NOTIFICATION TO AN AFFECTED PARTY OF A PROPOSED ACTIVITY UNDER ARTICLE 3 OF THE CONVENTION FOR ENVIRONMENTAL IMPACT ASSESSMENT IN THE TRANSBOUNDARY CONTEX

1. INFORMATION ON THE PROPOSED ACTIVITY	
(i) Information on the nature of the proposed activity	
Type of activity proposed:	The Project: „Refurbishment of Cernavodă NPP U1 and extension of intermediate dry spent fuel storage with MACSTOR - 400 modules" from now on called/ abbreviated "RT-U1 and DICA - MACSTOR 400 project".
Is the proposed activity listed in Appendix I to the Convention?	The activity of the RT-U1 and DICA MACSTOR 400 Project is not listed in Annex I to the Convention but is included in Annex III, point 2, of Law no. 22/2001. The proposed project is intended for the Cernavodă NPP - Unit 1, activity listed in Annex I, point 2 (b), of Law 22/2001.
Scope of proposed activity (e.g., main activity and any/all peripheral activities requiring assessment)	The RT-U1 and DICA - MACSTOR 400 Project will be carried out in order to operate Unit 1 of Cernavodă NPP for another life cycle and to ensure the intermediate storage space, for medium term, of the dry spent fuel resulting from the operation of Units 1 and 2. The Project will have two main subprojects: **Subproject 1 - Refurbishment of Cernavodă NPP Unit 1** which consists in replacing the items of the existing reactor assembly (fuel channels, calandria tubes, feeders), and rehabilitation/modernization of the systems in the nuclear and classical part of the unit, including the provision of specially designed spaces on the pre-storage part of radioactive waste. **Subproject 2 – extending of Intermediate Dry Spent Fuel Storage with MACSTOR 400 modules,** which will consist in construction of MACSTOR 400 modules types for storage of spent fuel resulted from U1 and U2 operation. The Project's implementation involves the following main stages: Subproject 1 - preparation of the activities which will be executed during shutdown of the unit, realization of necesary infrastructure, shutdown of the unit and discharge of nuclear fuel, drainage, drying, decontamination activities, replacement of the reactor components (reactor refurbishment), radioactive waste management and storage, implementation of the rehabilitation/modernization for NPP systems, technological samples and commisioning, closing the project – reception and decommissioning or preservation of the temporary facilities used for refurbishment. Subproject 2 – extending DICA site from an area of about 24,000 sqm to approx. 40,000 sqm (area between the limits of the outer fence of DICA), increasing the number of MACSTOR type modules from 27 modules to 37 modules, including 17 modules type MACSTOR 200 and 20 modules type MACSTOR 400, land

	preparation, building of the MACSTOR 400 modules type with dimensions 12.95 m x 21.94 m x 7.60 m and a double storage capacity compared to MACSTOR 200 type modules.
Scale of proposed activity (e.g., size, production capacity, etc.)	The surface of the area where the "RT-U1 and DICA - MACSTOR 400" Project will be developed is approximately 325,000 sqm. For **RT-U1 subproject**, the replacement, repair and modernization activities will be accomplished inside Unit 1, taking into account the results of assessments of the system, structures and components of Unit 1. In the project's implementation, construction works will be added to ensure spaces/buildings for permanent and temporary use, necessary for the refurbishment works activities. For the storage of the materials / equipments / radioactive waste, appropriate spaces will be arranged in the Reactor Building of Unit 5 and on the Cernavodă NPP site. For the storage of the materials / equipments / non-radioactive waste, appropriate spaces will be arranged on the Cernavodă NPP site. **The Intermediate Dry Spent Fuel Storage – IDSFS (DICA)** is equipped with monolithic reinforced concrete storage modules, roads and platforms, portal crane, gate body and security system. The calculations show that the surface of the DICA site will increase from about 24,000 sqm to approximately 40,000 sqm. Thus, 17 modules type MACSTOR 200 and 20 modules type MACSTOR 400 will be built in stages on the DICA site. The purpose of the RT-U1 and DICA - MACSTOR 400 Project is to retube and modernize the Unit 1 of Cernavodă NPP, for another life cycle of approximately 30 years operation, and to expand the dry spent fuel storage with MACSTOR 400 modules type for the spent fuel storage resulted from two life cycles of operation of Units 1 and 2. **1st Subproject - RT-U1** The main characteristics of the refurbished Unit 1 are: • Thermal Power: 2062 MW(t); • Gross electrical power: 706,5 MW(e); • Internal services consumption rate: <8%; • Number of fuel channels: 380; • Number of loops: 2; • Number of steam generators: 4; • Pressure (D2O) in the primary circuit: 9,89 Mpa; • Temperature at the outlet of the primary circuit: 310 grd.C; • Saturated steam pressure (H2O): 4,6 Mpa; • Supply water temperature: 187,20 grd. C; The product resulting from the main activity of the refurbished Unit 1 of Cernavodă NPP **is production of electricity for another life cycle of approximately 30 years**, delivering in the National Energy System (SEN) approximately **151.668.193 MWh**.

	2nd Subproject - DICA – MACSTOR 400 Regarding the DICA - MACSTOR 400 subproject, the intermediate dry storage capacity result is based on technical considerations and statistical data on the number of fuel bundles burned annually in each reactor, completed by the operating experience of the two units. Considering the development strategy of DICA, which provides building 17 modules type MACSTOR 200, and from module 18 to make the transition to modules type MACSTOR 400, to ensure the storage of spent fuel bundles resulted from two life cycles of operation for units U1 and U2, it is necessary to build 20 modules of the MACSTOR 400 type. It leads that, in order to ensure the storage of the spent fuel bundles resulted from the operation of the units U1 and U2 with two life cycles, **37 modules type MACSTOR** will be necessary, respectively**:** • **17 MACSTOR 200 modules (12 modules are already built);** • **20 MACSTOR 400 modules (first module MACSTOR 400 will be module 18).**
Description of proposed activity (e.g., technology used):	**The main activities for RT-U1 project implementation** are**:** ➢ ***Shutting down the unit and nuclear fuel discharging -*** discharged from the reactor into the spent fuel storage tank; ➢ ***Preparation of the reactor structures (drainage, drying, decontamination)*** Heavy water drainage and storage. The heavy water discharged from the reactor's systems will be stored in storage tanks specially arranged for this purpose, on Cernavodă NPP. After drainage of the heavy water, the nuclear systems on which the activities are to be carried out will be dried and decontaminated. ➢ ***Conditioning / preservation of systems during shutdown.*** This activity is developed both in the nuclear and in the secondary part. The systems conservation will be developed according to the procedures developed during the Project. ➢ ***Retubing of Unit 1 reactor:*** This activity involves several stages: ***i.*** ***Feeders disassemble.*** At this stage, the 380 inlet feeders and the 380 outlet feeders are dismantled, meaning all pipes including coupling assemblies, sampling tubing and temperature detectors. After feeders removal the inlet and outlet colectors will be inspected. Feeders and the others resulting waste will be collected in containers for low-level radioactive waste and they will be transferred into specially designed spaces for the intermediate storage of low and medium radioactive waste, inside the Reactor Building of

	Unit 5 of Cernavodă NPP. *ii. **Disassembly of fuel channels, calandria tubes and preparation of these for storage as radioactive waste.*** *iii. **Installation of new calandria tubes, fuel channels and feeders*** ➢ ***Radioactive waste management activities.*** Radioactive waste resulting from the activities of dismantling the pressure and calandria tubes and their associated assemblies, after volume reduction, will be placed in authorized containers, which will be stored temporary in internal special designed spaces/structures placed inside the reactor building of Unit 5 (the new DIDR-U5). ➢ ***Performing other planned activities identified in the process of defining the project.*** In parallel with the reactor refurbishment, in this long-term outage, other planned activities for modernization of Unit 1 will be developed. **The MACSTOR storage system,** chosen by Cernavodă NPP for the storage of the dry spent fuel from Units 1 and 2, consists of storage modules located on the site and of a series of equipments used to prepare the storage and the transfer of the dry spent fuel to the DICA. The main activities of preparation, transfer and effective storage of the fuel, as well as the main equipment used during the technological process, are described below: ➢ ***Fuel preparation for storage***. Activities for fuel preparation for storage are carried out in the spent fuel tank (BCU). The fuel bundles are transferred from the storage trays from the basin to the storage basket. ➢ ***Spent fuel loading station (SICA).*** SICA is used for drying of the spent fuel and for sealing the storage basket by welding. ➢ ***Fuel transfer.*** Transport of the transfer container loaded with the fuel storage basket from the SICA to the storage modules is provided by a mean of transport. ➢ ***The Portal Crane.*** The portal crane is used to handle the transfer container to the storage itself. ➢ ***The loading and positioning guide assembly.*** Each storage cylinder is closed at it's superior part by a shielding troncone shaped, plug made of steel filled with reinforced concrete. ➢ ***The Mean of Transport.*** The mean of transport is a commercial mean of transport with a surface of transport suitable for the placing and anchoring of the container. The purpose of the mean of transport is to transfer the container loaded with the fuel storage basket from the NPP (Extension Building of BCU) to the storage modules and to transfer the empty container back to the extension building.

	➢ ***Fuel storage.*** The fuel storage area is a fenced and secure enclosure. It will be extended to include 37 storage modules arranged in a 5 rows grid.
Description of purpose of proposed activity:	The RT-U1 and DICA – MACSTOR 400 Project will be developed in order to safe operation of Unit 1 for another life cycle and assurance of the necessary space for intermediate storage for medium term, of spent fuel resulted from operation of Units 1 and 2. The refurbishment of Unit 1 is necessary because the main systems and structures which limit the operating life of CANDU type reactors, fuel channels, calandria tubes and feeders, during the aging process can no longer fulfill their project functions. After completion of the first life cycle of Unit 1, it will be shut down in order to start the refurbishment project itself. At the end of project works, SN Nuclearelectrica will be in possession of a nuclear unit capable to operate safely in nuclear and environmental conditions for another life cycle, producing clean electricity, with significantly lower CO2 emissions than the production of electricity through other types of fuel processes.
Rationale for proposed activity (e.g., socio-economic, physical geographic basis)	In order to achieve Romania's energy objectives, it is needed to have a balanced approach to the development of the national energy sector, correlated with the value of investment expenditures. Thus, the Energy Strategy stipulates that nuclear energy is a strategic option for Romania, pointing out the need for the achievement of Cernavodă NPP Unit 1 refurbishment on time. **1st Subproject - RT-U1** According to the Romanian Energy Strategy, the **refurbishment of Unit 1**, represent Romania's priority investments to ensure the fulfillment of environmental and energy safety objectives and targets, security of supply and diversification of sources for a balanced energy mix, which shall ensure the transition to an energy sector with low greenhouse gas emissions and an affordable energy price for consumers. Moreover, the cost of the refurbishment works is approx. 40% lower than construction of the new nuclear power plants. Also, the execution time is between 24 and 30 months, significantly shorter than new nuclear power plants. **2nd Subproject - DICA – MACSTOR 400** The long-term operation of Unit 1 requires, among other things, setting up the intermediate storage space for the spent fuel. Currently, the spent fuel is stored in dry storage modules MACSTOR type (Modular Air-Cooled Storage). The MACSTOR 200 module was developed by AECL and developed at CNE Gentilly and in the year 2000 it represented one of the most modern and advantageous storage solutions.

	In order to accommodate the additional storage capacity in case of maintaining the MACSTOR 200 module, it would be necessary to extend the authorized location of DICA (27 MACSTOR 200 modules) with two more complete strings of 10 modules each and the third-string with 9 modules, resulting in 6 strings of modules. Considering the limited space in the DICA area, as well as the existence of some structures that have an influence extending this objective (public road, Unit 5 destination change project, currently under implementation, Cișmelei Valley secondary access road and not lastly the geological characteristics of the underground) the most feasible solution would be an increase of the storage density per unit area. Therefore, another option, regarding the DICA extension, is the transition to MACSTOR 400 module type, this being the more compact version of the module developed by AECL (Atomic Energy of Canada Limited in collaboration with KHNP - Korea Hydro & Nuclear Power Co.), starting from the design of MACSTOR 200 type module storage, designed by AECL. The new module has a double storage capacity compared to the module type MACSTOR 200.
Additional information/comments	At the end of the RT-U1 and DICA MACSTOR 400 project works, SN Nuclearelectrica will have a nuclear unit capable of operating and producing clean electricity for another life cycle, both within nuclear and environment safety conditions. Also, after finalization of DICA MACSTOR 400 subproject works, SN Nuclearelectrica will be in the possession of an Intermediate Dry Spent Fuel Storage with the benefits presented below: - Efficient use of available space, by increasing storage density per unit area, a very important advantage in the context in which the solution to increase storage capacity must be based mainly on the intensive use of good foundation land in terms of geological and geotechnical requirements; - Investment costs decreasing with about 15% compared to the total value of the investment and with about 23% compared to the value of Construction and Assembly works; - Operation mode will be identical with the existing one because the dimensions and characteristics of MACSTOR 400 allow the transition from the MACSTOR 200 to the MACSTOR 400 type module without major changes in the current placement of the row of modules within DICA; - Ensuring the necessary area for the construction of necessary modules for the fuel storage resulted from the operation of the Cernavodă NPP units correlated with the National Geological Storage Program which will be developed by the Nuclear and Radioactive Waste Agency (ANDR) according to the National Strategy for medium and long term on the safe management of spent fuel and radioactive waste.
(ii) Information on the spatial and temporal boundaries of the proposed activity	

Location:	The Project will be implemented on Cernavodă NPP site, 2 Medgidiei street, Cernavodă Town, postal code 905200, Constanța County.
Description of the location (e.g., physical-geographic, socio-economic characteristics)	The project will be implemented on Cernavodă NPP site. The land designated for RT-U1 and DICA - 400 Project is constituted of plots inside the Cernavodă NPP site.
Rationale for location of proposed activity (e.g., socio-economic, physical-geographic basis)	RT-U1 subproject will be implemented on Cernavodă NPP site. Regarding DICA – MACSTOR 400 subproject, it will be implemented in the West part of the actual DICA site, on the unused part of the land from the Cernavodă NPP site, where the limestone as used as a foundation for the nuclear objectives.
Time-frame for proposed activity (e.g.: start and duration of construction and operation)	**Subproject 1 – Refurbishment of Cernavodă NPP Unit** 1 is structured in three phases as follows: **Phase 1 -** Defining the objective for Unit 1 Refurbishment Project which was started through the Decision no. 9 / 28.09.2017 approved by the SNN S. A. Shareholders. **Phase 2 -** Preparation of project's implementation, in which the approvals, agreements and authorizations necessary to start the Refurbishment Project works are completed, preparation for the implementation of the activities identified in phase 1, infrastructure works - arrangement / reconditioning / construction of necessary spaces (workshops, locker rooms, offices, concrete platforms) and special spaces arranged for the storage of radioactive waste resulting from the project. At the end of Phase 2, the refurbishment project infrastructure is completed and ready to start Unit's 1 refurbishment activities. **Phase 3 –** Project implementation which consists in shutting down the Unit 1 for at least 2 years and beginning to perform the activities of Unit 1 reactor refurbishment and modernization of the other equipment of Unit 1 of Cernavodă NPP, depending on their physical conditions. **In case of the DICA MACSTOR-400 subproject**, the construction of MACSTOR 400 type module will be accomplished in gradual stages, module by module, the completion rate of the DICA - MACSTOR 400 Project will be scheduled so as to ensure the necessary storage space for the dry spent fuel at Cernavodă NPP simultaneously with the meeting of the transfer conditions according to the applicable National Commission for Nuclear Activities Control (CNCAN) norms and authorizations.
Maps and other pictorial documents connected with the information on the proposed activity	Maps and other illustrated documents related to the proposed activities are presented in Annex 1 to this Notification.
Additional information/comments	-

(iii) Information on expected environmental impacts and proposed mitigation measures	
Scope of assessment (e.g., consideration of: cumulative impacts, evaluation of alternatives, sustainable development issues, impact of peripheral activities, etc.)	The impact of the RT-U1 and DICA MACSTOR 400 project was evaluated on the: - population and human health; - fauna and flora, biodiversity, conservation of natural habitats, wild flora and fauna on the lands; - soil, assests and material goods; - water quality and water quantitative regime; - air and climate quality, and the impact determined by noise and vibrations; - landscape and visual environmental; - historical and cultural heritage. Also it was evaluated the indirect, secondary and cumulative impact in short, on medium and long term, temporary and permanent, pozitive and negative. <u>The impact determined by interaction of the elements mentioned above.</u> Considering the impact mitigation measures taken during the construction and operation of the RT-U1 and DICA - MACSTOR 400 project, it is estimated that the project will have an insignificant impact on the environment, using a safe technology for the population and environment and integrating the international experience gained in the construction and operation of similar installations. More information are presented in Annex 2 to this Notification.
Expected environmental impacts of proposed activity (E.g. types, locations, magnitudes)	The RT-U1 and DICA - MACSTOR 400 project will be developed inside the Cernavodă NPP site. The Environmental Impact Assessment will determine the RT-U1 and DICA – MACSTOR 400 project impact of the environment.
Inputs (e.g., raw material, power sources, etc.)	Unit 1 Refurbishment will produce electricity for another life cycle of approximately 30 years in the same conditions, as before. For the operation of the refurbished Unit 1 of Cernavodă NPP, the same raw materials will be used as before, namely: - Raw materials: nuclear fuel (UO2*).* The fuel is manufactured by the Nuclear Fuel Factory - FCN Pitesti within SN Nuclearelectrica SA.; - Auxiliary Materials*:* Heavy Water (D2O), SUVA - 134A, Helium, Nitrogen (N2), Liquid Nitrogen (N2), Carbon Dioxide (CO2) for Coating Gas, Carbon Dioxide (CO2) for Generator, Hydrogen purity 99.98% for generator, hydrogen purity 99.995%, gadolinium nitrate, hydrazine 35%, morpholine 99%, lithium hydroxide, RGCC-100 (corrosion inhibitor with sodium nitrite), ARQUAD

	MCB - 50 (biocide), sodium hydroxide 48 ÷ 50 %, hydrochloric acid 32%, ferric chloride 40%, sulfur hexafluoride, sodium chloride (min 97%) (for STA and STAP), 3D liquid antiseptic TRASAR (Nalco) for modernized STA, flocculant PRAESTOL A3040L for modernized STA, resins conventional (renewable), lubricating oil, consistent grease; - Materials used to preserve the plant's systems: hydrazine, ammonia, morpholine, lithium hydroxide, and ODACON®F solution, the latter being used in the process of preserving the systems during the shutdown period for refurbishment; - Classic fuels: diesel, CLU (Used for quarterly CTP tests). Regarding DICA - MACSTOR 400, which suppose the intermediate storage of the dry spent fuel from the nuclear units U1 and U2 on the site, a production process is not carried out on the site, so the term of raw materials does not apply to the subproject DICA - MACSTOR 400. The supply of electricity for the existing installations of the Dry Spent Fuel Storage site, related to the Gate Corp and the existing Modules, is made from the general panel, located in the Gate Corp. Power is provided by the own Common Service Station through two power lines of 0.4kV each.
Outputs (e.g. amounts and types of: discharges in air, discharges into the water system, solid waste)	The product resulting from the main activity of the refurbished Unit 1 of Cernavodă NPP is the production of electricity for an estimated life of approximately 30 years, delivering in the National Energy System (SEN) approximately 151.668.193 MWh. Information regarding the amounts and types of: discharges in air, discharges into the water system, solid waste from **the RT-U1 subproject** are presented in Annex 3a to this Notification. **DICA – MACSTOR 400 subproject** After completion of the works, the DICA-MACSTOR-400 subproject will ensure the storage of the dry spent fuel for Units 1 and 2 with two operating life cycles. Information regarding the amounts and types of: discharges in air, discharges into the water system, solid waste from **the DICA – MACSTOR 400 subproject** are presented in Annex 3b to this Notification.
Transboundary impacts (e.g., types, locations, magnitudes)	The distances measured in a straight line from the boundary of the Cernavodă NPP site to the nearest point of the border are approx.: 36 km from Bulgaria, 110 km from Ukraine, 127 km from Republic of Moldova, 421 km from Serbia and 565 km from Hungary.

	RT-U1 si DICA - MACSTOR 400 Project will be implemented on the Cernavodă NPP site. From the point of view of the cumulative impact in the normal operation, the RT-U1 and DICA - MACSTOR 400 project, Cernavodă NPP site with Unit 1 and Unit 2 and the future projects of SN Nuclearelectrica (Unit 3, Unit 4 and CTRF Projects) will have a non-significant impact in the transboundary context. This statement is based on information regarding radioactive emissions and tritium's radioactivity, which supports the results regarding the impact on the environment and the fact that, the existing DICA project has an insignificant radiologic impact on the environment in normal running. Taking into account all the safety analyses elaborated by Cernavodă NPP, it is estimated that the potential accidental situations with radiological consequences will have an insignificant impact both on the safe operation of the nuclear units and on the safe operation of the relevant objectives of the impact assessment.
Proposed mitigation measures (eg, if known, mitigation measures to prevent, mitigate, minimize, compensate for environmental effects)	Information referring the mitigation measures are presented in Annex 4 of this Notification.
Additional information / comments	-
(iv) Proponent/developer:	
Name, address, telephone and fax numbers:	Societatea Naţională Nuclearelectrica S.A. (SNN SA): • Bucharest, Sector 1, 65th Polonă Street • Tel: +4021.203.8200 • Fax: +4021.316.9400 • Pagina Web: www.nuclearelectrica.ro • E-mail: office@nuclearelectrica.ro Sucursala CNE Cernavodă: • Constanţa County, Cernavodă Town, 2nd Medgidiei Street • Tel: +40241.801.001 • Fax: +40241.239.266 • E-mail: corespondenta@nuclearelectrica.ro
(v) EIA documentation	
Is the EIA documentation (e.g., EIA report or EIS) included in the notification?	Not at this stage.
If no/partially, description of additional documentation to be forwarded and (approximate) date(s) when documentation will be available	The environment authority considered that the project is similar to those listed on Annex 1, point 24 and 2b), as well as on Annex 2, point 3g) and 13a), of the EIA Directive (transposed in national legislation by Law no. 292/2018) and needs to undergo a full EIA procedure. The environmment authority will develop the scoping report, based on the requirements of national legislation, the results of public consultation at national level and the results of transboundary

	consultations. The EIA report will be drafted based on the scoping report and it will be sent to all parties that wish to participate to the EIA process for this project. At this stage, we cannot estimate a date for the submission of the EIA report.
Additional information / comments	-
2. POINTS OF CONTACT	
(i)Point of contact for the possible affected Part or Parties:	
Authority responsible for coordinating activities relating to the EIA (refer to decision I/3, appendix): Name, address, telephone and fax numbers	**Republic of Bulgaria**: Ministry of Environment and Water Address: boulevard "Knyaginya Maria Luiza" 22, 1000 Sofia Centre, Sofia, Bulgaria Telephone: +359 88 889 7898, Web address: https://www.moew.government.bg/ **Ukraine**: Ministry of Environmental Protection and Natural Resources Address: St. Metropolitan Basil Lypkyvskyi 35, Kyiv 03035, Ukraine Telephone: (044) 206 31 39, (044) 206 33 02 Web Address: gr_priem@menr.gov.ua **Republic of Moldova**: Ministry of Environment Address: 9 Constantin Tanase Street, Chisinau, Republic of Moldova Telephone: +373 22 204 556 Web Address: https://mediu.gov.md/ **Serbia**: Ministry of Environmental Protection Address: 2 Mihajlo Pupina Boulevard 11070 Belgrade, Serbia Telephone: 011/3110-271; 011/3110-245 Web Address: eko.kabinet@eko.gov.rs **Hungary**: Ministry of Agriculture Address: Kossuth Lajos tér 11, Budapest 1055 Hungary Telephone: +3617952000, Web Address: https://2015-2019.kormany.hu/en/ministry-of-agriculture
List of affected parties to which notification is being sent	Republic of Bulgaria, Hungary, Serbia, Ukraine and Republic of Moldova.
(ii) Points of contact for the Party of origin	
Authority responsible for coordinating activities relating to the EIA (refer to Decision I/3, appendix) Name, address, telephone and fax numbers	Ministry of Environment, Waters and Forests 12 Libertatii Blvd., Sector 5, Bucharest, Romania -040129 Telephone: 004 021 408 9588 e-mail: registratura@mmediu.ro; evaluare.impact@mmediu.ro
Decision making authority if different than authority responsible for coordination activities relating to the EIA Name, address, tel and fax numbers	-

3. INFORMATION ON THE EIA PROCESS IN THE COUNTRY WHERE THE PROPOSED ACTIVITY IS LOCATED	
(i) Information on the EIA process that will be applied to the proposed activity	
Time schedule:	Approx. 12 months
Opportunities for the affected party/parties to be involved in the EIA process	The affected party may participate in decision-making under the EIA procedure as follows: - Following the notification it may take the decision to participate in the EIA procedure am may send comments and observations that will be taken into consideration in the EIA documentation; - If necessary, the authorities of the affected party will be consulted subsequently, according to the provisions of art. 5 of the Espoo Convention.
Opportunities for the affected party/parties to review and comment on the notification and the EIA documentation	Comments on the notification and technical report are expected, if the party decides to participate to the EIA procedure.
Nature and timing of the possible decision:	The decision that might be taken is to issue the environmental agreement and the construction authorization for this project
Process for approval of the proposed activity	The proposed activity will be approved by the construction authorization after the environmental agreement (final EIA decision) is issued by the environmental competent authorities.
Additional information/comments	-
4. INFORMATION ON THE PUBLIC PARTICIPATION PROCESS IN THE COUNTRY OF ORIGIN	
Public participation procedures	In accordance with the provisions of Romanian legislation, the public participates in decision making during EIA procedure, as follows: -has a minimum of 30 days for submitting comments/observations to the EIA documentation in the procedural stages; - within the public debate organized after the submission of the EIA report; the public has access to EIA documentation and may formulate comments/observations to it both before and during the public debate.
Expected start and duration of public consultation	In accordance with Romanian legislation, the public has a minimum of 60 days for submitting comments/observations to the EIA documentation in the procedural stages.
Additional information/comments	Contact persons from Ministry of Environment, Waters and Forests - Directorate for Impact Assessment and Pollution Control Mihaela MĂCELARU, focal point on Espoo Convention e-mail: mihaela.macelaru@mmediu.ro Anca – Maria APREUTESEI , head of Impact Assessment Unit e-mail: anca.apreutesei@mmediu.ro tel.: 004 021 408 9588
5. DEADLINE FOR RESPONSE	
Date	30 days after receiving the notification

Annex 1 - Maps and other illustrated documents related to the proposed activities

Figure A1.1 - Sensitive areas – towns, protected areas - in the area of influence of Cernavodă NPP

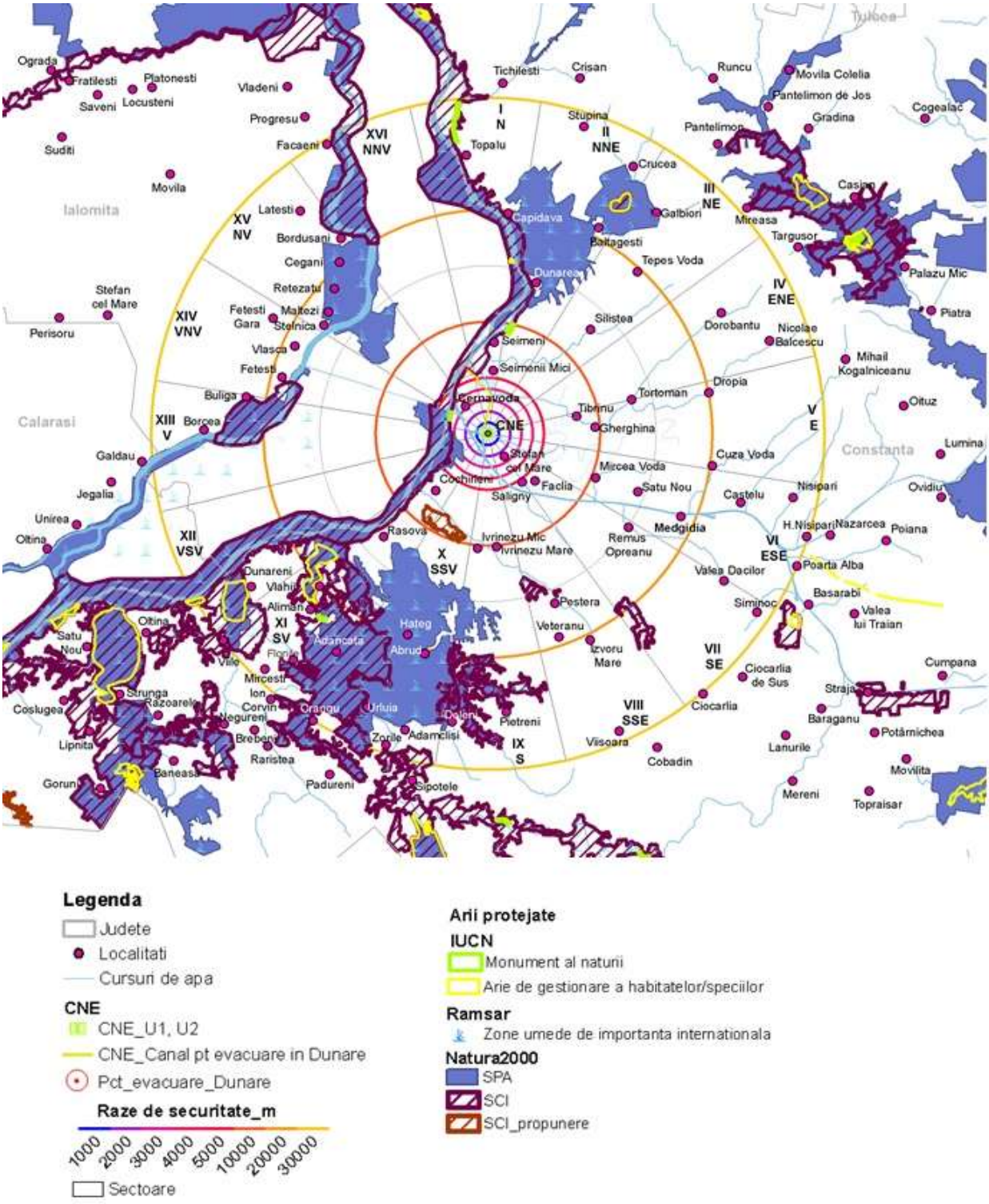


Figure A1.2 - Urban settlements in the vicinity of Cernavodă NPP

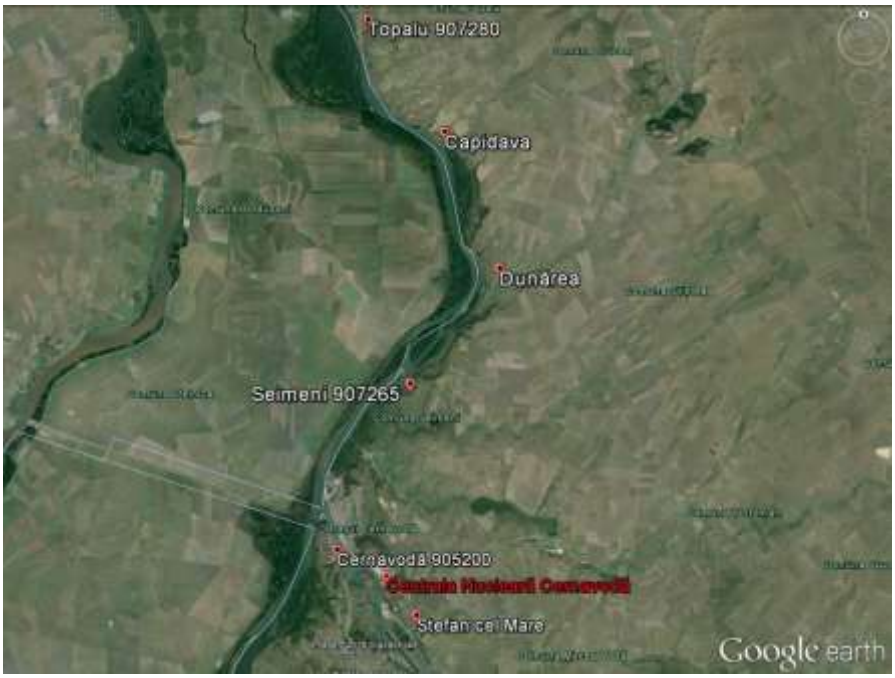


Figure A1.3 – Site location and delimitation plan

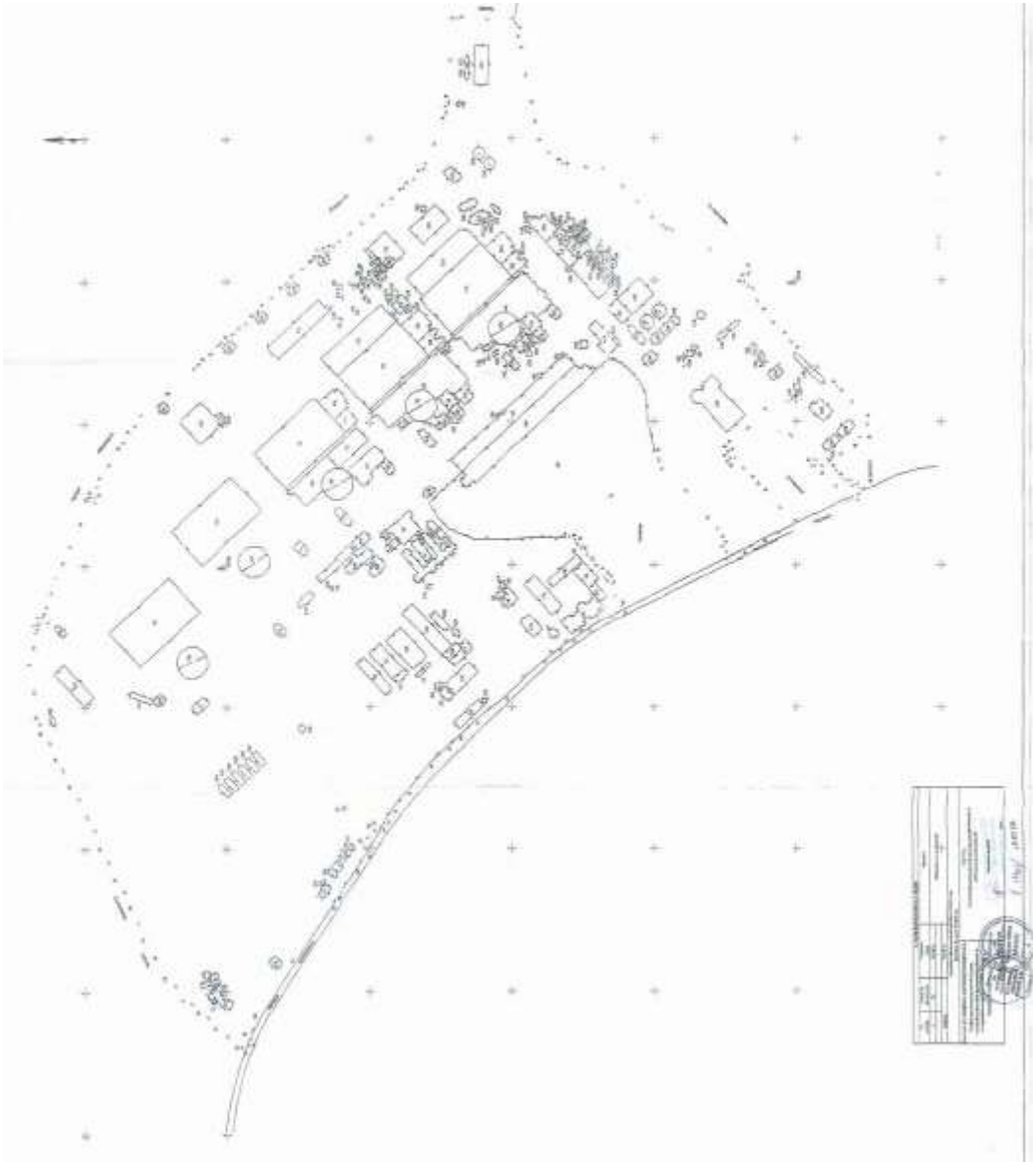
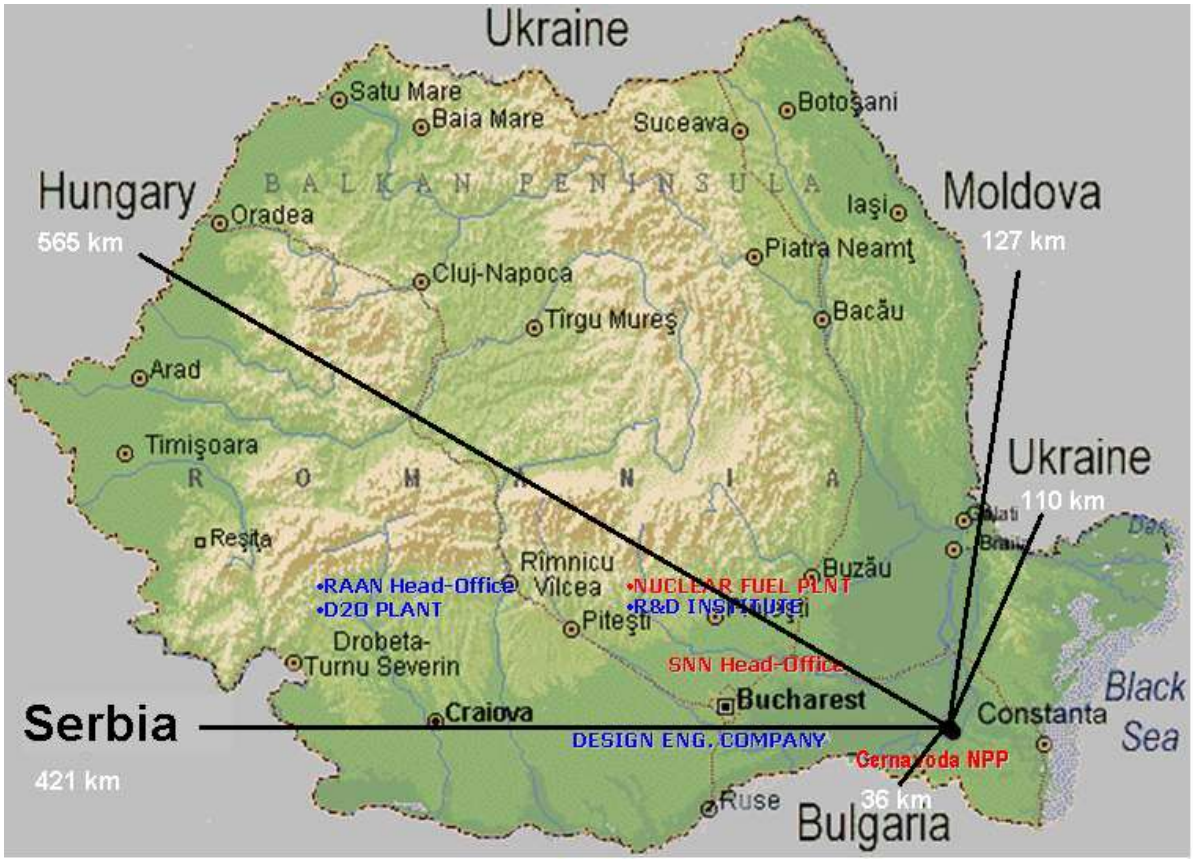


Figure A1.4 - Location and delimitation plan for RT-U1 and DICA MACSTOR 400

Figure A1.5. – Distances from Cernavoda to Romania's neighbours



Annex 2 - Scope of assessment (e.g. consideration of: cumulative impacts, evaluation of alternatives, sustainable development issues, impact of peripheral activities, etc.)

Impact on human population and their health

Regarding human health, according to the Study to assess the radiological impact on the health of the population generated by the Cernavodă NPP operation in the 30 km area around the objective, the estimated radiological impact on the health of the population in the 30 km area, generated by the operation of Cernavodă NPP under normal conditions falls into the category of very low risk.

Dose limits recommended by the International Commission on Radiation Protection (ICRP) and established by Directive 2013/59/EURATOM OF THE COUNCIL OF THE EUROPEAN UNION laying down basic safety rules for protection against the dangers posed by exposure to ionizing radiation and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom were implemented in the Norms regarding the basic radiological safety requirements, approved by the Order of the Minister of Health, of the Minister of National Education and of the President of the National Commission for the Control of Nuclear Activities no. 752/3.978/136/ 2018 and published in the Official Gazette of Romania, Part I no. 517 bis from 25.06.2018. They stipulate that the maximum exposure borne by a person in the population must comply with the following conditions:

- Effective radiation dose 1 mSv / year;
- Equivalent dose for lens 15 mSv / year;
- Equivalent dose for the skin (average value per 1cm^2 on the most strongly irradiated area) 50mSv / year;

The regulated dose limit represents the maximum exposure that an individual can withstand from all existing sources. In order to be able to set evacuation limits for the activity of a single source, the responsible authority establishes dose constraints, specific for the respective installation, a value that must not be exceeded during the normal operation of the objective. Dose constraint is a preventive restriction, which reduces the doses that people may receive from a certain source of radiation, in order to optimize radiation protection and comply with dose limits in case of cumulative radiation exposure, due to various practices, and / or multiple sources of radiation from the same practice and / or effluent emissions over time.

The authorization issued by CNCAN for each Unit of Cernavodă NPP established a value of 0.1 mSv / year for the constraint of the effective dose employed for a person from the critical group.

The refurbished Unit 1 will operate in compliance with the dose constraint established by CNCAN through the operation license.

Regarding the operation of ***DICA - MACSTOR 400***, the dry storage area will be provided with a physical protection system according to the regulations in force.

Low dose rates at the boundary of the site fence will be below the design value of 2.5 μSv / h (one tenth of the dose rate at the surface of the storage structures).

Beyond the outer fence of the storage area, the dose rates will thus be low enough to allow free access to the plant staff, and the contribution of DICA - MACSTOR 400 to the external exposure of the population will be negligible. The dose constraint set for IDSFS is 50 μSv / year.

According to the records related to environmental thermoluminescent dosimeters, the gamma dose flows outside the storage structure are at the level of the natural radiation background.

Preventively, during the construction of the new MACSTOR-400 module, specific radiation protection measures from Cernavodă NPP will be implemented, to ensure that the individual dose for the personnel

participating in the construction will not exceed the dose constraint approved by CNCAN for the IDSFS site (50 μSv /year) :

- Maintaining a proper distance from the sources in the vicinity of the work area (by building a temporary fence);
- Monitoring radiation fields in the work area;
- Reduction of time spent in the work area;
- Evacuation of personnel performing construction works during the period when burned fuel is transferred;
- Installation of additional biological protection screens.

In addition, according to the study to assess the radiological impact on the health of the population generated by the Cernavodă NPP operation, the estimated radiological impact on the health of the population in the 30 km area, generated by the Cernavodă NPP operation under normal conditions falls into the very low risk category: between 1 in 100,000 and 1 in 10,000 lifetime cancer risk.

Also, according to the Report on the state of the environment in Romania for 2019 published on the website of the Environmental Protection Agency Constanța „ In the analysed samples, the presence of artificial, gamma rays emitting radionuclides generated by Cernavodă NPP was not detected, and the values of the gamma dose flow, in the area of influence of Cernavodă NPP, fell within the range of variation values of the natural background radiation".

Taking into account all the above, it is estimated that the RT-U1 and DICA - MACSTOR 400 project together with the future projects proposed to be developed on site determines an insignificant impact on the health of the population in the area of influence of the Cernavodă NPP objective.

Impact on fauna and flora, biodiversity, conservation of natural habitats, wild flora and fauna and on the lands

The flora and fauna in the area of influence of the Cernavodă NPP platform will not be affected either by the realization or by the exploitation of the RT-U1 and DICA - MACSTOR 400 Project.

The statement is supported by:

- environmental radioactivity monitoring programs carried out in the pre-operational and operational phase of Cernavodă NPP;
- studies and monitoring on the impact of the operation of the Cernavodă nuclear power plant (U1 and U2) on the aquatic and terrestrial organisms in its area of influence, carried out in the periods 2008-2012 and 2013-2016;
- the study of adequacy assessment of the environmental impact of Units 3 and 4 from Cernavodă NPP elaborated in 2010 by INCDDD Tulcea;
- Level I and II environmental balance and report on level I and II environmental balance for SNN S.A.- Cernavodă NPP Subsidiary.

Environmental radioactivity monitoring as a result of the implementation of the RT-U1 and DICA - MACSTOR 400 Project will be an integral part of the Routine Environmental Radioactivity Monitoring Program at Cernavodă NPP.

For a correct estimation of the impact of the operation of the nuclear power plant on the environment in the period 1984-1994, the pre-operational environmental monitoring program was carried out in the Cernavodă NPP area. This program represented the "zero state" for the Cernavodă NPP Routine Environmental Radioactivity Monitoring Program, which was implemented starting with March 1996 (commissioning of Unit 1 of Cernavodă NPP).

The types of samples analysed within the Cernavodă NPP Routine Monitoring Program are based on environmental factors and their components: air, water, soil, sediment, atmospheric deposits, spontaneous vegetation, food samples, cereals, according to the monitoring program approved by CNCAN.

It is worth mentioning that the results of the measurements of the Routine Monitoring Program of the environmental radioactivity at Cernavodă NPP during 1996-2017 did not reveal the presence of CANDU specific radionuclides in the area of 30 km around Cernavodă NPP, except for tritium.

Annual tritium emissions were at very low levels - in the period 2015-2020, tritium gas emissions at both units were around $1.5x10^{14}$ Bq/year compared to the approved limit of $3.96X10^{15}$ Bq/year. and liquid effluent emissions were $1.4x10^{14}$ Bq/year for Unit 1 and $4.57x10^{13}$ for Unit 2, compared to an approved limit of $4.92X10^{16}$ Bq/year.

The conclusions of the adequacy assessment study and those of the independent environmental studies carried out for Cernavodă NPP took into account that the nuclear units started operating in 1996 and that until the date of the studies, the biota in the area did not suffer obvious reductions in species numbers or in specimen numbers.

Regarding the DICA - MACSTOR 400 subproject, it is estimated that no liquid, gaseous or solid radioactive materials will be released into the environment, taking into account that as so far, the radioactivity monitoring programs have not detected gaseous and liquid effluent emissions, and on the outside of the module wall the level of gamma exposure is within the limits of the natural background, resulting that under normal operating conditions the impact is insignificant.

In conclusion, taking into account the above, it is estimated that the implementation of the RT-U1 and DICA - MACSTOR 400 project will have an insignificant, indirect impact on flora and fauna.

The impact on the soil of the RT-U1 and DICA - MACSTOR 400 project is insignificant, the refurbishment, construction and operation of these objectives taking place inside the Cernavodă NPP site.

Impact on soil, assets and material goods

The impact on the soil and subsoil produced during the refurbishment activities of Unit 1 is insignificant, given that these activities are mostly carried out inside Unit 1.

The geological studies elaborated for the Cernavodă NPP site showed that the geological structure of the site area confers good conditions of stability and foundation of the power plant buildings.

In order to identify the lithology, stratification and determination of the geotechnical characteristics of the foundation ground for the new DIDR-U5, in 2020, the Geotechnical Study was developed which showed that the foundation rock on which the containment of U5 is built (inside which spaces will be arranged for the new DIDR-U5) consists of B2 limestone with a thickness of about 1m, followed by a massive area of Vallanginian clayey marls, which gives good conditions of stability and foundation to the reactor building of Unit 5.

Given that the new DIDR -U5 will be arranged inside the containment building of Unit 5, it is estimated that the impact of activities in the landfill will have a insignificant impact on the geology of the soil and subsoil, contributing to a more judicious use of the site.

Regarding the DICA - MACSTOR 400 subproject, the impact on the soil and subsoil produced during the operation of the landfill is insignificant. Liquid radioactive effluents that could be sources of indirect soil or subsoil pollution are treated and conditioned in the technological systems related to the plant.

Compared to the above, it is estimated that the implementation of the RT-U1 and DICA - MACSTOR 400 Project will have an insignificant impact on the soil environmental factor, both directly and cumulatively,

with the other activities on the Cernavodă NPP platform. In addition, the implementation of the RT-U1 and DICA -MACSTOR 400 projects results in a more judicious use of the land of the Cernavodă NPP site.

It is estimated that RT-U1 and DICA-MACSTOR 400 Project will not have an impact on material goods.

Impact on water quality and water quantitative regime

The water supply and wastewater discharge at Cernavodă NPP are regulated by the Water Management Authorization no. 72 of 06.09.2021 Modification of the Authorization no. 58 / 01.07.2021, regarding: "Water supply and wastewater discharge for U1 and U2 from CERNAVODĂ NPP" and Water Management Authorization no. 230 of 04.12.2019, regarding “Intermediate Dry Spent Fuel Storage facility (I.D.S.F.S.)”, both issued by the National Administration “Romanian Waters”.

Water supply and wastewater disposal for the RT-U1 Project will be achieved by connecting to the existing supply and evacuation facilities of Units 1 and 2 of Cernavodă NPP.

Water management authorization no. 72 of 06.09.2021 Modification of the Authorization no. 58 / 01.07.2021, imposes the maximum values allowed for discharge of quality indicators, depending on the category of discharged water (technological water, stormwater including inactive drainage, domestic water) and depending on the authorized receiver (Danube, Danube - Black Sea Canal, domestic sewerage).

From a radioactive point of view, before discharge, all waters will have the beta and gamma activity within the limits set by the National Commission for the Control of Nuclear Activities. The monitoring from the point of view of radioactivity will be done according to the rules established in the operating authorizations of Unit 1, respectively Unit 2.

Under normal operating conditions of DICA – MACSTOR 400, no polluting emissions are generated that would affect surface water and groundwater. The only possible water sources are rainwater and water from washing the platform.

The rainwater from the DICA - MACSTOR 400 site and the water from the washing of the platform are collected into the collection tanks. The evacuation of these waters to the emissary is done through a canal made of concrete pipes. At crossings under roads and concrete platforms, the canals will be protected in a reinforced concrete sleeve.

The collection tanks are made of reinforced concrete, being provided with knife gate valves which are normally closed.

Water samples are taken from this tank to check for possible radioactive contamination.

If the water is radioactive, it is collected into drums and transported to the plant where it is taken up by the liquid radioactive waste system.

If the water is not radioactive, it is gravitationally discharged to the emissary.

Under normal operating conditions, there is practically no possibility for exfiltrations from gutters or platforms to reach the groundwater table.

According to the Report for Health and Environment for 2016 published on the website of the National Institute of Public Health, “Drinking water quality ensures compliance with the value of the quality indicator parameter, the total dose of 0.1 mSv per year. The values of tritium concentrations in the impact area of Cernavodă NPP were below 100 Bq / l. From the determinations made in 2016, in drinking water or supply water, on the Romania’s territory no contamination was highlighted that would lead to a significant increase of the dose by ingestion”.

Also according to the Report on the state of the environment in Romania in 2019, published on the ANPM website "In the analyzed Danube water samples, no presence of artificial gamma radionuclides within the range of the emitters with Cernavodă NPP as source was detected".

Taking into account the above, it is estimated that the RT-U1 and DICA - MACSTOR 400 Project will have an insignificant impact on water quality.

Impact on air quality and climate

As is now the case, the normal operation of the refurbished Unit 1 will not generate significant greenhouse gas emissions (CO2, CH4, HFC, PFC, N2O, SF6). Greenhouse gases can only result in the situation of power outage, when the spare diesel groups come into operation or during the short period of their periodic testing.

Cernavodă NPP branch holds an authorization for Greenhouse Gas emissions for installations included in the EU-ETS category and located on site: Standby and Emergency Diesel Generators related to Unit 1 and Unit 2, Thermal Startup Power Station, fire extinguisher motor pump. No breaches of the conditions of these authorizations were registered.

During the normal operation of the refurbished Unit 1, no pollutants with acidifying effect, ozone and ozone precursors or suspended particles (SO2, NOx, CO, O3, heavy metals, polycyclic aromatic hydrocarbons - PAH, volatile organic compounds – VOC, suspended particles - PM10, PM2.5 fractions) are being emitted into the atmosphere".

According to the REPORT document on the Environmental Assessment level I for the Cernavodă NPP Subsidiary, "the impact on air quality due to non-radioactive emission sources is insignificant in the long term."

Normal operation of the new DIDR-U5 (Intermediate Radioactive Waste Storage Facility) and DICA - MACSTOR 400 does not result in polluant air emissions, so there will be no impact on the quality of the environmental factor.

Taking into account all of the above, it is estimated that the normal operation of the RT-U1 and DIDR - MACSTOR 400 Project will have an insignificant impact on the air quality on the platform and outside the Cernavodă NPP perimeter.

Noise and vibration impact

Cernavodă NPP is located in an industrial area. In accordance with the CNCAN norm, an exclusion zone was built for U1 and U2, where there no permanent human settlement can be placed.

The majority of the noise sources resulted from Cernavodă NPP operation, are placed to at least 20 m from de enclosure limits (the fence that borders the NPP's territory). Noise levels are under the limit imposed by legislation.

For the RT-U1 and DICA - MACSTOR 400 projects, the specific noise sources are generated by the construction activities for buildings and storages, construction of MACSTOR 400 modules. In the operation period, the specific noise sources are generated by the crane manoeuvring and auto transport.

The Unit 1 Refurbishment noise sources are similar with the present ones.

Regarding the vibrations, considering the quality of the special foundations, the transmitted vibration levels are estimated to be very low. Given the low levels of vibration during operation and the distance from the lens to inhabited areas, no impact on the environment is estimated due to vibration.

Considering the above, it is estimated that implementing and operating of the RT-U1 and DICA - MACSTOR 400 project will have an insignificant impact on the environment due to noise and vibration.

Impact on the landscape and visual environment

In the area of the RT-U1 and DICA - MACSTOR 400 Project site, the landscape and the visual environment are characteristic to the industrial platforms, where dispersion baskets, production halls and social headquarters of Cernavodă NPP are places.

Therefore, no direct impact on the landscape and visual environment will be made.

Impact on historical and cultural heritage

RT-U1 and DICA -MACSTOR 400 projects is carried out on the Cernavodă NPP site and it is estimated that in normal running, it will have no impact on the historical and cultural heritage of the area.

Indirect, secondary, cumulative-, short-, medium- and long-term impact, permanent and temporary, positive and negative impact: the impact determined by the interaction of the elements mentioned above

The types of impact on the environmental factors/elements estimated are:

- The impact of the RT-U1 and DICA - MACSTOR 400 project on the air factor, on short, medium and long term, cumulated with the effects resulting from the existing and future activities on the site, will be insignificant;
- The cumulative radiological impact on short, medium and long term caused by the operation of the RT-U1 and DICA - MACSTOR 400 project will be insignificant;
- The medium and long-term impact on human health and population will be insignificant;
- The medium and long-term impact due to the interaction between environmental factors – water, air and human health will be insignificant.

The economic benefits are:

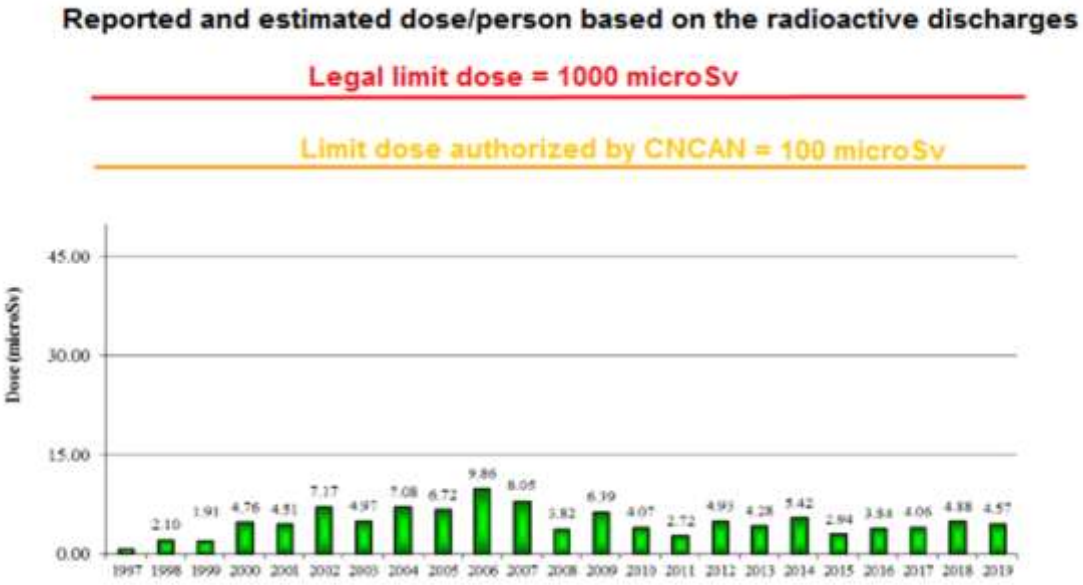
- Unit 1 Refurbishment will produce energy for another life cycle ~ 30 years, participating along with the other electricity sources in fulfilling environmental and safety energy objectives and targets;
- Unit 1 Refurbishment will produce “clean” energy, avoiding the release of about 6 million tons of CO_2 per year, thus contributing to the CO_2 reduction targets achievement;
- The construction of the RT-U1 and DICA - MACSTOR 400 Projects, will determine a considerable business increase in the construction sector, including builders and construction materials suppliers;
- New jobs will be created both during the construction and operation of the RT-U1 and DICA - MACSTOR 400 Project, facilitating new opportunities for many categories: administrative, technicians, engineers, construction workers and so on, for almost 30 years.

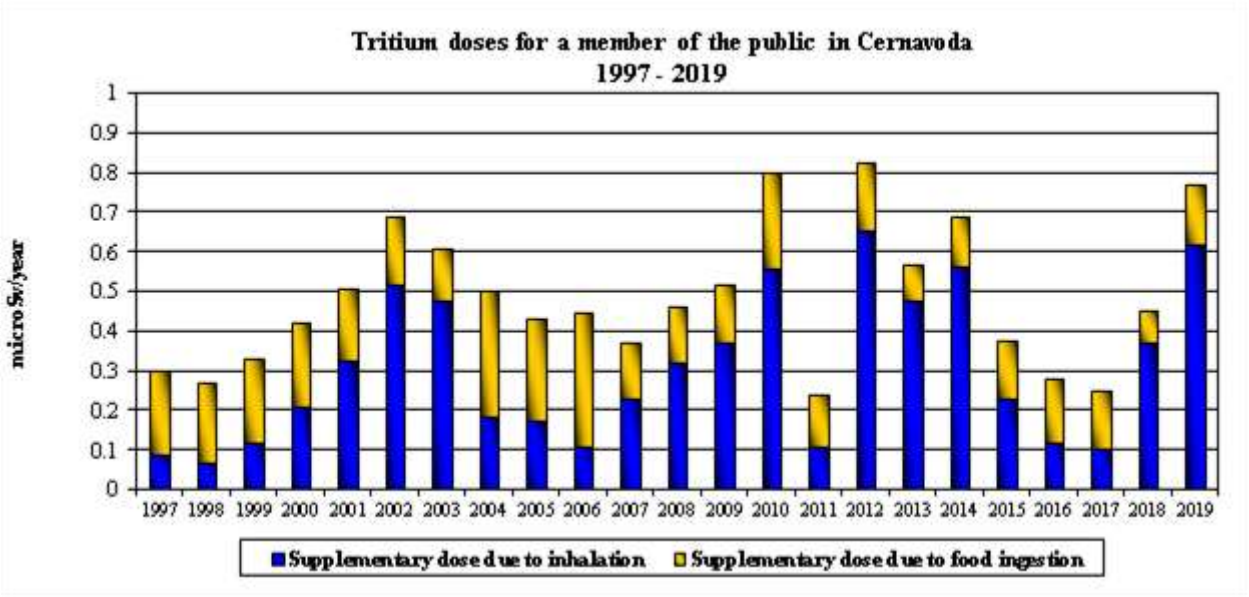
Considering the estimated cumulative radiological impact of the RT-U1 and DICA -MACSTOR 400 Project the following aspects shall be mentioned:

- The legal limit dose for population is 1mSv/year/person;
- CNCAN established constrains for both existing and future projects from the NPP site:
    - Cernavodă Tritium Removal Facility: 0.010 mSv/year;

- NPP Cernavodă Units U1 and U2 (including Radioactive Solid Waste Intermediate Storage): 0.1 mSv/year/unit;
- U3 and U4 Units (future projects): 0.060 mSv/year/unit;
- IDSFS: 0.050 mSv/year.

- The annual effective doses of exposure of the general population due to radioactive effluents discharge into the environment from Cernavodă NPP Units 1 and 2 are significantly lower than the dose constrains established by CNCAN. The calculated doses and reported based on the results of the monitoring of radioactive emissions are presented below in figure below. As can be seen from the graph, the calculated dose based on the results provided by the effluent monitoring program is one hundred times smaller than the legal dose, for the public person;
- Also, the radioactivity of the evacuated tritium at Cernavodă NPP is considerably under the legal dose regulated by CNCAN. The additional tritium doses for a the critical group persons are presented below. As it can be seen from the graph, based on the results provided form the environmental radiological monitoring program, the calculated doses are two thousand times smaller than the legal dose;





Taking into consideration all of the above and the measures taken during the construction and operation of the RT-U1 and IDSFS-MACSTOR 400 Project it is estimated that using an advanced technology and integrating the international experience gained while building and operating similar installations, the effects will be insignificant.

Measures to avoid, reduce the significant impact on the environment

No potential significant negative impact on the environment resulting from the operation of the RT-U1 and IDSFS – MACSTOR 400 project was estimated.

The project provides equipment and facilities for: Improving and controlling technological processes, control and reduction emissions, noise and vibration, soil and subsoil protection, waste management, fire protection and prevention.

The transboundary impact

RT-U1 and DICA – MACSTOR 400 Project will be developed on the Cernavodă NPP site. Both the implementation and normal operation stages of the RT-U1 and DICA – MACSTOR 400 project will not have a negative significant impact in the transboundary context.

From the point of view of the cumulative impact in the normal operation, the RT-U1 and DICA - MACSTOR 400 project, Cernavodă NPP with Unit 1 and Unit 2 and the future projects of Nuclearelectrica (Construction of Unit 3 and Unit 4 and CTRF Project) will have an insignificant impact in the transboundary context.

This affirmation is based on information regarding radioactive discharge and tritium's concentration in the environment presented above.

Therefore, it is estimated that RT-U1 and DICA – MACSTOR 400 project will not have a negative significative impact in the transboundary context.

Annex 3a - Outputs (amounts and types of: discharges in air, discharges into the water system, solid waste)
RT-U1 Subproject

Air Evacuation:

The sources of non-radioactive pollutants resulting from the refurbished Unit 1 operation are the same as those currently resulting from the operation of Unit 1:

- The steam from the steam valves, which discharges into the atmosphere only in transient operating situations. In conditions like start/shutdown conditions, the steam can be discharged into the atmosphere through the steam discharge valves;
- Gaseous emissions from diesel generators;
- Emissions from the Thermal Start-up Power Plant (CTP).

These pollutant emissions are limited to the Cernavodă NPP site as concluded in the Level I and II Environmental Balance Reports.

During operation period, the mobile sources of air pollutants will be represented by the transport of auxiliary materials. The emissions of pollutants from the material transport activity are dusts and combustion gases.

Potential radioactive pollutants for air and other pollutants resulting from the operation of Unit 1 refurbished are the same as the pollutants resulting from the operation of Unit 1 in the present. Consequently, the main pollutants found in the exhaust air from the Reactor Building and the Services Building (reactor building, spent fuel bay, decontamination centre, heavy water management) namely tritium, solid particles, iodine and noble gases are taken over by the ventilation systems of the NPP being properly treated by means of D_2O vapour recovery systems and air ventilation and filtration systems. The air filtration process ensures the limitation of discharges into the environment, within the limits approved by the nuclear regulatory authority, CNCAN.

Potential radioactive pollutants may result from radioactive waste management activities resulting from refurbishment activities and which will be stored in an intermediate special storage facility in the Unit 5 reactor building, called the new DIDR-U5.

Water evacuations:

From the refurbished Unit 1 operation may result following water evacuations :

- domestic water - all non-radioactive domestic water is discharged through a sewage system to the sewage pumping stations operated by CNE, reaching the sewage network of Cernavodă;
- rainwater - all rainwater, including that from underground drainage (groundwater drainage) is collected in a main collector from where it is discharged into the distribution bay of Cernavodă NPP, after passing through a decanter provided upstream of the final collector;
- potential radioactive wastewater – the disposal of the potentialy radioactive wastewater will be done through the existing radioactive aqueous liquid waste management system that serves Unit 1 and ensures water quality control so that liquid effluent emissions fall within the approved discharge limits.

Types of waste:

From Operation of Unit 1 refurbished may results the following types of wastes :

- Non-radioactive waste (assimilated to municipal waste): recyclable waste, packaging waste, and household waste. Non-radioactive waste is managed according to the implemented procedures at the level of the NPP site. The types of non-radioactive waste presented below:

No	**Non-radioactive waste**	**Coding/classification**
1.	Used oils	13 07 01*/13 02 08*
2.	Halogen-free oils	12 01 09*/13 05 07*
3.	Solvents without chlorine	14 06 03*
4.	Wastes containing organic substances	16 10 01*/19 02 08*/16 03 05*
5.	Hydraulic turbine fluid (FRF)	13 01 11*
6.	Sulfuric acid - solution	16 06 06*/11 01 06*
7.	Absorbents, filters and polishing materials	15 02 03
8.	Used ionic resins	19 09 05
9.	Plastic waste (containers for biological samples)	18 01 03*
10.	Construction waste (concrete, earth and gravel, etc.)	17 05 04/17 01 01/17 01 07
11.	Antifreeze (ethylene glycol)	16 01 14*
12.	Batteries and accumulators	16 06 01*
13.	Used tires (used rubber)	16 03 06/16 01 03
14.	Transformer oils – without PCB	13 03 07*
15.	Laboratory reagents containing dangerous substances/mixtures	16 05 06*
16.	Wood waste	17 02 01
17.	Iron and copper wastes	16 01 17/17 04 05/17 04 01
18.	Waste paper	19 12 01/15 01 01/20 01 01
19.	PET	15 01 02/16 01 19
20.	Absorbents, filters, polishes contaminated with hazardous chemicals	15 02 02*
21.	Activated alumina (hazardous inorganic waste)	16 03 03*
22.	Polyurethane hydro isolation/glass fibre	17 09 04

23.	Aluminium waste	17 04 11/17 04 02
24.	Household waste	20 02 01/20 03 01
25.	Bituminous waste for hydro isolations	17 03 03*
26.	DEEE	16 02 03*/16 02 13*/16 02 16*
27.	Electrical and electronic waste	20 01 36
28.	Ceramic insulators	16 02 16
29.	Plastic packaging waste	20 01 39/15 01 02
30.	Plastic or glass packaging, contaminated with dangerous substances	17 02 04*
31.	Used toners	08 03 17*
32.	Waste polyurethane foam	17 06 04
33.	Waste lighting sources	20 01 21*
34.	Glass waste	16 01 20

NOTE: Any waste marked with an asterisk (*) in the waste list will be considered hazardous waste.

- Radioactive waste resulting from the activities of dismantling the pressure tubes, calandria tubes and their associated assemblies, after volume reduction, they will be placed in authorized containers, which will be stored temporarily in internal special designed spaces/structures placed inside the reactor building of Unit 5 (new DIDR-U5). The estimated radioactive waste inventory resulted from refurbishment of Cernavodă NPP Unit 1 are presented below:

Radioactive waste source		**Estimated volume after compaction [m^3]**	**Volume reduction factor**	**Gross volume [m^3]**
Pressure tube		8.62	2.8	23.98
Calandria tube		5.710	5.5	31.48
Calandria tube inserts		0.72	N/A	0.72
Lateral structural component		54.5	N/A	54.5
Feeder pipes		198.4	N/A	198.4
Other reactor components and low activity waste (tools)		52.7	N/A	52.7
Highly active waste from shielding tools		32.4	N/A	32.4
Slightly active waste from shielding tools		62.9	N/A	62.9
Solid radioactive waste	vinyl	129.4	8.55	1106
	paper	111.8	9.50	1062
	metal	90.4	3.22	291

Radioactive waste source		Estimated volume after compaction [m^3]	Volume reduction factor	Gross volume [m^3]
	textile	69.6	8.49	591
	plastic	39.6	11.74	465
	other	91.7	8.94	820
Used ionic resins*		21.0	N/A	21
Used filters		3.6	N/A	3.6
Total		973.05		4816.2

Note: Used ionic resins from Unit 1 will be stored in storage tanks.

Unit 1 refurbished will produce same types of radioactive waste as Unit 1 produces in present.

Depending on the dose rate values on the outer surface of the container, solid waste is classified as follows:

- type 1 – low active - dose rates in contact with containers < 2 mSv/h
- type 2 – medium active - contact dose rate between ≥2 mSv / h and <125 mSv/h;
- type 3 – medium active - contact dose rate ≥ 125 mSv/h

Table below, shows the types of radioactive waste produced at Unit 1 of Cernavodă NPP, classified according to the operational classification:

Radioactive waste	Category
1. Radioactive solid waste Type 1 low active - dose rates in contact with containers < 2 mSv/h	➢ Non-compactable
	➢ Compactable
	➢ Used filter cartridges
2. **Radioactive solid waste Type 2** medium active - contact dose rate between ≥2 mSv / h and <125 mSv/h;	➢ Non-compactable
	➢ Used filter cartridges
3. Radioactive solid waste Type 3 medium active - contact dose rate ≥ 125 mSv/h	➢ Used filter cartridges
	➢ Activated components from nuclear systems and heavily contaminated parts
4. Used radioactive resins	IRN 77, 78, 150, 154 activated carbons
5. Organic liquid radioactive waste	➢ Oil
	➢ Used solvent
	➢ Sparkling cocktail
	➢ Slam
6. Flammable solid radioactive waste	➢ Cellulose and plastic materials impregnated with flammable solutions (lubricants, oil, etc.)

Annex 3b - Outputs (amounts and types of: discharges in air, discharges into the water system, solid waste)

DICA – MACSTOR 400 Sub-project

Air evacuation:

Sources of air pollutants, resulting from the operation of DICA - MACSTOR 400 are generated by the gaseous emissions produced by the operation of the car engine towing the transfer trailer that is released freely into the atmosphere by forced ventilation.

Water evacuation:

The water on the DICA site comes from precipitations and/or washing of concrete platforms. The waters on the DICA site are collected through a system of concrete gutters covered with road metal grilles, collecting channels on which are located manholes and drains provided with grilles.

Types of waste:

Regarding the management of low-level radioactive waste resulting from the operation of DICA-400, the following clarifications are made:

- potentially radioactive liquid waste - managed in the plant systems;
- radioactive gaseous waste - not generated in the normal operation of DICA - MACSTOR 400;
- radioactive solid waste - results from the activities of loading the burned fuel in the transfer basket as well as following a possible decontamination of the transfer container. The treatment of this waste is identical to the treatment of other low active solid waste resulting from the operation of the plant.

Annex 4 - Proposed mitigation measures (e.g., if known, mitigation measures to prevent, mitigate, minimize, compensate for environmental effects)

Installations for the retention and dispersion of pollutants in the atmosphere used in the refurbished Unit 1

- **Ventilation, filtration, evacuation and dispersion system of radioactive gaseous effluents**

This system collects radioactive gas emissions from potential areas where they may come from, ensures filtration and evacuation together with the ventilation air through the outlet vent, in conditions that ensure dispersion and atmospheric transport.

- **D_2O Vapour Recovery System**

To minimize the release of tritium from the Reactor Building, the D_2O Vapour Recovery System is provided. The air, in the areas served by this system, is recirculated through 8 dryers equipped with absorbent molecular weight (aluminosilicate) that retain the crushed water vapor.

Noble gases are chemically inactive and do not filter.

During the refurbishment activities, no emissions of noble gases and radioactive iodine are possible.

Potentially contaminated or contaminated air is collected by ventilation systems and is evacuated through a common exhaust chimney, after filtering and monitoring. Survey of radioactive gas discharges is performed by continuously monitoring of the air from the exhaust chimney through the Gaseous Effluent Monitor. The emission limits for each radionuclide have been established and approved by the nuclear regulatory authority, CNCAN.

- **Containment System**

The containment system is a "cover" of nuclear components to prevent the release of radioactivity in the environment. The containment system includes a pre-tensioned reinforced concrete structure, a filtered air discharge system, access locks, and an automatic quick containment closure system. The design of nuclear power plant provides a spray system that will absorb the energy released in the containment, thus reducing the pressure peak and the duration of the overpressure.

- **Filtered Containment Venting System**

Following the events at Japan's Fukushima nuclear power plant, all the world's nuclear power plants and their operators have reconsidered how they are prepared to respond in the event of severe events beyond design limits.

One of the most important measures to minimize the effects/consequences associated with the occurrence, however unlikely, of a severe accident at Cernavodă NPP was to implement an emergency filtered containment venting system at both units.

Emergency filtered containment venting system (EFCVS) works by passing vapours from inside through a Venturi treatment/filtration vessel, where iodine aerosols and isotopes are retained.

The system will operate only in the event of a severe accident, with the partial or total meltdown of the reactor core, to protect the containment system and prevent the release of radioactivity into the environment/atmosphere.

Installations used for the retention and dispersion of non-radioactive pollutants in the atmosphere

- **Stack from the Exauhst System for diesel groups**

This installation has the role to ensure gas dispersion. The diesel groups from Unit 1 are equipped with a stack for exhaust of the burned gas.

Installations for the retention and dispersion of pollutants in the atmosphere used in the new DIDR-U5

- **The heating, ventilation and air conditioning (HVAC) system** will be designed in order to:
  - Maintain adequate ambient air conditions for the safe conduct of personnel activities and the proper operation of the equipment. Local air coolers are installed to provide additional cooling for areas with high cooling loads if is necessary;
  - Limite the release of radioactive substances into the environment by filtering contaminated air before it is released into the environment through HEPA filters. Evacuated air is monitored for radioactivity control;
  - Prevent the spread of potentially radioactive air by maintaining the direction of airflow.

The non-radioactive emissions from the new DIDR-U5 are represented by dust and flue gases from the fuels of the means of transport, generating insignificant emissions into the air.

Protection against radiations

Cernavodă NPP already has a Radiation Protection Regulation and subsequent procedures applicable in production activities, which provide means, actions and measures to ensure radiation protection.

The main objective of radiation protection at Cernavodă NPP is to reduce the doses for professional exposed personnel and the population at the lowest levels reasonably achievable, according to the ALARA principle, below the limits specified by national legislation.

Through the internal radiation protection procedures, more restrictive administrative limits are assumed than those imposed by the norms in force. Thus, the administrative limit for the professionally exposed worker is 14 mSv per year compared to the legal limit of 20 mSv / year, and can be reduced by establishing performance indicators.

The releases of radioactivity into the environment are controlled and monitored so that they are at least two orders of magnitude smaller than the legal limits.

The processes of the plant that ensure the protection of the environment, the population and the personnel against radiation are permanently improved in accordance with the accepted practice and the international recommendations.

Installations for the retention and dispersion of pollutants in the atmosphere for DICA - MACSTOR 400 subproject

Regarding the DICA-MACSTOR 400 subproject, the MACSTOR Modules themselves are constructions designed to contain stored radioactive materials and to safely shield the radiation from the burned fuel.

Arrangements and endowments for the protection against radiations of the RT-U1 subproject

The refurbishment of Unit 1 of the Cernavodă NPP aims to protect personnel, population and the environment from radiations.

The design of the facilities and the selection of the equipment for the systems that contain, collect, store, process or transport radioactive material in any form, was made so that the radiation doses in their vicinity are kept as low as possible according to the ALARA principle.

Also, at Cernavodă NPP, the notion of nuclear zoning is used, which establishes differentiated areas in terms of radiation levels and access control in these areas.

There are 3 delimitation zones:

- Zone 3 is a clean space with no sources of radioactivity, except for those approved, with a very low probability of spreading contamination in adjacent areas and a general radiation dose rate of less than 0.5 μSv / h. There should be no detectable alpha, beta-gamma contamination in this area above the natural background values.

- Zone 2 is a controlled area with no radioactive sources, except for approved ones. Under normal conditions this area is free of contamination. Contamination can occur accidentally in certain situations due to the movement of personnel and equipment. This zone does not contain radioactive systems and has a general radiation dose rate of less than 10 μSv/ h, except in approved cases and which must be kept to a minimum that is reasonably achievable.
- Zone 1 is a controlled area that contains systems and equipment that may cause contamination or radiation exposure rates above 10 μSv / h, significant contamination or exposure to direct radiation. In zone 1, spaces occupied for long periods of time must have a dose rate for any type of radiation that is as low as reasonably achievable.

There are measures for clear demarcation of areas. Access to or from radiological areas is controlled in accordance with approved procedures.

The project itself of Unit 1 of Cernavodă NPP ensures the control of external irradiation sources by:

- ventilation systems that ensure the cleaning, circulation and adequate evacuation of the contaminated air;
- purification systems for moderator and primary reactor coolant to reduce their activity;
- chemical control of the reactor coolant and moderator;
- immediate detection and localization systems for defective fuel to prevent rising the activity in the primary circuit;
- radioactive waste management;
- facilities for decontamination of surfaces, equipment and personnel (spaces and endowments for decontamination).
- use of remote dose gamma monitoring systems.

The project of Unit 1 of Cernavodă NPP provided the following facilities for the control of internal contamination sources:

- ventilation systems that ensure the cleaning, circulation and adequate evacuation of the contaminated air;
- heavy water vapor recovery systems in the reactor building;
- primary and moderator leakage collection systems that direct leakage through closed collection lines;
- radioactive waste management systems in the plant;
- adequate space, equipment and materials for decontamination of surfaces, equipment and personnel;
- remote tritium dose monitoring systems with remote indication. The Tritium to Air Monitoring System (TAM) ensures continuous monitoring of tritium dose flows in rooms in radiological zone 1;

Contaminated equipment such as pumps and fittings are decontaminated by physical or chemical processes. The decontamination centre in the service building is specially provided for the use of special techniques for decontamination of leather, clothes, tools and mobile equipment.

The barriers provided by the project to reduce external staff exposure are:

- radiation shielding system in the plant;
- an access control system in certain areas of the reactor building, which restricts personnel access to areas with high levels of radiation;
- a range monitor system that warns personnel when there are high levels of radiation in certain areas of the plant. In the same sense, semi-portable and portable range monitors have been provided.

The reduction of internal personnel contamination was achieved by providing the following barriers:

- access control system;

- zoning of the plant from the point of view of space contamination and provision of monitors to control the contamination of personnel and equipment at the interface between areas;
- changing rooms and washing machines;
- personal protective equipment: protective suits, breathing apparatus and masks, hoods, shoes, gloves, etc;
- ventilation system and D2O vapor recovery system;
- tritium control;
- Tritium air monitoring system (TAM / RMS).

From the point of view of personnel protection against radiation, surveillance consists of individual internal and external dosimetry and monitoring of work spaces.

For the monitoring of the work spaces, both fixed and portable equipment were provided. The fixed equipment ensures remote monitoring of gamma fields and tritium concentrations in certain areas of the plant.

The portable equipment provided ensures the measurement of gamma, neutron and beta dose rates, tritium and aerosol concentrations in the air and levels of contamination of surfaces, personnel and equipment.

Arrangements and equipment for radiation protection for the new DIDR-U5

Radiation protection is ensured by:

- The walls of the U5 building represent the first protection against radiation;
- The U5 building and the spaces inside the building will be radiologically zoned, in accordance with the criteria established by CNCAN;
- Specific ventilation, conditioning and monitoring systems.
- Equipping the personnel working with appropriate radiation protection equipment

Arrangements and equipment for protection against radiations for DICA - MACSTOR 400 subproject

The Cernavodă Intermediate Dry Storage for Burned Fuel (DICA) is designed so that the on-site and off-site radiation doses comply with the ALARA principle throughout the preparation, transfer and storage of the burned fuel.

The biological protection design, access control, radiological monitoring, the design of ventilation systems and waste management must ensure the necessary radiological protection for personnel and the population. The project must limit the actual radiation doses so as to respect the administrative and legal limits for occupational exposure, the dose limit for the population of 50 μSv/year, and the basic principles of radiation protection: justification, optimization and limitation of individual doses.

The storage area is located at a sufficient distance inside the Cernavodă NPP exclusion zone, ensuring that the dose for the population is kept below the limit values for both normal operation and accident conditions. The storage area is provided with adequate fencing to prevent unauthorized public access to the installation.

For DICA Cernavodă, the ALARA principles for radiation protection program are focused on:

1. Protection of workers through a conservative project, properly tested equipment and simple methods of fuel preparation;
2. Adequate radiological protection of workers with the help of area monitoring equipment and personnel;
3. Training of the personnel involved in the operation of DICA, in accordance with its functions, focusing on the quality of work, radiological protection, management of abnormal events and recovery from basic project accidents;

4. Work planning in areas where radioactivity is present;
5. Reducing the exposure time;
6. Maintaining a safe distance from the equipment containing the burned fuel, maximizing the control of the equipment, such as performing remote loading operations at the SICA and at the storage module;
7. Efficient shielding of gamma radiation and neutrons at SICA, transfer container and storage module;
8. Decontamination of equipment and areas according to decontamination procedures;
9. Provide adequate ventilation of work areas and minimize the extent of contamination.

Program for the prevention and reduction of non-radioactive waste quantities

In order to minimize the amount of non-radioactive non-chemical waste generated during the operation of the refurbished Unit 1, the provisions of the environmental legislation in force, the provisions of the applicable permits, and the NPP procedures are applied.

Non-radioactive waste is collected in specially arranged temporary storage spaces, and is managed according to the internal procedure Cernavodă NPP. The collected non-radioactive waste is inspected labelled, packaged and verified for integrity and measured for detecting any contamination. After that they are transferred outside the radiological area.

The transport of non-radioactive waste containers to the temporary storage or transfer to other entities is done by authorized transport of non-hazardous or hazardous waste.

The transfer to economic agents authorized for temporary storage, recovery, or disposal is made on the basis of a contract for the provision of services, the transport is provided by the provider with means of transport for the categories of waste transferred.

Radioactive waste management plan

At Cernavodă NPP, a radioactive waste management program is implemented, in order to minimize the volume of radioactive waste and characterize the radioactive waste. The inventory of radioactive waste is regularly reported to the competent authorities.

The radioactive waste produced at Cernavodă NPP is brought to a safe and passive form, as soon as possible from the moment of generation. The processing of radioactive waste can lead to the appearance of radioactive effluents that are discharged under control and to the appearance of secondary waste that can be deposited or released under the authorization regime of CNCAN.

Pretreatment includes: collection, handling, segregation, compaction, neutralization, decontamination and solidification.

Radioactive waste is treated in order to: reduce the volume, remove radionuclides from the waste and change the composition. Minimizing the volume is achieved by compaction with a hydraulic press, directly in the barrel.

Removal of radioactivity is applied to solid waste and oil by decontamination methods.

The change of the composition (solidification) is made in the case of organic liquids and organic solid-liquid mixtures by absorption in the polymeric structure, using absorbent polymers. Organic liquid radioactive waste or solid-liquid organic mixture, following the characterization process, is treated by the method of changing the chemical composition, respectively absorption in polymeric structures.

Minimizing the volume by incineration is applied after a period of intermediate storage and is performed at authorized operators.

The main steps for characterization of radioactive waste are: selection of waste stream and preliminary measurements; sampling and radiochemical analysis of samples; calculation of scaling factor, in-situ measurements and calculation of radionuclides inventory.

Transport of radioactive waste and measures for environmental protection

a) Solid waste type 1 and 2 - compactable and non-compactable

Type 1 and 2 solid waste packed in "A" type packages is transferred to the Intermediate Radioactive Solid Waste Storage using means of transport, in compliance with radiation protection and maintenance procedures.

b) Solid waste type 3 - activated components from nuclear systems and highly contaminated parts.

Type 3 solid waste is packed in special containers and transported to the Intermediate Radioactive Solid Waste Storage, in compliance with radiation protection and maintenance procedures.

c) Solid waste type 2 and 3 - used filter cartridges

Used filter cartridges are handled, depending on the size, using a large reusable transport container or a small reusable transport container.

The large transport container ensures a reduction of the dose rate from 50 Sv / h to 0.25 mSv/h, and the small transport container ensures a reduction of the dose rate from 50 Sv / h to 0.15 mSv/h. Used filter cartridges are changed from the systems using these containers and transported to the Intermediate Radioactive Solid Waste Storage, after the removal of moisture, without any other processing. The transfer to the Intermediate Radioactive Solid Waste Storage is made in compliance with the radiation protection and maintenance procedures.

All containers that leave the Service Building must be free of contamination, and the transfer is made in favorable weather conditions (without wind and precipitation).

Currently, the Intermediate Deposit for Radioactive Solid Waste (DIDSR) is intended for the limited term storage of preconditioned (separated and compacted) low and medium active solid waste, resulting from the normal operation or in accident situations of Cernavodă NPP. The deposit ensures the storage of solid waste, except for used ionic resins, reactivity control bars and used fuel.

According to the National Medium- and Long-Term Strategy on Waste Nuclear Fuel and Radioactive Waste Management, a Final Waste Disposal and Medium Active Waste Disposal (DFDSMA) will be put into operation by the Nuclear and Radioactive Waste Agency. The low and medium active long-life waste, LILW-LL, will be stored intermediate on the Cernavodă NPP site, until the deep geological deposit becomes operational.

Radioactive waste prevention and reduction program

The control measures applied are the following, in this order:

- minimizing the volumes of waste produced;
- reuse of equipment according to the initial destination;
- recycling of materials;
- release from the authorization requirements;
- treatment by thermal and mechanical processes.

The minimization of radioactive waste must be ensured, both in terms of volume and activity, by appropriate operating and maintenance practices, both for primary waste resulting from operating and maintenance activities, and for secondary waste resulting from pre-disposal practices.

Proper planning of activities and the use of appropriate equipment for waste handling, so as to control the production of secondary waste, leads to minimizing the volume of radioactive waste produced.

Decontamination of equipment and surfaces (to avoid spreading contamination), together with the control of secondary waste resulting from decontamination activity leads to minimizing the volume of radioactive waste produced.

The reuse and recycling of materials is applied to minimize the amount of radioactive waste produced.

The release of radioactive waste under the authorization regime, together with the reuse and recycling of materials, are efficient methods of reducing the volume of radioactive waste that requires further processing and intermediate and final storage. The release under the authorization regime is made based on the results of the characterization process, the waste being removed from the authorization regime in accordance with the release levels established and approved by CNCAN. The release of radioactive waste resulting from the operation and maintenance activity of Cernavodă NPP is done in compliance with the provisions of CNCAN norms.

Related aspects to the prevention and response mode for accidental pollution cases

To create the lowest minimum risk associated with exposure to ionizing radiation for personnel who are carrying out professional activities, population, and the environment, Cernavodă NPP has continuously developed and improved an emergency response plan on the plant site, which must be approved by CNCAN.

Emergency response measures have been developed and implemented at Cernavodă NPP following the principle of defense in depth, including the necessary actions to maintain, as far as possible, physical barriers for stoppig the release of radioactive materials into the environment, as well as actions to mitigate the radiological consequences of accidents.

Emergency response plans and procedures, technical bases, roles and responsibilities in emergency response, emergency response equipment and facilities, presonnel training, interaction with other organizations were verified in the Nuclear Safety Periodic Safety Review Program in comparison with the recommendations of the relevant standards and guidelines in force, following the CNCAN requirements of the norms and evaluation methods recommended by the IAEA - International Atomic Energy Agency.