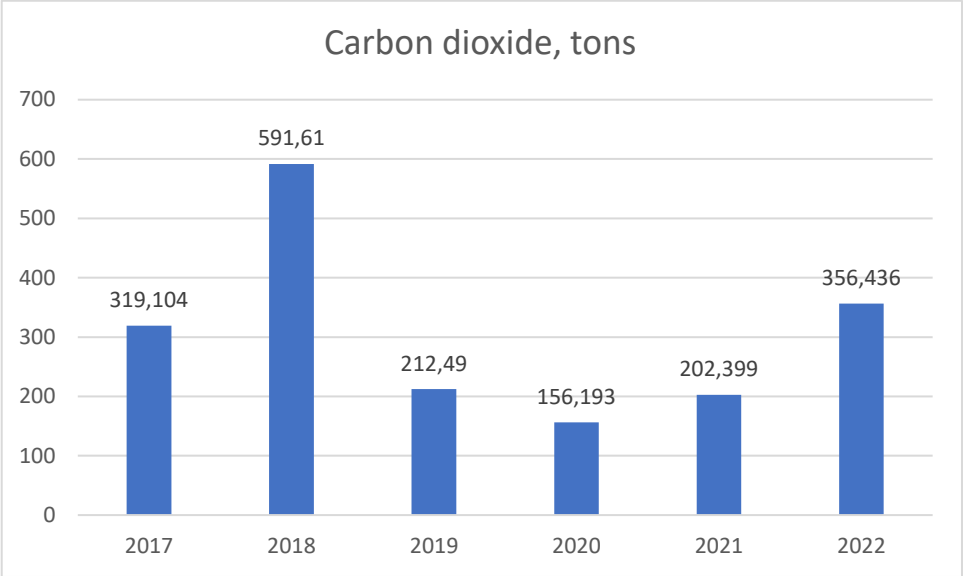
The general information has not changed compared to paragraph 5.2.1.1 of the 2017 Report of the EA the CCSUP.

5.2.1.2 Impact of the CCSUP on climate and microclimate

The implementation of the CCSUP does not affect the climate and microclimate characteristics in the area of the SS SUNPP.

The CCSUP will also not affect the amount of greenhouse gases emitted into the atmosphere annually as a result of NPP operation, and therefore no impact on the global climate is expected. The dynamics of greenhouse gas emissions is shown in Diagram 7.

Diagram 7 - Dynamics of carbon dioxide emissions at the SS SUNPP



5.2.2 Air environment

5.2.2.1 Brief description of the existing situation within the SA

General information compared to paragraph 5.2.2.1 of the 2017 Report of the EA the CCSUP during 2017-2022 has not changed significantly.

As of 15.02.2023, the SS SUNPP releases pollutants from 412 sources of pollutant emissions into the air (412 stationary sources of pollutant emissions, four mobile sources of pollutant emissions). The dynamics of changes in emissions of pollutants (non-radioactive) substances and radionuclides is given in Annex K.4.

In the fourth quarter of 2022, as a result of missile attacks on Ukraine's power grid by Russian troops, the power units of the South Ukrainian NPP were disconnected from the grid with emergency protection activated. Prompt actions of the employees to respond to the emergency, implementation of emergency power supply measures from diesel generators, allowed to avoid an accident. As a result of unscheduled operation of diesel generators, emissions of pollutants into the atmosphere temporarily increased due to fuel consumption.

However, during the reporting quarter and in 2022, air pollutant emissions were within the potential emission limits.

The data on air pollutant emissions from stationary sources in 2022 according to the statistical reporting form № 2 -TP (air) are presented in Annex K.4 in Table 75. The dynamics of changes in air emissions for 6 years is presented in Annex K.4, Table 74.

Observations of the atmospheric air condition within the industrial site, the SA and the SPZ of the SS SUNPP for the period 2017-2022 indicate the following:

– the content of pollutants and radionuclides in the air does not exceed the maximum permissible concentrations established by the regulations;

– emissions of pollutants did not exceed the maximum permissible levels established by the relevant permits;

– emission levels of pollutants and radionuclides did not lead to a deterioration in air quality;

– the direct implementation of the CCSUP measures did not lead to an increase in the anthropogenic load on the air.

5.2.2.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of accidents at the SS SUNPP).

Under normal operating conditions, no adverse radiation impact of the SS SUNPP on the air environment is expected. In case of emergencies/accidents and depending on their nature and scale, significant amounts of radioactive contaminants and dust may potentially be released into the air.

5.2.2.3 Impact of CCSUP measures on projected changes in the state

The general conclusions on the future impact of the CCSUP measures have not changed and are similar to those made in paragraph 5.2.2.3 of the 2017 Report of the EA the CCSUP.

It should be noted that the implementation of the CCSUP measures related to increasing the level of energy supply to the SS SUNPP and post-Fukushima consequences resulted in the commissioning of mobile diesel generators based on trucks, which are additional sources of air pollutant emissions. However, the analysis of emissions concluded that the contribution of these sources is not significant and does not lead to additional negative impact.

5.2.3 Geological environment

5.2.3.1 Brief description of the existing situation within the SA

The general information has not changed compared to paragraph 5.2.3.1 of the 2017 Report of the EA the CCSUP.

5.2.3.2 Justification of the absence of changes in the state as a result of the implementation of the CCSUP

The general information has not changed compared to paragraph 5.2.3.2 of the 2017 Report of the EA the CCSUP.

5.2.4 Water environment (groundwater, open water)

5.2.4.1 Brief description of the current situation within the SA

The general information has not changed compared to paragraph 5.2.4.1 of the 2017 Report of the EA the CCSUP.

Water is abstracted from the Pivdennyi Buh River for recycling water supply to the SS SUNPP and for drinking water production.

The dynamics of water use is shown in Table 33.

Table 33 - Volumes of water use at the SS SUNPP

Name of the water supply source	Water consumption, thousand cubic meters					
	2017	2018	2019	2020	2021	2022
Artesian water	-	-	-	-	-	-
Surface (Pivdennyi Buh River)*.	54998,0	56623,9	63964,5	61311,8	54952,4	54598,9

*Note: *- the volume of water use includes the volume of process water used for recharge of the Tashlyk cooling pond, chemical water treatment needs and the volume of drinking water used by the units of the PJSC NPP (including process water consumption of the water and sewage facilities and heating networks). Water use was carried out within the approved limits.*

Surface water indicators for 2022 in the area of the SS SUNPP site are presented in Annex K.4.

The analysis of the monitored indicators shows that the operation of the SS SUNPP did not make significant changes to the quality of surface water. The state of water in the Pivdennyi Buh River (control section) remains at the level of previous years and has no significant deviations.

5.2.4.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal operating conditions and in case of accidents at NPPs)

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 5.2.4.2 of the 2017 Report of the EA the CCSUP.

Not taking into account the CCSUP and in the absence of emergencies/accidents related to radionuclide releases, no significant negative impact of the SS SUNPP on changes in the state of water bodies was observed. In the event of an accident and depending on its nature, significant amounts of radioactive contaminants could potentially enter water bodies.

5.2.4.3 Impact of CCSUP measures on projected changes in the state

The general conclusions on the state of water resources have not changed and are similar to those made in paragraph 5.2.4.3 of the 2017 Report of the EA the CCSUP.

The CCSUP is not aimed at increasing electricity production, and therefore it is not expected to increase NPP water consumption, changes in the volume of thermal, chemical and radioactive discharges to water bodies. The CCSUP will reduce the risk of accidents at NPPs and, consequently, the risk of radioactive contamination of the water environment, which is a positive impact of the CCSUP.

5.2.5 Soil and landscape

5.2.5.1 Brief description of the current situation within the SA

The general information has not changed compared to paragraph 5.2.5.1 of the 2017 Report of the EA the CCSUP. The results of radionuclide content in the soils of the SS SUNPP are presented in Annex K.4.

5.2.5.2 Forecast of state changes in case of refusal to implement the CCSUP (under normal conditions and in case of accidents at the SS SUNPP*).*

The general information has not changed compared to paragraph 5.2.5.2 of the 2017 Report of the EA the CCSUP.

5.2.5.3 Impact of CCSUP measures on projected changes in the state

The general information and conclusions have not changed compared to paragraph 5.2.5.3 of the 2017 Report of the EA the CCSUP.

5.2.6 Flora and fauna, protected areas

5.2.6.1 Brief description of the current situation within the SA

The general information has not changed compared to paragraph 5.2.6.1 of the 2017 Report of the EA the CCSUP.

5.2.6.2 Projected state changes in case of failure to implement the CCSUP (under normal operating conditions and in case of accidents at SS SUNPP)

Under normal operating conditions, the SS SUNPP had no negative impact on flora, fauna and protected areas.

5.2.6.3 Impact of CCSUP measures on projected changes in the state

The general conclusions regarding the absence of future impacts of the CCSUP measures on flora and fauna, protected areas have not changed and are similar to the conclusions made in paragraph 5.2.6.3 of the 2017 Report of the EA the CCSUP.

5.3 Assessment of social and environmental impacts

5.3.1 Brief description of the current state of the social environment within the SA

A summary of the socio-economic situation in the SS SUNPP site is presented in Tables 34 and 35.

Table 34 - Socio-economic situation in the area of the SS SUNPP location (2021)

City.	Gender.	Age category	Average monthly salary 2021 (UAH)	Unemploymen t rate	Total population	Migration growth of the population (compared to 2019)	Natural population growth
Yuzhnoukrainsk (Mykolaiv region)	Males: 46,39% Females: 53,61%	0-14: 15,1% 15-64: 67,6% >65: 17,3%	14382,0	10,7%	38560	-114	-156
Voznesensk (Mykolaiv region)					33442	-39	-314
Konstantinovka (Mykolaiv region)					2154	-	-
Arbuzynka (Mykolaiv region)					5954	-	-
Oleksandrivka (Mykolaiv region)					5040	-	-
Domanivka (Mykolaiv region)					5728	-	-
Bratske (Mykolaiv region)					4953	-	-
On average in Ukraine (2021)	Males: 46,36% Females: 53,64 %	0-14: 14,9% 15-64: 67,4% >65: 17,7%	14577,0	10,3 %	41167335	21261	-442280

Table 35 - Causes of mortality in the region of SS SUNPP location (2021)

	Cardiovascular	Tumors	External causes	Digestive system	Respiratory system	Infections and parasites	Other
Mykolaiv region	60.74%	9.45%	4.37%	3.54%	4.83%	1.09%	15.98%
Ukraine	60.10%	10.41%	4.04%	3.48%	3.70%	0.88%	17.39%

5.3.2 Forecast of impacts on public health in case of refusal to implement the CCSUP (under normal conditions and in case of accidents at the SS SUNPP)

The general information has not changed compared to paragraph 5.3.2 of the 2017 Report of the EA the CCSUP.

Based on the results of the analysis of expected doses to human organs and tissues in design basis accidents, the following conclusions can be made:

– the levels of unconditionally justified emergency intervention for acute exposure were not exceeded, the levels of averted doses did not exceed the levels of unconditional justification, there is no need to plan basic emergency countermeasures, and it is not advisable to implement auxiliary countermeasures at this level of averted doses;

– the equivalent individual doses for 1 year under the most unfavorable conditions on the border of the sanitary protection zone and beyond to the thyroid gland of children through inhalation and to the whole body through external exposure did not exceed the threshold values.

5.3.3 Impact of CCSUP measures on the results of the population health forecast

5.3.3.1 Impact during the implementation of the CCSUP

The general information has not changed compared to paragraph 5.3.3.1 of the 2017 Report of the EA the CCSUP.

5.3.3.2 Impact after the implementation of the CCSUP

Implementation of the CCSUP measures resulted in reduction of the risks of emergencies and accidents (see paragraph 5.5.15) or mitigation of their consequences, which entails an increase in the level of protection of the population living in the area of SS SUNPP water outflow and minimization of the damage that may be caused to their health.

In addition, reducing the risks of accidents should reduce the level of stress associated with working or living near a nuclear power plant, which will have a positive impact on the psychological state of workers and the population of the surrounding areas.

5.3.4 Possible impacts of the CCSUP implementation on social conditions and satisfaction of the needs of the local population

5.3.4.1 Impact during the implementation of the CCSUP

The general information has not changed compared to paragraph 5.3.4.1 of the 2017 Report of the EA the CCSUP.

5.3.4.2 Impact after the implementation of the CCSUP

The general information has not changed compared to paragraph 5.3.4.2 of the 2017 Report of the EA the CCSUP.

Implementation of the CCSUP measures may lead to an increase in the time of uninterrupted operation of the nuclear power plant. This directly relates to the increase of funding for socio-economic compensation of the risk of the population living in the observation zone of the SS SUNPP. Funds for such compensation are provided by a fee of 1% of the electricity sold by NPPs (excluding value added tax). Thus, the amount of subventions to local budgets to finance social and economic compensation measures in the SS SUNPP observation area amounted to:

Name of the administrative-territorial unit	Subvention amount, thousand, UAH	
	2019	2020
Mykolaiv region	8745	9478,127
Arbuzyn district (Mykolaiv region)	3146,3	3288,525
Bratskyi district (Mykolaiv region)	1579,6	1664,244
Voznesensky district (Mykolaiv region)	2384,1	2564,827
Domanivskyi district (Mykolaiv region)	2895,7	3182,185
Pervomaiskyi district (Mykolaiv region)	619,5	690,163
Voznesensk (Mykolaiv region)	5407,2	5986,623
Yuzhnoukrainsk (Mykolaiv region)	4372,5	4739,063
Total	**29149,9**	**31593,757**

5.4 Assessment of impacts on the man-made environment

5.4.1 Brief description of the current state of the anthropogenic environment within the SS SUNPP SA

The general information has not changed compared to paragraph 5.4.1 of the 2017 Report of the EA the CCSUP.

5.4.2 Forecast of impacts on the state of the technogenic environment in case of refusal to implement the CCSUP (under normal conditions and in case of NPP accidents)

Existing emissions of Pollutants and Radioactive Substances into the air, their discharges into water bodies, thermal impact of the SS SUNPP, as well as consumption of water resources during the current state of NPP operation did not significantly affect the surrounding man-made environment.

In the event of design basis accidents, the negative impact on the environment will not exceed the permissible limits and will not require any special measures outside the SA, the SPZ of the SS SUNPP.

5.4.3 Impact of CCSUP measures on the predicted changes in the state of anthropogenic environment objects

Compared to the conclusions made in paragraph 5.4.3 of the 2017 Report of the EA the CCSUP on the possibility of additional waste generation during the growth of CCSUP activities, a decrease in waste generation is noted (see clause 5.1.9).

It should be noted that the implementation of CCSUP measures has led to an increase in the safety of power units, thus reducing the risks of impact of the SS SUNPP on the environment in the event of emergencies/accidents (probability of their occurrence) and the scale of their consequences, which may also lead to a reduction in the damage caused. Thus, the expected long-term impact of the CCSUP implementation on the anthropogenic environment is positive.

5.4.4 Forecast of possible negative impacts on NPPs from anthropogenic objects in case of refusal to implement and implementation of the CCSUP

The general conclusions on the absence of anthropogenic environmental impacts on the activities of the SS SUNPP have not changed and are similar to the conclusions made in paragraph 5.4.4 of the 2017 Report of the EA the CCSUP.

Based on the results of the regular assessment, it can be concluded that there were no potential negative impacts of man-made facilities located within the 30-kilometer observation zone that could cause disruptions in the operation of the SS SUNPP.

5.5 Comprehensive measures to ensure the regulatory state of the environment and its safety

5.5.1 Brief description of resource-saving measures implemented at the SS SUNPP excluding CCSUP

The resource-saving measures listed in paragraph 5.5.1 of the 2017 Report of the EA the CCSUP remained relevant in 2017-2022. The use of environmentally friendly technologies (use of equipment with ozone-depleting substances, purchase of LED lamps instead of mercury-containing lamps, optimization of water resources use, optimization of cooling pond blowdown, etc.

5.5.2 Justification of the absence of the need for additional resource-saving measures in connection with the implementation of the CCSUP

All CCSUP measures implemented at the SS SUNPP do not involve an increase in natural resource consumption, so no additional resource-saving measures are required.

5.5.3 Brief description of protective measures implemented at the SS SUNPP site without taking into account the CCSUP

The general information has not changed compared to paragraph 5.5.3 of the 2017 Report of the EA the CCSUP.

5.5.4 Changes in the complex of protective measures as a result of the implementation of the CCSUP

The general information has not changed compared to paragraph 5.5.4 of the 2017 Report of the EA the CCSUP. Implementation of the CCSUP measures did not lead to significant changes in the system of occupational health and safety management and social protection of personnel and the public.

5.5.5 Brief description of the remediation measures taken during the construction of the SS SUNPP

The general information has not changed compared to paragraph 5.5.5 of the 2017 Report of the EA the CCSUP.

5.5.6 Justification of the absence of the need for additional remediation measures in connection with the implementation of the CCSUP

None of the CCSUP measures require the implementation of restoration measures in addition to those already implemented.

5.5.7 Brief description of compensatory measures implemented during the operation of the SS SUNPP

The general information has not changed compared to paragraph 5.5.7 of the 2017 Report of the EA the CCSUP.

5.5.8 Justification of the absence of the need for additional compensatory measures in connection with the implementation of the CCSUP

In 2017-2022, there were no grounds to change the compensation measures described in paragraph 5.5.7 based on the results of the implementation of the CCSUP.

5.5.9 Brief description of safety measures implemented during operation of the SS SUNPP

5.5.9.1 Protective measures against radiation exposure

The general information has not changed compared to paragraph 5.5.9.1 of the 2017 Report of the EA the CCSUP.

5.5.9.2 Protective measures against non-radiation exposure

During the preparation and conduct of a supervisory audit by the international certification body TUV NORD CERT in October-November 2020, a high level of continuous readiness, in particular the emergency preparedness and response (civil protection) system of SE NNEGC Energoatom, for quick and effective actions in the event of nuclear and radiation accidents and other types of emergencies was confirmed.

The same high performance was confirmed by the Emergency Preparedness and Response Department of the Company's Directorate during the post-certification surveillance audit by the international certification body TUV NORD CERT from January 10 to 19, 2022. The operation of this system allowed to reduce the overall water consumption and minimize the generation of radioactive and non-radioactive waste.

The company complies with the requirements of international standards:

ISO 9001:2015 «Quality Management Systems. Requirements»;

ISO 14001:2015 «Environmental management systems. Requirements and guidelines for use»

ISO 45001:2018 «Occupational Health and Safety Management System».

5.5.10 Changes in the complex of security measures due to the implementation of the CCSUP

No additional specific environmental protection measures are required as a result of the implementation of the CCSUP.

5.5.11 List and characterization of residual impacts from SS SUNPP under normal operating conditions (excluding CCSUP)

5.5.11.1 Residual radiation exposure

The radiation impact of the SS SUNPP is characterized by radiation dose levels for personnel and the public in the SPZ and the SA, emissions of radioactive substances into the air and discharges of radioactive substances into water bodies, and concentrations of radioactive substances in the environment.

Annual emissions of inert radioactive gases (IRGs), long-lived radionuclides (LLRs) and iodine radionuclides from the SS SUNPP for 2017-2022 are presented in Annex K.4.

Based on the data obtained from the results of radiation monitoring of environmental objects, the following conclusions can be drawn:

– the density of atmospheric deposition, both for total beta activity and for individual radionuclides, was at low levels and was mainly due to global atmospheric deposition;

– the concentration of radionuclides in the ground layer during the reporting period did not exceed the maximum concentrations for air regulated by NRBU-97;

– emissions of SS SUNPP in ventilation pipes were significantly lower than the regulated values of permissible and control levels of gas and aerosol emissions;

– radionuclide content in the water environment of the PNPP site is below the values regulated by DR-97, NRBU-97 and established levels of permissible discharges of radionuclides into aquatic ecosystems.

In general, the level of radiation exposure of the SS SUNPP both to the public and the environment did not exceed 0.1% of the dose generated by natural sources, and therefore does not change the natural radiation level in the region where the NPP is located.

5.5.11.2 Residual non-radiation impact

The general information has not changed compared to paragraph 5.5.11.2 of the 2017 Report of the EA the CCSUP.

5.5.12 Changes in residual impacts due to the implementation of the CCSUP

The overall conclusions remain unchanged and are similar to those made in paragraph 5.5.12 of the 2017 Report of the EA the CCSUP.

The implementation of the CCSUP did not lead to any significant changes in the amount of heat and chemical components released by NPPs into water bodies and the atmosphere.

In addition, the CCSUP measures will not lead to any significant changes in the amount of noise, heat, and electromagnetic impacts of NPPs. Thus, changes in the residual impact as a result of the CCSUP implementation can be neglected.

5.5.13 Comprehensive assessment of changes in environmental impacts from the SS SUNPP under normal operating conditions due to the implementation of the CCSUP

The overall conclusions remain unchanged and are similar to those made in paragraph 5.5.13 of the 2017 Report of the EA the CCSUP.

According to the assessment, the CCSUP measures implemented at the SS SUNPP units did not lead to environmental degradation or increase in emissions and discharges of both radioactive and non-radioactive pollutants.

5.5.14 Comprehensive assessment of environmental risks in the event of accidents at SS SUNPP without taking into account the CCSUP

In 2022, massive missile attacks by Russian military groups on substations, power lines and other facilities of the Ukrainian power system resulted in emergencies at NPPs, the so-called blackouts, or complete power outages.

In the fourth quarter of 2022, as a result of missile attacks on Ukraine's power system by Russian troops, the power units of the South Ukrainian NPP were disconnected from the grid with the emergency protection activated. Prompt actions of the employees to respond to the emergency, implementation of emergency power supply measures from diesel generators, allowed to avoid an accident. As a result of unscheduled operation of diesel generators, emissions of pollutants into the atmosphere temporarily increased due to fuel consumption.

However, during the reporting quarter and in 2022, air pollutant emissions were within the potential emission limits.

The data on air pollutant emissions from stationary sources in 2022 according to the statistical reporting form № 2 -TP (air) are presented in Annex K.4 in Table 75. The dynamics of changes in air emissions for 6 years is presented in Annex K.4, Table 74.

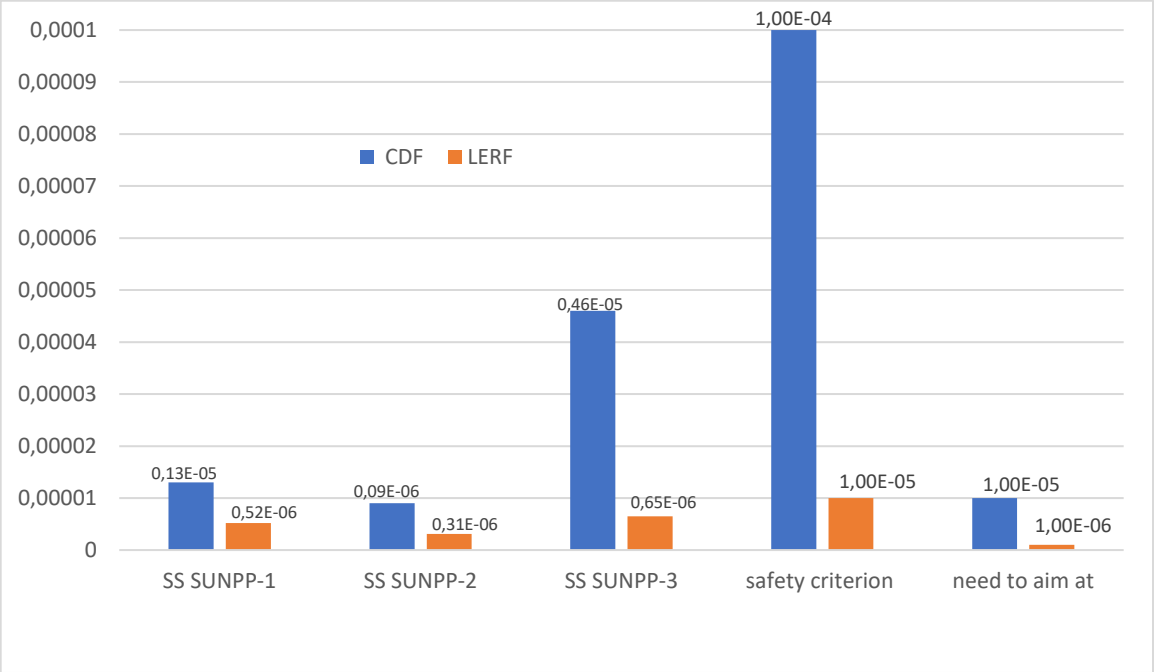
Design-basis accidents at the SS SUNPP will not lead to significant environmental risks outside the containment volume of the power unit and the NPP site.

5.5.15 Comprehensive assessment of changes in environmental risks (in case of accidents at the SS SUNPP) as a result of the CCSUP implementation

The general conclusions have not changed and are similar to the conclusions made in paragraph 5.5.15 of the 2017 Report of the EA the CCSUP

Based on the results of the CCSUP implementation and safety reassessment of SS SUNPP Units 1-3, a decrease in the main safety criteria is observed, as shown in Diagram 8.

Diagram 8 - Indicators of security criteria



CDF - Core damage frequency; LERF - Large early release frequency.

5.5.16 Assessment of economic efficiency from the implementation of the CCSUP in terms of environmental and health impacts

The general information has not changed and is similar to that set out in paragraph 5.5.16 of the 2017 Report of the EA the CCSUP.

5.6 Justification of the absence of changes in environmental impacts since the implementation of the *CCSUP*

As a result of the implementation of the CCSUP, the risk of negative impacts related to emergencies will decrease either due to a decrease in the probability of such a situation occurring and/or because the NPP will be able to limit the negative impact of such a situation.

	Air and atmosphere *	**Water bodies**		**Soils**	**Flora and fauna**	**Social environment ***
		surface waters	**underground waters**			
1 Radiation exposure						
1.1 Radiation exposure to gases and aerosols	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative	additional negative impact no additional negative

	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced	impact, risks reduced
1.2 Assessment of transboundary impacts	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
1.3 Liquid radioactive waste	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional negative impact,	additional negative impact no additional negative impact, risks reduced
1.4 Periodic inflows from splash ponds	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
1.5 Solid radioactive waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2 Chemical exposure						
2.1 Emissions from fuel combustion *	additional impact acceptable, risks reduced	no additional impact	no additional impact	no additional impact	no additional impact	additional impact acceptable, risks reduced
2.2 Penetration into groundwater	no additional impact,	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	no additional impact	no additional impact	additional negative impact no additional negative impact, risks reduced
2.3 Non-radioactive liquid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
2.4 Non-radioactive solid waste	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3 Physical impact						
3.1 Thermal impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact	no additional impact
3.2 Noise and electromagnetic radiation *	additional impact acceptable, risks reduced i	no additional impact	no additional impact	no additional impact	no additional impact	additional impact acceptable, risks reduced
Conclusions	additional negative impact is temporary, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced	additional negative impact no additional negative impact, risks reduced
* The general conclusions are reassessed taking into account the case of a design-basis accident, namely, complete NPP blackout in 2022						

6 Assessment of possible impacts from the implementation of the CCSUP in a transboundary context and measures to inform adjacent states

6.1 Brief description of the results of assessments of possible impacts of Ukrainian NPPs in the transboundary context (excluding CCSUP measures)

The impact of Ukraine's operating NPPs under normal operation is limited to the industrial site of each NPP, so the impact in the transboundary context can be disregarded.

Paragraph 6.1 of the 2017 CCSUP EA Report considered transboundary impacts on neighboring states and found that impacts are possible only in case of beyond design basis accidents and will depend on the amount, types and distribution of radionuclides released into the environment, as well as meteorological conditions.

The scale of design basis accidents is much smaller than that of beyond design basis accidents. For all design basis accidents at SS ZNPP, SS RNPP, SS KhNPP and SS SUNPP, the impact on the population of neighboring countries can be neglected in accordance with national standards and international recommendations.

The absence of transboundary impacts under normal operation, during the lifetime extension of power units and in the event of design basis accidents, as well as the acceptable level of such releases in the event of beyond design basis accidents at ZNPP and SUNPP are confirmed in the environmental impact assessment materials for the Zaporizhzhya NPP and South Ukrainian NPP sites in the "Transboundary Impact" sections of the EIA materials, as well as in the notification of planned activities in accordance with Article 3 of the Espoo Convention. This assessment was carried out in 2017-2018. According to the decision of the Ministry of Ecology and Natural Resources of Ukraine, the reporting materials were sent to the potentially affected parties to the Espoo Convention (Belarus, Germany, Poland, Moldova, Romania, Hungary, Slovakia, and Austria).

At the end of 2021, all transboundary consultations on the results of the Environmental Impact Assessment (EIA) of the ZNPP and SUNPP were completed.

According to the Law of Ukraine "On Environmental Impact Assessment," the EIA process includes transboundary consultations with affected states, which Ukraine implements under the Convention on Environmental Impact in a Transboundary Context (Espoo).

No new investment projects requiring EIA were launched during the reporting period;

At the end of 2018, in connection with the entry into force of the EIA Law, the EIA Report and the Announcement on the public discussion of the EIA Report on the construction of KhNPP Units 3 and 4 were published in the Unified Register of Environmental Impact Assessment (http://eia.menr.gov.ua/places/view/2231, case № 201811232231 dated 26.11.2018). At the end of 2018 (08.10.2018), an agreement was concluded with the Ministry of Environment to organize and conduct a public discussion. Public hearings in Ukraine were held in 8 regions and the city of Kyiv on February 11-21, 2019.

Based on the results of the public discussion and cross-border consultations, the Ministry of Environment issued the Conclusion on the Environmental Impact Assessment of

the planned activity «Construction of Khmelnytska NPP Units 3, 4» № 21/01-201811232231/1 on October 1, 2021, which was published in the Unified EIA Register on October 4, 2021.

The EIA procedure for the RNPP site was initiated in accordance with the Law of Ukraine «On Environmental Impact Assessment» dated 23.05.2017 № 2059-VIII and, in particular, the requirements of the Espoo Convention, including in the transboundary context.

The Ministry of Environment's transboundary consultations on the ZNPP and NPP EIAs and the RNPP EIA have been suspended until the end of the war unleashed by the Russian Federation.

6.2 Changes in evaluation results due to the implementation of the CCSUP

The CCSUP is not intended to increase electricity production, but rather to reduce the risk of accidents or emergencies. This, in turn, will lead to a reduction in environmental risks due to modernization of safety systems, the use of modern control and monitoring equipment, which will contribute to early warning of accidents and better management and mitigation of emergency situations. Therefore, reducing the risk of accidents means reducing the overall risk of potential transboundary impacts.

6.3 Measures to inform neighboring countries about the possible impact of the implementation of the CCSUP in a transboundary context'

The location of the sites of operating NPPs, the expected level of environmental impacts and the actual risk reduction achieved as a result of the CCSUP implementation allow us to conclude that detailed information and consultations with neighboring countries on the possible impact of the CCSUP implementation in the transboundary context are not required. At the same time, it is planned to publish the EA Report in English and Ukrainian on the Internet for the benefit of a wide range of domestic and foreign public.

7 Consultations with the public on the development and implementation of the CCSUP

7.1 Grounds for public consultation

Public consultations are a requirement of the EBRD and are in line with the state policy of Ukraine. Public consultations are planned and carried out to support the EA throughout its implementation and to disclose information at key stages so that stakeholders are involved and informed in a timely and convenient manner.

7.2 Methodology of public consultations

Public consultations within the framework of the implementation of this CCSUP EA are carried out in the following stages:

1. Publication of the Statement of Intent to conduct the next environmental assessment of the CCSUP on the Company's official website (https://www.energoatom.com.ua/app-eng/security-culture.html);

2. Publication of the Preliminary Report on the next CCSUP Environmental Assessment on the Company's website, in the information centers of each NPP for public access for review and study (October 2023).

3. Finalization of the EA Report, its approval and publication on the Company's website in English and Ukrainian (November 2023).

5. The SS NPP Information Centers are used to provide stakeholders with the opportunity to review printed copies of various documents and to submit written questions, comments and observations.

The centers are located at the following addresses:

Call Center of the SS ZNPP	Kyiv, 3 Nazarivska St., contact tel. (044) 277-78-13	09:00-17:00
Information Center of the SS SUNPP	Yuzhnoukrainsk, Mykolaiv region, Shevchenko boulevard b. 8A, contact tel. (05136) 5-64-44	09:00-17:00
Information Center of the SS RNPP	Varash, Rivne region, Independence Square b.5, contact tel. (03636) 6-42-43	09:00-17:00
Information Center of the SS KhNPP	Netishyn, Khmelnytskyi region, Lisova str. b. 6, contact tel. (03848) 6-37-13	09:00-17:00

In addition, all information and materials on the CCSUP EA can be obtained in Kyiv at the following addresses:

- the Company's headquarters (3 Nazarivska St., Kyiv);
- ecology division of SE NNEGC Energoatom, as the supervisor of the work (Kyiv, 22-24 Gogolivska St., tel. 277-79-66);
- LLC "SPE "UKREKOPROEKT", as the service provider (19 Myropilska St., Kyiv, tel. +380981084076).

7.3 Schedule of the public consultation process

In October-November 2023, public consultations on the results of the next environmental assessment of the CCSUP implementation were held in the form of e-mail correspondence.

The interested public could send questions, comments and suggestions on the results of the regular environmental assessment of the CCSUP implementation to the following e-mail addresses:

The section will be filled in based on the results of the public discussion.

7.4 Information materials for public consultations

A summary of the EA Report intended for a wide audience is provided in Annex B.

7.5 Work of information centers

The section will be filled in based on the results of the public discussion of the draft Report on Environmental Assessment of the CCSUP Implementation for the period 2017-2022.

7.6 Public events of the public consultation process

Public consultations are limited to e-mail correspondence.

The section will be filled in based on the results of public discussion of the draft Report on Environmental Assessment of the CCSUP Implementation for the period 2017-2022.

7.7 Analyzing, preparing responses and taking into account questions, comments and comments from the public

The section will be filled in based on the results of public discussion of the draft Report on Environmental Assessment of the CCSUP Implementation for the period 2017-2022.

8. CONCLUSIONS

Environmental impact

The main impact of the NPP on the environment within the 30 km observation zone remained related to heat emissions. The CCSUP is not aimed at increasing NPP production capacities, therefore, no significant increase or decrease in heat emissions, water evaporation and dust emissions from the NPP, as well as the volume of water used for cooling purposes is expected as a result of its implementation.

Realization of the CCSUP in 2017-2022 did not lead to an increase in vehicle use and a corresponding increase in emissions from mobile sources.

The CCSUP reduces the risks of emergencies and accidents at NPPs and, accordingly, the risk of environmental pollution. In addition, certain CCSUP measures will also mitigate the consequences of accidents and reduce potential releases of radioactive and non-radioactive pollutants into the environment, which demonstrates the positive impact of CCSUP implementation.

Impact on the surrounding social environment

The main impacts of the CCSUP implementation on the population living near the NPP were disturbance of peace caused by (s) additional transportation for the delivery of new equipment (although the delivery is planned mainly by train) and (ss) works related to the installation of additional seismic monitoring equipment, but these are not large-scale works that can be performed during a normal working day.

The implementation of the CCSUP required the involvement of external workers (subcontractor personnel) who are exposed to radiation and non-radiation factors and risks that exist at any NPP. According to the Ukrainian legislation, occupational safety and health measures are applied to all employees (internal, external, permanent and temporary) involved in activities at the NPP site. The purpose of such measures is to prevent the risks of accidents and excessive radiation exposure.

As shown in paragraphs. 2.5.15, 3.5.15, 4.5.15, 5.5.15, the main basic safety criteria are improved as a result of CCSUP implementation. Reduction of accident risks will lead to a decrease in the level of psychological burden on personnel and the population associated with work or residence near NPPs, which will have a positive impact on the psychological state of workers and the population of the adjacent territories. For this impact to be effective, it is necessary to raise public awareness of the CCSUP to understand the consequences of its implementation.

Impact on the man-made environment

Under normal conditions, NPP operation does not have a negative impact on the environment.

In the event of design basis accidents at NPPs, including IPAs, the negative impact on the environment will not exceed permissible limits and will not require any special measures.

Also, there is no significant impact of the environment on NPP operation.

Impact of design accidents caused by Russian military actions

Massive missile attacks by Russian military groups on substations, power lines and other facilities of the Ukrainian power system in 2022 resulted in emergencies at NPPs, the so-called blackout, which is a complete blackout of the power grid.

Prompt actions by NPP employees to respond to the emergency and implement emergency power supply measures from diesel generators helped to avoid accidents. As a result of unscheduled operation of diesel generators and PCR boilers, emissions of pollutants into the atmosphere temporarily increased due to additional fuel consumption. The impact of these design basis accidents on the environment was within the permissible limits and did not lead to significant environmental risks outside the unit containment and NPP site.

Assessment of possible transboundary impacts of the CCSUP

The CCSUP is not aimed at and will not lead to an increase in electricity production. As a result, no additional emissions and discharges of pollutants associated with the CCSUP measures into the air and water environment are expected during further NPP operation. The

CCSUP also has no significant impact on the amount of radioactive and other waste generated at NPPs.

After the implementation of the CCSUP, in general, environmental risks are reduced due to:

- reducing the likelihood of accidents;
- reducing the potential consequences of accidents through improved control, management and monitoring equipment, which contributes to early warning of accidents and better management of emergency situations.

Reduced accident risks indicate an overall reduction in the risks of potential transboundary spills. Thus, the impact of the CCSUP is positive.

This Report and the Non-Technical Summary of the ESIA will be made available for public review, in Ukrainian and English, on the Internet.

Public consultations

It should be noted that the Company has taken effective steps in the area of public relations and coverage of key events related to the implementation of the CCSUP and special terms of guarantee agreements related to the implementation of environmental and social measures.

Stakeholder engagement is a key component of the overall stakeholder engagement process for this Environmental Assessment, as it facilitates constructive dialogue with stakeholders through information disclosure and consultation.

ANNEXES

ANNEX A - List of references

1. Environmental and Social Policy, EBRD, 2019. (https://www.ebrd.com/home).

2. Law of Ukraine «On Handling Radioactive Wastes» on 30 June 1995 № 255/95-VR (https://zakon.rada.gov.ua/laws/show/en/255/95-%D0%B2%D1%80#Text).

3. Law of Ukraine «On Citizens' Appeals» on 2 October 1996 № 393/96-VR (https://zakon.rada.gov.ua/laws/show/en/393/96-%D0%B2%D1%80#Text).

4. The Montreal Protocol on Substances that Deplete the Ozone Layer on 16.09.1987 (https://zakon.rada.gov.ua/laws/show/995_215/card3?lang=en).

5. The Convention on Nuclear Safety, ratified by the Law of Ukraine on December 17, 1997 № 736/97- VR (https://zakon.rada.gov.ua/laws/show/995_023/card4?lang=en)

6. The Convention on Environmental Impact Assessment in a transboundary context, ratified by the Law of Ukraine on 19.04.1999 № 534-XIV (https://zakon.rada.gov.ua/laws/show/en/995_272?lang=en#Text)

7. The Convention on access to information, public participation in decision-making and access to justice in environmental matters, ratified by the Law of Ukraine on 06.07.1999 №832-XIV (https://zakon.rada.gov.ua/laws/show/994_015?lang=en#Text)

8. The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, ratified by the Law of Ukraine № 1688-III on 20.04.2000 (https://zakon.rada.gov.ua/laws/show/995_335?lang=en#Text)

9. Law of Ukraine "On Environmental Protection" on 25.06.1991 № 1264-XII (https://zakon.rada.gov.ua/laws/show/en/1264-12#Text)

10. The Law of Ukraine "On Air Protection" on 16.10.1992 № 2707-XII (https://zakon.rada.gov.ua/laws/show/en/2707-12?lang=en#Text)

11. The Law of Ukraine "On Ensuring Sanitary and Epidemic Safety of the Population" on 24.02.1994 № 4004-XII (https://zakon.rada.gov.ua/laws/show/4004-12?lang=en#Text)

12. The Law of Ukraine "On the Use of Nuclear Power and Radiation Safety" on 08.02.1995 № 39/95-VR (https://zakon.rada.gov.ua/laws/show/39/95-%D0%B2%D1%80?lang=en#Text)

13. The Water Code of Ukraine on 06.06.1995 № 213/95-VR (https://zakon.rada.gov.ua/laws/show/en/213/95-%D0%B2%D1%80#Text)

14. Comprehensive (Consolidated) Safety Upgrade Program for Ukrainian Nuclear Power Plants, approved by Resolution of the Cabinet of Ministers of Ukraine № 1270 on 07.12.2011 (as amended).

15. Statements by the management of SE NNEGC «Energoatom» (https://www.energoatom.com.ua/app-eng/mission.html)

16. Law of Ukraine "On Environmental Impact Assessment" on 23.05.2017 № 2059-VIII (https://zakon.rada.gov.ua/laws/show/en/2059-19#Text)

17. Law of Ukraine "On Waste Management" on 20.06.2022 № 2320-IX (https://zakon.rada.gov.ua/laws/show/2320-20?lang=en#Text)

18. Law of Ukraine "On Flora" on 09.04.1999 № 591-XIV (https://zakon.rada.gov.ua/laws/show/591-14?lang=en#Text)

19. Law of Ukraine «On Permit Activity in the Field of Nuclear Energy Utilisation» on 11.01.2000 № 1370-XIV (https://zakon.rada.gov.ua/laws/show/en/1370-14#Text)

20. Law of Ukraine «On On Extremely Dangerous Objects» on 18.01.2001 № 2245-III (https://zakon.rada.gov.ua/laws/show/2245-14?lang=en#Text)

21. Land code of Ukraine on 25.10.2001 № 2768-III (https://zakon.rada.gov.ua/laws/show/en/2768-14#Text)

22. Law of Ukraine "On Fauna" on 13.12.2001 № 2894-III (https://zakon.rada.gov.ua/laws/show/2894-14?lang=en#Text)

23. Law of Ukraine «On Drinking Water, Drinking Water Supply and Wwastewater Disposal» on 10.01.2002 № 2918- III (https://zakon.rada.gov.ua/laws/show/en/2918-14#Text)

24. Law of Ukraine «On Ecological Audit» on 24.06.2004 № 1862-IV (https://zakon.rada.gov.ua/laws/show/en/1862-15#Text)

25. The Law of Ukraine "On the Procedure for Making Decisions on Locating, Designing, and Building Nuclear Facilities and Objects Designed for Treating Radio-Active Waste That Are of National Importance" on 08.09.2005 № 2861-IV (https://zakon.rada.gov.ua/laws/show/2861-15?lang=en#Text)

26. The Law of Ukraine "On Access to Public Information" on 13.01.2011 № 2939-VI (https://zakon.rada.gov.ua/laws/show/en/2939-17#Text)

27. The Procedure for public hearings on the use of nuclear energy and radiation safety, approved by the Resolution of the Cabinet of Ministers of Ukraine № 1122 on 18.07.1998 (https://zakon.rada.gov.ua/laws/show/1122-98-%D0%BF?lang=en#Text)

28. The Procedure for involvement of the public in discussion of issues related to decision-making that may affect the environment, approved by the Resolution of the Cabinet of Ministers of Ukraine № 771 on 29.06.2011 (https://zakon.rada.gov.ua/laws/show/771-2011-%D0%BF?lang=en#Text)

29. Energy Strategy of Ukraine for the period up to 2050, approved by the Order of the Cabinet of Ministers of Ukraine № 373-r on 21.04.2023 (https://zakon.rada.gov.ua/laws/show/en/373-2023-%D1%80?lang=en#Text)

30. Composition and content of environmental impact assessment (EIA) materials (DBN A.2.2-1:2021) approved by the Order of the Ministry of Regional Development of Ukraine № 366 on 30.12.2021.

31. Requirements for Safety Assessment of Nuclear Power Plants (NP 306.2.162-2010), approved by SNRIU Order № 124 on 22.09.2010 (https://zakon.rada.gov.ua/laws/show/z0964-10?lang=en#Text)

32. The requirements for the safety assessment of nuclear power plants with regard to external natural impacts were approved by the Order of the State Nuclear Regulatory Inspectorate of Ukraine № 263 on 30.05.2021 (https://zakon.rada.gov.ua/laws/show/z0670-21?lang=en#Text)

33. The requirements for determining the size and boundaries of the observation zone of a nuclear power plant (NP 306.2.173-2011), approved by the SNRIU and the Ministry of Health of Ukraine on 07.11.2011 № 153/766 (https://zakon.rada.gov.ua/laws/show/z1343-11?lang=en#Text)

34. General Safety Regulations for Nuclear Power Plants (NP 306.2.141-2008), approved by SNRIU Order № 162 on 19.11.2007 (https://zakon.rada.gov.ua/laws/show/z0056-08?lang=en#Text)

35. Regulation on the Ecology Department of the Executive Directorate for Nuclear and Radiation Safety and Scientific and Technical Support PL-P.6.18.007-12.

36. Guideline on the functioning of the environmental management system of the Energoatom Company RK-D.0.18.609-14.

37. Recommendations to the Plan for the preparation and certification of the management system of the Energoatom Company for compliance with the international standard OHSAS-18001 CCSUP- PMU-E HS-ASR-001-00.

38. Report on determination of the scope of the EA works of 02.05.2011, SE NNEGC «Energoatom».

39. Environmental Assessment Report. Main report. SE NNEGC "Energoatom" Comprehensive (Consolidated) Safety Improvement Program for Ukrainian NPP Units: Environmental Assessment, SE NNEGC Energoatom, 31.01.2012.

40. Statement on the environmental consequences of the implementation of the Comprehensive (Consolidated) Safety Upgrade Program for Ukrainian NPPs (CCSUP), Energoatom Company, 18.10.2011.

41. The Law of Ukraine "On Ratification of the Guarantee Agreement (Ukraine: Comprehensive (Consolidated) Safety Upgrade Program to Increase the Safety of Power Generating Units of) between Ukraine and the European Bank for Reconstruction and Development" on 15.05.2014 № 1267-VII (https://zakon.rada.gov.ua/laws/show/1267-18?lang=en#Text)

42. The Law of Ukraine "On Ratification of the Guarantee Agreement between Ukraine as Guarantor and the European Atomic Energy Community as Lender in relation to the Agreement on the Loan Facility of 300000000 (three hundred million) euros dated August 7, 2013 between the National Nuclear Energy Generating Company "Energoatom" and the European Atomic Energy Community for the implementation of the project Comprehensive (Consolidated) Safety Upgrade Program for Nuclear Power Plants" on 15.05.2014 № 1268-VII (https://zakon.rada.gov.ua/laws/show/1268-18?lang=en#Text)

43. Environmental assessment of nuclear power units. General requirements for the composition and content of assessment materials (SOU NAEK 004:2011).

44. Stakeholder engagement plan. Integrated (consolidated) security enhancement program CCSUP-PMU-EPR-ACP-001-00, 2015.

45. The Law of Ukraine " On the National Targeted Environmental Program for Radioactive Waste Management" on 17.09.2008 № 516-VI (https://zakon.rada.gov.ua/laws/show/516-17?lang=en#Text)

Annex B - A summary of the EA Report for a wide audience

The document "Non-Technical Summary of the CCSF Environmental Assessment Report" is attached as a separate document.

Annex C - Book of questions – answers

The section will be filled in based on the results of the public discussion of the draft Environmental Assessment Report on the implementation of the CCSUP for the period 2017-2022.

Annex D - Statement on environmental impacts of the CCSUP implementation

Due to the fact that no significant changes in the environmental impacts were identified as a result of the CCSUP EA, the Environmental Impact Statement is not being revised.

Annex E - List of additional measures included in the CCSUP

Each CSPP measure is encrypted as follows:

- first digit: type of RS project (1 - VVER-1000/V-320, 2 - VVER-1000/V-302, VVER-1000/V-338, 3 - VVER-440/V-213);

- second and third digits: group and subgroups of measures:

Group	Subgroups
0 General	01 Qualification
1 Reactor core and fuel handling	11 Neutron-physical characteristics of the core
	12 Active zone design
	13 Fuel handling
2 Component integrity	21 First circuit system
	22 Safety-critical pressure systems
	23 Reactor (including vessel)
	24 Others
3 Systems	31 Supporting responsiveness
	32 Maintaining the coolant supply of 1 circuit
	33 Cooling the first circuit
	34 Pressure maintenance in 1 circuit
	35 Auxiliary systems
4 APCS	41 Information system
	42 Reactor control and protection system
	43 Security control systems
	44 Control and management systems
5 Electricity supply	51 External sources
	52 Energy distribution
6 Containment and building structures	61 The risk of bypassing the containment
	62 Integrity
7 Internal dangers	
	71 Fire protection
	72 Flood protection
	73 Dangers associated with pipeline ruptures and flying objects

8 External dangers	81 Seismic
	82 Natural phenomena
	83 External technogenic
9 Accident analysis	91 Safety analyses
	92 Accident management

- fourth and fifth digits: sequential two-digit number of the event in each subgroup

List of additional measures for VVER-1000/V-320 power units

Cipher	Name of the event
0	General
01	Qualification
10102	Investigation of the need and possibility of upgrading the qualification of power unit elements that may be involved in severe accident management for "harsh environment" conditions
1	Reactor core and fuel management
13	Fuel management
11305	Ensuring watering and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout
3	Systems
33	Cooling of the first circuit
13307	Ensuring GHG supply in conditions of prolonged complete NPP blackout
13308	Conducting a detailed analysis of the need to recharge the first circuit in the event of an accident with loss of power supply and/or the final heat sink
35	Auxiliary systems
13511	Ensuring the operability of consumers of the group "A" industrial water system when dehydrating splash pools
44	Control and management systems
14408	Integration of NPP ASKRO into the Unified Automated Radiation Monitoring System
5	Electricity supply
51	External sources
15103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout
52	Energy distribution
15209	Equipping the power oil-filled equipment of the main NPP power supply scheme with installations of a passive mechanical explosion prevention system
15213	Installation of RTSN-5,6 to improve the reliability of power supply for own needs
71	Fire protection
17105	Modernization of the automatic fire alarm system for the premises of the RV, DV, EETP, MV, SC
17106	Equipping NPP premises containing electrical and electronic equipment with stationary non-automatic gas fire extinguishing systems
17107	Installation of fire retardant valves on air ducts in fire partitions of ventilation centers, battery rooms, cable facilities and rooms containing electrical and electronic equipment, separating them from rooms of other categories for explosion and fire safety
17108	Bringing the fire resistance limit of removable non-combustible structures of cable ducts and raised floors of NPP premises containing electrical and electronic equipment to the standardized value

17109	Equipping NPP power units with automatic fire extinguishing units for auxiliary transformers
17110	Replacement of combustible roof insulation in the engine room
81	Seismic hazard
18102	Implementation of seismological monitoring systems for NPP sites
91	Security analyses
19105	Analyze the feasibility of implementing a strategy to localize the melt in the reactor vessel
19106	Development of seismic IAB

List of additional measures for VVER-1000/V-302,338 power units

Cipher	Name of the event
0	General
01	Qualification
20102	Investigation of the need and possibility of upgrading the qualification of power unit elements that may be involved in severe accident management for "harsh environment" conditions
1	Reactor core and fuel management
13	Fuel management
21305	Ensuring watering and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout
3	Systems
33	Cooling of the first circuit
23307	Ensuring GHG supply in conditions of prolonged complete NPP blackout
23308	Conducting a detailed analysis of the need to recharge the first circuit in the event of an accident with loss of power supply and/or the final heat sink
35	Auxiliary systems
23511	Ensuring the operability of consumers of the group "A" industrial water system when dehydrating splash pools
5	Electricity supply
52	Energy distribution
25209	Equipping the power oil-filled equipment of the main NPP power supply scheme with installations of a passive mechanical explosion prevention system
25212	Modernization of the generator excitation system
15213	Installation of RTSN-5,6 to improve the reliability of power supply for own needs
71	Fire protection
27102	Implementation of a smoke removal system from the evacuation corridors of the Southern Railway
27103	Equipping NPP premises containing electrical and electronic equipment with stationary gas fire extinguishing systems
27105	Modernization of the automatic fire alarm system for the premises of the DV, MV, SC
27106	Implementation of redundancy of water fire extinguishing systems of security systems
27107	Installation of fire retardant valves with a standardized fire resistance limit in places where supply and exhaust ventilation ducts cross fire barriers in battery rooms, rooms containing electrical and electronic equipment, cable structures, and RDES

27108	Bringing the fire resistance limit of removable non-combustible structures of cable ducts and raised floors of NPP premises containing electrical and electronic equipment to the standardized value
27109	Implementation of an automatic fire extinguishing system in the premises of diesel generators at the RDES
27110	Replacement of combustible roof insulation in the engine room
27111	Bringing the fire resistance limit of load-bearing metal building structures to the normalized value
27112	Bringing the fire resistance limit of transit air ducts and process pipelines passing through the premises of security systems and normal operation systems to the normalized value
27113	Bringing the fire resistance limit of the enclosing structures of switchgear, switchgear and relay panels of the substation to the normalized value
91	Security analyses
29105	Analyze the feasibility of implementing a strategy to localize the melt in the reactor vessel
29106	Development of seismic IAB

List of additional measures for VVER-1000/V-213 power units

Cipher	Name of the event
0	General
01	Qualification
30102	Investigation of the need and possibility of upgrading the qualification of power unit elements that may be involved in severe accident management for "harsh environment" conditions
11	***Neutron-physical characteristics of the core***
31103	Implementation of an external cooling system for the reactor vessel
1	Reactor core and fuel management
13	Fuel management
31305	Ensuring watering and cooling of the spent fuel pool under conditions of prolonged complete NPP blackout
3	Systems
33	Cooling of the first circuit
33307	Ensuring GHG supply in conditions of prolonged complete NPP blackout
33308	Conducting a detailed analysis of the need to recharge the first circuit in the event of an accident with loss of power supply and/or the final heat sink
35	Auxiliary systems
33511	Ensuring the operability of consumers of the group "A" industrial water system when dehydrating splash pools
41	***Information system***
34101	Instrumentation during and after accidents (PAMS)
51	***External sources***
35103	Ensuring emergency power supply in conditions of prolonged complete NPP blackout
52	Energy distribution
35209	Equipping the power oil-filled equipment of the main NPP power supply scheme with installations of a passive mechanical explosion prevention system
35212	Modernization of the generator excitation system
62	***Integrity***

36203	Development and implementation of measures to reduce hydrogen concentration in CSOs for beyond design basis accidents
71	Fire protection
37106	Equipping NPP premises containing electrical and electronic equipment with stationary non-automatic gas fire extinguishing systems
37107	Installation of fire retardant valves with a standardized fire resistance limit in places where supply and exhaust ventilation ducts cross fire barriers of the RDES
37111	Bringing the fire resistance limit of load-bearing metal building structures to the normalized value
37112	Bringing the fire resistance limit of transit air ducts passing through the premises of safety systems and normal operation systems of power units № 1, 2 to the normalized value
37113	Bringing the fire resistance limit of the machine hall roof trusses to the normalized value
91	Security analyses
39105	Analyze the feasibility of implementing a strategy to localize the melt in the reactor vessel
39106	Development of seismic IAB

Annex F - Implementation of CCSUP additional measures as of the end of 2022

ADDITIONAL MEASURES	Unit	Total Number of Measures	Completed	To Implement
SS ZNPP	ZNPP-1	12	9	3
	ZNPP -2	12	9	3
	ZNPP -3	12	8	4
	ZNPP -4	12	8	4
	ZNPP -5	12	7	5
	ZNPP -6	12	5	7
	Common	3	2	1
	Totally	**75**	**48**	**27**
SS RNPP	RNPP-1	15	10	5
	RNPP -2	15	10	5
	RNPP -3	12	10	2
	RNPP -4	12	8	4
	Common	3	2	1
	Totally	**57**	**40**	**17**
SS KhNPP	KhNPP -1	12	10	2
	KhNPP -2	12	8	4
	Common	2	1	1
	Totally	**26**	**19**	**7**
SS SUNPP	SUNPP -1	16	12	4
	SUNPP -2	17	12	5
	SUNPP -3	12	6	6
	Common	2	1	1
	Totally	**47**	**31**	**16**
SE NNEGC «Energoatom»		8	1	7
TOTAL		**213**	**139**	**74**

List of additional CCSUP measures completed as of the end of 2022

NPP	Unit	Completed before reporting Quarter	Completed during reporting Quarter
ZNPP	Unit -1	11305 13307 13511 15103 17105 17108 17109 17110 19106	
	Unit -2	11305 13307 13511 15103 17105 17108 17109 17110 19106	
	Unit -3	11305 13307 13511 15103 17105 17108 17109 17110	
	Unit -4	11305 13307 13511 15103 17108 17109 17110	17105
	Unit -5	11305 13307 13511 15103 17108 17109 17110	
	Unit -6	11305 13307 13511 17108 17110	
	Common	15213 18102	
	Totally	**47**	**1**
RNPP	Unit -1	31305 33307 33511 34101 35103 37107 37111 37112 37113	35212
	Unit -2	31305 33307 33511 34101 35103 35212 37107 37111 37112 37113	
	Unit -3	11305 13307 13511 15103 17105 17106 17107 17108 17109 17110	
	Unit -4	11305 13307 13511 15103 17107 17108 17109 17110	
	Common	18102 39105	
	Totally	**39**	**1**
KhNPP	Unit -1	11305 13307 13511 15103 17105 17107 17108 17109 17110	17106
	Unit -2	11305 13307 13511 15103 17105 17108 17109 17110	
	Common		18102
	Totally	**17**	**2**
SUNPP	Unit -1	21305 23307 23511 27102 27105 27106 27107 27108 27109 27110 27111 27113	
	Unit -2	21305 23307 23511 27102 27105 27106 27107 27108 27109 27110 27111 27113	
	Unit -3	11305 13307 13511 17107 17108 17109	
	Common	18102	
	Totally	**31**	**0**
SE NNEGC «Energoatom»		33308	
	TOTAL	**1**	**0**

Annex G - Implementation of CCSUP initially planned measures as of the end of 2022

INITIALLY PLANNED MEASURES	Unit	Total Number of Measures	Completed	To Implement
SS ZNPP	ZNPP-1	77	70	7
	ZNPP -2	77	70	7
	ZNPP -3	76	66	10
	ZNPP -4	76	69	7
	ZNPP -5	76	67	9
	ZNPP -6	77	45	32
	Common	3	2	1
	Totally	**462**	**389**	**73**
SS RNPP	RNPP -1	54	47	7
	RNPP -2	53	46	7
	RNPP -3	79	76	3
	RNPP -4	79	72	7
	Common	5	5	0
	Totally	**270**	**246**	**24**
SS KhNPP	KhNPP -1	79	75	4
	KhNPP -2	79	71	8
	Common	4	3	1
	Totally	**162**	**149**	**13**
SS SUNPP	SUNPP -1	53	50	3
	SUNPP -2	53	47	6
	SUNPP -3	77	58	19
	Common	5	5	0
	Totally	**188**	**160**	**28**
TOTAL		**1082**	**944**	**138**

List of completed CCSUP initially planned measures as of the end of 2022

NPP	Unit	Completed before reporting Quarter	Completed during reporting Quarter
ZNPP	Unit 1	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13503 13504 13505 13508 13509 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14405 14406 15201 15202 15203 15204 15205 15207 15208 15211 15212 16101 16201 16202 16203 16205 17101 17103 17104 17201 18101 19101 19102 19103 19201 19202 19203 19204	
	Unit -2	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13502 13503 13504 13505 13508 13509 14101	

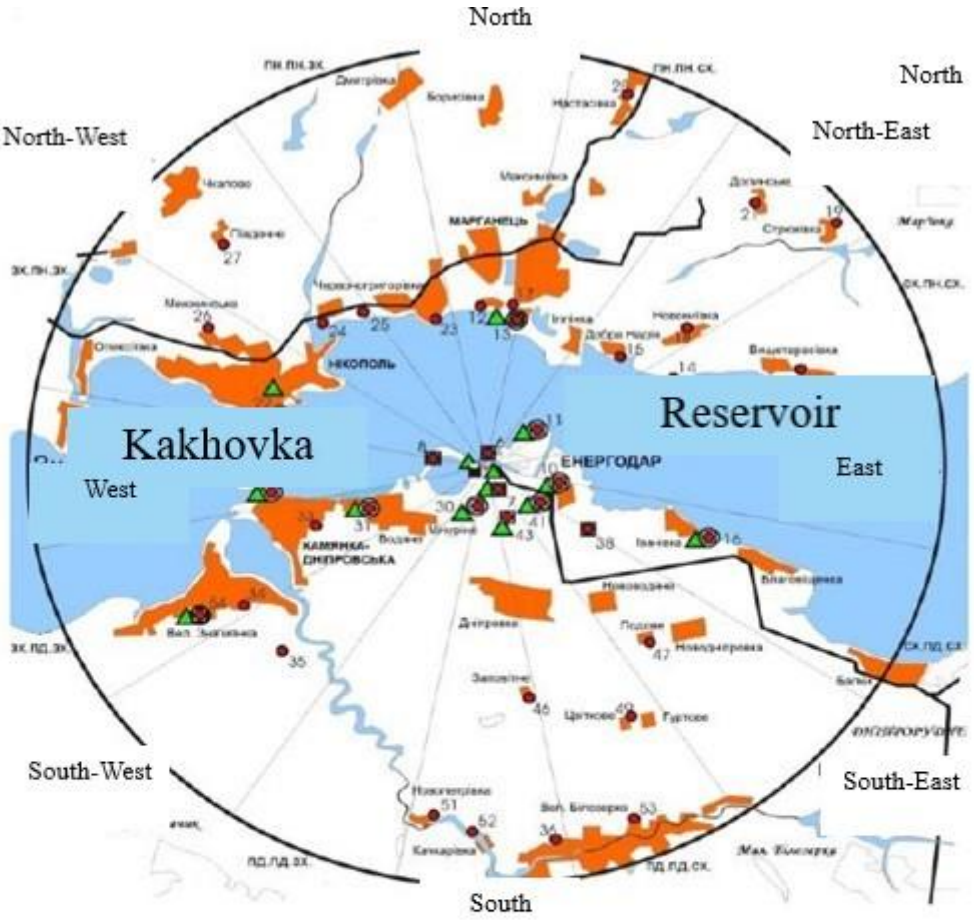
		14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14405 14406 15201 15202 15203 15204 15205 15207 15208 15211 15212 16101 16201 16202 16203 16205 17101 17103 17104 17201 18101 19101 19102 19103 19201 19202 19203 19204	
	Unit -3	10101 11302 11303 11304 12101 12102 12201 12202 12203 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13508 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14405 14406 15201 15202 15203 15205 15207 15211 15212 16101 16201 16202 16203 17101 17103 17104 17201 18101 19101 19102 19103 19201 19202 19203 19204	
	Unit -4	10101 11302 11303 11304 12101 12102 12201 12202 12203 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13508 13509 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14405 14406 15201 15202 15203 15204 15205 15211 15212 16101 16201 16202 16203 16205 17104 17201 18101 19101 19102 19103 19201 19202 19203 19204	14401 17101 17103
	Unit -5	10101 11302 11303 11304 12101 12102 12201 12202 12203 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13508 13509 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14405 14406 15201 15202 15203 15204 15205 15211 15212 16101 16201 16202 16203 16205 17102 17104 17201 18101 19101 19102 19103 19201 19202 19203 19204	14401
	Unit -6	11303 11304 12101 12201 12202 12203 13101 13102 13103 13202 13301 13303 13305 13401 13403 13504 13505 13506 13508 14101 14104 14201 14203 14204 14205 14206 14402 15201 15203 15205 15211 15212 16101 16201 16202 16203 17103 19101 19102 19103 19201 19202 19203 19204	15202
	Common	12302 13507	
	Totally	**384**	**5**
RNPP	Unit -1	30101 31101 31102 31301 32101 32302 32401 33302 33303 33501 33502 33503 33509 34103 34106 34107 34201 34301 34401 34402 34403 34404 34406 34407 34408 34409 35102 35201 35202 35203 35204 35205 35206 37101 37102	31302 34405

		37103 37105 39101 39102 39103 39104 39201 39202 39203 39204	
	Unit -2	30101 31101 31102 31301 32101 32401 33302 33303 33501 33502 33503 34102 34103 34104 34106 34107 34201 34301 34401 34402 34403 34404 34406 34407 34408 34409 35102 35201 35202 35203 35204 35205 35206 37102 37103 37105 39101 39102 39103 39104 39201 39202 39203 39204	31302 34405
	Unit -3	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13506 13508 13509 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14401 14402 14403 14404 14405 14406 14407 15201 15202 15203 15204 15205 15206 15207 15208 15211 15212 16101 16201 16202 16203 16205 17101 17102 17103 17104 17201 19101 19102 19103 19201 19202 19203 19204	
	Unit -4	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 12401 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13402 13403 13501 13502 13503 13504 13505 13506 13508 13509 14101 14102 14103 14104 14105 14106 14201 14202 14203 14204 14205 14206 14301 14402 14403 14404 14405 14406 14407 15201 15202 15203 15204 15207 15212 16101 16201 16203 16205 17101 17102 17103 17201 19101 19102 19103 19201 19202 19203 19204	15211
	Common	12302 13507 15101 33201	13510
	Totally	**240**	**6**
KhNPP	Unit -1	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13506 13508 13509 14101 14102 14103 14104 14105 14201 14202 14203 14204 14205 14206 14301 14401 14402 14403 14404 14405 14406 14407 15201 15202 15203 15204 15205 15206 15207 15208 15211 15212 16101 16201 16202 16203 17101 17103 17104 17201 19101 19102 19103 19201 19202 19203 19204	14106 16205
	Unit -2	10101 11302 11303 11304 12101 12102 12201 12202 12203 12301 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13506 13508 13509 14101 14102 14103 14104 14106 14201 14202 14203 14204 14205 14206 14401 14402 14403 14404 14405 14407 15201 15202 15203	16205

		15204 15205 15206 15207 15208 15211 15212 16101 16201 16203 17101 17102 17103 17201 19101 19102 19103 19201 19202 19203 19204	
	Common	12302 13507 15101	
	Totally	**146**	**3**
SUNPP	Unit -1	20101 21302 22101 22102 22201 22202 22203 22301 23103 23301 23302 23401 23402 23403 23501 23502 23503 23504 23509 24101 24102 24103 24104 24202 24205 24401 24403 24404 25101 25201 25202 25203 25204 25205 25207 25208 26101 26201 26202 26203 26205 27101 27201 27203 28101 29101 29102 29103 29203 29204	
	Unit -2	20101 21302 22101 22102 22201 22202 22203 22301 23103 23301 23302 23401 23402 23403 23501 23502 23503 23504 23509 24101 24102 24103 24104 24202 24205 24403 25101 25201 25202 25204 25205 25207 25208 26101 26201 26202 26203 26205 27101 27201 27203 28101 29101 29102 29103 29203 29204	
	Unit -3	10101 11302 11303 11304 12101 12102 12201 12202 12203 13101 13102 13103 13202 13301 13302 13303 13304 13305 13401 13403 13501 13502 13503 13504 13505 13508 14101 14102 14104 14105 14201 14202 14203 14204 14205 14206 14403 14405 14406 15202 15205 15211 15212 16101 16201 16202 16203 16205 17103 17201 18101 19101 19102 19103 19201 19202 19203 19204	
	Common	13507 13510 15101 22302 23201	
	Totally	**160**	**0**

Annex H - NPP radiation monitoring scheme

Figure 1 - 30-km observation area of the ZNPP



The control posts include:

- air filtering device, cuvette for collecting precipitation, container with a TLD dosimeter
- a cuvette for collecting precipitation, a container with a TLD dosimeter
- container with a TLD dosimeter
- air filtering device, 4 cuvettes for collecting precipitation, 4 containers with TLD dosimeters (control post)
- sensors of the "Ring" IPS

Figure 2 - 30-km observation area of RNPP

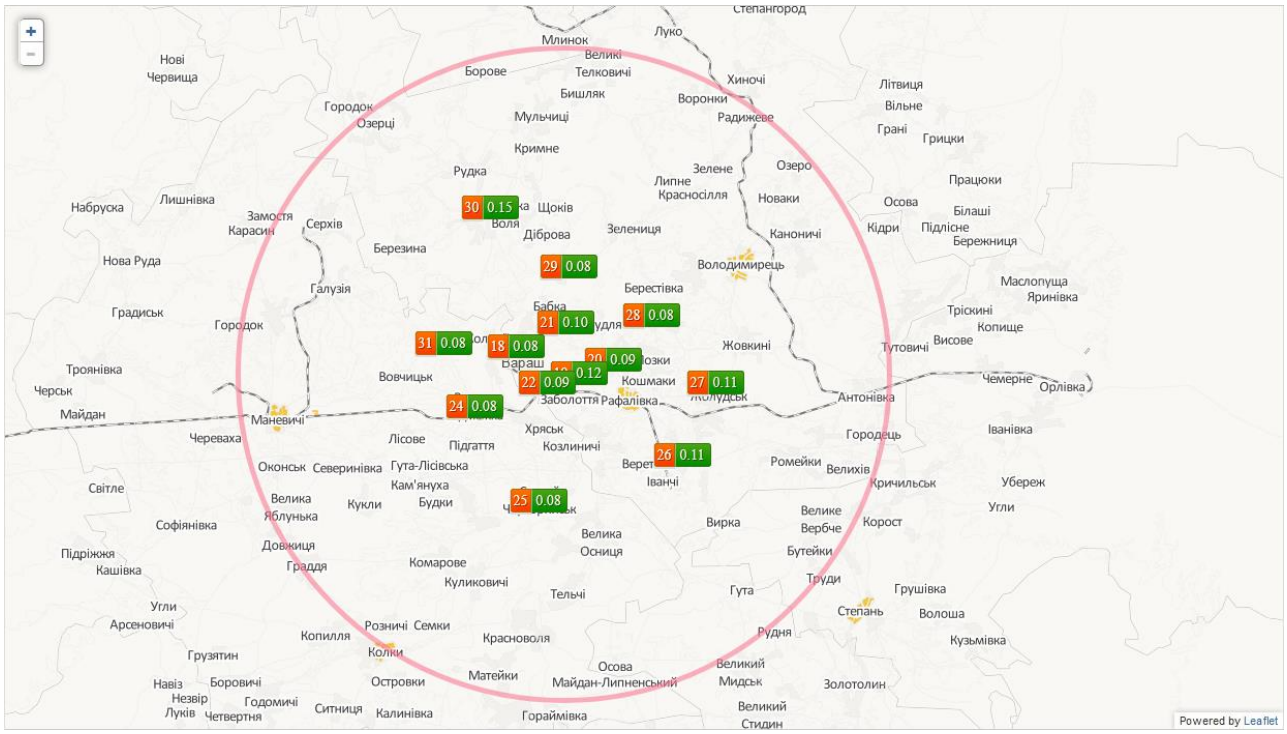


Figure 3 - 30-km observation area of KhNPP

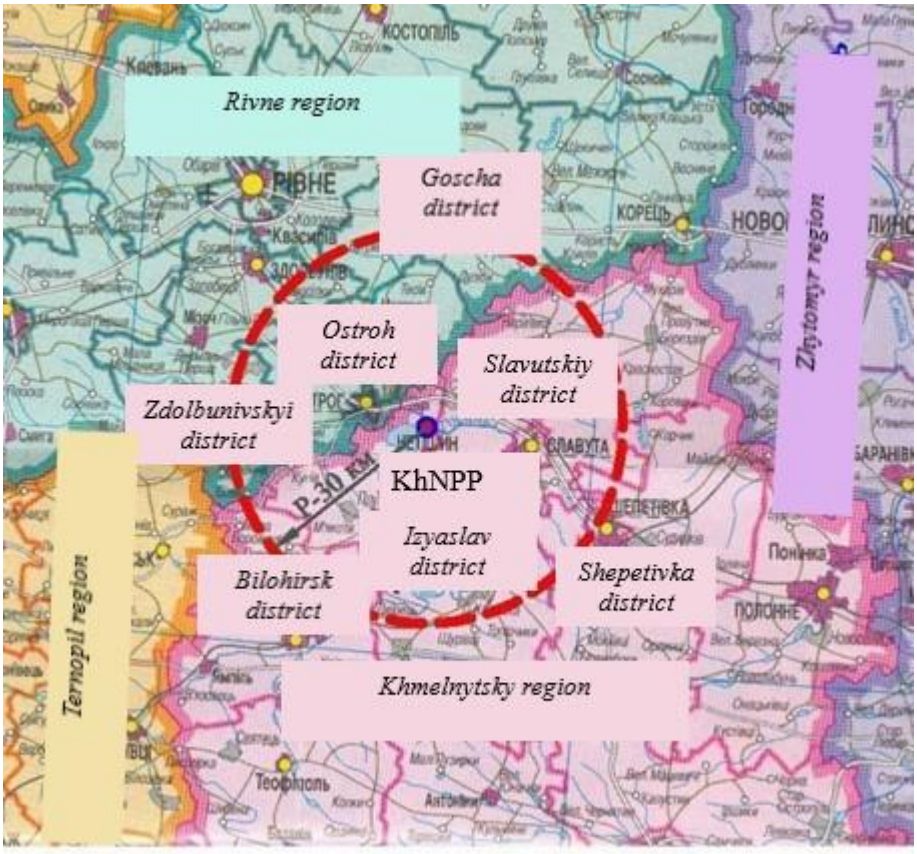
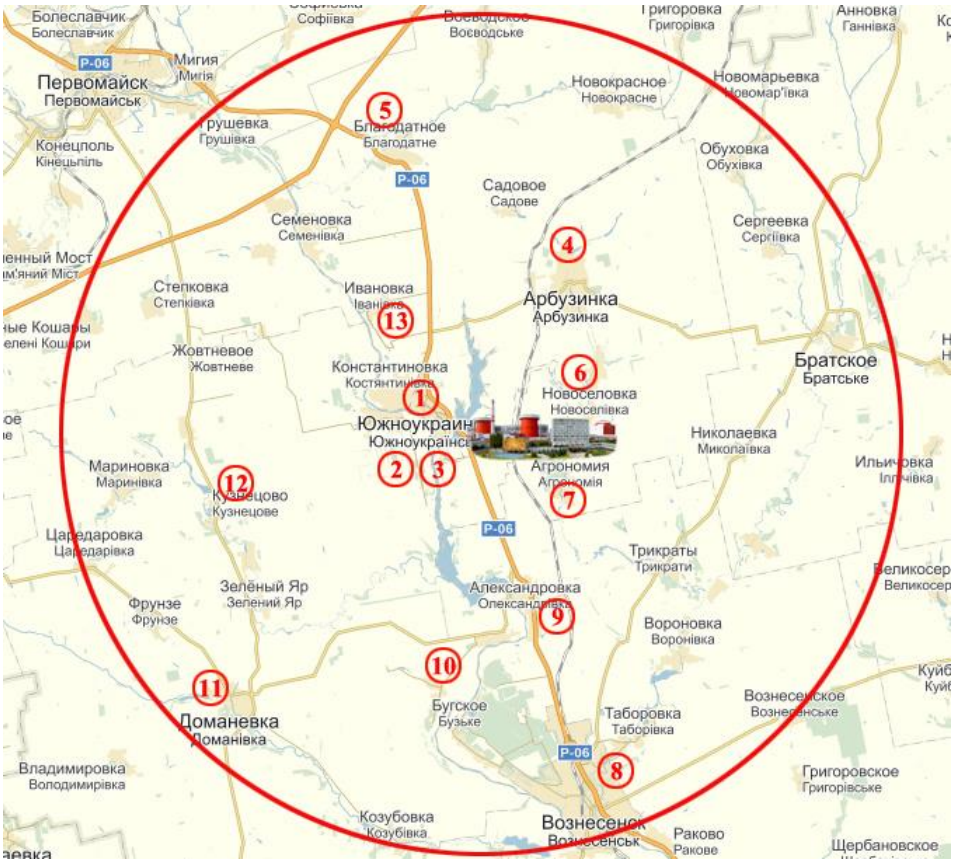


Figure - 4 - 30-km observation zone of the SUNPP



Annex I – Results of radiation monitoring of the NPP location area

The results of radiation monitoring in the facilities of operating NPPs in Ukraine are shown in the following figures and tables. The "zero background" shown in the tables refers to the state of environmental objects before NPP construction.

Due to the seizure of the city of Enerhodar, including the Zaporizhzhya NPP site, by Russian military groups in early March 2022, there is no data on ZNPP's OP for 2022.

Diagram 9 - Emissions of inert radioactive gases

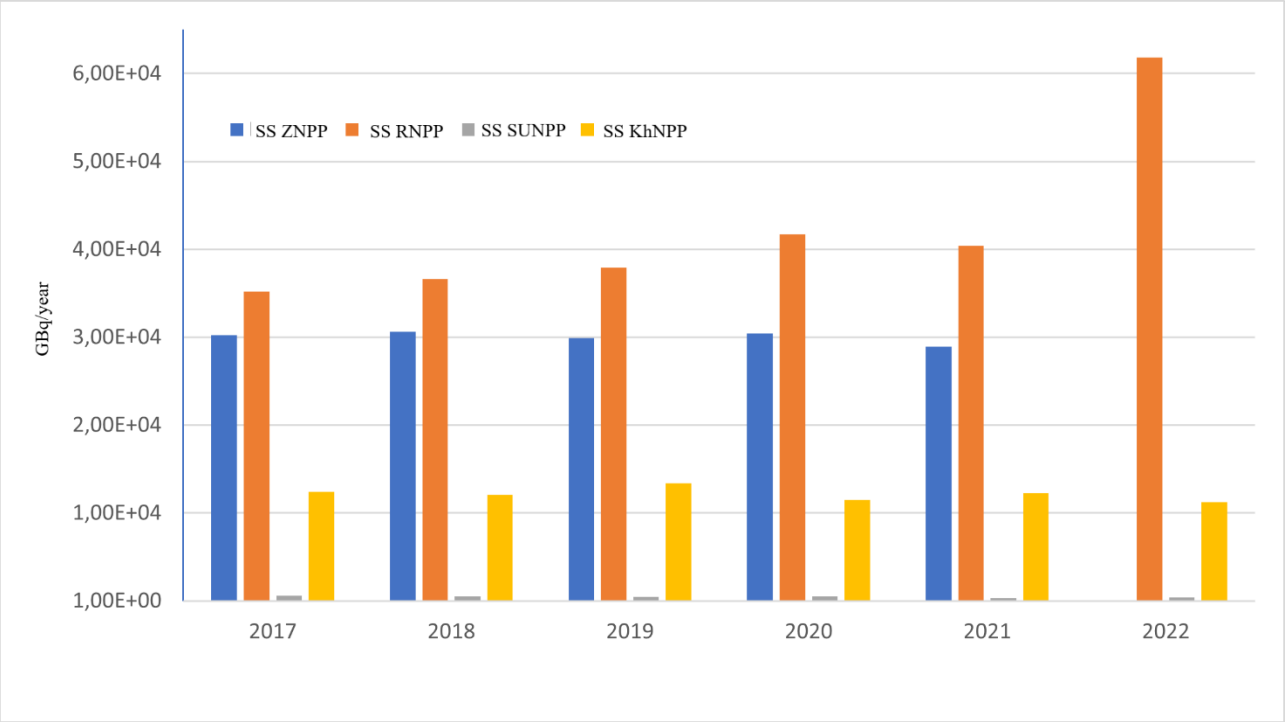


Diagram 10 - Gas and aerosol emissions of long-lived nuclides

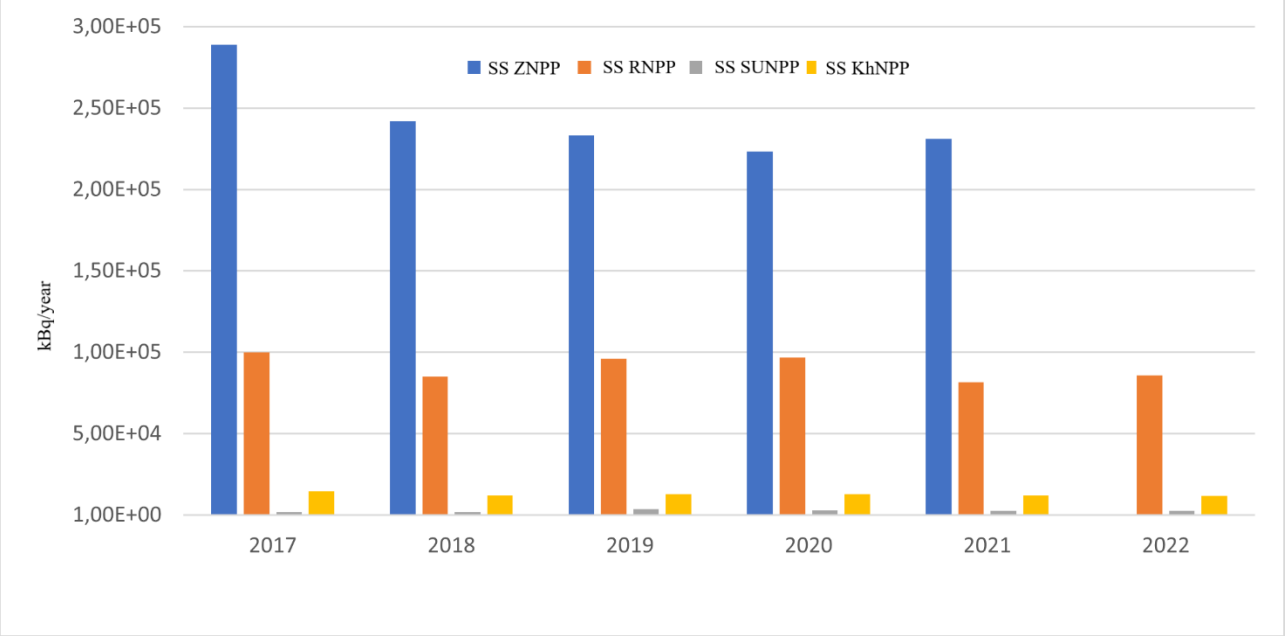


Diagram 11 - Total emissions of iodine radionuclides

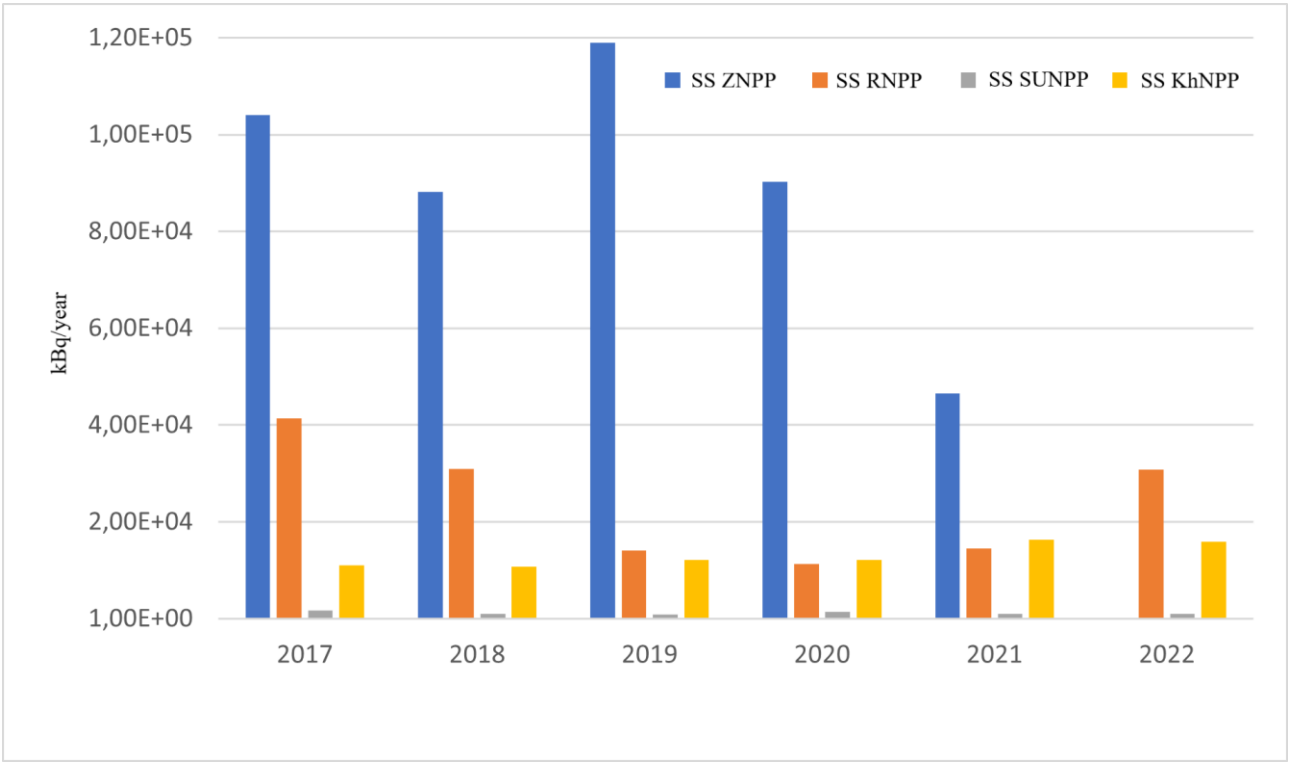


Diagram 12 - Cesium-137 emissions

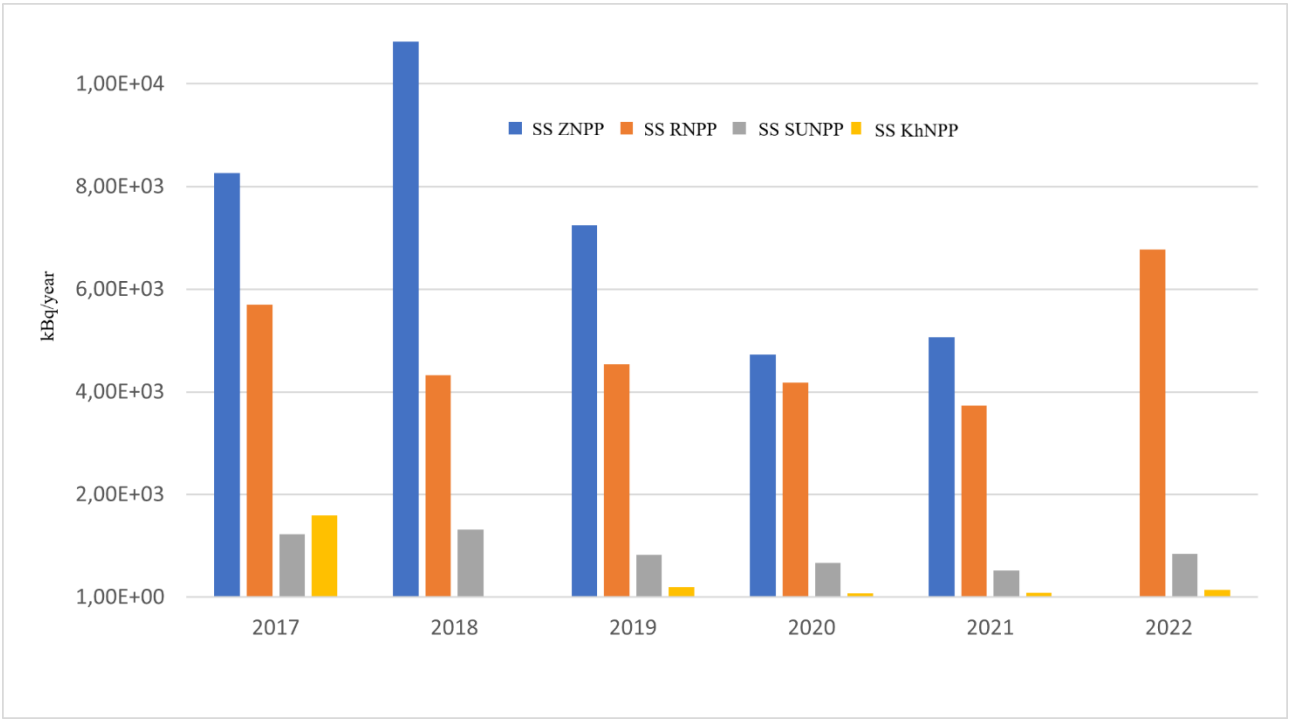


Diagram 13 - Cobalt-60 emissions

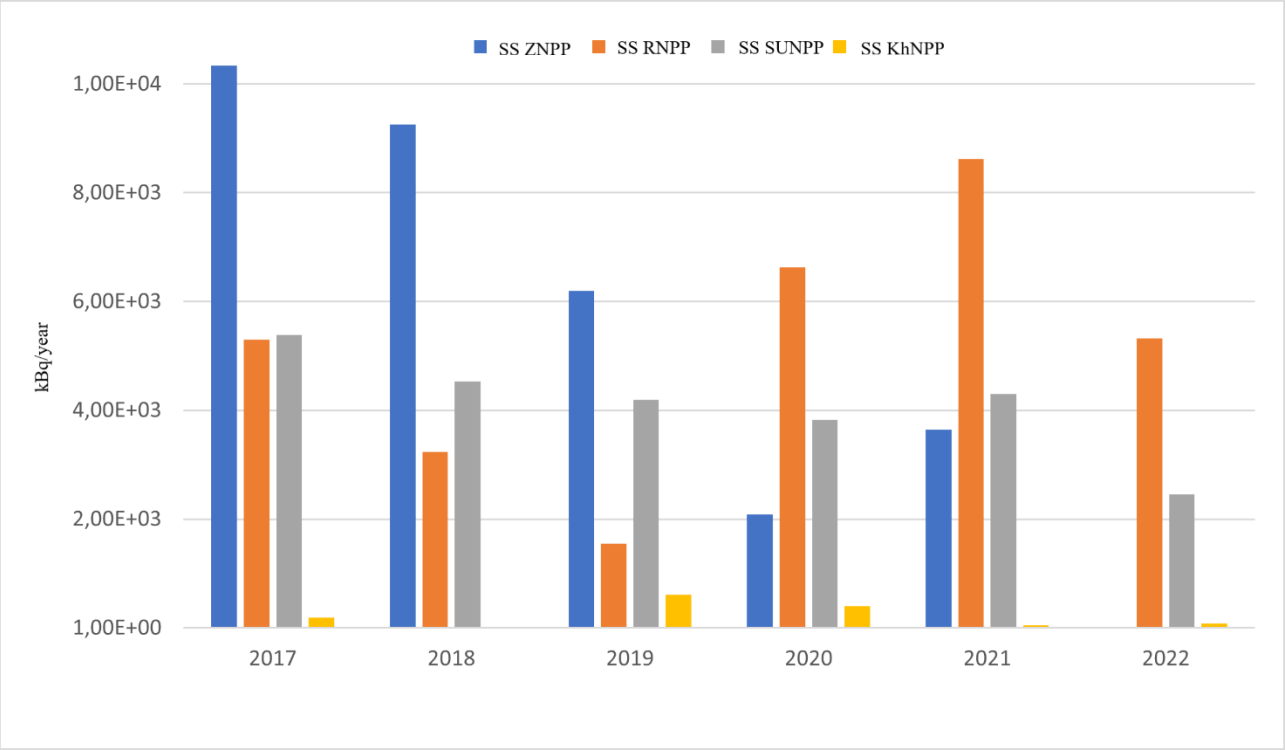


Diagram 14 - Tritium emissions

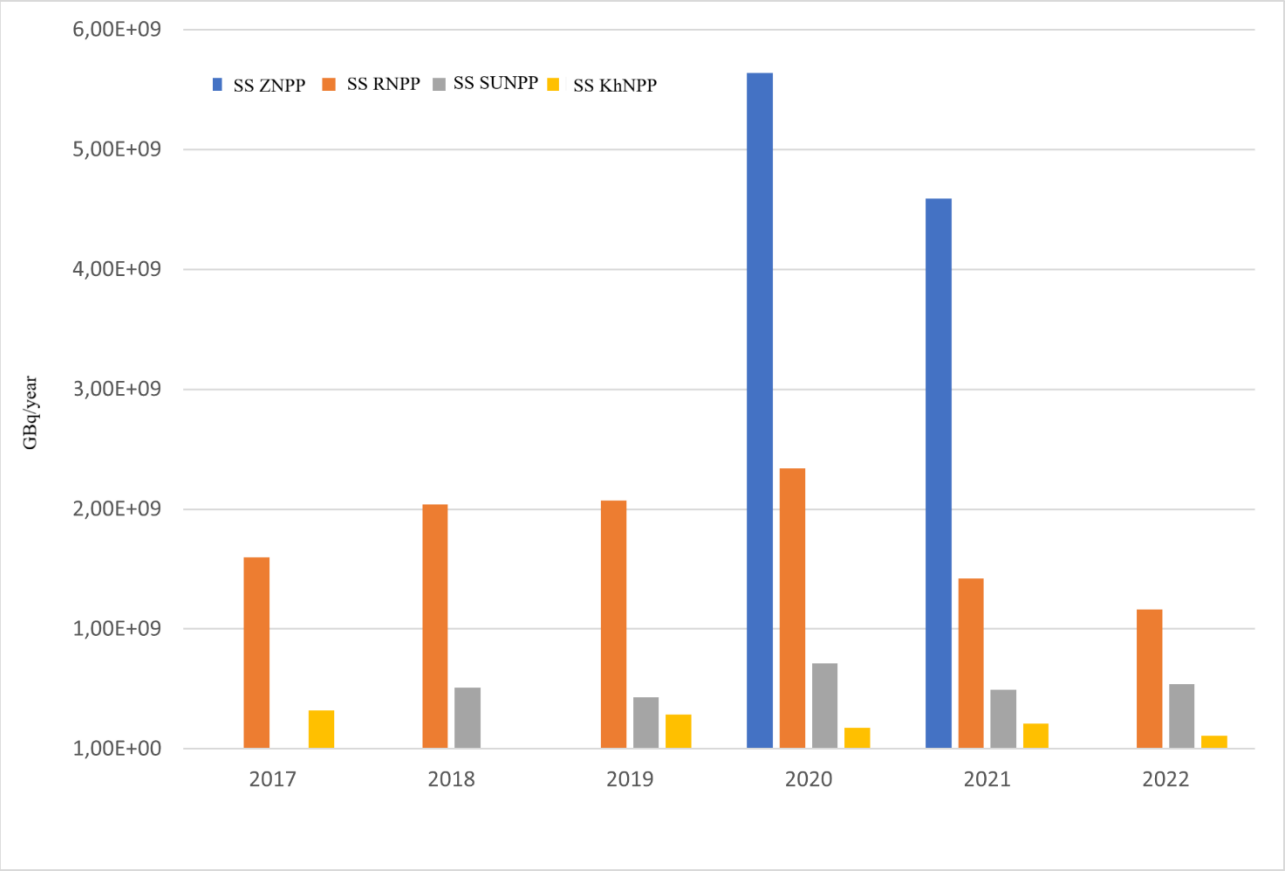


Diagram 15 - Tritium discharges to external water bodies

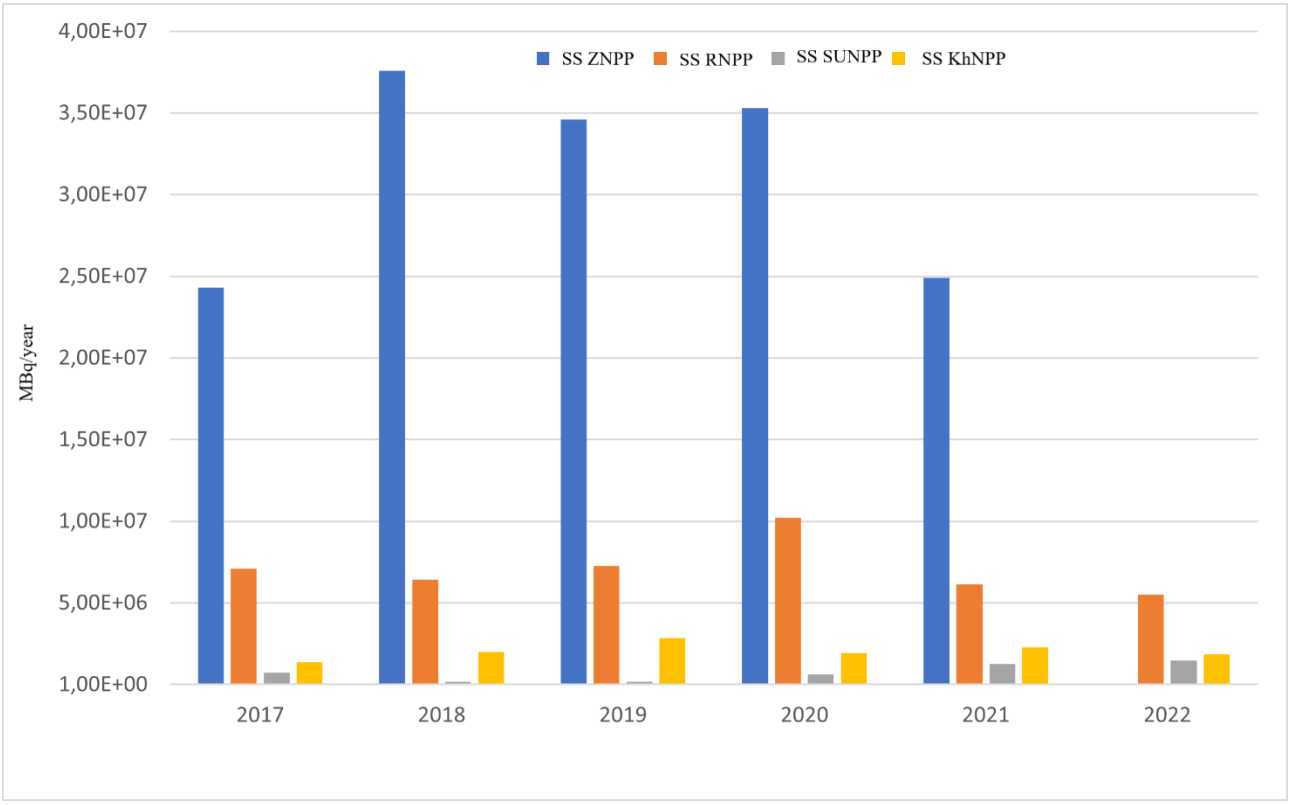


Diagram 16 - Discharge of cesium-137 to external water bodies

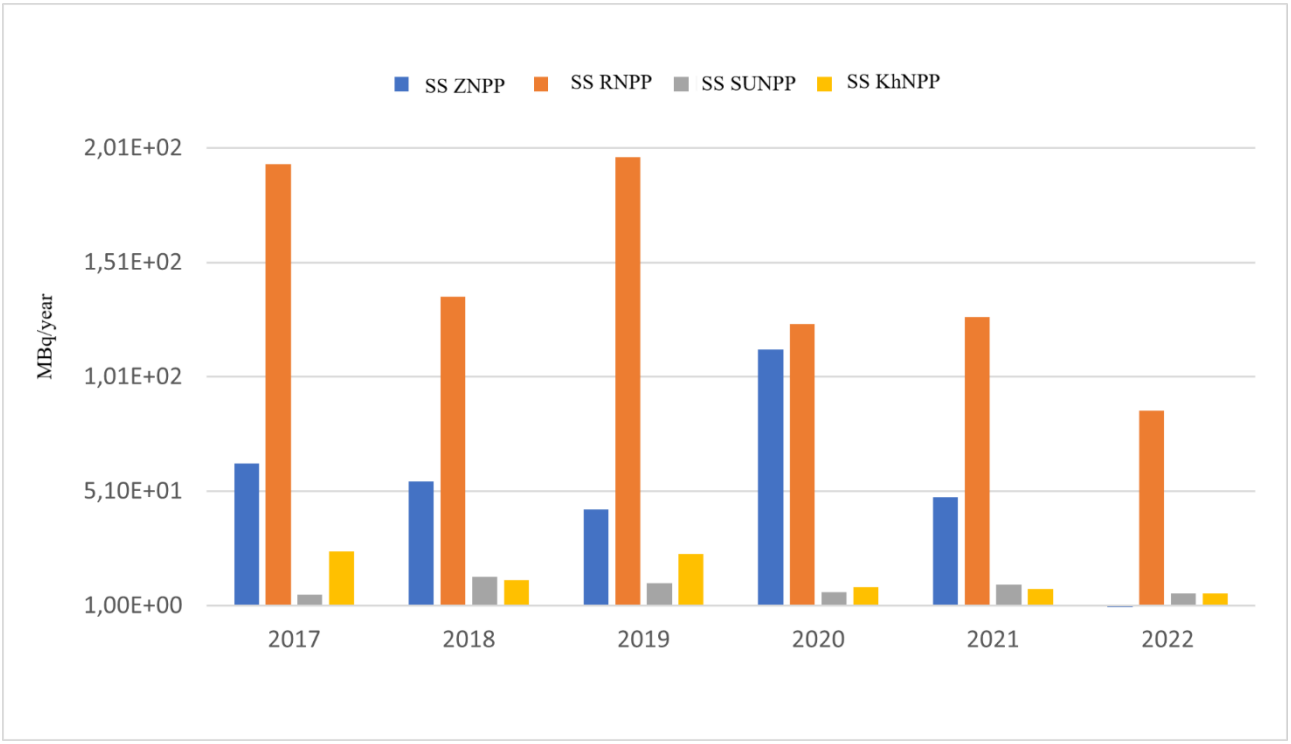


Diagram 17 - Discharge of cobalt-60 to external water bodies

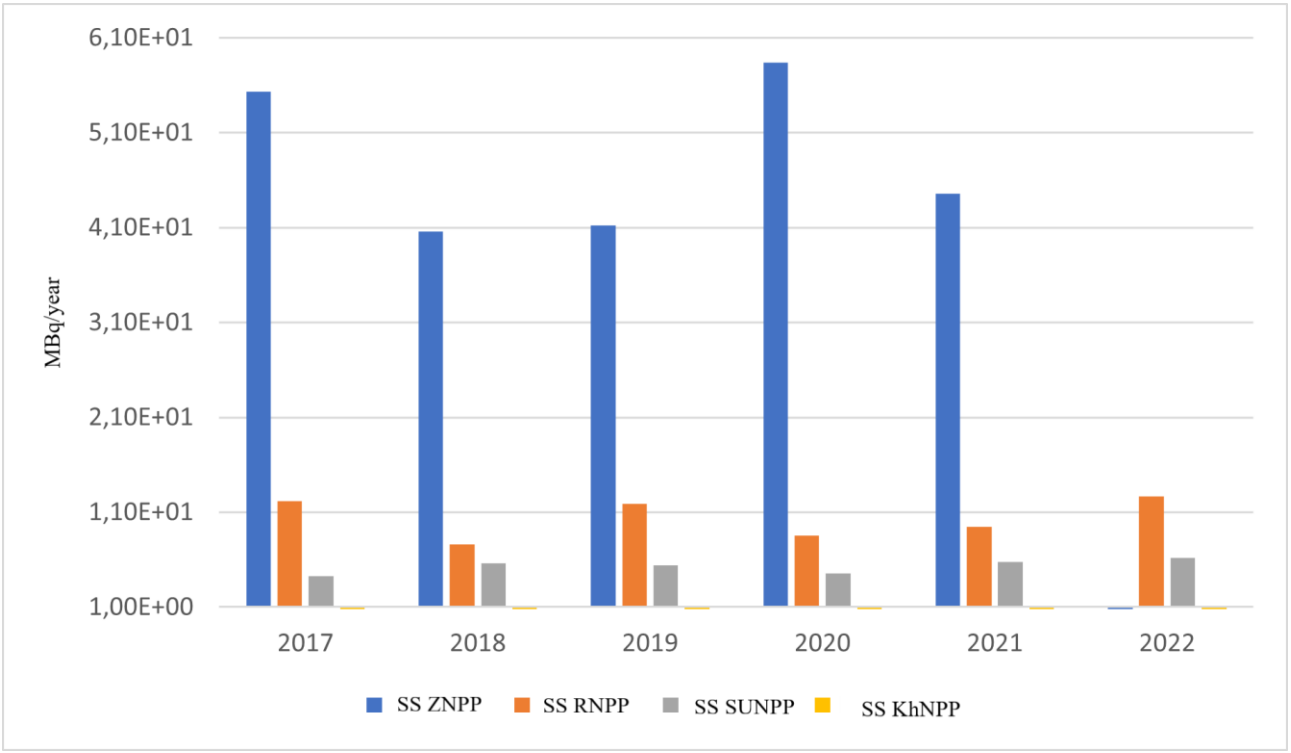


Diagram 18 - Discharge of strontium-90 to external water bodies

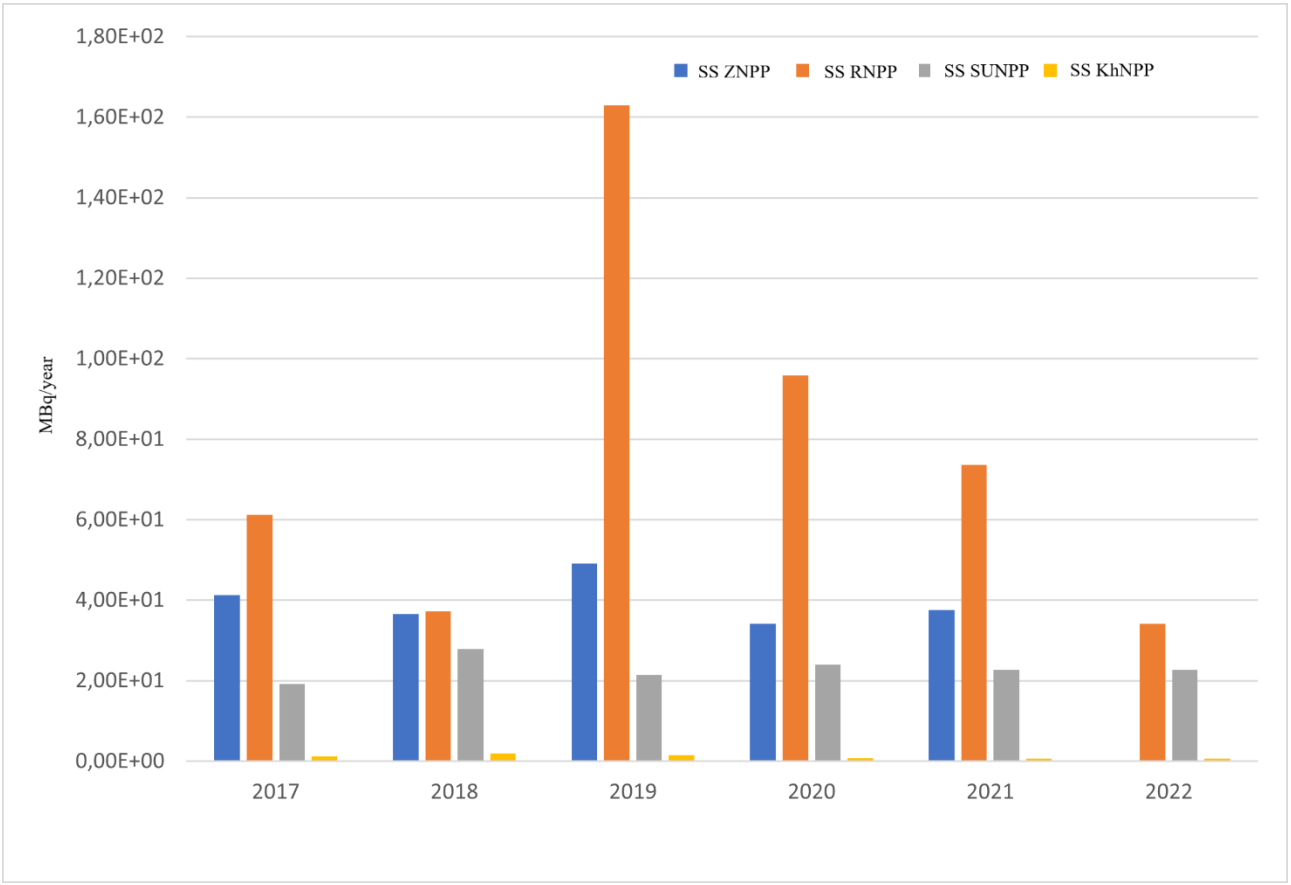
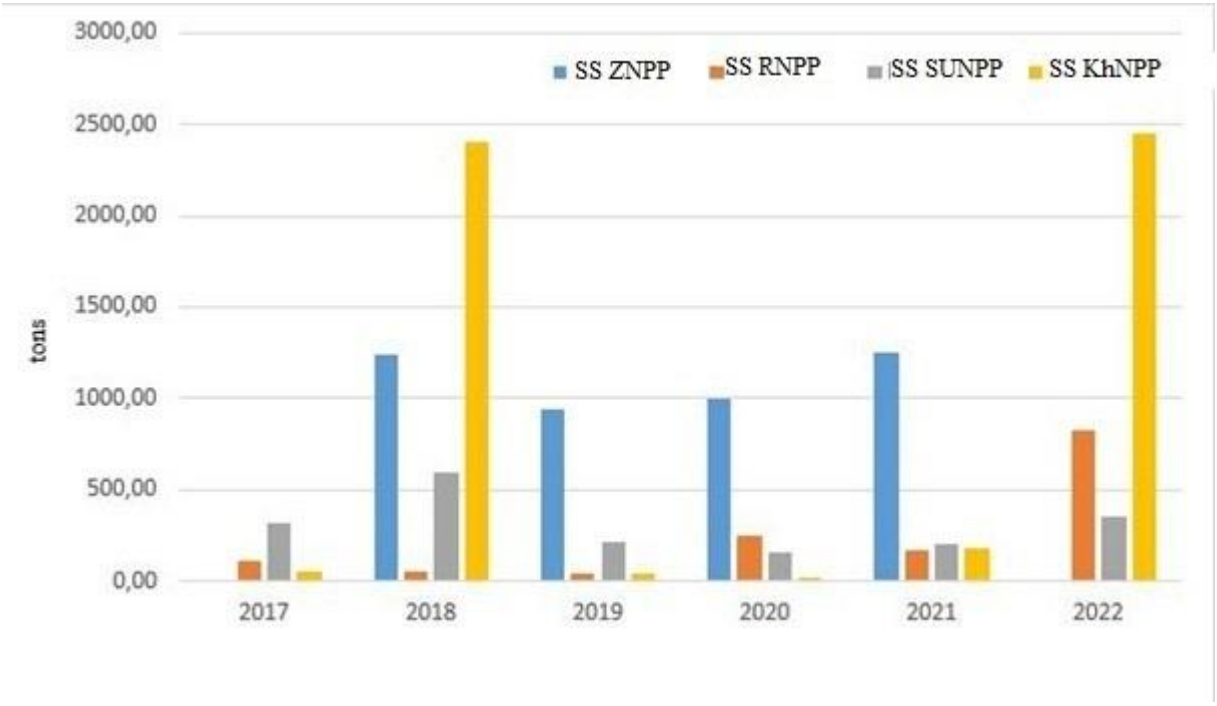


Diagram 19 - Total emissions of pollutants (non-radioactive) substances (excluding carbon dioxide)

Diagram 20 - Carbon dioxide emissions



At ZNPP, the volume of carbon dioxide was not determined in 2017

Diagram 21 - Metal emissions

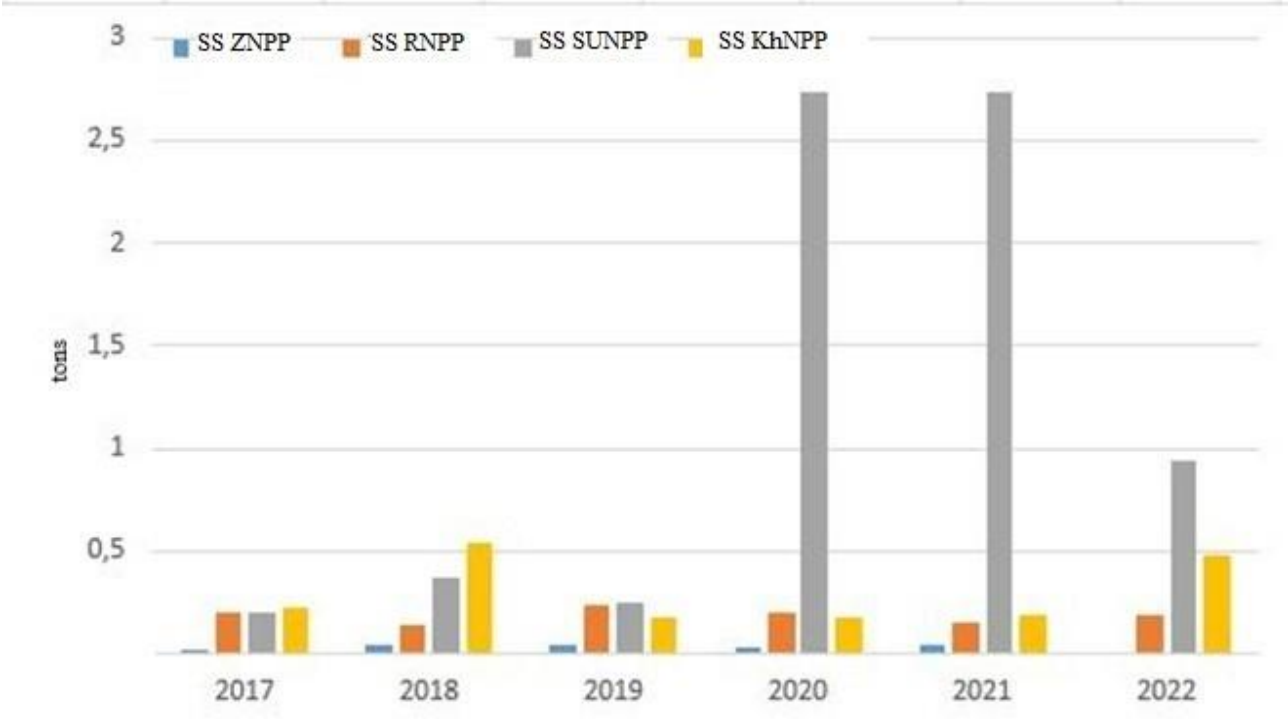


Diagram 22 - Solids emissions

Diagram 23 - Emissions of nitrogen compounds

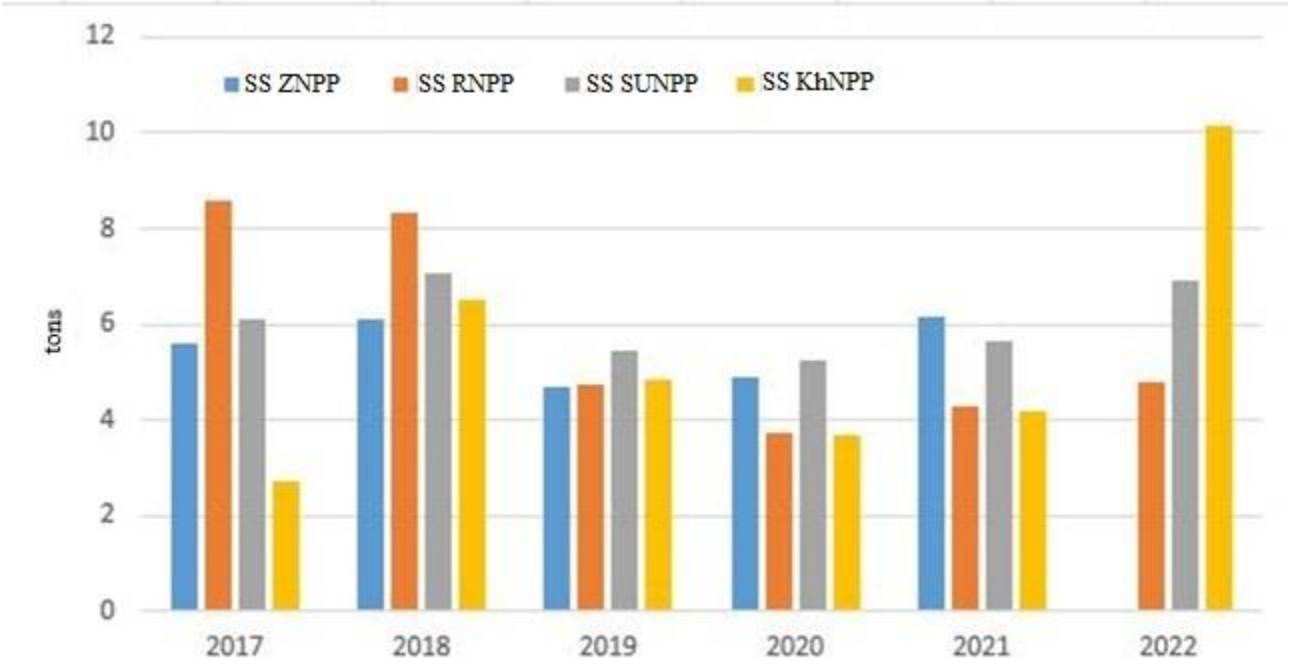


Diagram 24 - Emissions of sulfur compounds

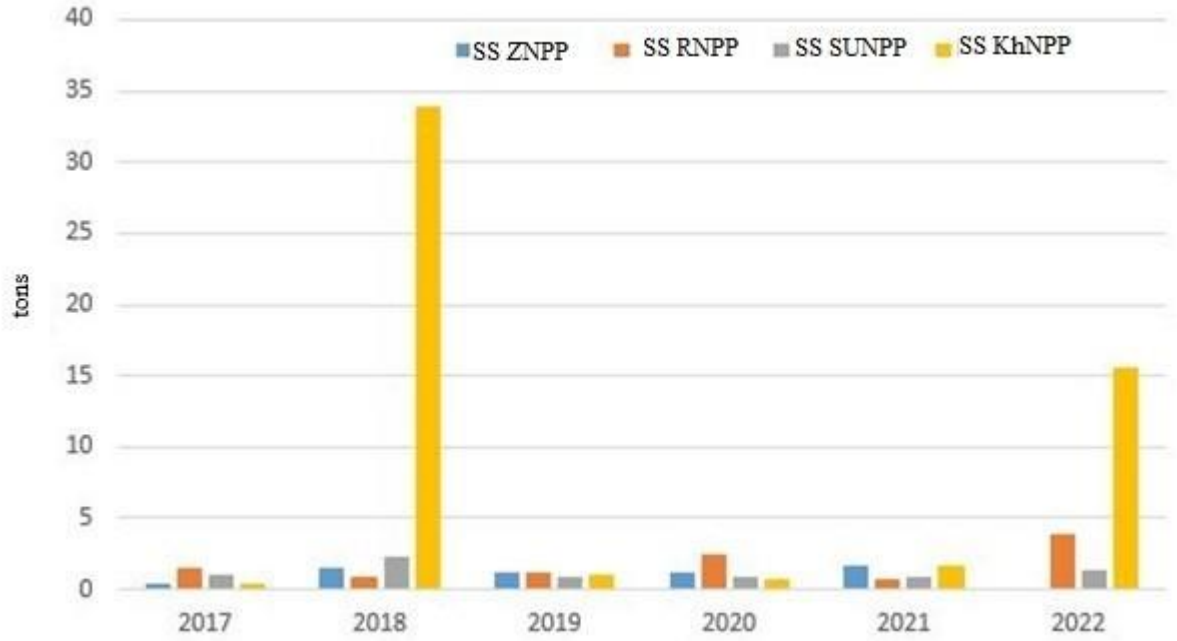


Diagram 25 - Carbon monoxide emissions

Diagram 26 - Emissions of chlorine compounds

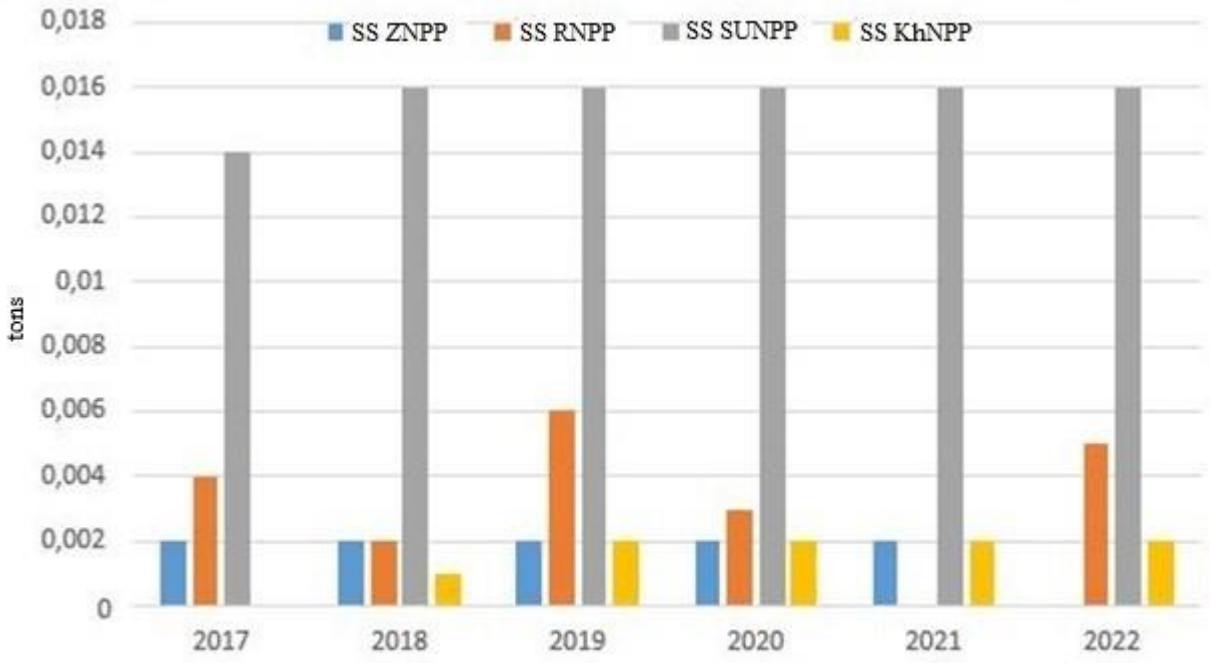
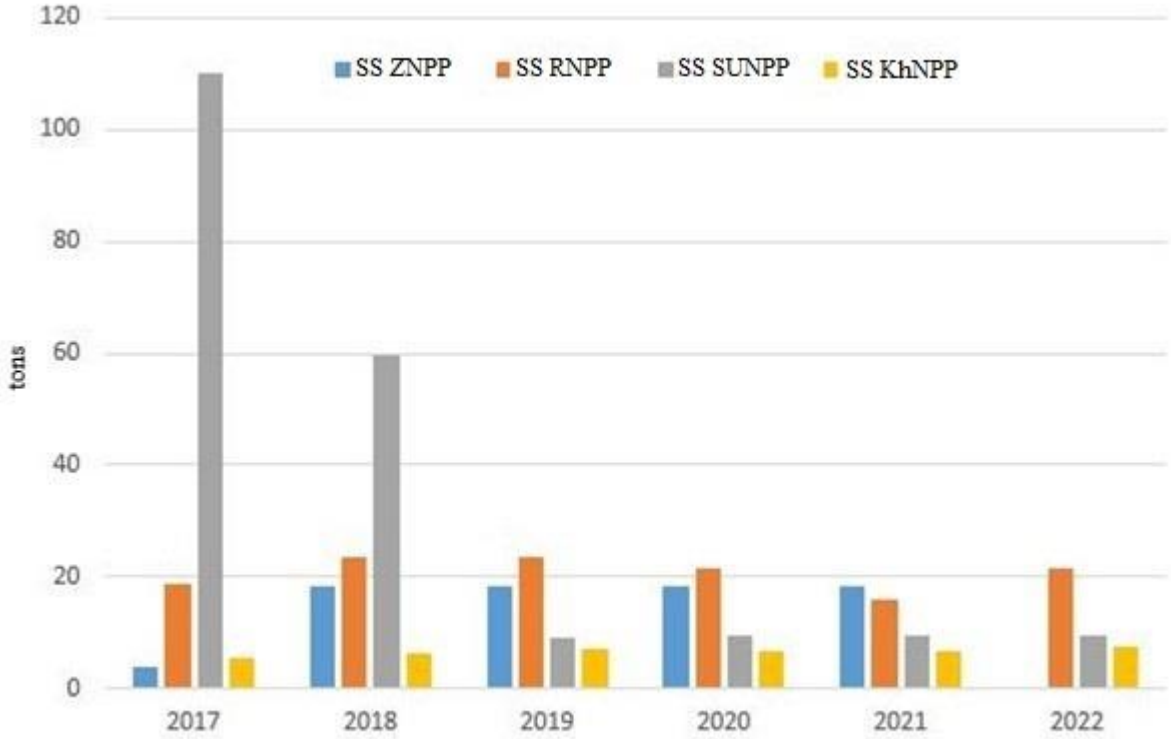


Diagram 27 - Emissions of fluorine compounds

Diagram 28 - Emissions of non-methane volatile organic compounds



I.1 Results of monitoring of SS ZNPP location area

Table 36 Average daily values of gas and aerosol emissions of radionuclides into the atmosphere by ZNPP facilities for 2017-2021* (ZNPP Board Report 2021, Table 5.2.1.1)

Radiation parameter	Year	Unit № 1	Unit № 2	Unit № 3	Unit № 4	Unit № 5	Unit № 6	SB-1	SB-2	NPP
IRG GBq/day	2017	11	7	9	7	7	7	20	15	83
	2018	10	8	11	7	7	7	19	15	84
	2019	8	8	8	7	7	7	21	16	82
	2020	9	7	8	8	9	7	20	16	83
	2021	7	7	8	7	6	8	20	16	79
LLN kBq/day	2017	84	75	61	81	57	75	228	129	789
	2018	50	67	43	73	42	57	181	150	664
	2019	49	62	61	72	42	43	174	138	640
	2020	51	68	54	73	64	43	156	99	609
	2021	44	51	46	67	36	49	172	167	632
Iodines kBq/day	2017	21	19	25	23	22	24	105	46	285
	2018	18	30	22	22	20	22	60	47	241
	2019	19	23	19	20	23	97	81	51	327
	2020	19	22	20	23	28	24	61	50	246
	2021	8	9	9	9	9	12	42	30	128

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, no data are available*

Table 37 Total annual emissions of inert radioactive gases (IRG), long-lived radionuclides (LLN) and iodine radionuclides from ZNPP for 2017-2021*.

Year	IRG GBq/year (aver.)	LLN kBq/year (aver.)	Iodines kBq/year (aver.)
2017	3,02E+04	2,89E+05	1,04E+05
2018	3,06E+04	2,42E+05	8,81E+04

2019	2,99E+04	2,33E+05	1,19E+05
2020	3,04E+04	2,23E+05	9,02E+04
2021	2,89E+04	2,31E+05	4,65E+04

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, no data are available*

Table 38 Radionuclide content in the atmospheric air of the ZNPP site (2021)*, μBq/m^3

Name of radionuclide	SPZ		SPZ -10 km		10-20 km		Control post B. Znamianka	
	average value	maximum value	average value	maximum value	average value	maximum value	average value	maximum value
^{137}Cs	1,4E+00	2,3E+00	1,3E+00	2,5E+00	1,3E+00	2,1E+00	1,3E+00	1,8E+00
^{134}Cs	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00
^{60}Co	<1,0E+00	1,2E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00	<1,0E+00
^{131}I	<1,0E+01	<1,0E+01	<1,0E+01	<1,0E+01	<1,0E+01	<1,0E+01	<1,0E+01	<1,0E+01
^{90}Sr	<1,0E-01	<2,9E-01	<1,0E-01	<1,6E-01	<1,0E-01	<1,9E-01	<1,0E-01	<1,0E-01

Note 1: According to the "zero background" measurements [2] volumetric activity ^{137}Cs in the atmospheric air before ZNPP startup was (2.2±0.7) μBq/m3.

Note 2. The entry "1.0E-00" should be read as the value of the radionuclide volume activity is below the MDR.

Note 3. Permissible concentration in air for category B according to NRBU-97: ^{137}Cs-8E-01 Bq/m^3; ^{134}Cs-1E+00 Bq/m^3; ^{60}Co-1E+00 Bq/m^3; ^{90}Sr -2E-01 Bq/m^3; ^{131}I-4,0E+00 Bq/m^3.

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

Table 39 – RS content in water of surface water bodies in the area of ZNPP location (2021)*, Bq/m^3

Control point	ZNPP cooling pond near the blowdown structure – p.1		Kakhovka reservoir									
			TPP dispensary above ZNPP - p.19		500 m below the blowdown structure – p.3		v. Vodyane 1000 m below the blowdown structure		In the area of water intake c. Nikopol		In the area of water intake c. Marganets	
	average value	maximum value	average value	maximum value	average value	maximum value	average value	maximum value	average value	maximum value	average value	maximum value
^{137}Cs	<4,7E+00	<6,6E+00	<4,9E+00	<7,4E+00	<4,6E+00	<4,9E+00	<4,8E+00	<6,0E+01	<5,0E+00	<5,4E+00	<5,1E+00	<5,7E+00
^{134}Cs	<2,1E+01	<2,5E+01	<2,0E+01	<2,0E+01	<2,0E+01	<2,2E+01	-	-	-	-	-	-
^{60}Co	<2,0E+01	<2,1E+01	<2,0E+01	<2,1E+01	<2,0E+01	<2,0E+01	-	-	-	-	-	-
^{90}Sr	1,6E+01	2,0E+01	1,4E+01	1,8E+01	1,5E+01	1,6E+01	1,5E+01	1,6E+00	1,1E+01	1,2E+01	1,1E+00	1,2E+01
^{3}H	2,2E+05	3,4E+05	<1,2E+04	<1,4E+04	1,8E+04	4,5E+04	<1,2E+04	<1,4E+04	<1,2E+04	<1,4E+04	<1,2E+04	<1,4E+04

Note 1: According to "zero background" measurements [2], the volumetric activity of radionuclides in the water of the Kakhovka Reservoir before ZNPP startup was as follows: ^{90}Sr - (24.3±1.2) Bq/m^3; ^{137}Cs - (2.6±0.8) Bq/m^3.

Note 2 Control points are given in accordance with the "Regulation..." 00.RB. XQ.Pr.01-20.

Note 3. "-" "Regulation of the RK..." 00.РБ. XQ.Pr.01-20 does not provide for monitoring of radionuclides ^{134}Cs, ^{60}Co.

Note 4. "<" means less than "MDR"

Note 5. According to NRBU-97, the permissible concentration of tritium in PCBingest drinking water for category B is 3E+07 Bq/m^3

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

Table 40 - Amount of pollutants discharged with wastewater in 2021*

№	Parameter name	Water body receiving wastewater	Approved permissible concentrations, mg/dm^3	MPD*. Approved, t/year	Annual average concentration. mg/dm^3	Total water withdrawn, thousand m^3	Actual discharge (t) fact
1	2	3	4	5	6	7	8
1	Mineralization	**Kakhovka reservoir**	403,0	4068,97167	399	**119065,248**	913,79879
2	Sulfates		60,9	651,03546	54,03		0,97120
3	Chlorides		34,4	0,00000	34,1		0,00000
4	Calcium		56,1	383,86526	55,5		109,63447
5	Magnesium		19,5	0,00000	18,11		0,00000
6	Sodium		25,4	337,80143	25,1		94,96450
7	Potassium		5,2	153,54611	4,9		25,96363
8	Ammonium nitrogen		0,3	0,00000	0,23		0,00000
9	Nitrites		0,03	0,00000	<0,03		0,00000
10	Nitrates		4,4	187,32624	1,9		6,35639
11	Phosphates		0,48	0,00000	0,29		0,00000
12	Iron		0,18	0,00000	0,14		0,00000
13	Manganese		0,019	0,00000	0,018		0,00000
14	Copper		0,01	0,00000	0,0086		0,17975
15	Zinc		0,044	1,22838	0,043		0,31726
16	Soluble oxygen		-	-	7,7		-
17	Suspended solids		5,0	675,60283	<5,0		0,00000
18	Petroleum products		0,022	0,00000	0,021		0,00000
19	SSAS		0,036	0,00000	0,035		0,00000
20	BOD_5		2,68	0,00000	2,66		0,00000
21	COD		24,7	0,00000	24,4		0,00000
22	pH		6,5-8,5	-	8,4		-

23	Temperature		-	-	25,1		-
24	General stiffness		-	-	4,3		-
25	Carbonate hardness		-	-	3,4		-
26	Total alkalinity		-	-	3,4		-
27	Cobalt		-	-	<0,0025		-
28	Nickel		0,0097	1,13625	0,0079		0,23939
29	Cadmium		-	-	<0,0002		-
30	Lead		0,002	0,00000	<0,002		0,00000
31	Fluorides		-	-	0,28		-
32	Morpholine		0,1	0,00000	<0,1		0,00000
	Total (excluding mineralization)		-	2392,46323	-		238,62659

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

Table 41 - RS content in the surface soil layer of the ZNPP site (2021)*, kBq/m^2

Sampling location/sampling depth	Name of radionuclide	SPZ		SPZ -10 km		10-20 km		Control post B. Znamianka	
		average value	maximum value	average value	maximum value	average value	maximum value	average value	maximum value
SPZ, 3H/5 cm	^{137}Cs	1,7E-01	4,0E-01	1,0E-01	1,9E-01	1,4E-01	3,4E-01	1,7E-01	1,7E-01
	^{134}Cs	<2,3E-02	<2,8E-02	<2,3E-02	<3,1E-02	<2,5E-02	<3,1E-02	<3,8E-02	<3,8E-02
	^{60}Co	<2,0E-02	<2,1E-02	<2,0E-02	<2,3E-02	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02
	^{131}I	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02	<2,0E-02
	^{90}Sr	4,1E-02	6,5E-02	3,5E-02	6,9E-02	2,6E-02	4,2E-02	4,5E-02	4,5E-02

Note 1: According to the data of "zero background measurements", the content of radionuclides in the surface soil layer before ZNPP startup was as follows: ^{90}Sr - (0.89±0.41) kBq/m^2; ^{137}Cs - (1.18±0.52) kBq/m^2.
Note 2. "<" means less than "MDR"
** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

Table 42 - Parameters of surface water condition near the ZNPP site*****

Parameter name	Unit of measurement	MPC	Cooling pond					Dnipro River to ZNPP					Dnipro River control gate				
			2017	2018	2019	2020	2021	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Mineralization	mg/dm^3	<1000,0	403	402	402	402	399	388	391	391	389	389	387	387	388	388	387
Sulfates	mg/dm^3	<100,0	60,1	58,4	58,2	57,1	54,03	55,5	54,9	55,0	52,1	52,7	55,5	54,4	54,5	52,6	51,7
Chlorides	mg/dm^3	<300,0	34,0	33,4	34,1	34,2	34,1	37,1	34,8	35,5	36,6	33,8	36,7	34,4	35,0	36,5	35,1
Calcium	mg/dm^3	<180,0	56,1	55,8	55,8	55,8	55,5	51,6	53,1	54,0	52,4	54,4	52,0	52,2	52,4	53,2	53,7
Magnesium	mg/dm^3	<40,0	18,3	18,7	18,5	18,8	18,11	19,8	19,6	18,5	19,39	18,01	19,3	19,1	19,3	18,82	18,21
Sodium	mg/dm^3	<120,0	25,1	24,7	25,1	24,7	25,1	24,0	23,9	24,6	24,3	24,1	23,8	24,3	24,3	24,3	24,1
Potassium	mg/dm^3	<50,0	5,1	5,0	5,1	4,8	4,9	4,9	4,5	4,7	4,5	4,5	5,0	4,5	4,5	4,5	4,5
Ammonium nitrogen	mg/dm^3	<0,39	0,3	0,28	0,28	0,24	0,23	0,29	0,29	0,29	0,27	0,24	0,29	0,27	0,28	0,25	0,22
Nitrites	mg/dm^3	<0,08	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03	<0,03
Nitrates	mg/dm^3	<40,0	2,2	2,41	2,97	2,38	1,9	1,8	2,0	2,2	1.43	1,07	1,68	2,2	2,16	1,36	1,03
Phosphates	mg/dm^3	<3,12* <2,15	0,32	0,39	0,37	0,31	0,29	0,33	0,36	0,31	0,25	0,28	0,33	0,38	0,3	0,29	0,24

Iron	mg/dm^3	<0,1	0,18	0,18	0,18	0,14	0,14	0,18	0,19	0,18	0.12	0,12	0,18	0,18	0,18	0,12	0,13
Manganese	mg/dm^3	<0,01	0,019	0.019	0,018	0,018	0,018	0,019	0,02	0,019	0,017	0,019	0,019	0,02	0,019	0,017	0,018
Copper	mg/dm^3	<0,001 to background	0,01	0,0093	0,009	0,0088	0,0086	0,0063	0,0072	0,0074	0,0063	0,007	0,0066	0,0071	0,0073	0,007	0,007
Zinc	mg/dm^3	<0,01	0,044	0,044	0,044	0,043	0,043	0,044	0,043	0,043	0,041	0,039	0,044	0,043	0,043	0,042	0,039
Soluble oxygen	mg O_2/dm^3	> 6,0	7,1	7,0	7,87	7,82	7,7	7,4	7,4	8,2	8,0	7,9	7,4	7,2	8,2	7,9	7,9
Suspended solids	mg/dm^3	<25%	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0	<5,0
Petroleum products	mg/dm^3	<0,05	0,021	0,021	0,021	0,021	0,021	0,02	0,021	0,021	0,021	0,020	0,019	0,02	0,021	0,021	0,020
APAR	mg/dm^3	<0,1** <0,5	0,036	0,036	0,036	0,036	0,035	0,035	0,036	0,036	0,036	0,035	0,035	0,035	0,036	0,036	0,035
BOD_5	mg O_2/dm^3	<2,26	2,68	2,66	2,66	2,66	2,66	2,75	2,71	2,7	2,69	2,69	2,74	2,69	2,66	2,69	2,72
COD	mg O_2/dm^3	<15,0*** <50,0	24,7	24,6	24,6	24,5	24,4	27,7	25,7	25,0	25,1	25,1	24,8	25,3	25,0	25,4	25,3
pH	un. pH	6,5-8,5	8,4	8,4	8,4	8,4	8,4	8,4	8,4	8,4	8,4	8,4	8,3	8,4	8,4	8,4	8,5
Temperature	°C	не > 3°C to the background in the	24,5	25,0	25,7	24,1	25,1	15,7	15.0	15,6	17,1	17,4	16,4	15,2	16,7	18,2	17,9

		control gate****														
General stiffness	mg eq/dm^3	Counterpart indicator	4,3	4,3	4,3	4,3	4,3	4,2	4,3	4,2	4,2	4,2	4,2	4,2	4,2	4,2	4,2
Carbonate hardness	mg eq/dm^3	Counterpart indicator	3,3	3,3	3,3	3,4	3,4	3,2	3,3	3,2	3,3	3,3	3,2	3,2	3,2	3,2	3,3
Total alkalinity	mg eq/dm^3	Counterpart indicator	3,3	3,3	3,3	3,4	3,4	3,2	3,3	3,2	3,3	3,3	3,2	3,2	3,2	3,2	3,3
Cobalt	mg/dm^3	<0,01	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025	<0,0025
Nickel	mg/dm^3	<0,01	0,0094	0,0095	0,0095	0,0083	0,0079	0,0054	0,0065	0,0066	0,0062	0,0062	0,0057	0,0065	0,0065	0,0063	0,0061
Cadmium	mg/dm^3	<0,005	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002	<0,0002
Lead	mg/dm^3	<0,1	<0,002	<0,002	<0,002	<0.002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002	<0,002
Fluorides	mg/dm^3	<0,75	0,3	0,27	0,28	0,28	0,28	0,29	0,26	0,28	0,27	0,27	0,29	0,27	0,27	0,27	0,27
Morpholine	mg/dm^3	<0,125	<0,1	<0,1	<0,1	<0,1	<0,1	0,29	0,27	0,28	0.28	0,28	<0,1	<0,1	<0,1	<0,1	<0,1

Note: * MPC for Phosphate in 2017-2019 is <3.12 mg/dm^3, from 2020 <2.15 mg/dm^3;

** The MPC for APAP in 2017-2019 is <0.1 mg/dm3, from 2020 <0.5 mg/dm^3;

*** The MPC for COD in 2017 is <15.0 mgO_2/dm^3, in 2018-2019 it is absent; from 2020 <50.0 mgO_2/dm^3.

**** The MPC for Temperature in 2017 was not > 8 in winter and not > 28 in summer; since 2018 it is not > 3°C to the background in the control sample.

***** *Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available.*

Table 43 - Amounts of PS emissions into the atmosphere by stationary sources of ZNPP, tons*

Name of PS	2021	2020	2019	2018	2017
Metals and their compounds	0,044	0,034	0,046	0,041	0,018
Substances in the form of suspended solids (microparticles and fibers)	4,143	4,111	4,169	4,167	3,899
Nitrogen compounds	6,140	4,890	4,673	6,094	5,579
Sulfur dioxide and other sulfur compounds	1,592	1,271	1,223	1,582	0,356
Carbon monoxide	1,226	0,954	1,252	1,248	2,805
Non-methane volatile organic compounds (NMVOCs)	18,368	18,386	18,405	18,381	3,995
Chlorine and chlorine compounds (in terms of chlorine)	0,002	0,002	0,002	0,002	0,002
Fluoride and its compounds (in terms of fluoride)	0,006	0,006	0,006	0,006	0,003
In addition:					
Carbon dioxide	1247,898	992,036	941,419	1234,384	-
Total	31,522	29,655	29,777	31,520	16,657

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

Table 44 - Parameters of the state of the SPZ atmospheric air in 2021*.

№	Name of the test substance	Concentration, mg/m^3 at sampling points			GDC ** Maximal one-time, mg/m^3
		№ 1	№ 2	№ 3	
1	Nitrogen oxide (oxide and dioxide) in terms of nitrogen dioxide	bsm	bsm	0,03	0,2
2	Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide	0,05	0,07	bsm	0,5

3	Ammonia	0,09	0,11	0,08	0,2
4	Carbon monoxide	1,81	0,74	0,85	5,0
5	Substances in the form of suspended solid particles undifferentiated by composition	bsm	bsm	bsm	0,5
6	Formaldehyde	bsm	bsm	bsm	0,035
7	Lead	bsm (<0,00024)	bsm (<0,00024)	bsm (<0,00024)	0,001
8	Xylene	b.d.l. (<0,20)	b.d.l. (<0,20)	b.d.l. (<0,20)	0,01
9	Mangan	bsm (<0,001)	0,0011	bsm (<0,001)	0,2
10	Iron	bsm	bsm	bsm	0,04

** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

*** Maximum permissible concentrations according to the "Hygienic Regulations for Approximately Safe Levels of Exposure to Chemical and Biological Substances in the Atmospheric Air of Populated Areas" approved by the Order of the Ministry of Health of Ukraine No. 52 dated January 14, 2020.*

Note: bsm - below the sensitivity of the method;
b.d.l. - below the definition limit.
Points of the study:
№ 1 Territory behind the fence of the ZVVO;
№ 2 Gardening society "Budivelnyk"
№ 3 Area near the nearest private residential building in Michurino village

Table 45 - Parameters of the state of the SPZ atmospheric air in 2020

№	Name of the test substance	Concentration, mg/m^3 at sampling points			GDC ** Maximal one-time, mg/m^3
		№ 1	№ 2	№ 3	
1	Nitrogen oxide (oxide and dioxide) in terms of nitrogen dioxide	0,10	0,09	Not found	0,2
2	Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide	0,14	0,11	0,07	0,5
3	Ammonia	0,11	0,09	0,06	0,2

4	Carbon monoxide	1,74	1,15	0,98	5,0
5	Substances in the form of suspended solid particles undifferentiated by composition	0,39	0,27	0,19	0,5
6	Formaldehyde	0,005	Not found.	Not found	0,035
7	Lead	0,10	0,09	Not found.	0,2
8	Xylene	0,14	0,11	0,07	0,5
9	Mangan	0,11	0,09	0,06	0,2
10	Iron	1,74	1,15	0,98	5,0

**"Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas", approved on 03.03.2015*

Note: bsm - below the sensitivity of the method;

b.d.l. - below the definition limit.

Points of the study:

№ 1 Territory behind the fence of the ZVVO;

№ 2 Gardening society "Budivelnyk"

№ 3 Area near the nearest private residential building in Michurino village

Table 46 - Air quality parameters of the SPZ in 2019

№	Name of the test substance	Concentration, mg/m^3 at sampling points			GDC ** Maximal one-time, mg/m^3
		№ 1	№ 2	№ 3	
1	Nitrogen oxide (oxide and dioxide) in terms of nitrogen dioxide	0,12	0,07	0,06	0,2
2	Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide	0,16	0,10	0,06	0,5
3	Ammonia	0,09	0,07	0,01	0,2
4	Carbon monoxide	2,00	0,97	1,03	5,0
5	Substances in the form of suspended solid particles undifferentiated by composition	0,27	0,13	0,12	0,5
6	Formaldehyde	Not found.	0,007	Not found	0,035
7	Lead	0,12	0,07	0,06	0,2
8	Xylene	0,16	0,10	0,06	0,5

9	Mangan	0,09	0,07	0,01	0,2
10	Iron	2,00	0,97	1,03	5,0

**"Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas", approved on 03.03.2015*

Note: bsm - below the sensitivity of the method;

b.d.l. - below the definition limit.

Points of the study:

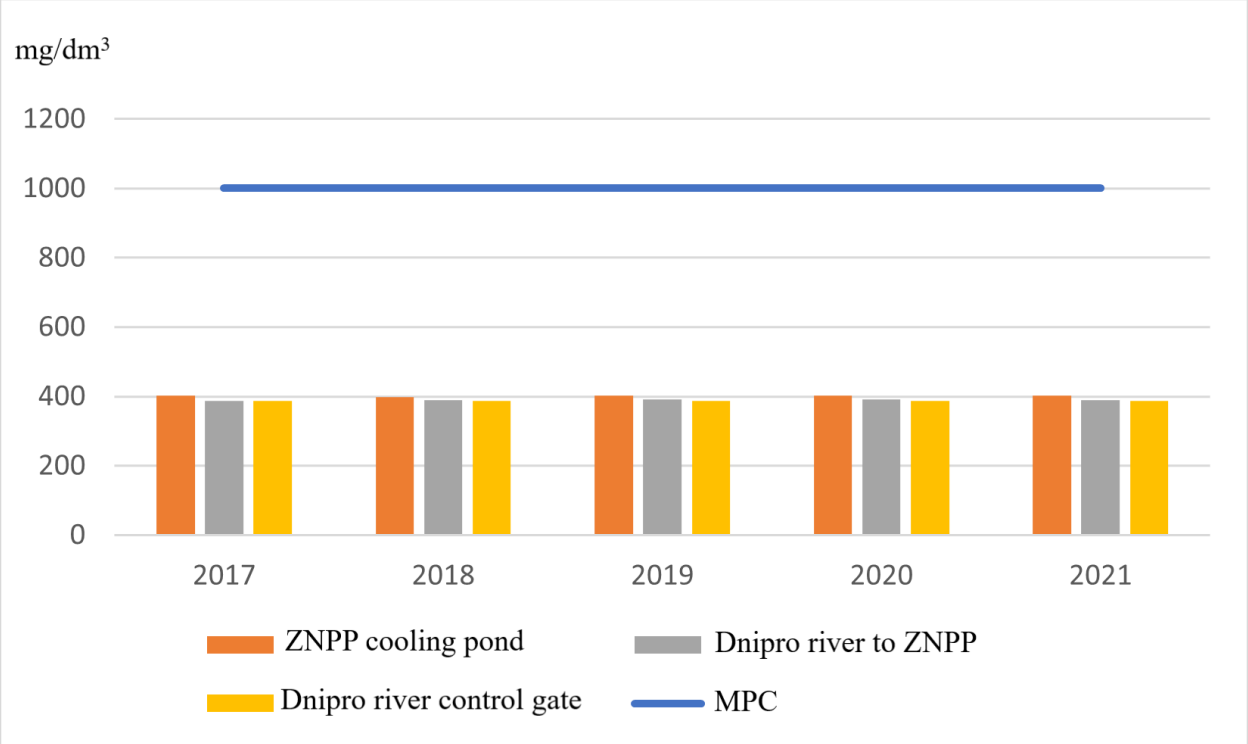
№ 1 Territory behind the fence of the ZVVO;

№ 2 Gardening society "Budivelnyk"

№ 3 Area near the nearest private residential building in Michurino village

The 2017 and 2018 Environmental Impact Assessment Reports of the Energoatom SE ZNPP on Non-Radiation Factors do not contain data on the parameters of the state of the atmospheric air on the SPZ border for 2017 and 2018, respectively. The conditions of the Permit for Air Pollutant Emissions by Stationary Sources in force in those years did not require monitoring of compliance with the established maximum permissible emissions of pollutants.

Diagram 47 - Water salinity of the ZNPP cooling pond and Kakhovka reservoir*



** Due to the seizure of the city of Enerhodar, including the Zaporizhzhia NPP site, by Russian military groups in early March 2022, data for 2022 are not available*

I.2 Results of monitoring of SS RNPP siting area

Table 48 Gas and aerosol emissions of RNPPs by radionuclide groups for 2017-2022

	IRG GBq/year	LLN GBq/year	Radioiodine GBq/year
2017	3.52E+04	9.97E-02	4.14E-02
2018	3.66E+04	8.51E-02	3.10E-02
2019	3.79E+04	9.58E-02	1.40E-02
2020	4.17E+04	9.66E-02	1.13E-02
2021	4.04E+04	8.15E-02	1.45E-02
2022	6.18E+04	8.55E-02	3.08E-02

Table 49 - RS content in the atmospheric air of the RNPP site (2022), Bq/m^3

Radionuclide	SPZ	SPZ -10 km	10-20 km*	20 km- edge ZS*
^{137}Cs	2.45E-06	3.08E-06	3.32E-06	7.45E-06
^{134}Cs	<1.73E-07	<2.98E-07	<1.43E-07	<3.30E-07
^{60}Cs	2.30E-07	<3.21E-07	<1.49E-07	<3.50E-07
^{131}I	<4.67E-07	<5.48E-07	<3.44E-07	<6.50E-07
^{90}Sr**	-	-	-	-

*Note: * For the zones "10-20 km", "20 km - boundary of the ZS", averaging of values of volumetric activity of radionuclides in the atmospheric air was performed based on the results of measurements for the period 01.02.22÷10.03.22.*

*** RNPP does not measure ^{90}Sr in the atmospheric air during normal NPP operation.*

Table 50 - RS content in the surface soil layer in the area of RNPP location (2022), Bq/m^2

Radionuclide	SPZ	SPZ -10 km	10-20 km*	20 km- edge ZS*
^{137}Cs	7.15E+02	1.54E+03	1.99E+03	3.97E+02
^{134}Cs	<3.56E+00	<3.86E+00	<3.00E+00	<3.40E+00
^{60}Cs	2.70E+00	<2.33E+00	<1.92E+00	<2.30E+00
^{90}Sr*	-	-	-	-

*Note: * RNPP does not measure ^{90}Sr in the atmospheric air during normal NPP operation.*

Table 51 - Air emissions from stationary sources in 2022 according to statistical reporting № 2-ТП (air)

Code.	Pollutants	Discarded since the beginning of the year, t	Potential emissions, tons per year
1	2	3	4
00000	Total for the enterprise (excluding carbon dioxide)	35,721	97,986
01000	Metals and their compounds	0,192	0,628
03000	Substances in the form of suspended solids (microparticles and fibers)	2,460	6,545
04000	Nitrogen compounds	4,763	15,672
05000	Sulfur dioxide and other sulfur compounds	3,834	17,446
06000	Carbon monoxide	2,997	13,728
11000	Non-methane volatile organic compounds	21,413	42,843
12000	Chlorine	0,005	0,931
15000	Methane	0,000	0,041
16000	Fluoride and its compounds (in terms of fluoride)	0,037	0,106
18000	Freons	0,020	0,046
07000	In addition, carbon dioxide	825,181	1545,737

Table 52- Amounts of PS emissions into the atmosphere by stationary sources of RNPP

Name of PS	2022	2021	2020	2019	2018	2017
Metals and their compounds	0,192	0,148	0,199	0,239	0,137	0,203
Substances in the form of suspended solids (microparticles and fibers)	2,460	1,657	2,277	1,799	2,250	2,239
Nitrogen compounds	4,763	4,256	3,727	4,740	8,347	8,582
Sulfur dioxide and other sulfur compounds	3,834	0,757	2,478	1,241	0,821	1,510
Carbon monoxide	2,997	2,102	8,508	3,945	3,256	3,356
Non-methane volatile organic compounds (NMVOCs)	21,413	15,921	21,345	23,337	23,437	18,815
Chlorine and chlorine compounds (in terms of chlorine)	0,005	0,000	0,003	0,006	0,002	0,004

Methane	0,000	0,000	0,000	0,012	0,012	0,012
Fluoride and its compounds (in terms of fluoride)	0,037	0,027	0,032	0,037	0,044	0,035
Freons	0,020	0,017	0,014	0,020	0,036	0,037
In addition, carbon dioxide	825,181	164,185	247,806	42,030	52,622	109,219
Total for the enterprise (excluding carbon dioxide)	35,721	24,885	38,583	35,376	38,341	34,785

Table 53 - Air quality parameters of the SPZ around waste disposal sites for 2022

Name of PS	MPC	Concentration by sampling points				
		p. 1 at the WDS	p. 2 on the border of the SPZ NW direction	p. 3 on the border of the SPZ East direction	p. 4 on the border of the SPZ S direction	p. 5 on the border of the SPZ N direction
1	2	3	4	5	6	7
Landfill for construction and industrial waste disposal						
Sulfuric anhydride	0,5	<0,04	<0,04	<0,04	<0,04-	<0,04
Nitrogen dioxide	0,2	0,055	0,05	0,05	0,032	0,03
Carbon oxide	5,0	0,7	0,72	0,52	0,48	0,54
Dust	0,5	0,3	<0,26	<0,26	<0,26	<0,26
Hydrocarbons	1,0	<0,05	<0,05	<0,05	<0,05	<0,05
Sludge collector						
Name of PS	MPC	Concentration by sampling points				
		p. 1 at the WDS	p. 2 on the border of the SPZ			
Шламонакопичувач						
Dust	0,5	0,3	0,28			
Hydrocarbons	1,0	<0,05	<0,05			

Table 54 - Parameters of the state of the SPZ atmospheric air around waste disposal sites for 2021

Name of PS	MPC	Concentration by sampling points				
		p. 1	p. 2	p. 3	p. 4	at the WDS
1	2	3	4	5	6	7
Landfill for construction and industrial waste disposal						

Sulfuric anhydride	0,5	-	<0,04	<0,04	-	<0,04
Ammonia	0,2	0,022	0,025	0,02	0,022	0,024
Dust	0,5	0,30	0,3	0,3	0,3	0,30
Phenol	0,01	-	<0,004	<0,004	-	<0,04
Formaldehyde	0,035	-	<0,01	<0,01	-	<0,01
Sludge collector						
Sulfuric anhydride	0,5	<0,04	<0,04	<0,04	<0,04	0,262
Ammonia	0,2	0,023	0,022	0,028	0,028	0,021
Dust	0,5	0,28	0,28	0,30	0,28	0,288
Phenol	0,01	<0,004	<0,004	<0,004	<0,004	0,009
Formaldehyde	0,035	<0,01	<0,01	<0,01	<0,01	0,022

Table 55 - Air quality parameters of the SPZ around waste disposal sites in 2020

Name of PS	MPC	Concentration by sampling points			
		p.1- north	p.2 - east	p. 3 - south	Landfill
1	2	3	4	5	6
Landfill for construction and industrial waste disposal					
Sulfuric anhydride	0,5	<0,04	<0,04	<0,04	0,33
Ammonia	0,2	0,023	0,025	0,02	0,015
Dust	0,5	0,29	0,3	0,3	0,33
Phenol	0,01	<0,004	<0,004	<0,004	0,009
Formaldehyde	0,035	<0,01	<0,01	<0,01	0,028
Sludge collector					
		p.1- north	p.2 - east	p. 3 - south	Sludge collector
Sulfuric anhydride	0,5	<0,04	<0,04	<0,04	0,262
Ammonia	0,2	0,022	0,022	0,019	0,021
Dust	0,5	0,27	0,28	0,27	0,288
Phenol	0,01	<0,004	<0,004	<0,004	0,009
Formaldehyde	0,035	<0,01	<0,01	<0,01	0,022

Table 56 - Air quality parameters of the SPZ around waste disposal sites in 2019

Name of PS	MPC	Concentration by sampling points			
		p.1- north	p.2 - east	p. 3 - south	p.1- north
1	2	3	4	5	6
Landfill for construction and industrial waste disposal					
Sulfuric anhydride	0,5	<0,04	<0,04	<0,04	0,35
Ammonia	0,2	0,023	0,025	0,2	0,16

Dust	0,5	0,29	0,3	0,3	0,32
Phenol	0,01	<0,004	<0,004	<0,004	0,009
Formaldehyde	0,035	<0,01	<0,01	<0,01	0,028
Sludge collector					
		p.1- north	p.2 - east	p. 3 - south	Sludge collector
Sulfuric anhydride	0,5	-	<0,04	<0,04	0,46
Ammonia	0,2	0,022	0,025	0,02	0,18
Dust	0,5	0,3	0,3	0,3	0,31
Phenol	0,01	<0,004	<0,004	<0,004	0,009
Formaldehyde	0,035	<0,01	<0,01	<0,01	0,030

The 2017 and 2018 Environmental Impact Assessment Reports on Non-Radiation Factors of the Rivne NPP of the State Enterprise NNEGC Energoatom on the Environment do not contain data on the parameters of the state of the atmospheric air on the border of the SPZ for 2017 and 2018, respectively. The conditions of the Permit for Air Pollutant Emissions by Stationary Sources in force in those years did not require monitoring of compliance with the established maximum permissible emissions of pollutants.

Table 57 - Dynamics of changes in the state of surface waters of the Styr River (after RNPP) (in terms of pollutant chemical content)

Indicator of polluting chemicals	Pollutant/chemical content, mg/dm^3					
	2022	2021	2020	2019	2018	20217
Mineralization	583,713	612,628	387,955	374,21	380,98	374,350
Sulfates	181,112	158,538	39,761	41,73	45,74	61,281
Chlorides	63,727	49,147	15,466	14,75	14,77	14,232
Calcium	99,499	105,956	93,477	98,20	98,60	97,074
Magnesium	42,531	36,976	29,358	18,73	22,74	24,004
Ammonium nitrogen	0,796	0,584	0,519	0,886	0,584	0,536
Nitrites	0,047	0,041	0,102	0,127	0,078	0,066
Nitrates	41,752	30,735	5,455	6,749	6,898	9,802

Phosphates	0,590	0,279	0,303	0,264	0,346	0,417
Iron	0,295	0,262	0,385	0,350	0,337	0,267
Copper	0,296	0,234	0,010	0,012	0,015	0,006
Zinc	0,020	0,009	0,015	0,013	0,012	0,006
Soluble oxygen	9,345	9,454	10,447	10,96	10,55	10,174
Suspended solids	13,768	9,670	9,855	9,74	9,00	10,653
Petroleum products	0,098	0,050	0,044	0,047	0,038	0,068
SSAS	0,031	0,008	0,011	0,014	0,025	0,012
BOD_5	2,761	1,756	1,973	3,88	2,85	2,518
COD	78,167	60,883	43,696	33,09	50,45	43,477
pH	8,701	8,647	8,315	8,30	8,24	8,269
Temperature	25,379	24,703	11,535	13,21	11,70	11,092

Table 58 - Average indicators of surface water condition (2022)

№	Nominative	MPC r, mg/dm^3	Approved DCs (SCCs) mg/dm^3	SCCs mg/dm^3 for year	River (before NPP) mg/dm^3 for year	River (after NPP) mg/dm^3 for year
1	2	3	4	5	6	7
1.	Mineralization	-	-	583,713	374,501	382,769
2.	Sulfates	500	418,48	181,112	42,453	41,811
3.	Chlorides	350	122,5	63,727	14,271	15,007
4.	Calcium	-	-	99,499	10,454	99,766
5.	Magnesium	-	-	42,531	25,697	27,069
6.	Ammonium nitrogen	2	0,835	0,796	0,470	0,504

7.	Nitrites (NO_2)	3,3	0,103	0,047	0,092	0,082
8.	Nitrates (NO_3)	45	44,5	41,752	7,764	8,373
9.	Phosphates	3,5	2,015	0,590	0,337	0,327
10.	Iron	-	0,306	0,295	0,321	0,327
11.	Copper	1	0,303	0,296	0,005	0,008
12.	Zinc	1	0,022	0,020	0,013	0,012
13.	Soluble oxygen	≥4	≥4	9,345	10,463	10,661
14.	Suspended solids	+0,75	14,88	13,768	8,316	8,291
15.	Petroleum products	0,3	0,104	0,098	0,112	0,083
16.	SSAS	0,5	0,034	0,031	0,012	0,014
17.	BOD_5	4,5	4,48	2,761	3,365	3,467
18.	COD	30	80,62	78,167	52,899	63,074
19.	pH	6,5÷9,0	6,5÷9,0	8,701	8,251	8,278
20.	Temperature, °C	-	-	25,379	12,062	12,128

I.3 Results of monitoring of SS KhNPP site location

Table 59 - Content of radioactive substances in the atmospheric air in the observation area of KhNPP for 2022, μBq/m^3

Name of radionuclide	SPZ	SPZ -10 km	SPZ -10-20 km	SPZ > 20 km
Measurement results for the I quarter of 2022				
^{137}Cs	9,73E-01	9,93E-01	9,58E-01	**
^{134}Cs	4,80E-02*	2,79E-02*	3,02E-02*	**
^{60}Co	5,13E-01	3,44E-02*	3,49E-02*	**
^{131}I	9,81E-02*	6,41E-02*	6,97E-02*	**
^{90}Sr	8,41E-02	9,83E-02	7,28E-02	**
Measurement results for the II quarter of 2022				
^{137}Cs	7,28E-01	6,47E-01	6,18E-01	**
^{134}Cs	3,74E-02*	4,65E-02*	3,13E-02*	**
^{60}Co	4,93E-02*	5,83E-02*	4,11E-02*	**
^{131}I	9,78E-02*	1,25E-01*	9,13E-02*	**
^{90}Sr	1,42E-01	1,42E-01	1,26E-01	**
Measurement results for the III quarter of 2022				
^{137}Cs	1,26E+00	1,57E+00	1,42E+00	**

^{134}Cs	3,25E-02*	1,93E-02*	8,22E-03*	**
^{60}Co	3,83E-02*	2,08E-02*	8,20E-03*	**
^{131}I	8,60E-02*	5,33E-02*	2,81E-02*	**
^{90}Sr	5,81E-02	5,80E-02	5,02E-02	**
Measurement results for the IV quarter of 2022				
^{137}Cs	7,82E-01	8,19E-01	8,12E-01	**
^{134}Cs	3,14E-02*	5,89E-02*	5,41E-02*	**
^{60}Co	3,58E-02*	6,85E-02*	6,24E-02*	**
^{131}I	7,12E-02*	1,19E-01*	1,11E-01*	**
^{90}Sr	2,53E-01	2,12E-01	1,72E-01	**
Note: Determination of the content of radioactive substances in the atmospheric air is performed on a quarterly basis; ** - values corresponding to ½ MBA are marked;* *** - results cannot be provided for technical reasons.*				

Table 60 - Contribution of each ventilation stack to the total gas and aerosol emission of radioactive substances into the environment for 2017-2022.

Radiation parameter	Year	SS KhNPP
IRG GBq/year	2017	12408,07
	2018	12153,12
	2019	13457,4
	2020	11540,6
	2021	12388,5
	2022	11264,6
LLN kBq/year	2017	14363,60
	2018	12290,66
	2019	12874,7
	2020	12685,3
	2021	12134,7
	2022	11725,5
Radioiodines kBq/year	2017	10977,3
	2018	10715,86
	2019	12118,8
	2020	12108,2
	2021	16396,9
	2022	15904,4

Table 61 - Air pollutant emissions from stationary sources in 2022

Code of polluting substance	Pollutants	Discarded, tone					Potential emissions, tons per year
		1 quarter	2 quarter	3 quarter	4 quarter	Since the beginning of the year	
00000	Total for the enterprise (excluding carbon dioxide)	9,344	23,697	9,901	16,363	59,305	50,956
01000	Metals and their compounds	0,043	0,272	0,044	0,117	0,476	0,201
03000	Substances in the form of suspended solids (microparticles and fibers)	0,995	1,620	1,052	1,256	4,923	4,220
04000	Nitrogen compounds	1,320	3,789	1,571	3,478	10,158	7,409
05000	Sulfur dioxide and other sulfur compounds	0,224	11,441	0,292	3,580	15,537	4,782
06000	Carbon oxide	1,890	1,929	2,058	2,929	8,806	9,935
10000	Organic amines	0,003	0,003	0,002	0,003	0,011	0,011
11000	Non-methane volatile organic compounds	1,730	1,606	1,840	2,270	7,446	7,524
12000	Methane	3,011	2,849	2,893	2,630	11,383	16,348
13000	Persistent organic pollutants (POPs)	0,000	0,000	0,000	0,000	0,000	0,000
15000	Chlorine and chlorine compounds (in terms of chlorine))	0,001	0,000	0,001	0,000	0,002	0,002
16000	Fluoride and its compounds (per fluoride)	0,005	0,006	0,006	0,006	0,023	0,023
18000	Freons	0,120	0,182	0,142	0,094	0,538	0,466

19000	Sulfur hexafluoride	0,002	0,000	0,000	0,000	0,002	0,035
Total		9,344	23,697	9,901	16,363	59,305	50,956
07000	In addition, carbon dioxide	0,000	1934,501	11,644	507,788	2453,933	207,134

Table 62 - Amounts of emissions of PS into the atmosphere by stationary sources of KhNPP, tons/year

Name of PS	2022	2021	2020	2019	2018	2017
Metals and their compounds	0,476	0,193	0,175	0,176	0,537	0,229
Substances in the form of suspended solids (microparticles and fibers)	4,923	4,071	3,982	4,086	6,448	6,965
Nitrogen compounds	10,158	4,165	3,664	4,849	6,497	2,712
Sulfur dioxide and other sulfur compounds	15,537	1,698	0,733	1,083	33,835	0,461
Carbon monoxide	8,806	6,756	6,733	7,216	7,457	7,027
Organic amines	0,011	0,011	0,011	0,011	0,011	0,011
Non-methane volatile organic compounds	7,446	6,690	6,525	6,918	6,196	5,537
Methane	11,383	11,562	12,652	11,401	14,626	17,458
Persistent organic pollutants	0,000	0,000	0,000	0,000	0,000	---
Chlorine and chlorine compounds (in terms of chlorine)	0,002	0,002	0,002	0,002	0,001	0,000
Fluoride and its compounds (per fluoride)	0,023	0,023	0,023	0,023	0,022	0,021
Freons	0,538	0,187	0,122	0,386	0,198	0,453
Sulfur hexafluoride	0,002	0,000	0,000	0,000	0,000	---
Carbon dioxide	2453,933	178,971	14,016	45,447	2403,872	50,410
Total for the enterprise (excluding carbon dioxide)	**59,305**	**35,358**	**34,622**	**36,151**	**75,828**	**40,874**

Table 63 - Parameters of the state of the SPZ atmospheric air for 2022

Name of the Pollutant	Concentration at sampling points, mg/m^3					Maximum-recurrent MPC, mg/m^3
	№ 1	№ 2	№ 3	№ 4	№ 5	
1	2	3	4	5	6	7
Nitrogen dioxide	<0,02	<0,02	<0,02	<0,02	<0,02	0,2
Sulfur dioxide	<0,05	<0,05	<0,05	<0,05	<0,05	0,5

Notes: - maximum single concentration in accordance with the «Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas» approved by the Order of the Ministry of Health of Ukraine № 52 dated 14.01.2020, registered with the Ministry of Justice of Ukraine on 10.02.2020 under № 156/34439;

№ 1 - NPP-Bilotyn road;

№ 2 - NPP-Komarivka road;

№ 3 - NPP-Netishyn road;

№ 4 - mill area;

№ 5 - the area of the sports complex.

Table 64 - Parameters of the state of the SPZ atmospheric air for 2021

Name of the Pollutant	Concentration at sampling points, mg/m^3					Maximum-recurrent MPC, mg/m^3
	№ 1	№ 2	№ 3	№ 4	№ 5	
1	2	3	4	5	6	7
Nitrogen dioxide	<0,02	<0,02	<0,02	<0,02	<0,02	0,2
Sulfur dioxide	<0,05	<0,05	<0,05	<0,05	<0,05	0,5

Notes: - maximum single concentration in accordance with the «Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas» approved by the Order of the Ministry of Health of Ukraine № 52 dated 14.01.2020, registered with the Ministry of Justice of Ukraine on 10.02.2020 under № 156/34439;

№ 1 - NPP-Bilotyn road;

№ 2 - NPP-Komarivka road;

№ 3 - NPP-Netishyn road;

№ 4 - mill area;

№ 5 - the area of the sports complex.

Table 65 - Parameters of the state of the SPZ atmospheric air for 2020

Name of the Pollutant	Concentration at sampling points, mg/m^3					Maximum-recurrent MPC, mg/m^3
	№ 1	№ 2	№ 3	№ 4	№ 5	
1	2	3	4	5	6	7
Nitrogen dioxide	<0,02	<0,02	<0,02	<0,02	<0,02	0,2
Sulfur dioxide	<0,05	<0,05	<0,05	<0,05	<0,05	0,5

Notes: - maximum single concentration in accordance with the «Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas» approved by the Order of the Ministry of Health of Ukraine № 52 dated 14.01.2020, registered with the Ministry of Justice of Ukraine on 10.02.2020 under № 156/34439;

№ 1 - NPP-Bilotyn road;

№ 2 - NPP-Komarivka road;

№ 3 - NPP-Netishyn road;

№ 4 - mill area;

№ 5 - the area of the sports complex.

Table 66 - Parameters of the state of the SPZ atmospheric air for 2019

Name of the Pollutant	Concentration at sampling points, mg/m^3					Maximum-recurrent MPC, mg/m^3
	№ 1	№ 2	№ 3	№ 4	№ 5	
1	2	3	4	5	6	7
Nitrogen dioxide	<0,02	<0,02	<0,02	<0,02	<0,02	0,2
Sulfur dioxide	<0,05	<0,05	<0,05	<0,05	<0,05	0,5

Notes: - maximum single concentration in accordance with the «Maximum Permissible Concentrations of Chemical and Biological Substances in the Atmospheric Air of Populated Areas» approved by the Order of the Ministry of Health of Ukraine № 52 dated 14.01.2020, registered with the Ministry of Justice of Ukraine on 10.02.2020 under № 156/34439;

№ 1 - NPP-Bilotyn road;

№ 2 - NPP-Komarivka road;

№ 3 - NPP-Netishyn road;

№ 4 - mill area;

№ 5 - the area of the sports complex.

The Report on the Assessment of the Impact of Non-Radiation Factors of the Khmelnytska NPP of the State Enterprise NNEGC Energoatom on the Environment for 2018 states that the monitoring of the state of atmospheric air in the sanitary protection zone and the observation zone around the KhNPP is carried out by the content of nitrogen and sulfur oxides in the atmospheric air. The average annual content of pollutants at the boundary of the SPZ was: sulfur oxides - less than 0.05 mg/dm^3 (<10% of the MPC - 0.5 mg/dm3/), nitrogen oxides - 0.021 mg/dm^3 (≈10% of the MPC - 0.2 mg/dm^3/).

The Report on the Assessment of the Impact of Non-Radiation Factors of the Khmelnytska NPP of the State Enterprise NNEGC Energoatom on the Environment for 2017 states that the monitoring of the state of atmospheric air in the sanitary protection zone and the observation zone around the Khmelnytska NPP is carried out by the content of nitrogen and sulfur oxides in the atmospheric air. The average annual content of pollutants at the boundary of the SPZ was: sulfur oxides - less than 0.05 mg/dm^3 (<10% of the MPC - 0.5 mg/dm^3/), nitrogen oxides - 0.021 mg/dm^3 (≈10% of the MPC - 0.2 mg/dm^3/).

Table 67 - Radionuclide content in water of surface reservoirs in the area of KhNPP location for 2022, Bq/m^3

Name of radionuclide	Cooling pond	r. Gorin (before the NPP)	r. Gorin (control gate)
Measurement results for the I half of 2022			
^{137}Cs	1,12E+01	5,20E+00	1,18E+01
^{134}Cs	2,85E+00*	1,34E+00*	3,47E-01*
^{60}Co	2,96E+00*	1,69E+00*	3,20E-01*
^{90}Sr	6,87E+00	5,32E+00	6,49E+00
^{3}H	3,26E+04	1,47E+04	1,05E+04
Measurement results for the II half of 2022			
^{137}Cs	1,21E+01	9,52E+00	9,22E+00
^{134}Cs	8,68E-01*	5,50E-01*	8,05E-01*
^{60}Co	9,49E-01*	6,25E-01*	9,35E-01*
^{90}Sr	7,22E+00	4,10E+00	5,18E+00
^{3}H	6,27E+04	8,15E+04	4,33E+03
Note: The content of radioactive substances in water of surface water bodies is determined 2 times a year; ** - values corresponding to ½ MBA are marked;*			

Table 68 - Radioactive contamination of soils in the observation area of KhNPP, kBq/m^2

Name of radionuclide	SPZ						SPZ -10 km					
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
^{137}Cs	1,25E+00	1,82E-01	5,76E-02	1,08E-01	1,20E-01	8,42E-02	1,08E+00	1,61E-01	1,84E-01	2,42E-01	1,83E-01	1,36E-01
^{134}Cs	8,99E-03*	3,92E-02	2,19E-03*	2,94E-03*	2,63E-03*	7,56E-03*	1,51E-01	2,75E-02	1,87E-03*	4,01E-03*	2,15E-03*	1,12E-02*
^{60}Co	9,71E-03*	2,55E-03*	2,41E-03*	3,21E-03*	2,86E-03*	6,84E-03*	9,17E-03*	1,83E-03*	1,94E-03	4,86E-03*	2,30E-03*	1,02E-02*
^{90}Sr	1,51E-02*	2,27E-01	2,49E-01	1,69E-01	1,38E-01	2,47E-01	2,03E-02*	2,42E-01	2,58E-01	2,10E-01	2,00E-01	3,04E-01
	SPZ -10-20 km						**SPZ >20 km**					
	2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
^{137}Cs	2,52E+00	1,57E-01	1,71E-01	1,78E-01	1,99E-01	1,14E-01	**	1,93E-01	1,77E-01	2,19E-01	2,73E-01	1,72E-01
^{134}Cs	1,49E-02*	4,94E-02	2,10E-03*	3,86E-03*	2,83E-03*	1,19E-02*	**	2,00E-03*	2,46E-03*	6,43E-03*	5,63E-03*	2,00E-02*
^{60}Co	1,49E-02*	3,34E-03*	2,24E-03*	4,17E-03*	3,16E-03*	8,63E-03*	**	2,00E-03*	2,78E-03*	7,18E-03*	7,17E-03*	2,02E-02*
^{90}Sr	3,01E-02*	2,96E-01	2,71E-01	2,35E-01	2,65E-01	3,37E-01	**	1,68E-01	2,57E-01	2,73E-01	1,94E-01	2,63E-01

Notes: Soil contamination is measured once a year;

** - values corresponding to ½ MVA are noted;*

*** - results cannot be provided for technical reasons.*

Table 69 - Surface water status parameters for 2022

№	Parameter name	MPC, mg/dm^3 (cultural and domestic/natural freshwater)	Cooling pond	river to the EE ("p.1, bridge")	river (control gate) («p.2, mill»)
1	2	3	4	5	6
1.	Dry residue, mg/dm^3	≤1000/≤1000	516,9	385,6	388,3
2.	Sulfates, mg/dm^3	≤500/≤100	113,14	48,96	50,94
3.	Chlorides, mg/dm^3	≤350/≤300	52,19	25	24,97
4.	Calcium, mg/dm^3	-/≤180	72,79	97,39	98,36
5.	Magnesium, mg/dm^3	-/≤40	19,01	16,04	16,1
6.	Sodium, mg/dm^3	≤200/≤120	77,86	15,33	15,23
7.	Potassium, mg/dm^3	-/≤50	11,44	5,62	5,4
8.	Salt ammonium, mg/dm^3	-/≤0,5	0,219	0,39	0,348
9.	Nitrites, mg/dm^3	≤3,3/0,08	0,021	0,106	0,086
10.	Nitrates, mg/dm^3	≤45,0/≤40,0	2,275	4,847	5,453
11.	Phosphates, mg/dm^3	-/≤0,7	0,455	0,175	0,159
12.	Iron, mg/dm^3	≤0,3/≤0,1	0,1	0,138	0,154
13.	Manganese (manganese),mg/dm^3	≤0,1/-	0,013	-	-
14.	Copper, mg/dm^3	≤1,0/-	0,031	0,010	0,010
15.	Zinc, mg/dm^3	≤1,0/-	0,030	-	-
16.	Soluble oxygen, mgO_2/dm^3	not less than 4 mgO_2/dm^3/-	10,01	8,9	9,31
17.	Suspended solids, mg/dm^3	-/≤25,0	5,63	5,72	5,08
18.	Petroleum products, mg/dm^3	≤0,3/≤0,05	0,029	0,032	0,032
19.	SSAS, mg/dm^3	≤0,5/-	0,04	0,031	0,031
20.	BOD_5, mgO_2/dm^3	≤6,0 mgO_2/dm^3/≤3,0 mgO_2/dm^3	4,33	4,68	4,84
21.	COD, mgO_2/dm^3	≤30 mgO_2/dm^3/≤50 mgO_2/dm^3	33,48	21,84	20,52
22.	Hydrogen index pH	6.5-8.5 pH units/6.5-8.5 pH units	8,47	7,9	7,92
23.	Temperature.°C	6-30/6-30	14,74	11,15	11,15

Table 70 - Groundwater status parameters (if used or directly affected) for 2022

№	Parameter name	Background concentrations mg/dm^3	Factual concentrations, mg/dm^3
1	2	3	4
1	**Netishyn groundwater intake (artesian water)**		
1.1	pH, units.	---	7,20
1.2	Total hardness, mg-eq/l	---	1,45
1.3	Iron. mg/l	---	1,03
1.4	Copper, mg/l	---	0,15
1.5	Manganese, mg/l	---	0,06
1.6	Sodium, mg/l	---	---
1.7	Salt ammonium, mg/l	---	1,74
1.8	Carbonates, mg-eq/l	---	---
1.9	Bicarbonates, mg-eq/l	---	---
1.10	Chlorides, mg/l	---	4,8
1.11	Nitrites, mg/l	---	0,01
1.12	Nitrates, mg/l	---	0,68
1.13	Sulfates, mg/l	---	14,8
1.14	Permanganate oxyl., mgO/l	---	---
1.15	Dry residue, mg/l	---	---
1.16	Fluoride, mg/l	---	0,48
2	**Industrial site (H1/H2 horizons)**		
2.1	pH, units.	---	7,53/7,71
2.2	Total hardness, mg-eq/l	---	10,90/8,58
2.3	Calcium, mg/l	---	155,33/116,19
2.4	Magnesium, mg/l	---	38,30/33,83
2.5	Potassium, mg/l	---	8,60/8,81
2.6	Sodium, mg/l	---	20,96/63,70
2.7	Salt ammonium, mg/l	---	5,12/1,91
2.8	Carbonates, mg-eq/l	---	0,03/0,05
2.9	Bicarbonates, mg-eq/l	---	4,15/4,38
2.10	Chlorides, mg/l	---	28,56/42,88
2.11	Nitrites, mg/l	---	0,05/0,08
2.12	Nitrates, mg/l	---	2,14/0,68
2.13	Sulfates, mg/l	---	517,44/322,17
2.14	Permanganate oxyl., mgO/l	---	---/---
2.15	Dry residue, mg/l	---	901,71/717,92
3	**Floodplain of the Goryn and Viliya rivers Horizon H1**		
3.1	pH, units.	---	6,79
3.2	Total hardness, mg-eq/l	---	7,46
3.3	Calcium, mg/l	---	97,65
3.4	Magnesium, mg/l	---	31,48
3.5	Potassium, mg/l	---	4,37
3.6	Sodium, mg/l	---	27,23

3.7	Salt ammonium, mg/l	---	4,18
3.8	Carbonates, mg-eq/l	---	0
3.9	Bicarbonates, mg-eq/l	---	4,64
3.10	Chlorides, mg/l	---	46,05
3.11	Nitrites, mg/l	---	0,01
3.12	Nitrates, mg/l	---	0,53
3.13	Sulfates, mg/l	---	51,39
3.14	Permanganate oxyl., mgO/l	---	---
3.15	Dry residue, mg/l	---	388,64
4	**c. Netishyn (H1/H2 horizons)**		
4.1	pH, units.	---	7,62/8,48
4.2	Total hardness, mg-eq/l	---	5,38/5,88
4.3	Calcium, mg/l	---	72,09/78,41
4.4	Magnesium, mg/l	---	21,64/23,85
4.5	Potassium, mg/l	---	5,65/5,49
4.6	Sodium, mg/l	---	27,45/50,79
4.7	Salt ammonium, mg/l	---	2,07/1,46
4.8	Carbonates, mg-eq/l	---	0,03/0,18
4.9	Bicarbonates, mg-eq/l	---	4,41/3,53
4.10	Chlorides, mg/l	---	27,13/21,95
4.11	Nitrites, mg/l	---	0,03/0,02
4.12	Nitrates, mg/l	---	0,41/0,50
4.13	Sulfates, mg/l	---	79,63/56,36
4.14	Permanganate oxyl., mgO/l	---	---/---
4.15	Dry residue, mg/l	---	357,86/331,75

Table 71 - Dynamics of changes in the state of surface waters in the area of KhNPP location

№	Name of pollutants	Average annual pollutant content					
		2017	2018	2019	2020	2021	2022
Cooling pond							
1.	Dry residue, mg/dm^3	477,8	491,3	516,7	531,2	513.8	516,9
2.	Sulfates, mg/dm^3	109,27	113,41	129,6	127,08	116,71	113,14
3.	Chlorides, mg/dm^3	43,17	45,71	50,6	56,40	49,32	52,19
4.	Calcium, mg/dm^3	68,1	70,07	66,27	66,11	71,17	72,79
5.	Magnesium, mg/dm^3	18,01	18,8	20,19	20,14	20,33	19,01
6.	Sodium, mg/dm^3	75,44	77,75	86,46	92,17	76,93	77,86
7.	Potassium, mg/dm^3	10,62	10,75	10,94	11,26	9,62	11,44
8.	Salt ammonium, mg/dm^3	0,188	0,176	0,403	0,240	0,259	0,219
9.	Nitrites, mg/dm^3	0,029	0,024	0,023	0,035	0.022	0,021
10.	Nitrates, mg/dm^3	1,93	1,58	1,247	1,330	1.301	2,275
11.	Phosphates, mg/dm^3	0,669	0,775	0,725	0,759	0.599	0.455
12.	Iron, mg/dm^3	0,1	0,109	0,111	0,105	0,102	0.1
13.	Manganese (manganese),mg/dm^3	0,015	0,018	0,012	0,011	0.011	0.013
14.	Copper, mg/dm^3	0,024	0,022	0,015	0,022	0.032	0,031

15.	Zinc, mg/dm^3	0,017	0,021	0,02	0,017	0.029	0,030
16.	Soluble oxygen, mgO_2/dm^3	9,95	9,68	10,05	9,59	10,14	10,01
17.	Suspended solids, mg/dm^3	5,61	6,06	7,42	8,12	6,74	5,63
18.	Petroleum products, mg/dm^3	0,016	0,019	0,019	0,036	0,030	0,029
19.	SSAS, mg/dm^3	0,019	0,024	0,033	0,028	0,026	0,04
20.	BOD_5, mgO_2/dm^3	3,34	3,18	3,51	3,63	4,14	4,33
21.	COD, mgO_2/dm^3	35,79	40,24	37,86	36,57	31,29	33,48
22.	Hydrogen index pH	8,43	8,41	8,6	8,41	8,41	8,47
23.	Temperature. °C	15,3	15,39	14,69	15,5	14,9	14,74
Goryn River (before KhNPP)							
1.	Dry residue, mg/dm^3	355,8	381,3	355,1	363,5	392,0	385,6
2.	Sulfates, mg/dm^3	53,48	63.64	48,9	47,71	51.11	48.96
3.	Chlorides, mg/dm^3	20,08	20,61	20,67	24,88	22.36	25
4.	Calcium, mg/dm^3	91,01	97,61	91,95	89,76	98,35	97.39
5.	Magnesium, mg/dm^3	15,08	15,4	15,6	17,82	18,41	16,04
6.	Sodium, mg/dm^3	12,02	19,09	13,38	15,06	12,45	15,33
7.	Potassium, mg/dm^3	5,65	5,58	5Д9	5,13	4,27	5,62
8.	Salt ammonium, mg/dm^3	0,298	0,236	0,43	0,324	0,364	0,39
9.	Nitrites, mg/dm^3	0,075	0,073	0,106	0,090	0.069	0.106
10.	Nitrates, mg/dm^3	6,164	5,34	4,892	3,258	6,608	4.847
11.	Phosphates, mg/dm^3	0,246	0,215	0,231	0,317	0,200	0,175
12.	Iron, mg/dm^3	0,238	0,194	0,159	0,115	0.145	0.138
13.	Manganese (manganese),mg/dm^3	-	-	-	-	-	-
14.	Copper, mg/dm^3	0,01	0,01	0,01	0,01	0,010	0,010
15.	Zinc, mg/dm^3	-	-	-	-	-	-
16.	Soluble oxygen, mgO_2/dm^3	9,61	9,35	9,45	9,68	9.99	8,9
17.	Suspended solids, mg/dm^3	14,48	8,64	6,88	8,07	6.47	5,72
18.	Petroleum products, mg/dm^3	0,015	0,017	0,022	0,036	0,029	0,032
19.	SSAS, mg/dm^3	0,016	0,024	0,032	0,029	0,036	0,031
20.	BOD_5, mgO_2/dm^3	3,36	3,78	3,27	3,55	4,45	4,68
21.	COD, mgO_2/dm^3	16,92	16,59	15,13	15,66	21,96	21,84
22.	Hydrogen index pH	7,74	7,82	7,8	7,95	7,93	7,9
23.	Temperature. °C	11,4	12,6	11,95	12,0	11,0	11,15
Goryn River (control gate)							
1.	Dry residue, mg/dm^3	349,9	381,8	352,8	362,1	397.8	388,3
2.	Sulfates, mg/dm^3	50,82	65,21	48,35	48,85	54,78	50,94
3.	Chlorides, mg/dm^3	19,8	20,65	20,45	25,08	22,30	24,97
4.	Calcium, mg/dm^3	87,98	97,28	91,7	88,84	99,43	98,36
5.	Magnesium, mg/dm^3	14,68	15,3	16,25	18,12	18,51	16,1
6.	Sodium, mg/dm^3	11,62	19,29	13,27	15,48	12,78	15,23
7.	Potassium, mg/dm^3	5,68	5,58	5,18	5,13	4.30	5,4
8.	Salt ammonium, mg/dm^3	0,248	0,233	0,422	0,303	0,368	0,348

9.	Nitrites, mg/dm^3	0,081	0,075	0,113	0,097	0,072	0,086
10.	Nitrates, mg/dm^3	5,444	5,479	4,928	3,357	6,552	5,453
11.	Phosphates, mg/dm^3	0,239	0,228	0,238	0,322	0,205	0.159
12.	Iron, mg/dm^3	0,254	0,194	0,169	0,130	0,152	0,154
13.	Manganese (manganese),mg/dm^3	-	-	-	-	-	-
14.	Copper, mg/dm^3	0,01	0,01	0,01	0,01	0,010	0,010
15.	Zinc, mg/dm^3	-	-	-	-	-	-
16.	Soluble oxygen, mgO_2/dm^3	9,43	9,56	9,49	9,70	10,05	9,31
17.	Suspended solids, mg/dm^3	15,02	8,33	7,97	6,44	6,41	5,08
18.	Petroleum products, mg/dm^3	0,016	0,016	0,023	0,037	0,025	0,032
19.	SSAS, mg/dm^3	0,016	0,023	0,031	0,030	0,036	0,031
20.	BOD_5, mgO_2/dm^3	3,56	3,65	3,28	3,66	4,38	4,84
21.	COD, mgO_2/dm^3	15,9	15,69	15,53	16,36	20,34	20,52
22.	Hydrogen index pH	7,81	7,9	7,89	7,94	7,93	7,92
23.	Temperature. °C	11,4	12,6	11,95	12,0	11,0	11,15

Table 72 - Dynamics of changes in the state of groundwater in the area of KhNPP location

№ з/п	Name of pollutants	Average annual pollutant content					
		2017	2018	2019	2020	2021	2022
1. Netishyn groundwater intake (artesian water)							
1.1	pH, units.	7,8	7,4	7,6	7,65	7,40	7,20
1.2.	total hardness, mg-eq/l	0,95	1,3	1,47	1,38	1,43	1,45
1.3.	iron, mg/l	0,8	0,84	0,76	1,21	1,06	1,03
1.4.	copper, mg/l	0,08	0.014	0,011	0,14	0,126	0,15
1.5.	manganese, mg/l	0,04	0,006	0,014	0,014	0,089	0,06
1.6.	sodium, mg/l	—	—	—	—	—	—
1.7.	salt ammonium, mg/l	—	—	0,2	1,91	1,82	1,74
1.8.	carbonates, mg-eq/l	—	—	—	—	—	—
1.9.	bicarbonates, mg-eq/l	—	—	—	—	—	—
1.10.	chlorides, mg/l	3,83	5,5	3,3	4,06	3,72	4,8
1.11.	nitrite, mg/l	0,001	0,002	0,023	0.024	0,009	0,01
1.12.	nitrates, mg/l	0,19	0,027	0,26	0,073	0,095	0,68
1.13.	sulfates, mg/l	16,4	13,3	10,3	19,23	9,05	14,8
1.14.	permanganate per oxide, mgO/l	—	—	—	—	—	—
1.15.	dry residue, mg/l	—	—	—	—	—	—
2. Floodplain of the rivers. Goryn and Viliya (H1 horizon)							
2.1.	pH, units.	6,5	6,04	6,96	7,29	6,98	6,79
2.2.	total hardness, mg-eq/l	2,66	2,82	5,62	5,26	6,30	7,46
2.3.	iron, mg/l	38,41	39,41	77,7	63,57	87,17	97,65
2.4.	copper, mg/l	9,03	10,38	21,24	25,19	23,69	31,48
2.5.	manganese, mg/l	4,78	4,9	5,08	4.27	4,61	4,37
2.6.	sodium, mg/l	26,02	29,26	50,58	51,63	37,56	27,23

2.7.	salt ammonium, mg/l	8,75	11,95	4,79	2,19	2,90	4,18
2.8.	carbonates, mg-eq/l	0,00	0,00	0,00	0,00	0,00	0,00
2.9.	bicarbonates, mg-eq/l	2,95	2,21	4,15	4,51	6,36	4,64
2.10.	chlorides, mg/l	101,98	121,58	84,94	70,55	58,63	46,05
2.11.	nitrite, mg/l	0,04	0,05	0,02	0,01	0,02	0,01
2.12.	nitrates, mg/l	0,79	0,54	0,33	0,44	0,48	0,53
2.13.	sulfates, mg/l	73,58	74,76	95,26	65,53	70,15	51,39
2.14.	permanganate per oxide, mgO/l	—	—	—	—	—	—
2.15.	dry residue, mg/l	330,83	338,78	437.92	407,00	462,38	388,64

Table 73 - Soil condition parameters in the KhNPP SPZ

№	Parameter name	Actual concentrations, mg/dm^3						MPC, mg/kg (g/kg*)
		2017	2018	2019	2020	2021	2022	
1.	pH, units.	5,89	7,31	5,0	6,2	5,82	6,28	
2.	Calcium, g/kg	3,88	3,01	4,98	4,93	5,78	4,78	
3.	Magnesium, g/kg	0,061	0,14	0,061	1,322	0.198	0.137	
4.	Ammonium, g/kg	0,0137	0,0134	0,0352	0,0167	0,0265	0.0231	
5.	Nitrates, g/kg	0,0251	0,0152	0,0175	0,0138	0,027	0,0188	0,13 g/kg*
6.	Sulfates, g/kg	0,094	0,0436	0,0405	0,1278	0,1633	0,1225	0,16 g/kg*
7.	Chlorides, g/kg	0,091	0,1	0,141	0,13	0,121	0.064	
8.	Potassium, mg/kg	12,75	13,58	8,38	8,38	5,16	6,50	560,0 mg/kg
9.	Sodium, mg/kg	6,75	23,13	10,63	11,25	11,9	19.13	
10.	Phosphorus, g/kg	0,006	0,037	0,013	0,008	0.016	0,013	
11.	Cobalt, g/kg	0,0046	0,0021	0,00403	0,0014	0,00432	0.00194	0.005 g/kg*
12.	Iron, g/kg	0,118	0,152	0,177	0,261	0,127	0,165	
13.	Dry residue, %.	0,154	0,228	0,151	0,152	0,156	0,099	
14.	Gross nitrogen, %.	0,196	0,069	0,043	0,049	0,042	0,031	
15.	Organic matter, %.	2,603	3,949	10,512	8,118	5,264	4.735	

16.	Humidity, %.	8,727	5,366	13,39	19,265	18.301	15,887	
17.	Ash content, %.	97,397	96,051	89,488	91,882	94.736	95,263	
18.	Zinc, mg/kg	6,96	11,09	8,31	8,79	9,27	9,34	100,0 mg/kg
19.	Manganese, mg/kg	50	60,4	82,14	108,03	103,95	34.29	1500.0 mg/kg
20.	Copper, mg/kg	7,99	7,31	3,83	6,63	5,99	5,19	55 mg/kg

I.4 Results of monitoring of the SS SUNPP site location

Table 74 - Dynamics of changes in air pollutant emissions from stationary sources of the SS SUNPP for 2017-2022

Name of the pollutant	Pollutant emissions, tons/year					
	2022	2021	2020	2019	2018	2017
1	2	3	4	5	6	7
Total for the enterprise (excluding carbon dioxide), incl.	37,662	35,570	34,872	35,433	90,658	137,700
Metals	0,939	2,740	2,736	0,251	0,368	0,201
Substances in the form of solid particles	10,371	8,400	8,426	11,003	11,128	11,249
Nitrogen combinations	6,916	5,655	5,224	5,446	7,087	6,092
Sulphur compounds	1,320	0,936	0,808	0,934	2,344	1,039
Carbon monoxide	8,676	8,356	8,254	8,443	9,811	8,924
Non-methane volatile organic compounds	9,269	9,357	9,301	9,232	59,781	110,064
Methane	0,021	0,018	0,014	0,016	0,029	0,021
Chlorine compounds	0,016	0,016	0,016	0,016	0,016	0,014
Fluoride compounds	0,092	0,092	0,092	0,092	0,094	0,096
In addition, carbon dioxide*	356,436	202,399	156,193	212,490	591,610	319,104

*-CO_2 emissions are displayed but not summarized

Table 75 - Air pollutant emissions from stationary sources in 2022

Code of pollutants substances, greenhouse gases	Pollutants	Discarded, tone					Potential emissions, tons per year
		1 quarter	2 quarter	3 quarter	4 quarter	Since the beginning of the year	
1	2	3	4	5	6	7	8
0000	Total for the enterprise	8,662	8,570	8,241	12,147	37,662	43,681

	(excluding carbon dioxide),						
01000	Metals	0,081	0,080	0,682	0,096	0,939	2,780
03000	Substances in the form of solid particles	2,687	2,836	2,093	2,755	10,371	13,956
04000	Nitrogen combinations	1,326	1,242	0,971	3,377	6,916	6,646
05000	Sulphur compounds	0,171	0,171	0,139	0,839	1,320	1,491
06000	Carbon monoxide	2,032	2,029	2,018	2,597	8,676	9,310
11000	NMVOC	2,335	2,182	2,308	2,444	9,269	9,369
12000	Methane	0,003	0,003	0,003	0,0012	0,021	0,021
15000	Combination of chlorine	0,004	0,004	0,004	0,004	0,016	0,016
16000	Combination of fluoride	0,023	0,023	0,023	0,023	0,092	0,092
07000	Carbon dioxide *	33,657	27,487	7,843	287,449	356,436	471,858

*carbon dioxide (code 07000) in the form of 2TP (air) is displayed but not summarized

Table 76 - Indicators of emissions of IRGs, DINs and iodine radionuclides into the atmosphere, normalized per 1000 MW of installed capacity for 2017-2022

	2017	2018	2019	2020	2021	2022
IRG, GBk/year	6,25E+03	5,21E+03	4,92E+03	5,45E+03	3,46E+03	3,53E+03
DIN MBq/year	1,71E+01	1,99E+01	3,62E+01	3,10E+01	2,68E+01	2,44E+01
Radioiodine, MBq/year	1,77E+01	9,83E+00	8,80E+00	1,39E+01	1,07E+01	9,22E+00

Table 77 - Average content of radionuclides in the atmospheric air of settlements in the SS SUNPP zone

Radionuclide	Content in air, μBq/m^3											
	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
	SPZ						**SPZ -10 km ****					
^{137}Cs	0,41*	0,66*	0,49*	2,53*	0,44*	0,58	0,40*	0,48*	0,44*	2,35*	0,28*	0,51
^{134}Cs	0,29*	0,26*	0,27*	0,27*	0,28*	<0,55	0,30*	0,25*	0,26*	0,35*	0,25*	<0,52
^{60}Co	0,33*	0,29*	0,31*	0,31*	0,31*	<0,62	0,35*	0,29*	0,29*	0,28*	0,28*	<0,58
^{54}Mn	0,30*	0,28*	0,28*	0,28*	0,28*	<0,56	0,30*	0,26*	0,26*	0,26*	0,25*	<0,52
^{131}I	0,46*	0,46*	0,46*	0,44*	0,44*	<0,87	0,47*	0,45*	0,61*	0,42*	0,40*	<0,82
^{90}Sr	0,15	1,31	0,71	0,78	0,66	2,65	0,12	0,61	1,08	1,08	0,43	0,97
	SPZ 10-20 km **						**SPZ > 20 km**					
^{137}Cs	0,42*	0,68*	0,54*	2,36*	0,35*	<0,57	0,31*	0,55*	0,35*	1,75*	0,27*	<0,53
^{134}Cs	0,29*	0,25*	0,24*	0,24*	0,26*	<0,51	0,27*	0,25*	0,24*	0,24*	0,25*	<0,49

^{60}Co	0,33*	0,28*	0,26*	0,28*	0,29*	<0,56	0,32*	0,27*	0,28*	0,28*	0,27*	<0,53
^{54}Mn	0,29*	0,26*	0,25*	0,25*	0,26*	<0,50	0,28*	0,25*	0,25*	0,25*	0,25*	<0,49
^{131}I	0,47*	0,46*	0,45*	0,43*	0,41*	<0,84	0,43*	0,43*	0,39*	0,38*	0,38*	<0,79
^{90}Sr	0,11	0,17	0,54	1,29	0,66	0,73	0,12	0,24	0,16	0,58	0,50	0,65

Notes:
SPZ - 10 km: Yuzhnoukrainsk, Volya, Agronomy, Konstantynivka, Bugske villages;
10-20 km: Arbuzynka settlement. Arbuzynka;
> 20 km: Ryabokoneve village.
*Values are based on 0.5 MDA spectrometer when measuring a specific sample
**Due to technical reasons, at this station sampling was carried out by the mobile sampling device "PPA-3"

Table 78 - Radwaste content in surface water bodies in the area of SS SUNPP location, Bq/cubic meter

Radionuclide	Cooling pond						Pivdennyi Buh River Oleksiivka village (to the SS SUNPP)					
	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
^{137}Cs	2,15*	2,20*	1,86*	1,88*	1,85*	<3,78	2,16*	2,14*	1,92*	1,89*	1,85*	<3,62
^{134}Cs	1,87*	1,79*	1,56*	1,55*	1,69*	<3,44	1,83*	1,76*	1,65*	1,63*	1,61*	<3,26
^{60}Co	75,65*	75,23*	75,15*	78,23*	73,83*	<150,66	72,63*	73,75*	71,38*	78,00*	73,10*	<146,76
^{90}Sr	20,5	21,00	24,50	16,50	14,00	16	20,0	17,50	17,25	12,25	12,25	12,5
^{3}H	136650	125861	125445	139000	142500	116472	13000	12667	11584	12083	12250	11334
Pivdennyi Buh River Bugske village (after the SS SUNPP)												
^{137}Cs	2,16*	2,05*	1,90*	1,88*	1,88*	<3,82						
^{134}Cs	1,76*	1,74*	1,66*	1,56*	1,60*	<3,26						
^{60}Co	70,95*	71,55*	72,90*	76,85*	76,50*	<143,76						
^{90}Sr	19,75	17,25	12,0	11,25	11,75	12,5						
^{3}H	13084	12834	14250	14667	12250	13583						

*Note: *values are given by 0.5 MDA spectrometer when measuring a specific sample*

Table 79 - Contamination of soils with radioactive substances in the settlements of the SS SUNPP SA

Radionuclide	Content of RS, kBq/m2					
	2017	2018	2019	2020	2021	2022
SPZ						
^{137}Cs	5,21E-01	2,53E-01	2,21E-01	2,44E-01	9,76E-02	1,79E-01
^{134}Cs	5,67E-03*	5,95E-03*	5,24E-03*	5,37E-03*	5,72E-03*	<1,08E-02
^{60}Co	5,41E-03*	5,65E-03*	5,54E-03*	5,31E-03*	5,35E-03*	<1,09E-02
^{90}Sr	2,15E-02	3,56E-02	7,79E-02	6,46E-02	3,62E-02	6,46E-02
^{54}Mn	-	-	-	-	-	<1,09E-02
SPZ -10 km						
^{137}Cs	5,44E-01	4,10E-01	3,35E-01	2,47E-01	2,51E-01	3,19E-01
^{134}Cs	5,67E-03*	5,77E-03*	5,52E-03*	5,43E-03*	5,40E-03*	<1,26E-02
^{60}Co	5,49E-03*	5,26E-03*	5,53E-03*	5,25E-03*	5,39E-03*	<1,05E-02
^{90}Sr	2,03E-02	7,14E-02	7,91E-02	7,37E-02	9,08-02	1,94E-02
^{54}Mn	-	-	-	-	-	<1,13E-02
SPZ 10-20 km						
^{137}Cs	3,75E-01	3,02E-01	3,95E-01	2,45E-01	2,64E-01	2,97E-01
^{134}Cs	5,65E-03*	5,89E-03*	5,36E-03*	5,74E-03*	5,39E-03*	<1,14E-02
^{60}Co	5,65E-03*	5,45E-03*	6,45E-03*	5,32E-03*	5,28E-03*	<1,08E-02
^{90}Sr	1,9E-02	2,89E-03	3,67E-02	9,66E-02	5,29E-02	2,14E-02
^{54}Mn	-	-	-	-	-	<1,07E-02
SPZ > 20 km						
^{137}Cs	3,87E-01	4,60E-01	6,62E-01	2,06E-01	2,69E-01	2,34E-01
^{134}Cs	5,64E-03*	6,02E-03*	5,19E-03*	5,42E-03*	5,42E-03*	<1,08E-02
^{60}Co	5,71E-03*	5,11E-03*	5,20E-03*	5,24E-03*	5,36E-03*	<1,06E-02
^{90}Sr	2,9E-02	6,81E-02	3,93E-02	9,08E-02	7,81E-02	9,08E-02

^{54}Mn	-	-	-	-	-	<1,08E-02

*Note: *values are given by 0.5 MDA spectrometer when measuring a specific sample SPZ: ORU-330, ORU-150, Hydrodistrict*

SPZ-10 km: city Yuzhnoukrainsk, village: Volia, Agronomy, ORS Base, Kostiantynivka, Bugske, V.Razdol, Marianivka

10-20 km: village: Oleksiivka, Arbuzynka, Anetivka, Oleksandrivka, Kostove

> 20 km: village: Novokrasne, Taborivka, Ryabokoneve (control post)

Table 80 - Surface water quality parameters for 2022, mg/dm^3

№	Parameter name	MPC	Sampling location		
			Tashlyk pond cooler	River Southern Bug River (before the SS SUNPP)	Oleksandrivske reservoir (control gate)
1	2	3	4	5	6
1	Mineralization	<1000	1195	604	608
2	Sulfates	<100	364	89	89
3	Chlorides	<300	163	56	57
4	Calcium	<180	44	62	62
5	Magnesium	<50	89	38	39
6	Sodium + potassium	<170	210	61	62
7	Ammonium salt	0,5-1,0	0,25	0,35	0,34
8	Nitrites	<0,08	0,040	0,035	0,034
9	Nitrates	<40	3,17	3,77	3,75
10	Phosphates	<2,14	0,13	0,30	0,29
11	Iron	<0,1	0,056	0,054	0,054
12	Silicon	н/в	9,7	9,0	9,0
13	Nickel	<0,01	0,0083	0,0033	0,0035
14	Copper	<+0,001b	0,027	0,011	0,011
15	Fluorides	<+0,05b	0,62	0,39	0,39
16	Dissolved oxygen	>6,0	8,17	10,94	10,79
17	Suspended solids	<25,0	19,50	14,60	14,90
18	Petroleum products	<0,05	0,019	0,015	0,015
19	SSAS	<0,028	0,017	0,015	0,015
20	BOD_5	<3,0	1,76	2,55	2,52
21	BOD_F	н/р	2,52	3,64	3,61
22	COD	<50,0	33,70	29,30	29,85
23	pH,u.	6,5-8,5	8,71	8,43	8,43
24	Temperature,℃	*	25,7	12,2	12,6

*The water temperature of the water body should not exceed 3℃ compared to the natural temperature in summer

Table 81 - Condition of the Tashlyn cooling pond at the SS SUNPP

Name of pollutants/chemicals	Units of measurement	MPC	Content of harmful chemicals					
			2022	2021	2020	2019	2018	2017
1	2	3	4	5	6	7	8	9
Dry residue	mg/dm^3	-	1195	1101	1110	1100	1097	1099
Sulfates	mg/dm^3	(until 2022- 389) 400	364	353	352	354	349	351
Chlorides	mg/dm^3	(until 2022 - 162) 201	163	157	152	147	145	143
Hydrocarbonates	mg/dm^3	-	363	361	357	357	352	353
Calcium	mg/dm^3	-	44	48	44	48	50	49
Magnesium	mg/dm^3	-	89	86	88	88	89	86
Sodium and	mg/dm^3	-	210	202	198	190	181	187
Ammonium nitrogen	мгN/дм^3	(until 2022- 0,37) 0,50	0,20	0,20	0,24	0,21	0,18	0,16
Nitrites	mg/dm^3	0,080	0,040	0,038	0,040	0,042	0,039	0,035
Nitrates	mg/dm^3	(until 2022 - 6,83) 13,47	3,17	3,42	3,44	3,53	3,95	4,20
Phosphates	mg/dm^3	(until 2022 - 0,44) 0,70	0,13	0,15	0,13	0,14	0,16	0,18
Silicon	mg/dm^3	-	9,7	11,8	12,2	13,7	14,5	16,9
Total iron	mg/dm^3	(until 2022 - 0,10) 0,20	0,056	0,063	0,060	0,056	0,061	0,065
Nickel	mg/dm^3	(until 2022 - 0,01) -	0,0083	0,0090	0,0092	0,0094	0,0095	0.0098
Copper	mg/dm^3	(until 2022 - 0,036) -	0,027	0,027	0,029	0,029'	0,032	0.029
Fluorides	mg/dm^3	(until 2022 - 0,67) -	0,62	0,61	0,62	0,62	0,61	0,61
Dissolved oxygen	mg O2/dm^3	-	8,17	8,05	7,82	8,03	8,08	8,18
Suspended solids	mg/dm^3	(until 2022 - 24,04) 25,10	19,50	19,30	18,90	18,70	18,80	18,50
Petroleum products	mg/dm^3	0,050	0,019	0,020	0,020	0,021	0,020	0,022
SSAS	mg/dm^3	0,028	0,017	0,016	0,012	0,013	0,012	0,014
BOD_5	mg	3,00	1,76	1,77	1,67	1,61	1,64	1,63
COD	mg/dm^3	(until 2022 - 47,45) 50,00	33,70	32,00	2,38	32,00	34,00	35,00
Hydrogen index	u. pH	6,5-8,9	8,71	8,70	8,68	8,66	8.63	8,69
Temperature.	degrees,	-	25,7	26,4	27,6	26,3	26,5	25,9
Запах	scores	-	1	1	1	1	1	1
Transparency	cm	-	28	28	30	30	29	29
Chromaticity (visual)	degrees	-	35	33	29	30	28	26
General stiffness	mmol/dm^3	-	9,5	9,5	9,4	9.6	9.8	9,6
Total alkalinity	mmol/dm^3	-	6,95	6,91	6,86	6,75	6,71	6,71

Table 82 - Dynamics of changes in the state of the Pivdennyi Buh River (background channel) in the area of the SS SUNPP pumping station

Name of pollutants/chemicals	Units of measurement	MPC	Content of harmful chemicals					
			2022	2021	2020	2019	2018	2017
1	2	3	4	5	6	7	8	9
Dry residue	mg/dm^3	<1000	604	588	560	553	614	576
Sulfates	mg/dm^3	<100	89	88	88	85	88	86
Chlorides	mg/dm^3	<300	56	53	54	48	49	49
Hydrocarbonates	mg/dm^3	n/d	316	317	315	319	317	302
Calcium	mg/dm^3	<180	62	65	61	66	65	64
Magnesium	mg/dm^3	<50	38	35	36	32	34	34
Sodium and	mg/dm^3	<170	61	61	65	62	60	55
Ammonium nitrogen	мгN/дм^3	0,5-1,0	0,27	0,25	0,26	0,26	0,29	0,27
Nitrites	mg/dm^3	<0,08	0,035	0,035	0,036	0,046	0,037	0,042
Nitrates	mg/dm^3	<40	3,77	4,09	4,08	4,97	4,36	4,54
Phosphates	mg/dm^3	(until 2022) <0,70 <2,14	0,30	0,32	0,32	0,40	0,41	0.41
Total iron	mg/dm^3	<0,10	0,054	0,067	0,056	0,053	0,055	0,057
Silicon	mg/dm^3	n/d	9,0	9,4	9,4	11,2	11,6	11,8
Nickel	mg/dm^3	<0,010	0,0033	0,0038	0,0035	0,0034	0,0037	0,0035
Copper	mg/dm^3	<+0,001	0,011	0,011	0,011	0,011	0,012	0,011
Fluorides	mg/dm^3	<+0,05	0,39	0,41	0,40	0,40	0,41	0,42
Dissolved oxygen	mg O2/dm^3	>6	10,94	10,46	10,48	10,76	10,85	10,85
Suspended solids	mg/dm^3	<25,00	14,60	15,70	15,33	16,20	14,20	13,80
Petroleum products	mg/dm^3	<0,05	0,015	0,015	0,016	0,017	0,015	0,017
SSAS	mg/dm^3	<0,028	0,015	0,019	0,014	0,014	0,011	0,012
BOD_5	mg O2/dm^3	<3,0	2,55	2,56	2,47	2,42	2,40	2,43
COD	mg/dm^3	<50	29,30	28,40	28,21	27,00	28,00	28,50
Oxidizability permanganate	mg O2/dm^3	n/d	8,09	8,33	10,48	8.57	7,64	7,79
Hydrogen index	u. pH	6,5-8,5	8,43	8,43	8,43	8,40	8,36	8,34
Temperature.	degrees, C°	n/d	12,2	12,1	13,2	12,8	12,2	12,4
Запах	scores	(until 2019) 1 n/d	1	1	I	1	1	1
Transparency	cm	<30	28	28	28	28	28	29
Chromaticity (visual)	degrees	n/d	41	41	40	36	37	39
General stiffness	mmol/dm^3	n/d	6,2	6,2	6,0	5,9	6,1	6,0
Total alkalinity	mmol/dm^3	n/d	5,58	5,63	5,60	5.59	5,55	5,29

Annex G - Environmental and Social Action Plan (Status of implementation of the Environmental and Social Action Plan)

Implementation of the ESAP in 2022. Environmental, health and safety measures.

RP – was realized in the past, before the start of the reporting year;

RC – realization was continued during the reporting year and will continued further;

RN – realization is planned for the next reporting year;

NN – realization was not needed for its ground unavailable;

RF - realization was finished during the current year.

№	ESAP, par	Action/Indicator name	Realization status	Comment
1	1.1	Availability of ESAP, agreed with EBRD	RP	The valid ESAP version non-objected by EBRD of 09.04.2015 is included to PIP and was published at SE NNEGC "Energoatom" site.
2	1.1	Annual reporting on ESAP implementation	RP	ESM Report: 2013-2014 was sent to EBRD 27.02.2015. ESM Report: 2015, 2016, 2017, 2018, 2019, 2020 were sent to Lenders 01.03.2016, 07.03.2017, 28.02.2018, 04.03.2019, 28.02.2020 and 16.03.2021 correspondingly. The summary of ESAP implementation for 2021 was included in the Borrower's Quarterly Report for the 4th quarter of 2021.
3	1.1	Implementation of EA every 5 years	RP	The first EA Report was published 31.01.2012. The next EA Report including of PC reporting materials was published and sent for the State ecological expertize on 10.07.2017. The expertize was stopped and canceled by Minpryrody, because the legislative basis — the Law of Ukraine "On ecology expertize" has lost of force. The next OP is suspended until the end of hostilities on the territory of Ukraine.
4	1.1	Ecological Audits every 3 years	RP,RC	For the first time independent external audit was carried out in 2015, the results were sent to Lenders 31.07.2015. The next audit was carried out in 2018, the results were sent to Lenders 21.06.2018 and 16.07.2018. According to the it 1.1 of ESAP, "The audit can be part of the ongoing EHSS management system". Certificate for management system of the Company as per ISQ-14001:2015 covers "Performance of repair, installation and renovation works". The last surveillance audit of the management system on this certificate was carried out on 10.10.2021-19.01.2022 The results were sent to Lenders 27.06.2022.
5	1.1	H&S Audit every 3 years	RP,RC	For the first time independent external audit was carried out in 2015, the results were sent to Lenders 31.07.2015. The next audit was carried out in 2018, the results were sent to Lenders 16.07.2018. According to the it.1.1 of ESAP, "The audit can be part of the ongoing EHSS management system". Certificate for management system of the Company as per ISO-45001:2018 covers "Performance of repair, installation and renovation works". The last surveillance audit of the management system on this certificate was carried out on 10.10.2021-19.01.2022 The results were sent to Lenders 27.06.2022.
6	1.2	Published EHSS policy	RP	The Statements of Management were published at the official SE NNEGC "Energoatom" site from 2014. It publishes the Company's strategic goals and plans, as well as the goals for 2022.
7	1.2	Structure chart of	RP	The detailed structure chart of EHSS management is presented in PIP.

		EHSS management, including environmental department and definition of its functions		
8	1.3	Development of EMSP covering each NPP. Certification of MS for compliance with international standard ISO-14001	RP	Initial certification of MS of SE NNEGC "Energoatom" Directorate and SS for compliance with international standard ISO- 14001 was arranged in 2013-2014. Regular re-certification of MS of SE NNEGC "Energoatom" was made in 2019.
9	1.3	Raising the role of the existing H&S management subdivision. Certification of MS for compliance with standard OHSAS-18001	RP	The detailed description of H&S management presented in PIP and ESM Report: 2013-2014. The initial MS certification for compliance with standard OHSAS-18001 was made in 2016, regular re-certification for compliance with standard 150-45001:2018 (replacing OHSAS-18001) was made in 2019.
10	1.4	Provision of public relation activity with the qualified personnel	RP	The detailed description of IPR management and activity presented in PIP and ESM Report: 2013-2014.
11	1.4	Maintenance of SE NNEGC "Energoatom" and SS NPP web-sites in the actualized state. Regular monitoring and promulgation of EHSS information	RP, RC	The official web-sites of SE NNEGC "Energoatom" and SS NPP work and were regularly updated, including EHSS issues. Due to the war unleashed by the Russian Federation against Ukraine on February 24, 2022, the operation of the site was temporarily suspended, the most important information was published on the Company's Facebook page. During the reporting period, the functioning of the site is restored. The activity monitoring results for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report; 2022.
12	1.5	Monitoring of specialists' training for work in the industry on the basis of training institutions of the appropriate profile	RP, RC	The activity monitoring results for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report: 2022.
13	1.5	Improvement of	RP, RC	The activity monitoring results for previous years were presented in the previous ESM Reports, for current

		personnel qualification on the basis of Personnel Training Centers		year it will be presented in ESM Report: 2022.
14	1.6	Development of template of the annual Report on Environmental and Social Matters (ESM Report)	RP	Template of the annual Report on Environmental and Social Matters is attached to PIP.
15	1.6	Annual ESM report	RP	ESM Report; 2013-2014 was sent to EBRD 27.02.2015. ESM Report: 2015, 2016, 2017 2018, 2019, 2020 were sent to Lenders 01.03.2016, 07.03,2017, 28.02.2018, 04.03.2019, 28.02.2020 and 16.03.2021 correspondingly. Due to the war unleashed by the Russian Federation against Ukraine, completion of the ENP Report: 2021 was stopped. The summary of ESM activity for 2021 was included in the Borrower's Quarterly Report for the 4th quarter of 2021 sent to Lenders 31.01.2022.
16	1.7	Obtaining all required EHSS licenses and permits and following their requirements	RP,RC	The list of valid licenses presented in the PIP. The activity monitoring results for previous years were presented in previous ESM Reports, for current year it will be presented in ESM Report: 2022.
17	1.7	Information provision and consultations with the public on compliance with terms and conditions of licenses and permits	RP, RC	Consolidated monitoring results for previous years were presented the previous ESM Reports, for current year it will be presented in ESM Report: 2022.
18	1.7	Immediate reporting to EBRD on any actual non-compliance with licenses and permits	NN	The facts of failure to meet terms and conditions of licenses and permits were not detected during the reporting period, except for the situation at ZNPP. As a result of the war unleashed by the Russian Federation against Ukraine on February 24, 2022, the territory of ZNPP is currently occupied, the SNRCU has lost regulatory control over this station. ZNPP are operated by its personnel. Information on the situation at ZNPP was provided in the Borrower's Quarterly Report for the 1st quarter of 2022, sent to Lenders 29.04.2022.
19	1.8	Development and promulgation of NTS related to LTE of the operating power units including EHSS matters in Ukrainian and English	RP	In 2015 the NTS on EIA materials of ZNPP and SUNPP in particular related to its energy units LTE were published. The NTS on EIA materials of ZNPP power units No 3 and 4 was published 17.02.2017, RNPP units No 3 - 12.06.2018, KhNPP units No 1 - 30.05.2018, ZNPP units No 5 - 23.03.2020.

20	1.8	Planning of NTS promulgation within the frames of SEP	RP	The NTS promulgation activity foreseen in CCSUP SEP. SE NNEGC "Energoatom" standard regarded requirements to SEP development put into force in 2016 provides accorded activity within any other investment projects.
21	1.9	Implementation of EIA for the new investment projects, for which it is required by the Ukrainian legislation , following provisions of Aarhus Convention and Espoo Convention	RP,RF,RC	The new investment projects, which require EIA, were not started during the reporting period. The Announcement on Planned Activity on erection of KhNPP cower units No 3.4 was introduced into EIA Register http://eia.menr.gov.ua/places/view/2231 , The updated Feasibility Study Report was approved by CM of Ukraine in 2018. The updated EIA Report for the KhNPP power units No 3,4 was published in 2019. In the same year Minpryrody completed a cycle of public discussions of the EIA for the KhNPP power units No 3,4 in Ukraine, the corresponding transboundary consultations was finished. The Announcement on Planned Activity on operation of RNPP Dower units No 1-4 was introduced into EIA Register http://eia.menr.gov.ua/places/view/76. During 2019 Minpryrody completed a cycle of public discussions of the EIA for RNPP in Ukraine. The transboundary consultations on EIA for ZNPP, RNPP and PNPP are suspended until the end of the war waged by Russia.
22	1.9	Promulgation and making available PP, RC for public the EIA materials	PP, RC	EA Report of CCSUP, NTS on updated EIA materials of units No3,4 KhNPP erection, NTS on EIA materials of ZNPP and SUNPP, EIA Report for Oleksandrovsk water pool level raise and EIA Report for RNPP were kept available at the SE NNEGC "Energoatom"/SS NPP official web-sites and}/or in EIA Register. Due to the war waged by the Russian Federation against Ukraine on February 24,2022, the operation of the Company's website was temporarily suspended. During the reporting period, the functioning of the site is restored.
23	1.10	Cooperation with authorities to facilitate the government-to-government consultations under Espoo Convention for the projects that may have a considerable transboundary impact	RP,RF, RC	The activity monitoring results for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report: 2022. In 2019 Minpryrody completed a cycle of public discussions of the EIA for RNPP and the EIA for KhNPP power units No 3,4 in Ukraine, the corresponding transboundary consultations for the KhNPP is finished in 2021. The transboundary consultations on EIA for ZNPP, RNPP and PNPP are suspended until the end of the war waged by Russia.
24	1.10	Registration of all consultations RC and information feedback under projects that may have a considerable transboundary impact	RC	The activity monitoring results for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report: 2022.

25	1.11	Development of internal procedures for EIA performance for the new investment projects and re-licensing of the power units	RC	The Law of Ukraine "On Environmental Impact Assessment" was put into force 18.12.2017. Development of the draft accorded SE NNEGC "Energoatom" standard was started in the 2-nd quarter 2017. Its completion was postponed up to approval of the EIA necessity criteria and transboundary and public consultations procedures on EIA by CM of Ukraine. The regarded criteria was approved by CM of Ukraine latterly 2017. Adjustment of the consultations procedures CM of Ukraine was continued. Elaboration of the draft standard is suspended until the end of the war waged by Russia.
26	1.11	Development of the internal RP procedures of SEP development for the new investment projects and re-licensing of the power units	RP	SE NNEGC "Energoatom" standard regarded requirements to SEP development for investment projects was put into force in 2016.
27	1.12	Creation and realization of programs for the enterprise social development	RP, RC	Personnel social protection and actions for the further company social development were determined in the Collective agreement, The activity monitoring results for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report: 2022.
28	1.12	Availability of the monitoring system of the social guarantee fulfilment and social development actions realization	RP	The Management responsibility determined in the Collective agreement. The detailed description of SPP and SPS management and activity presented in PIP and ESM Report: 2013-2014.
29	1.13	Availability of mechanism for delivery and handling personnel appeals	RP	Mechanism for delivery and handling the personnel appeals, as well as responsibility distribution are described in ESM Report: 2013-2014 and SEP.
30	1.13	Promulgation of consolidated results of personnel appeals handling	RP, RC	Consolidated results for the 4th quarter of 2021 were published at the site. Due to the war unleashed by the Russian Federation against Ukraine on February 24, 2022, the full operation of the site was temporarily suspended, the most important information is published.
31	1.14	Development and promulgation of the Management Statement on RLR policy	RP	A statement on RLR policy is published at the SE NNEGC "Energoatom" site. Due to the war unleashed by the Russian Federation on February 24, 2022, the full operation of the site was temporarily suspended, the most important information is published.

32	1.14	Development and realization of IRLR plans for projects requiring involuntary resettlement	NN	The investment projects realized during the reporting and planned periods do not envisage an involuntary resettlement.
33	1.15	Monitoring of creation of new RW handling installations to the state suitable for a long-term storage / disposal	RC	During the reporting quarter the measures regarding the current RW management, RW generation minimization, creation of new facilities for RW management, improvement of technologies and methods for RW management were realized in scope determined by the "The Complex Program of Radioactive Waste Management at SE NNEGC Energoatom" nM- fl.0.18.174-21 put into force on 06.05.2022. Implementation of the measures is currently complicated by the war waged by the Russian Federation against Ukraine on February 24,2022.
34	1.15	Introduction of Gantt diagrams for planning / monitoring of creation of RW handling installations	RP	Monitoring of new RW handling facilities creation to the form acceptable for LTSD realize in MS Project format. Now the version of Gantt chart at the beginning 2022 is actual. The chart will be adjusted after the end of the war.
35	1.15	Control of introduction of RW handling to the state suitable for a long-term storage / disposal as part of EMS auditing	RP,RC	independent external audit was carried out in 2015, the results were sent to Lenders 31.07.2015. The next audit was carried out in the 2nd quarter of 2018, the results were sent to Lenders 16.07.2018. The last surveillance audit of the management system for the certificate on ISO-14001:2Q15 was carried out on 10.10.2021-19.01.2022 The results were sent to Lenders 27.06.2022.
36	1.16	Support to SNRIU in introduction of the system of international information exchange EURDEP	RP, RC	In the 3rd quarter 2016 the Ukraine join to EURDEP system. The testing information exchange data presented on-line at the map scheme of EURDEP https://remap.jrc.ec.europa.eu/GammaDoseRates.aspx. . The monitoring results on data supply for previous years were presented in the previous ESM Reports, for current year it will be presented in ESM Report: 2022. As a result of the war unleashed by the Russian Federation against Ukraine on February 24, 2022, the territory of ZNPP is currently occupied, the SNRCU has lost regulatory control over this station.