MINISTRY OF ENVIRONMENT,
WATERS AND FORESTS

Ref.no. 8096/31.03.2021

To: **Mr. Emil DIMITROV, Minister**
Ministry of Environment and Water
Republic of Bulgaria

Ref.: SEA procedure for the **National Strategy on Medium and Long-Term on the Safe Management of Spent Nuclear Fuel and Radioactive Waste**

Dear Mr. Minister,

Further to your letter dated February 18th, 2021, we have the pleasure to convey to you the answers of the Romanian Nuclear and Radioactive Waste Agency to the questions and remarks sent by letter ED - 39/18.02.2021 regarding the **National Strategy on Medium and Long-Term on the Safe Management of Spent Nuclear Fuel and Radioactive Waste** and **SEA Report.**

Please send us your final answer regarding the mentioned strategy until April 16th, 2021.

We take this opportunity to express our appreciation regarding our fruitful cooperation and our willingness to continue it in the future.

Please accept, Mr. Minister, the assurance of our highest consideration,

MINISTER

Barna TÁNCZOS

Bulgaria's comments on the National Strategy and the Environmental Report

I)

The presented report examines the possible impacts on the environment and human health from the implementation of the strategy, assessing all three options presented in the strategy-the selected reference scenario and two other alternatives. According to the conclusion of the report, prepared on the basis of mathematical analysis and spectral analysis to assess the impact on the environment, including human health, is that the quantitative overall impact corresponds to a negligible impact. The environmental report also envisages measures to prevent/reduce the potential impact on the environment and human health, as well as indicators to be monitored in order to assess the impact after the construction of the sites.

It should be noted that at this stage the location of one of the most important sites has not yet been selected - the future deep geological depot for final storage of spent nuclear fuel and highly active radiological waste, which according to the preferred version of the strategy should be built in 2055, therefore the assessment of the transboundary impact of the strategy cannot be considered final and should be supplemented after the selection of the exact location of this repository.

ANDR:

The Strategic Environmental Assessment (SEA) procedure for the National Strategy, for transboundary impact is taking into consideration the Deep Geological Repository (GDR) for spent nuclear fuel (SNF) and high level waste (HLW), only as a necessary future project, because at this moment of time no decision was taken about the host rock / design concept / location etc. of the DGR.

Taking into account the arguments presented above, the transboundary impact of the National Strategy is final. When the development of the DGR project will advance, ANDR will update the National Strategy accordingly.

II)

In general, the Ministry of Health proposes in the documentation to consider in more detail the possible impact of the implementation of the strategy for the management of spent nuclear fuel and radioactive waste on the health status of the population in the Republic of Bulgaria. In the analysis of the results to pay attention to groups of diseases for which a causal relationship with radiation exposure is allowed. The indicators regarding the assessment of the impact of the implementation of the strategy on human health should also include the conduct of a periodic analysis of the morbidity of this group of diseases for which a causal relationship with radiation exposure is allowed.

INSP:

The Ministry of Health supervises the health status of Romania's population located near major nuclear objectives, including the influence area of Kozloduy NPP (Bulgaria) in connection with the exposure to ionizing radiation, by annual analysis of cancer incidence and mortality rates caused by cancer (the cancer's cases analyzed foreseen only the types which have been proven to be caused /

related to the exposure to ionizing radiations, according to IARC). It is unclear how we could conduct a thorough analysis on the targeted Bulgarian population, since we do not have access to incidence and mortality rates for specific cancers in Bulgaria, nor the demographic data of the population groups referred to.

III)

Additional information should be provided regarding the assessment of seismic risk and possible adverse effects and impacts on environmental factors, in particular groundwater and surface water, and regarding human health as a result of the maximum possible seismic events that may affect the area of the nearest to the northern border of the Republic of Bulgaria depot for final storage of waste with low and medium activity in the "exclusion zone" of Cherna Voda NPP.

ANDR:

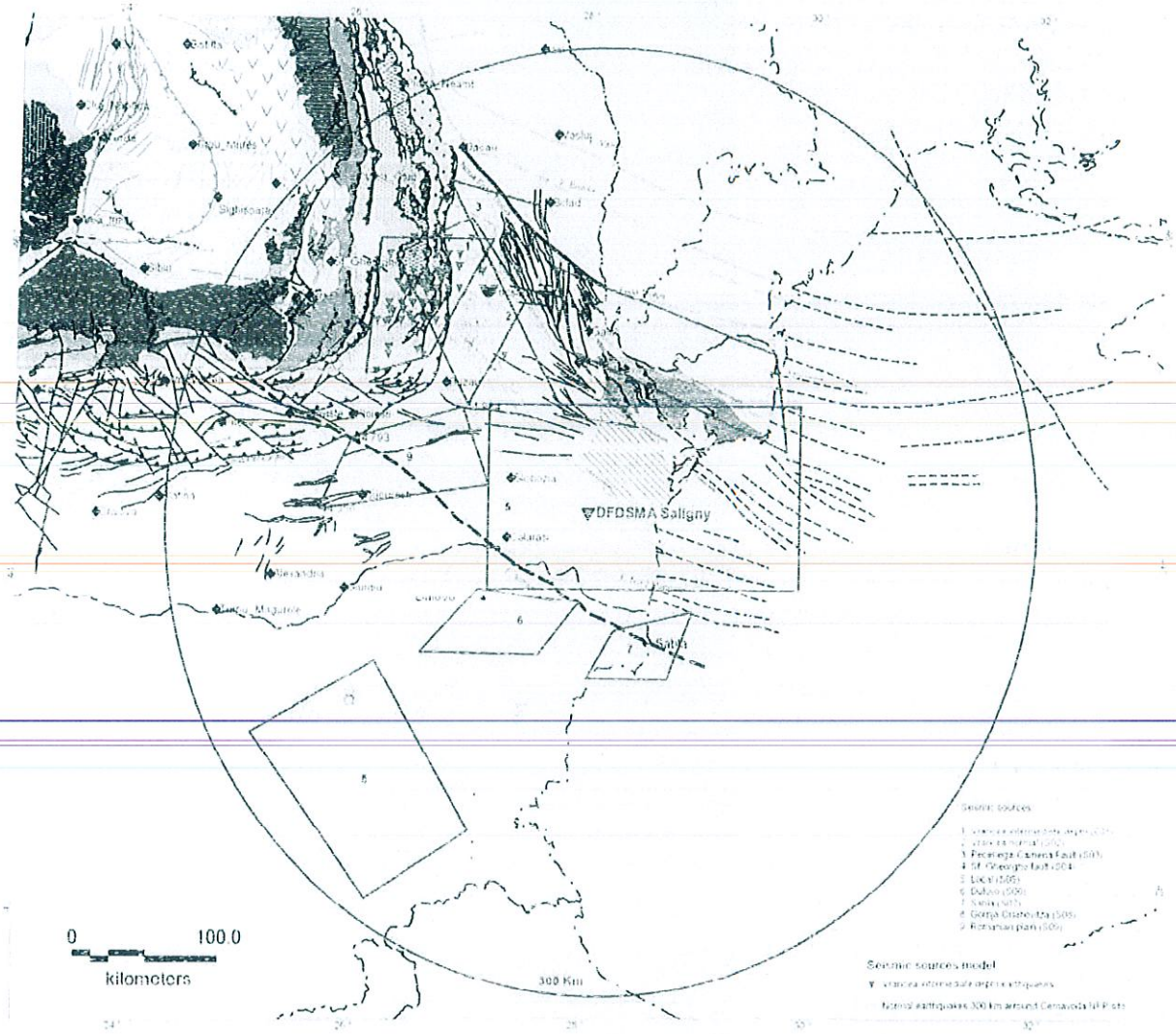
An interactive seismic zonation map of Romania, created by the Research Center for Seismic Risk Assessment, can be accessed on the following links:

- ***https://bit.ly/30tZ5gM (Tc seismic zonation map)***
- ***https://bit.ly/3qobYnm (PGA seismic zonation map)***

Throughout the last couple of years, ANDR focused on defining the geological, tectonic and seismic aspects of DFDSMA's site. In the representation below, you can find all the seismic sources acting on a radius of 300 km from the Saligny site, which have been analyzed to assess the underground conditions.

The Preliminary Assessment Report of the Saligny Site Performances concluded that DFDSMA site is characterized by:

- ***Peak Ground Acceleration (PGA), ag = 0,16 g;***
- ***Corner Period (Tc) of the response spectrum, Tc = 1,0 sec.***
- ***A general tectonic stability, which will not lead to fissures or fractures in the Multiple Barrier System. The underground water is intercepted at great depths, therefore radionuclide's migration will be stopped even in the most pessimistic scenarios with the advantages of the geological conditions (mineral stability, radionuclides retention, sealing proprieties of the clay, low permeability, structural resistance).***



Distribution of seismic sources in Romania, on a radius of 300 km around DFDSMA site

Before implementing the DFDSMA surface repository, we will conduct a thorough review and update of our documentation. Further results of studies and analyzes regarding the Saligny site and the seismic hazard will be inserted at the project planning stage (environmental impact assessment – EIA, of DFDSMA project).

We would also like to mention that Cernavoda NPP is subjected to the same seismic influence as DFDSMA site, taking into consideration the close proximity of the two objectives. Since DFDSMA is a radiological objective, we believe that the safe operation of the nuclear facility, Cernavoda NPP, represents an additional assurance regarding the security and stability of the underground conditions.

IV)

1) The presented National Strategy for Medium and Long-Term Safe Management of Spent Nuclear Fuel (SNF) and Radioactive Waste (RAW) meets the requirements of Art.12 of Directive 2011/170/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste as regards the content of a national SNF and RAW management program. There is room for improvement in order to make the data in the program more complete and more fully in line with the requirements of Directive 2011/70/Euratom.

ANDR:

We took into consideration all of your presented comments. Considering the purpose of the SEA procedure, referring to the revision and the implementation of the National Strategy, we believe it is suitable to present a global overview of the two objectives (DFDSMA, DGR). A more detailed assessment will be presented at the implementation phase of DFDSMA, respectively DGR. However, we hope that the answers we have given, will clarify most of your observations.

2) The document considers one baseline scenario for the implementation of the national program and two alternative scenarios. The baseline scenario (item B.2) envisages extension by 25 years of the life of Units 1 and 2 of Cherna Voda NPP, commissioning and extension of the life of Units 3 and 4, operation and decommissioning of research installations and industrial facilities with sources of ionizing radiation. The alternative scenarios take into account the future construction of a repository for short-lived low and intermediate level waste (NSRF) and a deep geological repository, providing options with a deviation from the schedule for the implementation of the baseline scenario. The construction of these two important facilities for the program should also be mentioned in the baseline scenario with the specific deadlines for implementation. Also, when considering the costs of implementing the scenarios, they should be compared.

ANDR:

We have implemented your observation accordingly, into the National Strategy, section B.2, which presents the reference scenario regarding the safe management of radioactive waste and spent nuclear fuel. Our two main projects, DFDSMA, respectively DGR, have been included in this section.

Regarding the costs, about the alternative scenarios, a comparison of the cost's estimation can be found in section B.2.1, for each intended project. In the future ANDR will be able to provide more information of costs estimations for the reference scenario and the alternative scenarios, once we thoroughly updated the fee for the contribution fund and other techno-economic reports.

3) The presented inventories of SNF and RAW in the annexes to the strategy are current as of 2016. Considering that ANDR prepares annually the national inventory of quantities and types of generated radioactive waste and that licensees report annually the inventories of SNF and RAW is appropriate in the strategy to present such quantities by 2019.

ANDR:

The National Strategy on Medium and Long-term on the Safe Management of Spent Nuclear Fuel and Radioactive Waste has been updated accordingly, with the inventory reported by the end of 2019. The inventory tables can be found in Annex A of the programatic document.

4) The text of the strategy stipulates that ANDR provides post-closure monitoring of spent nuclear fuel and radioactive waste repositories. The presented environmental assessment of the strategy also notes the planned pre-operational monitoring during operation, which should be reflected in the strategy, taking into account the relevant costs for project implementation (pp. 17, 29).

ANDR:

After the siting process is completed for DFDSMA, ANDR will implement a pre-operational monitoring programme, which will be approved by the regulatory body, CNCAN.

The general objective of pre-operational monitoring is to provide the necessary baseline, for determining any measurable increments of contaminants (both radionuclides and toxic chemicals) and radiation in the environment that could be attributable to the disposal facility.

The main objectives of the pre-operational monitoring programme are to:

- ***Provide input data needed for refining the safety assessment;***
- ***Charaterize the radioactivity background for comparison with later monitoring results;***
- ***Characterize the pathways along which would travel any contaminants possibly migrating from the disposal facility;***
- ***Further characterization of the geotechnical and seismic conditions of the site;***
- ***Design the operational (including closure) monitoring programme;***
- ***Collect samples of environmental media for archival purposes.***

5) Taking into account the requirement of Article 12, item 1 (b) of Directive 2011/70/Euratom, it is desirable in the strategy presented by Romania to specify the deadlines for the construction of the intermediate storage facility for long-lived NSRFs in RATEN ICN-Pitesti.

RATEN-ICN:

TRIGA reactors (TRIGA SSR 14MW and TRIGA ACPR) will end their operational lifecycle in 2035. The decommissioning of the research reactors will begin in 2040.

Taking into account that DGR will become operational at the earliest time possible in 2055 and that the closure of DNDR Baita Bihor is foreseen in 2040, RATEN-ICN is taking into consideration the construction of an on-site interim storage facility for LILW-LL, which could become operational in 2040. The new interim storage facility is dedicated for LILW-LL, generated by TRIGA reactors.

6) As the planned for construction facility for processing and conditioning of short-lived NSRF is an important element of the preparation of RAW for disposal in the repository for short-lived NSRF, it is appropriate to include it as a stage in Table 5 with key indicators and deadlines.

SNN:

As presented in chapter B6-6.2 of the National Strategy, technical-economic studies to identify optimum solutions for treatment and conditioning of radioactive waste generated by Cernavoda NPP are under consideration in order to meet criteria for waste acceptance at DFDSMA. In accordance with IAEA standards and international good practices, technical solutions for treatment and conditioning of the Cernavoda NPP waste radioactive waste will be established in correlation with the ANDR's process of developing waste acceptance criteria. A decision process on final solutions for treatment and conditioning of Cernavoda NPP waste to be disposed of at DFDSMA involves all key stakeholders which have performed activities in relation with management of radioactive waste generated by Cernavoda NPP, as mentioned in the National Strategy and including SNN-the owner of Cernavoda NPP, ANDR, RATEN- research entity, Ministry of Energy. Taking into account those presented above, the current radioactive waste management strategy for Cernavoda NPP will be updated for planning the implementation of a final solution for treatment and conditioning of waste in accordance with DFDSMA schedule approved in the National Strategy as well as the detailed planning of ANDR's process of developing waste acceptance criteria. As mentioned in the Introduction of the National Strategy and in accordance with Romanian law, GO 11/2003 on safe management of radioactive waste and safe management of spent fuel, the National Strategy is subject to periodic update. Next update of the National Strategy will present the updated radioactive waste management strategy at Cernavoda NPP in accordance with the approved DFDSMA project.

7) Taking into account the requirements of the European Commission presented in Article 12, item 1 (h) of the Directive, it is desirable, after ANDR has prepared the planned additional assessment of the costs for the implementation of the program, in a new version of the strategy, to present estimates for accumulation and spending of funds in the RAW management and decommissioning funds.

ANDR:

We would like to note that the present Strategy envisages the intention to develop and implement two objectives: DFDSMA and DGR. Considering the purpose of the SEA procedure, referring to the revision and the implementation of the National Strategy, we believe it is suitable to present a global overview of the two objectives (DFDSMA, respectively DGR).

We greatly appreciate your comment and we can confirm that with the development of our main projects, the next version of the National Strategy will include an updated section regarding the costs assessment.

V)

The presented Environmental Assessment Report of the Strategy for Medium and Long-Term Safe Management of RAW and SNF of Romania is comprehensive and covers all aspects of impact. The analyses of the expected impact have been made for the different scenarios of the Strategy implementation, mainly for the envisaged project of a storage facility for low and intermediate level radioactive waste, DFDSMA next to the site of Cherna Voda NPP. All routes of impact, incl. radiological impact during operation and post-institutional control of the repository. Technical and organizational measures have been proposed to ensure the radiation protection of personnel, the population and the environment. The set dose limits guarantee compliance with the dose limits for staff and the general public. Site selection satisfies safety criteria, minimizes the cumulative effect and negligible transboundary impact. An example program for radiation monitoring during operation of the DFDSMA repository is presented.

In order to make the Strategic Environmental Assessment Report more informative and the forthcoming future Environmental Impact Assessment (EIA) procedures for the projects of the National Strategy, we consider it appropriate to supplement the relevant parts of the report, namely:

1) The set dose limit of 0,3 mSv/y for the population for the period of post-institutional control is the same as during operation, which is not justified in view of the reduction of the activity of the radionuclide inventory in the storage and the penetrating radiation from it. Possibly more conservative (lower) limits for the population can be reconsidered and proposed - e.g. 0.1 mSv., Which is the limit for annual individual effective dose for a critical group of the population as a result of a facility for surface disposal of RAW after its closure in the Republic of Bulgaria.

   CNCAN:

   According to the regulations in force the dose limit for public is 1 mSv/year. During the licensing process the regulatory authority may establish dose constrains. For disposal facility the dose constrain is establish at 0.3 mSv/year in planned exposure situation. According to the same regulation for post closure period of a disposal facility the dose constrain is establish at 0.3 mSv/year. It is true, the dose in post closure period should be lower, more information will be presented in the Safety assessment report of the disposal facility.

2) The cumulative effect of the commissioning of new storage projects has not been considered, but only mentions that it is impossible to assess at present and that no potential effect is predicted. From a radiological point of view, it is good to mention the sites that will be included in the assessment of the cumulative effect - existing and future. For greater information, data from the currently available nuclear and radiation facilities in operation, such as Cherna Voda NPP, can be cited, with a major contribution to the formation of the cumulative effect of the effective dose of personnel and the population in the area. In this context, the share of the future repository for short-lived low and intermediate level RAW, DFDSMA is insignificant.

   CNCAN:

The disposal facility is placed in the exclusion zone of Cernavoda NPP. Therefore, it is considered as an individual facility. The cumulative effect of the commissioning of new storage projects is not considered in this case.

The cumulative effect on entire site is considered the cumulative dose is lower than dose limit of 1 mSv/year. For Cernavoda NPP the dose constrain is established at 0.1 mSv/year for each unit assuming that the entire project consists of 5 units. In the meantime, the construction of Unit 5 was definitively abandoned there is enough dose reserve even the cumulation of the dose is considered.

3) Is radiation monitoring of the mentioned constructed network of multiple drilling wells (piezometers) for monitoring of chemical indicators of groundwater performed? For some piezometers, including near the border with the Republic of Bulgaria it is good to provide for radiation monitoring.

ANDR:

Radiation and chemical monitoring of the groundwater will be performed through the existing boreholes network. If we plan on extending the network (including piezometers near the border with the Republic of Bulgaria), we can do so through a constant collaboration with the Romanian Ministry of Water and Forests, in order to obtain datasets for the existing boreholes in the national groundwater network.

4) Table 13 attached to the Report, Monitoring Program, indicates which sites will be subject to radiation control, but does not specify specific indicators that will be tested - e.g. total beta activity, total alpha activity, key radionuclides (3 H, 137 Cs, etc.). It is desirable to supplement the parameters of the monitoring program, taking into account the requirements for the scope of monitoring in Directive 2000/473/Euratom and for drinking water indicators with Directive 2013/51 /Euratom.

INSP:

Regarding the specific radioactive indicators for drinking water, we would like to let you know that the monitoring programme conducted by the Health Ministry is in line with the provisions of Directive 2000/437/Euratom. Therefore, Romania has to report to the European Comission a document which analyzes the quality of the drinking water. Additional parameters of the monitoring programme (conducted by ANDR) will be included in the "Pre-operational Monitoring Programme" of DFDSMA project.