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THE MINISTRY OF ENVIRONMENT OF THE REPUBLIC OF LITHUANIA

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**COMMENTS AND PROPOSALS BY LITHUANIA ON THE EIA REPORT FOR THE
CONSTRUCTION OF A RADIOACTIVE WASTE DISPOSAL AND TEMPORARY
STORAGE FACILITY IN BELARUS**

With this letter, the Ministry of Environment of the Republic of Lithuania provides the comments and proposals submitted by the concerned public authorities and the public of Lithuania on the Environmental Impact Assessment Report for the project of the Republic of Belarus “Construction of a Radioactive Waste Disposal and Temporary Storage Facility” (hereinafter - EIA Report), submitted by the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus on June 30, 2026.

This letter highlights the principal deficiencies that, in Lithuania's view, require substantial revision of the EIA documentation. Detailed comments and proposals submitted by the concerned public authorities and the public of Lithuania are attached to this letter.

1. The scope of the assessment is not sufficient and does not address the radioactive waste management system. We must note that even the scope of the proposed activity is not clearly defined throughout the EIA Report. While the project is formally presented as the construction of a radioactive waste disposal and temporary storage facility, the documentation also refers to radioactive waste treatment, conditioning, incineration, long-term storage of high-level radioactive waste, management of waste arising from spent nuclear fuel reprocessing, transportation and disposal activities. However, these activities are not assessed consistently within the EIA Report.

The proposed facility is intended to manage radioactive waste arising from the operation and decommissioning of the Belarusian Nuclear Power Plant (hereinafter - BNPP), as well as other radioactive waste streams. Consequently, the proposed activity should be assessed as part of the broader radioactive waste management system associated with the Belarusian nuclear programme. Therefore, Lithuania considers that the EIA Report does not provide a sufficiently comprehensive assessment covering all relevant stages of radioactive waste management and their environmental implications.

2. Cumulative impacts have not been adequately assessed. Lithuania considers that the assessment of cumulative impacts is insufficient. The proposed facility is intended primarily to manage radioactive waste generated during the operation and future decommissioning of BNPP. Therefore, BNPP and the proposed Radioactive Waste Disposal and Temporary Storage Facility (hereinafter - RWDF) represent functionally interconnected components of a single nuclear infrastructure system. Nevertheless, the EIA Report mostly evaluates the RWDF in isolation.

The report does not provide sufficient assessment of cumulative impacts arising from:

- routine releases from BNPP and the RWDF;
- radioactive waste generated during operation, spent fuel management and decommissioning activities;
- cumulative impacts on transboundary groundwater and surface water systems;
- combined accident and post-accident scenarios;
- cumulative environmental impacts during operation, closure and post-closure periods.

In Lithuania's opinion, this is inconsistent with Appendix II of the Espoo Convention, which requires a description of likely significant effects of the proposed activity, including cumulative effects.

3. Consideration of reasonable alternatives is not substantiated and no reasons for selecting the preferred option are provided. The assessment of alternatives in the EIA Report does not provide sufficient information about the criteria for selecting reasonable and preferred alternatives. Moreover, EIA Report does not clearly explain how the criteria were applied throughout the site selection process. Different sections of the EIA Report appear to use different site selection criteria, and in several cases the EIA Report refers to a selection criterion as “not identified”.

Lithuania further notes that important issues relating to seismic hazards, active and neotectonic faulting, differential tectonic movements, hydrogeological conditions and long-term geological stability are insufficiently substantiated and the information provided does not allow verification that all alternatives satisfy minimum safety requirements. Therefore, there are doubts as to whether all of the alternatives considered in the EIA Report can be regarded as “reasonable”.

Consequently, Lithuania considers that the EIA Report does not fully meet the requirements of Appendix II of the Espoo Convention regarding the consideration of reasonable alternatives.

Three possible sites for RWDF are considered without any clear definition of the criteria that would be applied to choose a specific alternative. We strongly believe that the EIA process shall provide a transparent and well-justified basis for identifying and selecting the preferred alternative(s), through a comparison of their potential environmental impacts. This issue is particularly important in the context of transboundary EIA, as the selection of a location alternative may significantly influence the potential environmental impacts from the perspective of a particular Concerned Party.

4. The transboundary impact assessment does not provide sufficient information to evaluate impacts on the environment of Lithuania. Information provided in the EIA Report does not provide sufficient evidence to conclude that there will be no significant adverse transboundary impact on the environment of Lithuania.

A fundamental concern is that many conclusions presented in the EIA Report are just statements and cannot be independently verified because key assumptions, parameters and input data used in the assessment are either absent or insufficiently described. This applies, *inter alia*, to radionuclide inventories, activity levels, concept of disposal, waste acceptance criteria, engineered barrier characteristics, radionuclide migration parameters, groundwater transport assumptions, accident source terms and public dose calculations.

There are particular concerns with respect to:

- long-term radionuclide migration through groundwater;
- impacts on transboundary groundwater systems and the Neris/Viliya River Basin;
- impacts resulting from water discharges and air emissions;
- treatment and incineration of radioactive waste;

- assessment of transboundary impacts during the post-closure period;
- evaluation of uncertainty associated with long-term environmental modelling.

Lithuania notes that one of the preferred alternatives is located within the transboundary Neris/Viliya river catchment and approximately 40 km from Vilnius – the capital of Lithuania. Nevertheless, the EIA Report does not provide sufficient analysis of potential transboundary consequences for Lithuanian groundwater resources, surface waters, ecosystems and the population.

Furthermore, the long-term safety assessment presented in the EIA Report is too general and does not provide sufficient information on the evolution scenarios of the facility, radionuclide release mechanisms, performance of engineered and natural barriers, exposure pathways, uncertainty analyses or long-term environmental consequences. As a result, Lithuania is unable to verify the conclusion that radiological impacts will remain within acceptable limits throughout the period during which the waste remains hazardous.

5. Accident analysis is incomplete. Lithuania considers that the accident analysis presented in the EIA Report is incomplete. The assessment appears to focus on selected accident scenarios involving certain radioactive waste packages, while other potentially relevant and credible accident scenarios have either not been assessed or have been assessed only partially. The EIA Report does not adequately address accidents involving high-level radioactive waste, long-lived intermediate-level waste, radioactive waste treatment facilities, failures of filtration systems, severe transport accidents or impacts on storage facilities.

In addition, the EIA Report does not provide sufficient information regarding radionuclide-specific releases, source terms, modelling assumptions and input parameters used to assess radiological consequences.

6. The Non-Technical Summary is insufficient. We would like to reiterate that, although the Ministry of Environment of Lithuania, acting as the authority responsible for coordinating the transboundary EIA process under the Convention on Environmental Impact Assessment in a Transboundary Context (hereinafter - the Espoo Convention), has published the documentation received, together with a Lithuanian translation prepared by the Ministry, on its website, thereby providing the public with an opportunity to submit comments and proposals, the non-technical summary of the EIA Report does not provide the key information necessary for the public to understand the Project and its likely environmental impacts. Furthermore, it does not fully comply with the information requirements set out in Appendix II to the Espoo Convention for the purposes of ensuring adequate and effective public participation.

A non-technical summary should enable competent authorities, stakeholders and members of the public in affected Parties to understand the nature of the proposed activity, its environmental implications, associated risks and the basis for the conclusions reached by the assessment.

However, the non-technical summary does not adequately explain:

- the quantities and characteristics of radioactive waste to be managed;
- cumulative impacts;
- accident scenarios and their potential consequences;
- long-term safety considerations;
- transboundary impacts on neighbouring States;
- uncertainties associated with the radiological, geological and hydrogeological assessments.

Instead, the non-technical summary largely provides a set of statements without providing sufficient information regarding the underlying assumptions, limitations and uncertainties. As a

result, it does not adequately support informed participation by affected authorities and the public in the environmental decision-making process.

In view of the above, Lithuania considers that the identified deficiencies are fundamental and directly affect the ability of the affected Party to determine whether the proposed activity may cause significant adverse transboundary impacts within the meaning of Article 1(vii) and Appendix III of the Espoo Convention. Therefore, Lithuania considers that the current EIA Report does not meet the requirements of the Espoo Convention and cannot serve as an adequate basis for meaningful transboundary consultations.

In particular, the EIA documentation:

- does not provide a sufficiently comprehensive cumulative impact assessment;
- does not prove that the analysed alternatives are reasonable and does not provide an objective selection of a preferred alternative;
- does not provide an adequate basis for assessing long-term environmental safety;
- does not contain sufficient information to evaluate potential transboundary impacts on Lithuania;
- does not adequately assess all relevant accident scenarios; and
- does not provide a sufficient non-technical summary enabling effective public participation.

In conclusion, taking into account all the comments and questions submitted, Lithuania considers that extensive supplementary information and a comprehensive revision of key sections of the EIA Report should be provided to Lithuania as an affected Party before consultations can effectively fulfil their purpose under Article 5 of the Espoo Convention.

Therefore, while Article 5 of the Espoo Convention provides for the duration of the consultation period to be agreed upon by the Parties, the five-month timeframe proposed by Belarus should begin only upon submission of the complete and duly supplemented EIA documentation, which fully complies with the requirements of the Espoo Convention (Article 4, Article 5 and Appendix II) and provides a sufficiently basis for assessing potential transboundary impacts.

Vice-minister

Giedrė Ričkutė

ENCLOSURE: Comments and proposals by Lithuania on the EIA report for the construction of a radioactive waste disposal and temporary storage facility in Belarus, 34 pages in English

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COMMENTS AND PROPOSALS BY LITHUANIA ON THE EIA REPORT FOR THE CONSTRUCTION OF A RADIOACTIVE WASTE DISPOSAL AND TEMPORARY STORAGE FACILITY IN BELARUS

I. Ministry of Energy of the Republic of Lithuania

1. “2.3 *Purpose and Need for the Proposed Activity*.”: The EIA Report assumes that spent nuclear fuel (SNF) will be reprocessed and that the resulting high-level radioactive waste will be stored for the long term pending the availability of a deep geological repository. However, the economic viability of SNF reprocessing remains uncertain and may depend on future technological, market, and policy developments. Should Belarus revise its policy and opt for the direct disposal of SNF rather than its reprocessing, this could significantly affect the projected quantities, characteristic, and management requirements of radioactive waste. What measures have been proposed to ensure that the Radioactive Waste Disposal and Temporary Storage Facility would remain suitable under such circumstances, and how has this scenario been assessed?

2. “2.6. *Protective Barrier System*”: No information is provided on the service life of the engineering barriers. What degradation periods were assumed for the following components: concrete, waste containers, barrier clay material and the drainage system?

3. “6 *Description of the Main Sources and Potential Types of Environmental Impact*”: Please specify: the planned operational lifetime of the storage facility for waste arising from spent nuclear fuel reprocessing, the expected schedule for the construction and commissioning of a deep geological repository for long-lived, high-level radioactive waste, and the contingency measures that would be implemented if the repository were not available within the planned timeframe;

4. “9.2. *Assessment of the risk of emergency situations at the RWDF*”: The assessment of emergency scenarios appears to be incomplete. The following scenarios do not appear to have been considered: fire in the radioactive waste processing building, forest fire, loss of external power supply.

5. “10. *Assessment of Potential Significant Adverse Transboundary Environmental Impact Resulting from the Implementation of the Planned Activity*”: The EIA Report either omits or does not provide a sufficiently detailed analysis of the potential transport of radionuclides through hydrogeological pathways into the catchment area of the transboundary Vilija (Neris) river, including the territory of the Republic of Lithuania. No results are provided from long-term modelling of radionuclide migration in groundwater and surface waters within the river Vilija basin during the operational, decommissioning and post-closure phases of the facility.

Could radionuclide concentration calculations be provided for the Belarusian-Lithuanian border and for monitoring points within river Neris basin for assessment periods of 100, 1,000 and 10,000 years?

6. “11. *Proposals for the Post-Project Analysis (Local Monitoring) Program Table 11.1*”: The frequency of ambient air monitoring (once per year), as indicated in Table 11.1, does not appear to be sufficiently representative and may not allow for an objective assessment of the facility’s potential impact on the ambient air. Please provide justification for the selected monitoring frequency or consider increasing the frequency of measurements, taking into account seasonal and meteorological factors.

7. “11. *Proposals for the Post-Project Analysis (Local Monitoring) Program*”: Will monitoring points be established:

- near the state border with the Republic of Lithuania,
- on the Vilija (Neris) river upstream of its entry into Lithuania,

and, following the closure of the facility, will monitoring at these locations continue throughout the entire period during which the facility may present a potential hazard?

II. State Nuclear Power Safety Inspectorate

1. Chapter 1 of EIA Report states that: "...ILW-SL and LLW-LL shall be disposed of in near-surface disposal facilities located at depths of up to 100 metres;"; also "...The **conceptual design of the facility was developed** by CPTI (Central Planning and Technological Institute) JSC and comprises 31 buildings and structures." The Report does not provide any description of the buildings and structures, parameters of planned buildings and structures as well as parameters of radioactive waste treatment facilities (for example, incineration capacity) or concept of disposal facility. At the same time the Chapter 2.6 of Report provides description of engineering barriers of the disposal facility applied to a near-surface disposal facility on surface. The Report does not provide any concept of disposal of ILW-SL.

2. Classification of radioactive waste is described in section 4.1. Please explain how both radioactive waste might be classified as ILW when containing radionuclides with half-lives of up to 31 years and at the same time when containing radionuclides with half-lives exceeding 31 years. Also please explain how is radioactive waste sorted in practice based on the classification criteria presented in the table 4.2 – specifically, the specific activity criteria for beta emitters, alpha emitters (excluding transuranic ones), and transuranic alpha-emitting radionuclides?; how are these criteria determined – for instance, do they take into account the activity concentration limit values for individual radionuclides that are typically established in repository acceptance criteria? Also, it should be noted that categorisation of sealed radioactive sources is used for application of those sources purposes. Once DSRS are declared as radioactive waste, classification system of radioactive waste shall be applied.

3. Chapter 1 (page 9)) of EIA Report states that: „RWDF radiation safety during normal operation is ensured by keeping the gamma-ray dose rate at heights of 3–4 cm and 1 m above the facility's top shielding layer within established limits.“ Please indicate those limits and explain what kind of radiation safety criteria is used. Also, it is stated: „The adopted biological shielding for the radioactive waste disposal facility for Radiation Hazard Classes II, III, and IV (ILW-SL, LLW, and VLLW) will ensure public radiation safety.“ Again, no criteria and explanation is provided.

4. Table 2.1 (page 13). In accordance with provisions of GSG – 1 of IAEA content of long lived radionuclides (half-lives exceeding 31 years) shall be limited, also waste that contains long lived radionuclides concentration of which exceed those limits is not intended to be disposed in near surface disposal facility. Please explain how the radioactive waste will be sorted for disposal and for storage? What set of criteria is used for sorting, storage and disposal of ILW?

5. The Report states that DSRS of categories 3-5 are considered to be disposed of in the disposal facility. Please describe what is concept of disposal of DSRS, on the basis of which safety assessments is this declaration concluded.

6. Chapter 2.5.2, 2.1 figure of the EIA Report shows that substantial amount of ^{51}Cr and ^{65}Zn are produced by NPP. Those radionuclides might have impact on exposure to workers and public during operation stage of the facility, but those radionuclides are not provided in table 2.3. Please explain why those radionuclides were excluded from the list. Please provide justification of proposed list of radionuclides that was used in assessment.

7. Chapter 2.5.4 of EIA Report states that „For assessing radiation impacts on the population in the event of accidents at the RWDF, the NZK-150-1.5P container is recommended as the reference package.“ In the same chapter it is stated that the same container can be used:

- “for packaging Class II RW with a half-life exceeding 31 years, intended for temporary storage;

- for packaging Class II RW with a half-life of up to 31 years, intended for disposal at a Near-Surface RWDF (NSRWDF)

- for packaging combustible Class III and IV RW intended for disposal at an NSRWDF;“

It is unclear what type of RW was used to assess the impact on population. Also, it is not explained why only those two radioactive waste packages are considered in the evaluation.

8. It is stated in Chapter 2.5.4: “The waste acceptance criteria for disposal are set out in Resolution No. 47 of the Ministry for Emergency Situations of the Republic of Belarus, dated July 16, 2019“, but criteria are not provided and discussed. The EIA Report shall assess how those criteria are met.

9. Chapter 2.6 provides general description of engineered barriers but does not provide any parameters that were used in assessment of the environment impact.

10. It is stated in chapter 2.8 of EIA Report (page 23): “If a delivered container fails to meet the established acceptance criteria, a decision will be made on its further handling”. Please explain how and where further handling of the container will be organized. There shall be appropriate equipment for the repackaging of the container if needed. It is not clear whether such equipment will be at RWDF or not.

11. Page 23: Please explain whether repackaging of Class I radioactive waste container will be performed at RWDF site?

12. It is stated in chapter 2.9 of EIA Report (page 24) that dose limit of 1 mSv and its associated risk are regarded as criteria that must not be exceeded. The same safety criteria are mentioned in chapter 7.8.3 of EIA Report. According to IAEA recommendations 1 mSv is annual effective dose limit for the public. This limit refers to the maximum amount of ionizing radiation that members of the public could receive from all the sources of ionizing radiation in planned exposure situations. Design criteria for one source of radiation (i. e. RWDF) could not be the same as design criteria for all the sources of radiation and for single radiation source dose constraint shall be used as design criteria.

13. Chapter 2 “General Description of the Proposed Activity“ ends with description of construction stage of the facility. All phases of the proposed activity e.g. commissioning, operation of storage and disposal, closure and post closure periods shall be included in this chapter.

14. In chapter 5.1.1 it is stated that “According to the data ... of the Republican Centre for Hydrometeorology, Radioactive Contamination Control and Environmental Monitoring State Institution of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus the background concentrations of pollutants in the atmospheric air at the Aveny Village of the Ostrovets District of the Grodno Region as of June 2025 are below the specified maximum allowable concentration (MAC)”. In the other paragraph it is stated that “According to the data of the Republican Centre for Hydrometeorology, ... the background concentrations of pollutants in the atmospheric air at the Volovniki Village of the Mstislavl District of the Mogilev Region as of January 2026 are below the specified maximum allowable concentrations” and the same date was used for the Novoselki Settlement of the Khoyniki District of the Gomel Region. Please explain why different dates of the same report were used to analyse the data for Ostrovets District.

15. It is stated in chapter 7.8.3 of EIA Report (page 192): “The radiation safety criteria presented in Table 7.5 shall be confirmed in the analysis of normal operation and after closure of the RWDF. In addition, an assessment of the consequences of radiological emergency at the RWDF shall be performed in accordance with the emergency response criteria”. The safety criteria are provided in EIA Report, although there is no assessment of the public exposure in the normal operation phase.

16. It is stated in chapter 7.8.3.1 of EIA Report (pages 192-193): “The assessment of the consequences of DBA and BDBA was performed based on data on annual effective doses (hereinafter — AED) to the public, since beyond the RWDF site boundary the effective dose to the public does not exceed the general response criterion even on an annual basis — 100 mSv.” It is not clear why 100 mSv criterion for DBA and BDBA was chosen (see page 193). According to provisions of IAEA publications SSR-5 and GRS Part-5 measures are taken to prevent the occurrence of incidents or accidents, and that provisions are made to mitigate the consequences if accidents occur. 100 mSv criterion cannot be considered as a proper design criterion for DBA and this criterion cannot represent minor significance of radiological consequences for public.

17. It is stated in chapter 7.8.3.1 of EIA Report (page 193), that activity release in case of DBA and BDBA was calculated using SAFRAN code and for modelling of the radionuclide migration and dose calculation AFRY code was used. It is unclear whether the assessment was properly conducted, since the EIA Report does not provide any input data. It is not clear what activity release was estimated, what exposure pathways were taken into account and what input parameters were used for public dose calculation (meteorological, habit, nutrition and other data for calculation). Same remarks apply also to the chapter 10 of the EIA Report.

18. Page 193: It is stated, that “The assessment of the consequences of radiological emergency was performed taking into account the destruction and fire of waste containers NZK-150-1.5P containing radioactive waste with the highest total activity (Class II (short-/medium-lived), Class III radiation hazard), intended for disposal in the RWDF”. Please explain why assessment of the radiological consequences has not been performed for containers containing Class I or Class II long lived radioactive waste, given that an accident involving these containers could potentially result in more serious radiological consequences?

19. Chapter 7.8.3.1 of EIA Report states that “Within this section, the results of the assessment of radiological emergency at the RWDF with the most severe consequences for the public among all analysed scenarios are presented:

....

- additionally, a scenario involving the crash of a heavy aircraft with a mass of 400 t and 70 t of fuel, with fire of radioactive waste containers (release — 7.26×10^9 Bq).“

This section of the EIA Report does not contain any information regarding impact assessment data nor results of this scenario. Please provide the corresponding information.

20. Page 195: Please provide a number of damaged radioactive waste packages assumed in analysis of the event of crash of 5-ton aircraft and duration of the fire induced by crash.

21. In chapter 7.13 very brief description of assessment of environmental impact during the post-operational stage is provided. This assessment is site specific and depends on soil characteristics, the level of ground water and its long term changes, the distance to the nearest bodies of water etc. It is stated in the EIA Report: “Conclusion: According to the report “Preliminary Assessment of Long-Term Safety,” under the normal evolution scenario of the RWDF, the conducted long-term safety assessments demonstrated that the expected dose levels will not exceed the regulatory limits at the site boundary over the period during which the waste retains potential hazard. The predicted average annual levels of radionuclide exposure to the population decrease with increasing distance from the disposal modules”. No parameters of normal evolution scenario and stages of post closure surveillance are provided in the report. It is unclear how the assessment was carried out and there is no evidence that specifics of each site were taken into account during this assessment.

22. Page 225: Please provide a number of damaged radioactive waste packages assumed in analysis of the event of crash of a heavy aircraft and duration of the fire induced by crash.

23. Table 11.1 of chapter 11.1 of EIA Report suggests the radiological monitoring frequency of air and water once per year. Since it is mentioned in the EIA Report (Table 7.5 of chapter 7.8.3) that radiological impact on population is expected during normal operation it is unclear why such low frequency is suggested.

24. Table 12.1 compares the sites and then conclusion that all sites are suitable is provided, but criteria are not provided. Table 12.1 consist of titles of criteria but not values.

25. Chapter 12.2 of the EIA Report states "...Based on a comparative analysis of natural and additional conditions characterising the alternative sites for RWDF siting, compliance of each of the specified sites with the requirements has been determined...." But there is no description of the requirements. Please provide information on requirements established for siting.

26. Chapter 13 of the EIA Report states that "IAEA Publication 1449 2.11 states that: "During normal operation of a radioactive waste disposal facility, no releases of radionuclides are expected or only very minor releases (such as small amounts of gaseous radionuclides) may occur, and therefore there will be no significant radiation doses to members of the public." Since it is mentioned in the EIA Report (Table 7.5 of chapter 7.8.3) that radiological impact on population is expected during normal operation, the conclusion in chapter 13 of EIA Report "Within the system of existing uncertainties, the environmental impact assessment of the proposed activity should be considered satisfactory." is incorrect.

27. Hence, the Report does not consist of assessment itself, initial modelling assumptions, parameters of technologies and engineering barriers (it is described on comments above), also it is not clear whether environment impact assessment of processing and storage of radioactive waste were included, it is impossible to assess the validity of the statement of chapter 13 above.

III. Radiation Protection Centre

1. Although Section 7.1 of the EIA Report (p. 161) states that *"The radiation impact on ambient air during the RWDF operation period will be insignificant, as the RWDF buildings and structures where radioactive waste management takes place are equipped with supply and exhaust ventilation with mechanical and natural induction"*, and Section 7.2 (p. 164) states that *"Radioactive contamination of surface water bodies by the RWDF wastewater is excluded by the technological water systems"*, it should be noted that the use of equipment and technologies alone does not ensure that radioactive substances from the planned economic activity in Belarus – the radioactive waste disposal and interim storage facility (hereinafter – the RWDF) – will not be released into the environment. Other comprehensive measures are also necessary.

The EIA Report does not provide information on the monitoring of releases to air and water from the RWDF. In accordance with the safety requirements of the International Atomic Energy Agency (hereinafter – the IAEA), monitoring of releases to air and water from the RWDF should be carried out. Therefore, the EIA Report should be supplemented with a description of the arrangements for monitoring such releases.

2. Table 7.5 of the EIA Report (p. 190), which sets out the dose assessment criteria under normal operating and accident conditions, specifies the public dose limit (effective dose) as *"1 mSv per year averaged over any consecutive 5-year period, but not exceeding 5 mSv in any single year"*.

Under the IAEA Safety Requirements (IAEA GSR Part 3), the public dose limit (effective dose) for planned exposure situations is set at **1 mSv per year**. Under special circumstances, a higher

effective dose may be permitted in a single year, provided that the average effective dose over five consecutive years does not exceed 1 mSv per year.

Therefore, in accordance with the IAEA safety requirements, the public dose limit (effective dose) specified in Table 7.5 of the EIA Report should be amended accordingly.

3. Section 5.8 of the EIA Report (p. 135) states that: *“The investigation of radiological conditions in the area of Site 2-1 location was performed based on the analysis of historical radiation monitoring data within the National Environmental Monitoring System (NEMS)”* and *“The analysis of data over the 5-year period from the ambient air radiation monitoring OPs within the area of impact of the Belarusian NPP allows for the conclusion that multi-year DR indicators are stable”*.

It should be noted that an analysis of ambient air monitoring data covering only the most recent five-year period cannot provide a sufficient basis for drawing conclusions regarding the potential impact of the Belarusian NPP on ambient air, as the monitoring period coincides with the operational period of the Belarusian NPP.

In order to draw conclusions regarding the potential impact of the Belarusian NPP on ambient air, data covering a longer period should be analysed. Therefore, the EIA Report should be supplemented with a description and analysis of longer-term ambient air monitoring data for the Site 2-1 location, including an assessment of the potential influence of the Belarusian NPP.

4. Section 5.8 of the EIA Report (p. 136) analyses surface water and soil monitoring data for the Site 2-1 location covering the most recent five years. Such data cannot demonstrate the potential influence of the Belarusian NPP.

It would therefore be appropriate to analyse longer-term monitoring data for surface water, soil and drinking water at the Site 2-1 location, taking into account the potential influence of the Belarusian NPP, and to supplement the EIA Report accordingly.

In addition, the data provided for the Site 2-1 location are highly aggregated. For a more accurate assessment, the EIA Report should provide more detailed monitoring data for ambient air, surface water, soil and drinking water at the Site 2-1 location.

5. Section 7.2 of the EIA Report (p. 163) states that: *“The discharge of industrial wastewater together with domestic or surface runoff is not provided for, except for the routine draining (during maintenance or servicing works) of waterfilled equipment of the process building in a volume of up to 357.5 m³/day, with the quality of the drained water corresponding to the quality of the drinking water used in the RWDF household-drinking water supply system”*.

The World Health Organization's requirements for drinking water are established with regard to public exposure resulting from naturally occurring and artificial radionuclides present in drinking water.

Wastewater from the RWDF, particularly industrial wastewater, may contain radionuclides characteristic of the RWDF that differ from those present in drinking water. The requirements applicable to drinking water and wastewater differ in their regulatory nature and purpose, as well as in terms of exposure assessment. Therefore, drinking water requirements cannot be applied to wastewater.

The EIA Report should be amended accordingly so that the assessment of wastewater discharges is not based on drinking water requirements.

6. Table 11.1 of the EIA Report (pp. 227–229), which sets out the proposed environmental monitoring programme during RWDF operation:

6.1. does not include monitoring of gamma dose rate, airborne aerosols, deposition (only snow is planned to be monitored) or groundwater within the sanitary protection zone (hereinafter – the SPZ), although such monitoring within the SPZ would enable the earliest possible detection of any significant potential impact of the RWDF.

Therefore, Table 11.1 of the EIA Report should be supplemented with monitoring of gamma dose rate, airborne aerosols, deposition (rather than only snow, as currently proposed) and groundwater within the SPZ.

6.2. states that measurements of alpha, beta and gamma radiation or measurements of gross alpha and gross beta activity concentrations are planned to be carried out in wastewater, surface water and groundwater.

As measurements of alpha, beta and gamma radiation and gross alpha and gross beta activity concentrations, as currently planned, are not sufficiently accurate and sensitive and may not provide timely detection of the potential impact of the RWDF, monitoring of the activity concentrations of individual radionuclides characteristic of the RWDF should also be carried out in wastewater, deposition, surface water and groundwater.

Therefore, Table 11.1 of the EIA Report should be supplemented with measurements of the activity concentrations of individual radionuclides characteristic of the RWDF in wastewater, deposition, surface water and groundwater.

6.3. The monitoring of ambient air, surface water and deposition is proposed to be carried out only once a year, which is considered too infrequent.

To ensure timely response and the representativeness of the monitoring data, the frequency of monitoring of ambient air, surface water and deposition specified in Table 11.1 should be increased.

7. The EIA Report provides insufficient information on the planned radiological environmental monitoring during the decommissioning of the RWDF.

The EIA Report should therefore be supplemented by specifying how radiological environmental monitoring is planned to be carried out during RWDF decommissioning.

8. In Tables 5.6–5.12 of the EIA Report (pp. 77–99), some gross alpha and gross beta activity concentration values are reported as 0.0 Bq/l.

Where the measurement results are below the detection limit, it is recommended that the results be reported as **below the detection limit**, together with the applicable detection limit value, rather than as 0.0 Bq/l.

9. Section 7.1 of the EIA Report (p. 161) states that *“The height of the vent stack ensures the reduction of the radioactive concentration in the ambient air at the point of plume touchdown to levels not exceeding the public dose limit established by the legal and technical regulatory acts of the Republic of Belarus”*.

It cannot be concluded that the public dose limit will not be exceeded solely as a result of the use of high stacks. A combination of comprehensive measures is required to achieve this objective. It is therefore recommended that this sentence be amended accordingly.

IV. Lithuanian Geological Survey

General

1. Schemes of location of alternative sites are of different scale and different legends are used. Therefore, it is difficult to compare the spatial data of the sites.

2. All alternatives are described as sites for the radioactive waste (RW) landfill. However, the planned activity contains the storage of high level RW.

3. It is not clear why the exclusionary and adverse factors/criteria in the Environmental Impact Assessment (EIA) Report in the table 4.5 differs from the criteria defined in the table 12.1. The consistent information should be provided.

4. The meaning of the criteria evaluation “not identified” is not clear. This could mean the absence of the features and absence of the data (“no data”).

Geology and tectonics

5. The surface (Quaternary) geological conditions are described like suitable for the planned activity, however, the marginal glacial and glacio-fluvial deposits are horizontally and vertically changeable that influences very much the possibility to predict real parameters of soils.

6. There is no explanation why the sites have not been investigated taking into account all the adverse factors/criteria in table 4.5: e.g. criterion “*Fracture zones*” (criterion 7) is not assessed for no one site in the EIA Report.

7. The conclusions that the important sites’ suitability criteria: „*Presence of neotectonically active zones identified by other investigation methods*“ and „*Identification of geotectonic faults based on investigations carried out in 2024–2026*“ 9 (table 12.1) are “not identified” **are not confirmed**, as:

a. for the site 2-1 there is a lack of justified information on structural relationship of site’s faults with active seismogenic Oshmyany fault (e.g. Oshmyany zone of potential earthquake page 169) and its tectonic activity assessment;

b. it is not explained what is assumed under “*active*” “*fault*” in terms of geological timing and tectonic activity;

c. there is no information what are the factors, timing and critical values for fault and or neotectonic fault to be considered as “active”;

d. it is no timing of the „neotectonic“ period provided;

e. there is no methods for determination of “*active fault*”, “*neotectonically active zone*” and “*geotectonic faults*” described in the IER Report, thus the statements that *Presence of neotectonically active zones identified by other investigation methods*“ and „*Identification of geotectonic faults based on investigations carried out in 2024–2026*“ are “not identified” are not motivated;

f. it is not explained what are differences between “*active fault*”, “*neotectonically active zone*”, “*fracture*”, “*tectonic fault*” and “*geotectonic fault*”, as all these terms are used in the IEA Report and it is not clear if these are the same tectonic structures and processes, or different;

g. it is not explained why „*Identification of geotectonic faults*” is only *based on investigations carried out in 2024–2026* and no data of earlier investigations have been used.

The clear information, assessment and data should be provided.

8. There is no explanation of capability of faults in/adjacent to sites as defined in the IAEA documents.

9. There are no data-based explanation why the exclusionary factors/criterion “*Sites where the intensity of the maximum credible earthquake exceeds ? points on the MSK-64 scale*” are set to high 8 points on the MSK-64 scale that indicated rather high seismic hazards - e.g. 0,1-0,2g? The clear information should be provided.

10. There is no explanation why 2 sites that have the adverse factors/criterion e.g. „intensity of the maximum credible earthquake is between 6 and 8 points on the MSK-64 scale“ or site 1-5 that is located within Pripyat earthquake source zone have been selected among 3 best suitable alternatives?

11. There is no critical values of differential tectonic movements set for the adverse factors/criterion “Sites where differential tectonic movements have been identified during the Quaternary period, but which are not located on active faults.”, thus, it is not clear what velocity of differential earth crust movements is allowed within the sites of RWDF?

12. For site 2-1 the horizontal movements of the earth crust with velocity of movements along the Korelichy Fault of about 40 mm/year and vertical movements with velocity amplitude reaches 12–20 mm/year within active fault zone are very high, thus without this critical value it is not clear how site 2-1 and site 1-5 are considered as suitable candidates RWDF construction?

The justification has to be provided.

13. There is no data in the EIA Report for „differential tectonic movements identified during the Quaternary period“, as for the sites 2-1 and 1-5 only data and assessment of „modern movements“ are provided.

The clear information should be provided.

14. There is a contradictory information is provided for site 2-1 in terms of presence in the active faults: e.g. in page 169 it is stated that “Within the **zones of faults active at the latest stage**, the velocity amplitude reaches 12–20 mm/year.”, but in the table 12.1 there is stated that “neotectonically active zone” is “**not identified**”. Moreover, there is not clear what is considered as “latest stage” in terms of timing.

The clear information has to be provided.

15. It is not explained why only “archival data on modern vertical movements of the Earth's crust (MVMEC) for the period of years 1913–1979” have been used for determining the velocity of modern movements of the Earth's crust for the site 2-1, whilst the recent instrumental measurements of movements data in the vicinity of the Belarusian Nuclear Power Plant (page 233) are available. Why these data have not been used for assessment of modern vertical movements for site 2-1?

The information has to be provided.

16. The Environmental Impact Assessment (EIA) Report presents seismic hazard in terms of MSK-64 macroseismic intensity values. In accordance with current IAEA guidance on seismic hazard assessment for nuclear facilities and radioactive waste disposal facilities : e.g. 1) IAEA Safety Standards Series No. SSG-9 (Rev. 1), Seismic Hazards in Site Evaluation for Nuclear Installations (2022); 2) IAEA Safety Requirements No. SSR-5, Disposal of Radioactive Waste (2011); 3) IAEA Safety Guide No. SSG-14, Geological Disposal Facilities for Radioactive Waste, it is required that the seismic hazard characterization be supplemented with ground-motion parameters, including Peak Ground Acceleration (PGA), spectral accelerations, response spectra and the corresponding annual probabilities of exceedance.

17. Presentation of seismic hazard solely in terms of macroseismic intensity does not provide sufficient information for assessing the potential impact of seismic events on repository structures, engineered barriers and long-term repository safety functions, or for the comparance with the seismicity and seismic hazards of the adjacent territories.

The clear information has to be provided.

18. The seismic hazard assessments for all three potential sites are based on the General Seismic Zoning Map of Northern Eurasia (GSZ-97D) and on the maximum credible earthquake (MCE) with a recurrence interval of 10,000 years (corresponding to an annual exceedance probability of 10^{-4}). However, this approach not fully reflects the current state of knowledge, as the GSZ-97D map was developed using seismic data available up to 1997 and does not appear to account for the two strongest earthquakes ever instrumentally recorded in the Baltic region (M 5.0 and M 5.2), which occurred in the Kaliningrad Region in 2004.

19. These earthquakes should be taken into consideration in the assessment of seismic hazard for the territory of Belarus, as they provide important information on the contemporary seismicity and seismotectonic conditions of the Baltic region and may contribute to a more robust characterization of regional seismic sources.

This information has to be considered in the assessments.

20. The EIA Report should provide more detailed information on the probabilistic seismic hazard assessment methodology, including seismic source models, recurrence relationships, ground-motion prediction equations and associated uncertainties. This information is necessary to evaluate the robustness of the seismic hazard estimates.

21. The EIA report states that local seismic monitoring networks have been established and are operating at each of the potential radioactive waste disposal sites. However, the documentation does not provide the coordinates of the seismic stations, and the seismic monitoring stations of Site 3-3 are not shown on the corresponding map. In addition, no information is provided on when the seismic stations were installed, nor on the number and characteristics of local and regional seismic events recorded by these monitoring networks. Such information is important for assessing the adequacy of the monitoring programme and the representativeness of the seismic data used in the site evaluation and has to be provided.

22. Considering the long-term safety requirements applicable to radioactive waste disposal facilities, it is needed to clarify how potential future seismic events are included in the post-closure safety assessment and whether their potential impacts on natural and engineered barriers have been quantitatively evaluated, given that the environmental safety of the disposal facility must be maintained over timescales of hundreds to thousands of years. The mentioned information has to be provided.

Hydrogeology

23. The assessment focuses mainly on current hydrogeological conditions and does not sufficiently evaluate long-term changes associated with climate change, groundwater level fluctuations, and landscape evolution (Sections 7.13, 13);

24. Groundwater is relatively shallow at all candidate sites (approximately 2-4 m below ground surface in places), which increases the importance of long-term barrier performance (Sections 5.2, 5.3, 7.2);

25. The analysis of radionuclide migration pathways is based largely on average hydraulic properties and does not adequately address preferential flow through local high-permeability zones or geological heterogeneities (Sections 5.3, 7.3, 13);

26. Predicted groundwater travel times to nearby surface waters are relatively short, particularly at Site 3-3 (about 6 years), indicating the need for more robust uncertainty and sensitivity analyses;

27. The transboundary hydrogeological assessment, especially for Site 2-1 within the Viliya/Neris River basin, is not sufficiently detailed (Sections 5.2.1 and 10);

28. Limited information is provided on radionuclide-specific retardation processes for mobile radionuclides such as H-3, C-14, I-129, and Tc-99, which are most relevant for groundwater protection over long timescales (Sections 2.5.2, 2.5.3, 7.13).

29. From a hydrogeological perspective, the report is acceptable for the EIA stage but does not yet provide a fully convincing long-term safety case for radioactive waste disposal. Additional investigations and modelling are required to address uncertainties related to groundwater evolution, climate change, radionuclide transport, and transboundary impacts before final site selection and licensing.

Geotechnics

30. The evaluation of the strength of soils in the engineering geological elements (EGE) is not correct, because the values of $q_c \leq 4$ MPa couldn't be prescribed to the "strong loamy sand" (tables 5.5, 5.10).

31. Not all EGE are described equally. Values of strength parameters are used to describe most of the EGE, however some of them are described according to plasticity (EGE 24, table 5.14).

32. For the geotechnical characterization of the EGE the number of laboratory tests should be presented and statistical evaluation of the parameters should be performed.

V. Environmental Protection Agency

1. Surface water bodies

Due to the discharge of treated surface runoff, domestic wastewater and process wastewater from the planned Site No. 2-1, located approximately 20 km from the border of the Republic of Lithuania, into the Neris River. Within the territory of the Republic of Lithuania, the Neris River is protected and included in the European ecological network of protected areas, Natura 2000, as a Site of Community Importance for the conservation of habitats. The discharge of such wastewater may have a significant adverse impact on the ecological status of the Neris River, water quality and biodiversity. The EIA Report states that BOD₅ is to be monitored when assessing the impact of wastewater discharged from Site No. 2-1 into the Neris River. However, Belarusian legislation does not establish a limit value for this parameter for wastewater discharged into surface water bodies. In Lithuania, on the other hand, pollution from wastewater discharged into the natural environment is regulated based on BOD₇, for which limit values have been established. The EIA Report does not sufficiently assess the potential impact of wastewater discharged from Site No. 2-1 into the Neris River on the territory of the Republic of Lithuania. Therefore, the EIA Report should be supplemented with a comparison of BOD₅ with the BOD₇ limit value applicable in Lithuania, as well as an assessment of the potential impact in this regard.

2. Ambient air

The EIA Report states that radioactive waste will be incinerated using a radioactive waste incineration facility to be installed at Site No. 2-1, with the resulting ash removed following multi-stage treatment of the exhaust gases. Therefore, the EIA Report should provide a detailed assessment of the potential impact on ambient air arising from the release of pollutants into the environment during the incineration of radioactive waste at Site No. 2-1. The EIA Report should also provide modelling results in the form of maps showing the dispersion of emissions into ambient air, taking into account the territory of the Republic of Lithuania.

VI. Vilnius District Municipality

Expressing the concerns of the public concerned and seeking to safeguard the interests of the residents of Vilnius District Municipality, we hereby object to the plans of the Republic of Belarus to construct a radioactive waste disposal and temporary storage facility (repository) in close proximity to the state border of the Republic of Lithuania.

The territory of Vilnius District borders the Republic of Belarus; therefore, the residents of the district, as well as its unique natural and cultural heritage, would be exposed to the highest level of potential risk in the event of possible incidents or long-term radioactive contamination. The planned economic activity, with construction scheduled for 2028–2030 and an operational lifetime of 100 years, poses an unacceptable radiological, environmental and social risk not only to Vilnius District but also to the entire territory of the Republic of Lithuania and its population. The facility is planned to operate for as long as 100 years and would be used for the disposal of low-level radioactive waste and the interim storage of high-level and long-lived radioactive waste generated by the Belarusian Nuclear Power Plant. This would create a direct and long-term risk to the safety of the residents of Vilnius District and the wider Vilnius region.

Pursuant to Article 6(28) of the Law on Local Self-Government of the Republic of Lithuania, improvement and protection of environmental quality and environmental monitoring constitute one of the independent functions of municipalities, the purpose of which is to create a healthy and harmonious living, working and recreational environment and better overall living conditions. Local authorities are closest to the population and are therefore best placed to identify specific environmental problems within their territories (e.g. industrial pollution in a particular area or contamination of lakes) and are required to respond to such problems promptly. The Municipality has an interest in ensuring that, when economic activities are planned and carried out in Vilnius District, conditions are established for the rational use of land and for the interests of natural and legal persons or groups thereof, the public, municipalities and the State concerning land and territory use and the conditions for the development of activities in the territory to be properly balanced.

Having examined the EIA Report for the construction of a radioactive waste disposal and interim storage facility for radioactive waste generated during the operation of the Belarusian Nuclear Power Plant, the Municipality concludes that the technical document submitted is incomplete and insufficiently substantiated. The EIA Report lacks essential data and detailed information necessary for an objective assessment of the impacts of the planned economic activity.

The facility is planned to dispose of very low-level and low-level radioactive waste, as well as short-lived intermediate-level radioactive waste. Long-lived intermediate-level radioactive waste and high-level radioactive waste are planned to be stored on an interim basis. The preliminary design provides for a complex comprising 31 structures and installations, and a near-surface disposal concept is being considered. Three potential sites are being considered: the Khoiniki District in Gomel Region, the Astravyets District in Grodno Region, and the Mstislavl District in Mogilev Region. One of the alternatives is located in the Astravyets District, approximately 20 km from the Lithuanian border. The EIA Report assesses the management of radioactive waste generated during the operation and decommissioning of the Belarusian Nuclear Power Plant, as well as previously accumulated institutional radioactive waste, which is a matter of serious concern.

Pursuant to the provisions governing transboundary environmental impact assessment in the Republic of Lithuania and other countries, as well as the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), any nuclear energy or radioactive waste management facility must ensure full transparency and comprehensive safety. The EIA Report submitted does not contain sufficiently comprehensive and reliable modelling results concerning

radiological and non-radiological impacts through air and water, particularly with regard to the migration of contaminants through groundwater and transboundary surface water bodies. The potential impacts cannot be declared in advance to be safe or confined to the local area. The EIA Report must assess all potential transboundary risks. The territory of Vilnius District is closely connected with the Neris River basin and groundwater bodies that supply local residents with water through boreholes and wells. The EIA Report submitted by Belarus does not provide reliable modelling of how radionuclides, in the event of an accident or as a result of deterioration of structures over the 100-year operational period, could affect groundwater and surface water bodies in Vilnius District.

Pursuant to Article 53 of the Constitution of the Republic of Lithuania, the State shall protect human health and shall be required to protect the environment from harmful effects. More than 120,000 people live in Vilnius District, and their right to a safe and clean environment is directly disregarded by the unilateral plans of the neighbouring country. The distance from the potential site to settlements and densely populated areas of Vilnius District creates continuous psychological and social pressure on the local community. The planned facility is critically close to the Lithuanian border and only approximately 20 km from Vilnius District. Such a location creates a disproportionate geopolitical and environmental risk for Lithuania. The construction of a radioactive waste repository in the vicinity of the Lithuanian border is contrary to the precautionary principle, as any environmental damage resulting from an accident or a long-term loss of containment could be irreversible.

It should be noted that the planned works and site selection must comply with the safety requirements of the International Atomic Energy Agency (IAEA Safety Standards), which require rigorous assessment of geological stability and consideration of the safety interests of neighbouring States. Radioactive waste management facilities should not be established in locations that pose a disproportionate risk to population centres in neighbouring countries. The selection of a site in close proximity to the Lithuanian region poses a risk to the Baltic Sea basin and the regional ecosystem. The hydrological system of the Astravyets District is an integral part of the Neris River basin. The Neris River provides water to strategic groundwater abstraction sites serving the city and district of Vilnius. Any leakage of radionuclides into groundwater or surface water would result in irreversible degradation of Lithuania's drinking water resources. No evidence has been provided demonstrating how the migration of radionuclides through deep aquifers would be prevented over the long term.

Pursuant to the EU Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC), the region is required to ensure the protection of biodiversity. Vilnius District contains numerous protected natural areas, Natura 2000 sites and regional parks. A potential radiological accident could cause irreversible impacts on the flora and fauna of these areas, which would be contrary to international commitments concerning the conservation of biodiversity.

In contravention of the fundamental purpose of environmental impact assessment procedures for planned economic activities, the EIA Report does not contain a genuine analysis of alternative locations in more distant areas of Belarus that may be geologically more favourable and less sensitive from a demographic perspective. The site appears to have been selected primarily on the basis of economic convenience, namely its proximity to the nuclear power plant, while disregarding the priority given to international safety considerations and the safety of neighbouring countries.

VII. The public (including scientific community and non-governmental organizations)

1. In the course of the planned economic activity (PEA), three main activities will essentially be carried out: radioactive waste (RW) treatment, interim storage, and disposal in disposal facility

modules. During the implementation of these activities, the pathways, durations, quantities, dispersion and other parameters of radionuclide releases into the environment will differ. Consequently, the impact on the population will also differ during the various stages of the PEA.

The EIA Report should therefore assess not only the environmental impact of the closed radioactive waste disposal facility, but also the potential impacts arising from RW treatment and storage.

2. The EIA Report assesses accidents involving the handling of radioactive waste packages. However, accidents associated with other technological activities to be carried out at the facility have either not been adequately assessed, or no justification has been provided as to why their assessment is not necessary.

For example, it is stated that Class III and Class IV radioactive waste, as well as low-level radioactive waste (LLRW), will be incinerated. However, potential radionuclide releases into the environment in the event of a failure of the filtration system, as well as the potential resulting impact on the population, have not been assessed.

3. Assessments of radiological impacts on the population in the event of potential accidents have been carried out for packages containing Class II and Class III radioactive waste. No such assessments have been carried out for packages containing Class I radioactive waste.

Furthermore, the EIA Report does not provide the radionuclide inventory and activity levels of the Class I radioactive waste, nor information on the packages in which this waste will be stored.

4. Tables 2.1 and 2.2 of the EIA Report provide the total volumes of radioactive waste that will be received at the radioactive waste disposal and interim storage facility. As indicated in Section 2.4, this will include radioactive waste generated during the operation and decommissioning of the Belarusian NPP, waste from the Ecores storage facility, waste from spent nuclear fuel reprocessing, and other waste streams.

Based on the information provided, it is not clear what quantities and types of radioactive waste will be generated during the operational phase, during decommissioning, as a result of spent nuclear fuel reprocessing, or from other waste streams.

5. The description of the assessment of radionuclide migration from the near-surface disposal facility (Section 7.13 of the EIA Report) is insufficient. It does not provide information on the radionuclides included in the modelling, their activity levels, leaching rates, dispersion, changes in radionuclide concentrations in groundwater over time, representative exposure pathways, or other relevant parameters.

It is therefore not possible to independently verify the stated conclusion that the dose will not exceed 0.3 mSv/year.

6. Additional comments on specific sections of the EIA Report:

Nr.	Page	Text of the EIA report	Comment
1.	7	The RWDF is intended to: ...- temporarily store HLW (Radiation Hazard Class I), including waste arising from SNF reprocessing, and ILW (Radiation Hazard Class II) containing radionuclides with half-lives exceeding 31 years;	Please specify the duration of the “interim storage” of high-level radioactive waste and long-lived intermediate-level radioactive waste at the RWDF. Will “interim storage” continue after the closure of the near-surface disposal facility modules?

2	8	„Potential environmental impacts were assessed for all stages of the RWDF life cycle: - pre-operational stage (RWDF construction); - operational stage (RW feed); - facility-closure and post-closure stages.	The dates and durations of the individual stages of the RWDF lifecycle (pre-operational stage, operational stage, closure stage and post-closure stages) are not specified. Please provide the planned start dates and durations of the individual stages of the RWDF lifecycle.
3	17	Table 2.4 – Specific Activity of Long-Lived Radionuclides in the Most Permanent Media	According to Tables 2.1 and 2.2, high-level radioactive waste and long-lived intermediate-level radioactive waste to be stored at the RWDF may account for 20–35% of the total volume of radioactive waste managed at the RWDF. However, the activity of these waste streams may be significantly higher than the activity of the “Most Permanent Media” identified in Table 2.4. Please provide the activity concentrations of individual radionuclides in the high-level radioactive waste and long-lived intermediate-level radioactive waste planned to be stored at the RWDF, as well as in spent nuclear fuel (SNF).
4	17	*** Specific activity of radionuclides, expressed in Bq/g. **** Corresponds to the clearance level value...	Table 2.4 does not contain any text marked with “****” or “*****”. Please clarify and correct the entries in the table accordingly.
5	18	2. These waste streams contain long-lived radionuclides at concentrations acceptable for near-surface disposal.	What activity concentrations of long-lived radionuclides are considered acceptable for disposal in the near-surface disposal facility at the RWDF? Please specify.
6	19	Table 2.5 – Radionuclide Composition, Specific Activity, and Activity of RW Containers Used for the Assessment of Radiation Impact on the Population of the Republic of Belarus in the Event of Accidents at the RWDF	Short-lived radionuclides may also be relevant to the assessment of public safety. The EIA Report does not state that only radioactive waste containing insignificant concentrations of short-lived radionuclides will be accepted at the RWDF site. Please assess the activity concentrations of short-lived radionuclides and their potential impact on the population under normal

			operating conditions and in the event of accidents, in particular during the operational phase of the RWDF.
7	22	RW transportation and delivery will be carried out by road and rail along routes ...	What types of radioactive waste are planned to be transported by rail, and to which potential sites will they be transported? The receipt of radioactive waste by rail is not provided for in the RWDF layout (Annex A).
8	155	Based on the RWDF's design capacity and throughput, the required technological equipment has been specified.	Please provide the main design capacity parameters of the planned radioactive waste treatment facilities (including compaction, incineration, evaporation of liquid radioactive waste, etc.).
9	157	Provision is made for the construction of ten identical radioactive waste disposal modules, each with a gross capacity of at least 15,000 m ³	According to Tables 2.1 and 2.2, the volume of radioactive waste planned to be disposed of in the near-surface disposal facility may range from 50,000 to 90,000 m ³ , corresponding to approximately 30–60% of the planned total capacity of the disposal modules (150,000 m ³). What is the actual planned capacity of the near-surface disposal facility at the RWDF, and what volume of radioactive waste is planned to be disposed of therein? What capacity of the disposal facility is covered by this EIA? What is the expected activity of the radioactive waste to be disposed of in the disposal facility as of the date of its closure?
10	161	Based on data from the similar facility (radioactive waste processing facility RADON FSUE (Sergiev Posad, Moscow Region) the expected release of beta- and gamma-emitting radionuclides, following the removal of radioactive aerosols, is expected to be 2.65×10^6 Bq.	Does RADON FSUE process radioactive waste of the same origin and activity levels? Are the treatment technologies and processing capacities planned for the RWDF comparable to those used at RADON FSUE?
11	161	The height of the vent stack ensures the reduction of the radioactive concentration in the ambient air ...	What is the planned height of the ventilation stack?
12	164	Radioactive contamination of surface water bodies by the RWDF wastewater is excluded by the technological water systems.	On page 9 of the EIA Report, in the discussion of potential radiological impacts, the following potential impact is identified:

“— radiation impact resulting from discharges from special sewage system”.

The monitoring programme (p. 228) also provides for radiological monitoring of wastewater.

It is likely that the technological treatment of liquid radioactive waste and decontamination activities (e.g. decontamination of premises and personnel) will generate excess water that cannot be reused for other RWDF purposes and will therefore need to be discharged into the environment (e.g. after treatment, as evaporator condensate). The volumes and activity levels of wastewater discharged from the controlled area should be assessed, including, where appropriate, on the basis of the operational experience of comparable facilities, such as the aforementioned RADON FSUE.

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|----|-----|---|--|
| 13 | 193 | <p>The assessment of the consequences of radiological emergency was performed taking into account the destruction and fire of waste containers NZK-150-1.5P containing radioactive waste with the highest total activity (class II (short-/medium-lived), class III radiation hazard), intended for disposal in the RWDF.</p> | <p>The RWDF will also handle containers containing high-level radioactive waste (Class I) and long-lived intermediate-level radioactive waste (Class II), the activity levels of which may be significantly higher than those of the NZK container considered in the assessment. Please assess the radiological consequences of damage to other types of radioactive waste packages.</p> |
| 14 | 194 | <p>DBA scenario — dropping of a radioactive waste package with destruction of the NZK containing radioactive waste (release — 1.7×10^8 Bq);</p> | <p>Please provide the releases of individual radionuclides and their corresponding activity levels.</p> |
| 15 | 194 | <p>BDBA scenario — crash of a 5-ton aircraft with fire of radioactive waste packages
(release — 3.63×10^7 Bq);</p> | <p>How many NZK containers are assumed to be damaged under this scenario?</p> <p>Is the activity released into the environment lower than the activity released in the event of damage to a single NZK container under the DBA scenario?</p> |

			Please provide the releases of individual radionuclides and their corresponding activity levels.
16	194	additionally, a scenario involving the crash of a heavy aircraft with a mass of 400 t and 70 t of fuel, with fire of radioactive waste containers (release — 7.26×10^9 Bq).	How many NZK containers are assumed to be damaged under this scenario?
			Please provide the releases of individual radionuclides and their corresponding activity levels.
17	208	During the preliminary assessment of long-term safety: – an analysis and systematization of data ... made it possible to determine RWDF evolution scenarios; – an algorithm for hydrodynamic and geochemical transport calculations was described, a contamination source model was developed, and quantitative estimates of the dynamics of contaminant release into the environment were obtained; – based on the developed hydrogeological model, the results of hydrodynamic calculations are presented ...; – a geochemical transport model for the spread of contamination from the RWDF has been developed, and on its basis a forecast of contamination spread from the RWDF has been provided, ... and groundwater contamination levels in the near-field zone of the RWDF have been determined;	The modelling sequence described is generic for the safety assessment of near-surface disposal facilities, does not reflect the specific characteristics of the RWDF, and does not allow the adequacy and relevance of the calculations performed to be assessed. The description should be expanded to provide details of the RWDF evolution scenarios considered in the calculations, the source term and its evolution over time, the release of individual radionuclides and their respective activity levels from the disposal facility, the engineered and natural barriers considered, including their parameters and properties, the calculated concentrations of radionuclides in environmental media and their changes over time, the exposure pathways considered, the models used, and the parameters applied for the dose assessment.
18	208	The expected dose levels for the population caused by the disposed radioactive waste will not exceed the dose limit of 0.3mSv/year at the boundary of the RWDF site during the period in which the waste remains potentially hazardous.	Were the assessments of radionuclide dispersion carried out only up to the boundary of the site? What is the period during which the radioactive waste is considered potentially hazardous? Which waste parameters and their respective values determine whether the radioactive waste is considered “potentially hazardous”?

19	220	Based on the conducted procedure, a fault tree has been developed for the RWDF (see Figure 9.1). The values assigned to the fault tree events are presented in Table 9.1.	The event codes in Tables 9.1 and 9.2 do not correspond to the event codes shown in Figure 9.1. Please clarify and correct the inconsistencies.
20	225	Taking into account the RWDF design [3], an aircraft crash may result in the Fire of the upper layer of N/II packages in one module.	An aircraft may crash not only onto the disposal facility modules, but also onto, for example, the interim storage facility, where high-level radioactive waste and long-lived intermediate-level radioactive waste, as well as Category 1–2 spent nuclear fuel (SNF), are stored. An aircraft crash onto other RWDF buildings where radioactive waste with potentially higher activity levels than those disposed of in the disposal facility is handled or stored should also be assessed.
21	Appendix A	Preliminary General Layout Scheme Pragmatic Use of the Territory	Certain entries (e.g. the dimensions of structures) are illegible. Please improve the quality and resolution of the diagrams provided.

General Conclusions

The document submitted for public discussion in Belarus and in the affected countries does not comply with the fundamental principles and approaches of **Environmental Impact Assessment (EIA)**, nor with generally accepted technical and professional standards. It provides irrelevant and factually inaccurate information, advocates the choice of outdated and less safe technologies, and therefore fails to provide the public with an accurate understanding of the proposed activity.

We call for a complete revision of the design documentation and the Environmental Impact Assessment (EIA), so that:

- the proposed activity is clearly defined, and its justification is properly presented;
- the environmental impacts of all stages of radioactive waste (RW) management planned to take place in Belarus are assessed — from the point at which RW is generated, and from the removal of **spent nuclear fuel (SNF)** from reactor pools at the nuclear power plant, through to the final stage of its lifecycle;
- **modern, proven alternatives with the lowest associated risks** are fully considered, including the widely used practice in the United States and Western European countries of **above-ground interim dry cask storage of SNF and radioactive waste for periods of 50–100 years**;
- a **detailed comparative environmental impact assessment** is carried out for all alternatives, considering differences in the stages of the technological cycles for managing SNF and RW;

- the EIA of the proposed activity includes all **key elements related to RW management**, including dry storage of SNF at the nuclear power plant site, handling and transfer operations, storage at staging facilities prior to transportation, transportation of SNF.

Comments on the EIA Report

1. General

1.1. The subject of the EIA is poorly defined and described inconsistently.

The title of the document reads: “**CONSTRUCTION OF A RADIOACTIVE WASTE DISPOSAL AND TEMPORARY STORAGE FACILITY. PRE-DESIGN DOCUMENTATION. ENVIRONMENTAL IMPACT ASSESSMENT.**” (BelRAO, 2026)

The introductory section states: “The planned activity considered in this document is **the construction** of a radioactive waste disposal and temporary storage facility (hereinafter referred to as the RWDSF).”

However, the non-technical summary states: “**The planned activity has the potential to cause radiological impacts** due to direct gamma radiation from packages containing radioactive materials, radioactive releases into the atmosphere through the ventilation systems of the storage modules and the processing facility.”

Thus, the document describes the planned activity as being limited to construction, while the EIA text refers to activities such as processing, storage, disposal, and incineration of radioactive waste in Belarus. This creates a contradiction and leaves it unclear what exactly is the subject of the assessment. We believe that in line with European practice, the assessment should cover the entire process of SNF and radioactive waste management, starting with the removal of SNF from the spent fuel pools at the nuclear power plant and the generation of other liquid and solid radioactive waste. This is particularly important because neither the EIA for the Belarusian Nuclear Power Plant nor other relevant documents assess these processes.

Based on this, and in accordance with modern approaches to EIA, a **cumulative environmental impact assessment** should be carried out. This should address not only the combined effects of different factors, but also the impacts of **all stages of the waste management process that cannot be avoided in practice or in principle**. These include not only the construction of the storage facility, but also waste management activities over the entire period from waste generation to its final endpoint — that is, until the waste no longer poses a hazard. A relevant example here is **Swedish practice**. In the EIA report prepared by SKB (2011) for the final management system for SNF, the scope of the assessment included **interim storage, encapsulation, final disposal, and directly associated transportation operations**, as well as the cumulative impacts of the operation of the entire system.

1.2. The EIA Report does not adequately define and describe the planned methods and technologies for managing spent nuclear fuel and/or RW from SNF reprocessing, although they are repeatedly referred to throughout the text.

The document does not clearly specify what particular solutions are proposed for the management of SNF or how many years they are intended to cover.

Thus, Chapter 1, “**Non-Technical Summary,**” and Section 2.3, “**Purpose and Need for the Proposed Activity,**” state that the RWDSF is intended for:

- receiving, inspecting, sorting, processing, and conditioning radioactive waste (RW), and bringing it into compliance with the acceptance criteria for disposal;

- **disposal of very low-level, low-level, and short-lived intermediate-level RW**, including disused sealed sources of ionizing radiation classified as Categories 3–5 according to the degree of radiological hazard;

- **storage of long-lived intermediate-level and high-level RW**, including disused sealed sources of ionizing radiation classified as Categories 1 and 2 according to the degree of radiological hazard, as well as **RW resulting from SNF reprocessing**. (BelRAO, 2026).

Chapter 2, “**General Description of the Proposed Activity**,” then lists the main stages of the activity considered in the EIA, **but does not include the storage of RW resulting from SNF reprocessing**.

Tables 2.1 and 2.2 again refer to the temporary storage of **Class I and II RW with a half-life of more than 31 years, and Categories 1 and 2 ionizing radiation sources**. However, it remains unclear whether **SNF or RW resulting from SNF reprocessing** are included in these categories.

Section 2.5.1, “Problem Statement,” states that “Class I and II RW (long-lived) will be stored at the RWDSF site in a specially designated storage facility,” but does not clarify whether this includes **SNF or RW resulting from SNF reprocessing**.

Section 2.7, “**RWDSF Facilities and Structures**,” lists such elements as the “**Site for the Storage of RW from SNF Reprocessing No. 22**” and the “**Solid RW Storage Facility (23/1–23/4)**.” This leaves it unclear whether SNF or SNF reprocessing RW will be stored at a site, meaning an open, engineered area, or in an enclosed storage facility, what the proposed storage period is, and what storage technology has been selected.

The conclusion to Section 2 refers exclusively to disposal; the temporary/interim storage of SNF and/or SNF reprocessing RW is not mentioned.

Section 4.1, “**Alternative Options for Implementing the Proposed Activity**,” does not address the management of SNF and/or SNF reprocessing RW at all. If this section treats SNF and/or SNF reprocessing RW as Class I and II radioactive waste, it considers only disposal in deep geological formations and near-surface disposal at a depth of up to 100 meters. The latter raises serious doubts about the competence of the authors of the EIA Report for the Belarusian RWDSF, not least because a facility located 100 meters below ground cannot be considered near-surface and would constitute a costly and technically complex installation.

Section 6, “**Description of the Main Sources and Potential Types of Environmental Impact**,” again mentions the temporary storage of RW resulting from the reprocessing of SNF from the operation of the Belarusian Nuclear Power Plant as one of the main production processes of the RWDSF. At the same time, the **Site for the Storage of Radioactive Waste from SNF Reprocessing No. 22** is described there as a facility equipped with a supply and exhaust general ventilation system with mechanical and natural draft and HEPA filters. This description is incomplete and does not specify the storage and handling technology for this type of waste.

Section 12.1, “**Justification of the Preferred Method for Radioactive Waste Disposal**,” **does not address SNF or SNF reprocessing RW, nor does it specify any disposal or storage method**. Instead, it is limited to citing regulatory requirements that prescribe either storage or disposal without a preceding decay-in-storage period, depending on the waste class.

It is deeply concerning that, even at the pre-design stage, such little attention is being paid to the management of the most hazardous waste generated by a nuclear power plant, namely **spent nuclear fuel (SNF) and radioactive materials resulting from SNF reprocessing**. It is worth noting that, in countries with well-established nuclear power industries, these materials are subject to the most stringent regulatory requirements. Countries such as Sweden and the United Kingdom have spent decades developing acceptable solutions for their management. At present, however, the

management of SNF and RW from SNF reprocessing is still considered technically unresolved. This is precisely why most countries have opted for interim dry cask storage in above-ground storage facilities.

1.3. The EIA mentions, but does not describe, the methods and technologies for managing radioactive waste other than SNF or RW resulting from SNF reprocessing.

The document mentions but does not clearly describe the selected technologies for the treatment, processing, and disposal of RW, nor does it substantiate their practical validation or provide their design specifications. The technologies for managing radioactive waste other than SNF or RW resulting from SNF reprocessing are presented in the document with an unacceptably low level of detail.

Chapter 1, “**Non-Technical Summary**,” states that a near-surface design has been selected for the radioactive waste disposal facility. It also lists the radioactive waste treatment facilities to be located there, including facilities for the **evaporation and cementation of liquid radioactive waste (LRW)**, as well as the **incineration of combustible solid radioactive waste (SRW) of Classes III and IV and very low-level radioactive waste (VLLW)**. This implies that evaporation, cementation of the resulting concentrate, and incineration of combustible SRW have been selected as waste management methods.

No description is provided of the technological processes for evaporation, cementation, and incineration, the equipment to be used, or the environmental parameters of the proposed activities.

Section 2.5.4, “**Packaging of Radioactive Waste**,” identifies the types of non-returnable containers (**NZKs** - *a Russian abbreviation*) selected for radioactive waste disposal (storage), including:

- “special packaging for Class I radioactive waste,” without specifying its type, design, or designation;

- NZK-150-1.5P containers;
- KZKh-2ks containers;
- NZK-IOS containers;
- KRAD-1.36 containers;
- as well as special packaging sets KMZ-RNI-RADON.

These containers are integral to the overall technological process, which was developed, certified, and is used in the Russian Federation. The process is not transparent enough to provide sufficient information for full-scale EIA meeting the requirements of the Espoo UNECE convention.

The EIA does not provide a technical description of the containers, their engineering parameters and specifications, or their ventilation capabilities. It also lacks a clear description of the engineering procedures for handling these containers during RW loading, transportation, and disposal, as well as subsequent monitoring. Basic technical, engineering, and environmental parameters of the activity are also not provided.

Section 2.6 provides a very general description of the engineered barrier system of the RWDSF modules, without specifying key technical characteristics, including the design service life, the characteristics of the engineered barriers themselves, or those of the facility. This section gives the impression that the RWDSF is a single structure consisting of reinforced-concrete cells into which containers of radioactive waste are placed for disposal. This is inconsistent with the following Section 2.7, “**Composition of RWDSF Facilities and Structures**,” which describes a complex of buildings within a single site, serving different purposes, and already refers to modules for

radioactive waste disposal. The description of the protective barrier system of the disposal cells is unacceptably insufficient and contradictory. Section 2.6 contains only brief mentions of enclosing reinforced-concrete structures, clay seals, underlying and cover barriers, drainage systems, and other basic elements that are now widely used in civil and private construction.

Section 6, “Description of the Main Sources and Potential Types of Environmental Impact,” states: **“Based on the capacity and throughput of the RWDSF, the process equipment was selected,”** while the equipment itself is not identified, and its technical and environmental specifications are not provided.

The same section states that the **“Radioactive Waste Disposal Modules”** will consist of ten monolithic, enclosed reinforced-concrete structures, separated by common walls and embedded to a depth of 5.5 m (bottom level). This contradicts the “near-surface” disposal at a depth of 100 m referred to in Chapter 4. The radioactive waste disposal modules are assumed to be unheated, while at the same time being equipped with forced ventilation and HEPA filters. The document does not specify how the modules will be ventilated, at what stage of their life cycle, for how long, or how the filtration system will be maintained. The further description is limited to mentioning the loading of containers with radioactive waste, filling the spaces between the containers in the cells with inert material, sealing cells with concrete, and covering them with a protective barrier. No technical or environmental parameters of the disposal modules are provided.

2. The proposed technical and technological solutions are not justified, and the selected technologies are outdated and associated with the highest risks.

Despite the insufficient and very general description of the proposed technical processes, the document clearly states that the waste management methods have been selected. These are listed in Sections 1.2 and 1.3. This selection is not supported by any preceding technical analysis, including a comparative assessment of environmental impacts against modern alternatives in actual use worldwide. At the same time, the technologies presented in the EIA as the only acceptable options have been demonstrated to pose significant risks and/or are outdated.

2.1. Incineration of Solid Radioactive Waste

Chapters 1 and 2 mention the incineration of combustible Class III and IV solid radioactive waste (SRW), as well as very low-level radioactive waste (VLLW), as processes selected for the RWDSF, with no alternatives considered.

However, incineration requires treatment of the off-gases and results in the generation of secondary waste. Simple incineration does not destroy radioactivity; it redistributes radionuclides, and some radionuclides may enter the atmosphere without being captured. The IAEA (1992) identifies iodine and ruthenium among radionuclides that can be volatile at moderate incineration temperatures, cesium at higher temperatures, as well as tritium, C-14, and S-35. The IAEA also notes that during incineration, radionuclides are redistributed among the ash, off-gas treatment residues, and stack emissions. More advanced thermal treatment technologies associated with lower risks include, among others, pyrolysis and plasma treatment (Álvarez et al., 2025).

2.2. Conditioning and Cementation of Liquid Radioactive Waste (LRW)

The project relies on the outdated technology of direct cementation of spent ion-exchange resins (SIER) and high-salt liquid radioactive waste (LRW) concentrates, including those generated from the operation of the Belarusian Nuclear Power Plant.

LRW from VVER-1200 reactors contains large amounts of borates and nitrates (Sorokin et al., 2020). **Borates** strongly retard the hydration of Portland cement, adversely affecting the hardening and strength development of the cement matrix (Li et al., 2019). When exposed to

moisture in the alkaline environment of concrete, **spent organic resins undergo osmotic swelling** and generate hydrogen as a result of radiolysis (Lafond et al., 2015).

The list of selected Russian containers for the storage/disposal of radioactive waste (see Section 1.3 of these Comments) does not specify how gases are to be vented from NZK containers with radioactive waste; the document does not mention any gas-venting filters or mechanisms, and no information on this is available in Russian sources either. The EIA Report does not address radiolysis and gas accumulation at all. This raises concerns about the safety of the selected technology and calls into question the integrity of the primary safety barrier during the very first years of storage/disposal, since, in a hermetically sealed NZK container, gas pressure may result in its structural failure.

According to Chapters 1 and 2 of the EIA, direct cementation of the RW concentrate is preceded by conditioning, i.e. evaporation of liquid radioactive waste to reduce its volume. The description of the LRW conditioning process does not mention any measures to remove or reduce the concentration of tritium in the solutions being evaporated. At the same time, emissions from the ventilation systems of the RWDSF are to be treated using aerosol HEPA filters, which are not capable of capturing gas molecules or water vapor. Thus, there is a high probability that tritium from the evaporated LRW, volatilizing as gaseous HTO (tritiated water), will be released directly into the atmosphere. As the plume cools, moisture will fall as precipitation around the facility, creating a risk of direct, uncontrolled contamination of adjacent areas with tritium. Inhalation of tritiated water vapor or ingestion of contaminated water would result in internal exposure to beta radiation from tritium.

3. Uncritical and Non-Transparent Adoption of Russian Radioactive Waste Management Technologies Entailing Greater Risks

The greatest concern is that Belarus is adopting Russian radioactive waste management technologies without sufficient transparency and critical assessment. The EIA Report provides very little information on the type and technical parameters of the selected technology; however, the mentioning of NZK-150-1.5P indicates that the selected technology is a Russian reinforced-concrete container and corresponds to a Russian RWDSF design.

In 2001, Russia adopted the national standard **GOST R 51824-2001**, which established requirements for reinforced-concrete **non-returnable containers** (GOST R 51824-2001, 2001). In 2002, **Open Joint Stock Company “345 Mechanical Plant”** commenced serial production of these containers (Sviridov, 2008). According to the developer, the **NZK-150-1.5P** is designed for a service life of 300 years, including for use in **near-surface disposal facilities** (Sviridov, 2008). The NZK is a rectangular box with a lid, fabricated from **steel-reinforced concrete** (Gataullin & Medelyaev, 2008).

Russian technology for the solidification of **evaporator concentrate from low- and intermediate-level liquid radioactive waste** allows the NZK to be filled by direct pouring. In this process, the radioactive waste is mixed with a cementitious formulation and poured directly into the reinforced-concrete container, which is subsequently hermetically sealed with a lid or plug (Sorokin et al., 2013).

In accordance with GOST R 51824-2001, the NZK-150-1.5P has no means of venting to prevent hydrogen accumulation. Instead, GOST R 51824-2001 specifies requirements for water tightness, as well as for the gas or diffusion permeability of the reinforced-concrete structure.

This Russian technology has a number of safety issues that are neither addressed nor discussed in the EIA. The most serious of these are the following.

3.1. The claimed 300-year service life of the NZK has not been demonstrated in practice. Theoretical studies indicate that this service-life requirement cannot be met.

To date, there is no reinforced-concrete system, particularly one incorporating steel reinforcement, for which a 300-year service life has been demonstrated or reliably established. The documented service life of modern concrete does not exceed 100 years (Andrade et al., 2006). The containers for radioactive waste (NZK) and their associated storage facilities have an even shorter demonstrated operational history: just 24 years, dating back to 2002. It should also be noted that, in addition to structural integrity and other mechanical properties, the NZK must reliably maintain its containment and isolation functions; otherwise, radionuclides may be released into the environment.

Theoretical analysis of NZK by Sorokin et al. (2022) does not prove that the containers can maintain their integrity for 300 years. Rather, it sets out internally contradictory and practically impossible-to-meet criteria for the long-term integrity of the containers. For example, the authors claim that a 300-year design life for NZK is feasible under conditions of continuous contact with stagnant water (to promote self-strengthening of the concrete and prevent corrosion of the reinforcement), while at the same time requiring that contact with water be completely excluded (to prevent destructive chemical processes in the container walls and the concrete matrix).

3.2. Russian Near-Surface Disposal Facility Designs Do Not Guarantee 300 Years of Reliable Isolation of Radioactive Waste from the Environment

Russian environmental impact assessments (EIAs) for near-surface radioactive waste disposal facilities, similar to those proposed for Belarus, do not prove that a 300-year design life is realistic for ensuring the reliable isolation of radioactive waste in the proposed disposal facilities. The EIA reports consider the “most significant evolution scenarios,” including loss of containment or protective integrity of the facilities and the potential release of hazardous radionuclides into the environment within the first 100 years.

3.2.1. Proposed Radioactive Waste Disposal Facility at the Mayak Production Association

The Federal State Unitary Enterprise National Operator for Radioactive Waste Management of the Russian Federation (FSUE NO RAO) plans to construct a near-surface radioactive waste disposal facility (RWDF) for solid radioactive waste (RAW) of Classes 3 and 4 at the Mayak Production Association in Chelyabinsk Oblast. The RWDF will consist of 15 modular concrete structures divided into compartments. Once filled with waste, the structures will be covered with a multifunctional protective barrier and covered with soil.

The EIA Report for this facility includes a section entitled “**Environmental Impact Assessment during the Post-Operational Stage**” (FSUE NO RAO, 2025, pp. 149–150), which presents scenarios involving the degradation of the RWDF's engineered isolation barriers over a period of 100–300 years: “As the near-surface disposal facility evolves, the upper and lower engineered barriers, as well as the packages containing radioactive waste, undergo gradual degradation. (...) Between 30 and 300 years, the activity gradually becomes distributed throughout the entire volume of the near-surface radioactive waste disposal facility and begins to come into contact with the near-field of the facility and the engineered barriers, which themselves also gradually degrade. Conservatively, complete degradation of the upper and lower barriers is assumed to occur within 300–350 years. It is assumed that degradation of the upper and lower barriers results in the gradual infiltration of precipitation into the disposal area containing the radioactive waste containers (which also undergo degradation), followed by the transport of contamination through the degrading lower barrier into the near-field of the facility and subsequent migration of radionuclides into the far field.”

Probabilistic Evolution Scenario 1 for this near-surface RWDF (FSUE NO RAO, 2025, pp. 150–151) assumes that, in the event of flooding, the facility may lose its containment properties as early as 100 years after closure: “The impermeability of the upper engineered barriers will deteriorate within 100 years to the point that 40% of atmospheric precipitation enters the disposal area. According to the initial conditions, by this point the radioactive waste packages have been destroyed and the activity is uniformly distributed throughout the disposal area. Water infiltrating from precipitation leaches contaminants into the near field of the RWDF, followed by migration of contaminants into the far field.” **Probabilistic Evolution Scenario 2** allows for complete (100%) degradation of the upper and lower engineered barriers within 100 years after closure of the RWDF (FSUE NO RAO, 2025, pp. 151–152), by which time the radioactive waste packages have been destroyed and the activity is uniformly distributed throughout the disposal area. This would likewise result in the migration of radionuclides first into the near field and subsequently into the far field of the disposal facility.

3.3. Operational Experience with Russian RWDFs Demonstrates Failures Within the First 40 Years

Several radioactive waste disposal facilities (RWDFs) built during the Soviet time are currently in operation in Russia. These facilities are reinforced-concrete structures buried 4–6 meters underground, similar to those proposed for Belarus. Previous operational experience with such RWDFs in Russia demonstrates the unreliability of this technical solution. In particular, there have been documented cases of radioactive substances leaking from radioactive RWDFs at the former Radon facilities near Kazan and in Sosnovy Bor, Leningrad Oblast. The failure of one of the containers used for radioactive waste storage in the city of Obninsk resulted in serious consequences, including radioactive contamination of nearby water bodies.

3.3.1. Failed Radioactive Waste Disposal Facility in Obninsk

The below-ground RWDF known as “Structure 227,” operated by the Federal State Unitary Enterprise *State Scientific Center of the Russian Federation – A.I. Leipunsky Institute of Physics and Power Engineering* (FSUE SSC RF – IPPE), was built to store radioactive waste from the Obninsk Nuclear Power Plant and waste generated by other reactors and facilities operated by the enterprise. “Structure 227” was filled between 1955 and 1961 (FSUE SSC RF – IPPE, 2014, p. 5).

In 1999–2001, approximately 40 years after the facility was placed into a monitored/closed state, leaks were detected. The concrete of the fourth storage compartment was found to have deteriorated. As a result, the surrounding area and soil to a depth of up to 8 meters, as well as a nearby marsh extending toward the Protva River, were contaminated with radionuclides. Concentrations exceeding the applicable drinking-water standards for specific alpha and beta activity were recorded (FSUE SSC RF – IPPE, 2014, pp. 11, 12, 16, 21).

A decision was made to decommission the RWDF affected by the accident and retrieve the radioactive waste stored there. The resulting remediation activities are expected to generate additional radioactive waste: **5,400 tonnes of contaminated soil and 500 tonnes of concrete rubble** (FSUE SSC RF – IPPE, 2014, p. 32). The estimated cost of retrieving, sorting, packaging, and transporting the radioactive waste is **RUB 390 million** (approximately **USD 11.1 million in 2014 prices**) (Ozharovsky, 2014).

3.4. A 300-year isolation period is insufficient for the disposal of radioactive waste. The EIA Report for the Belarusian RWDSF does not address radioactive waste management for as long as the waste remains hazardous.

Table 2.3 of Section 2.3 of the EIA Report for the Belarusian RWDSF (BelRAO, 2026) specifies the radionuclide composition of radioactive waste from the Belarusian NPP (incompletely, without distinguishing SNF or RW resulting from its reprocessing, and other radioactive waste).

The listed radionuclides include H-3, C-14, Cs-137, I-129, Pu-240, Sr-90, Am-241, U-235, and Pu-239, which pose risks to humans and biota because they can accumulate in organs and tissues and have radiological and radiotoxicological significance (ICRP, 1993; US EPA, 2026). Notably, U-235 has a half-life of 700 million years, while Am-241 has a half-life of 433 years. Thus, 300 years is clearly insufficient for all hazardous radionuclides to decay to the point where they no longer pose a risk to the environment and human health.

The EIA Report for the Belarusian RWDSF (BelRAO, 2026) does not address measures to isolate radioactive waste containing, among others, the radionuclides mentioned above for as long as they remain hazardous.

3.5. Technical problems underlying the risk of environmental contamination have not received adequate attention from Russian developers of radioactive waste containers and disposal facilities.

The following unresolved technical problems, which have not been addressed by Russian developers and are not considered in the EIA for the Belarusian RWDSF fundamentally question the feasibility of accident-free operation of the containers and disposal facilities by Russian design.

3.5.1. Radiolysis, Hydrogen Generation, and Tritium

Ionizing radiation induces the radiolysis of water contained in the pores and hydrated phases of the cementitious matrix, resulting in the formation of molecular hydrogen (Yin et al., 2019). Molecular hydrogen is also generated through the anaerobic corrosion of steel reinforcement embedded in concrete. Hydrogen may generate excess pressure and compromise the integrity of the waste package (NDA, 2016).

3.5.2. Radionuclide Transport Through the Concrete Wall of the NZK Container

Tritium present in radioactive waste may be converted into gaseous tritiated hydrogen. Experimental studies have shown that tritiated hydrogen and molecular tritium can pass through concrete walls (Nishikawa et al., 2006). The latter is particularly relevant under NZK conditions, where the designers rely primarily on the gas permeability of concrete to vent excess hydrogen (Sorokin et al., 2021).

Upon contact with water, radionuclides may gradually leach from the cemented waste matrix and subsequently migrate through the container wall (Grambow et al., 2020). The high watertightness rating of W10 specified for the concrete of NZK containers under GOST R 51824-2001 does not imply the absence of pores or complete impermeability to gases and dissolved substances. For a number of radionuclides, including Cs-137 and H-3, diffusive transport through cementitious matrices has been demonstrated experimentally (Wellman et al., 2009).

We are particularly concerned that the EIA Report for the Belarusian RWDSF does not address the processes mentioned above and does not specify the service life of NZK containers under the specific conditions of disposal. No methods for monitoring or repackaging are described; the NZK containers and the radioactive waste placed in them are treated as a permanent solution requiring no subsequent maintenance. At the same time, even Russian literature sources (Sorokin et al., 2013) acknowledge the need to consider the management of such waste over hundreds of thousands of years.

4. The environmental impact of the proposed RW management solutions has not been properly assessed.

The EIA Report does not provide, even at a preliminary level, the basic technical parameters, a clear characterization of the selected radioactive waste management solutions, a comparison with alternative options, or a defined methodology for assessing environmental impacts. Consequently,

the environmental impact of the proposed Belarusian RWDSF cannot be adequately evaluated. Nevertheless, the document contains sections that claim to present the results of such an assessment and support them with contradictory, inaccurate, or otherwise unverified data.

4.1. Use of Unreliable Input Data for Predictive Assessments

The assessment of radiation impacts was carried out using data from comparable facilities rather than the actual characteristics of the proposed facility. Table 7.2 explicitly states: “The values and activities of releases are provided on a preliminary basis, based on data from comparable projects (FSUE ‘RADON, ’Russian Federation).” The EIA should be based on the specific characteristics of the equipment to be used in the proposed facility and on the characteristics of radioactive waste generated in Belarus. Using data from another, even if comparable, project as the basis for a safety assessment in Belarus constitutes a methodological error that reduces the reliability of all subsequent calculations of public radiation doses.

4.2. The Environmental Impact Assessment on Atmospheric Air is Incomplete with Respect to the Requirements of EkoNIP.

Clause 25 of EkoNIP 17.02.06-001-2021 establishes requirements for the information, based on which the impacts on the atmospheric air must be assessed. Section 7.1 of the EIA for the proposed Belarusian RWDSF does not meet the following requirements. (MNRIP RB, 2021).

1) The requirement of specification of the emission sources (fugitive, channeled, stationary, or mobile). The EIA Report specifies only the quantities (“42 emission sources, 32 of them are channeled, 11—fugitive,” with the reference to the source [13]); the list of the sources and their individual characteristics is not presented.

2) The requirement of Maximum Allowable Emission Concentration data specification (mg/cu. m). These data are not present in section 7.1.

3) The requirement to list pollutants (...) and quantify emissions (...) for each emission source. Table 7.1 specifies only aggregated quantities regarding pollutants for all 43 emission sources, summarized, without breakdown by individual sources.

4) The requirement to specify estimated data on dispersion, including by summation groups. Section 7.1 mentions calculations accomplished and specifies the calculation points (RT1-RT12) for each of three sites with the resulting conclusion on non-exceeding the limits, but, at the same time, the results of calculations (concentration values for each point) and considering summation groups of pollutants are not shown in the text.

5) The requirement to calculate background concentrations. Section 5.1 specifies the concentrations only qualitatively (“below the established Maximum Allowable Concentrations”) without providing quantitative data. The use of the latter in the dispersion calculations cannot be traced in Section 7.1.

4.3. Impact Assessment on Land Resources is incomplete with Respect to the Requirements of EkoNIP

Clause 28 of EkoNIP 17.02.06-001-2021 establishes the requirements for the information on which assessment of impacts on land resources is based.

Section 7.4 of the EIA Report provides the following information: the area and volume of the fertile topsoil layer to be removed at each site (including the depth of disturbance and volume in cubic meters); a qualitative description of mechanical disturbances (compaction, desiccation, and littering); and a brief mention of possible erosive processes.

The following information is not provided:

- the depth of penetration of pollutants through the soil profile; changes in land categories and land-use types (despite the fact that a significant portion of the sites under consideration is forested, as stated in Section 7.3 of the EIA Report, Sheet 179);

- the area subject to grading,
- the thickness of the mineral soil to be cut or placed as fill,
- the volume of mineral soil to be removed, and
- the procedures for its handling, separately from the fertile (topsoil) layer addressed in the relevant section.

4.4. Non-Compliance with the Site Selection Criteria for the Physical and Mechanical Properties of the Soils

Table 4.5 in Chapter 4 of the EIA Report, “Safety Requirements and Criteria for the Selection of an Area and Site for an RWDSF,” provides a list of “Exclusionary Factors” for selecting the main alternative sites for the facility. One of these factors, specified in Item 10 of the table, is the siting of the facility in areas where soils with a deformation modulus of less than 20 MPa occur.

At the same time, the actual site investigation data for the three main alternative sites presented in the same report show the following:

- **Site 2-1:** The following engineering-geological elements (IGE) are identified: IGE-1a (15 MPa), IGE-3a (16 MPa), IGE-10 (7.5 MPa), and IGE-11 (12.5 MPa). The text explicitly states that soils with a deformation modulus of $E < 20$ MPa are widespread throughout the upper part of the moraine deposits.

- **Site 3-3:** IGE-1a has a deformation modulus of only 4.4 MPa, IGE-3 has 4.9 MPa, and IGE-4 has 9.7 MPa. Most of the underlying soil layers have values significantly below the minimum threshold of 20 MPa.

Thus, the EIA Report demonstrates a direct violation of the project’s own safety criteria. Locating the RWDSF in an area underlain by soils with such low bearing capacity could result in differential settlement and failure of the protective barriers.

4.5. Non-Compliance with the Site Selection Criteria Based on Hydrological Requirements

According to the same “Exclusionary Factors” (Item 8 of Table 4.5), sites where the groundwater level is at a depth of less than 3 meters from the ground surface are considered unsuitable under certain filtration coefficients.

At the same time, the actual data for the three main alternative sites presented in the same report show the following:

- **Site 2-1:** Groundwater levels were recorded at depths ranging from 0.6 to 12.6 m.
- **Site 1-5:** Perched groundwater was encountered at a depth of 3.9 m; however, during periods of rainfall and snowmelt, it may occur practically at the ground surface.
- **Site 3-3:** Perched groundwater was recorded at a depth of 3.3 m.

The text acknowledges the presence of “perched groundwater” and technogenic groundwater flooding, yet concludes that the sites are suitable. This conclusion contradicts the requirement for the long-term isolation of radioactive waste from the hydrosphere.

4.6. The Sorption Capacity of Clay Barriers for the Belarusian RWDSF Has Not Been Assessed for Individual Radionuclides

Sections 2.5.3 and 7.13 of the EIA Report state that, among other radionuclides, the radioactive waste to be disposed of will contain difficult-to-detect isotopes such as tritium, C-14, Tc-99, I-129, and Cl-36, and that a sorptive clay barrier is intended to provide the required isolation.

However, radionuclides such as Cl-36, Tc-99 (in the form of pertechnetate under aerobic or mildly oxidizing conditions), and I-129, when released from the radioactive waste into groundwater, occur in the form of anions. The clay materials used in the barriers, as well as the sandy loams of the natural soils at all the alternative sites, have negatively charged surfaces. According to IAEA (2010), these geological media exhibit no sorption of anionic forms of iodine and technetium or of tritiated water. Thus, the clay barrier does not provide a universal sorption function for such biologically significant and hazardous radionuclides present in the radioactive waste as tritium, C-14, Tc-99, I-129, and Cl-36. The functional properties of the clay barriers have not been properly assessed in the EIA Report.

4.7. The Assessment of Impacts on Water Resources Does Not Address the Key Mechanisms Affecting the Mobility and Subsequent Transport of Radionuclides

The EIA does not address the physicochemical separation of wastewater and surface-active chemical compounds, nor does it consider how organic acids and surfactants will affect radionuclide mobility in the event of their simultaneous release (accident or loss of containment of the wastewater).

At the same time, the interaction of ethylenediaminetetraacetic acid (EDTA) or surfactants with radioactive substances that have entered the soil or an aquifer results in a dramatic increase in the migration of heavy isotopes (Means et al., 1978), as they form water-soluble complexes with zero net charge. For such complexes, the concept of the “barrier function of clays” is no longer applicable.

5. The Alternatives Have Not Been Analyzed or Comparatively Assessed for Their Environmental Impacts

The absence of a proper alternatives analysis is one of the most serious shortcomings of the Belarusian RWDSF EIA Report, as the analysis of alternatives is a key component of the EIA process.

The only alternative mentioned in Section 4.2 is the “temporary alternative.” The content of this section does not constitute an assessment, but rather a brief statement by the developers that this option is unacceptable. The only grounds given for rejecting it are the limited design capacity of the storage facilities at the Belarusian NPP and the limited remaining service life of the storage facilities operated by UE “Ekores.” These factors, in themselves, do not demonstrate that interim storage of radioactive waste and spent nuclear fuel without reprocessing is unacceptable. Moreover, the document itself states that the operating period of the existing storage facilities may be extended based on the results of a safety assessment.

The alternative of interim storage is particularly important for SNF and RW resulting from its reprocessing, as it is required by the current “Strategy for the Management of Spent Nuclear Fuel from the Belarusian Nuclear Power Plant.” Chapter 5 of this document identifies interim storage as one of the mandatory stages of SNF management and states: “Provision must be made for the possibility of expanding the storage area to construct an interim SNF storage facility.” (Council of Ministers of the Republic of Belarus, 2019).

The interim storage option cannot be rejected also because, for various objective reasons, construction of the RWDSF may be postponed.

Meanwhile, long-term interim storage is a well-established and regulated method for managing RW. In the United States, the Nuclear Regulatory Commission explicitly recognizes both

spent fuel pool storage and dry cask storage as permissible methods of storing SNF, including on-site storage pending the availability of a permanent repository; dry storage is subject to procedures for extending storage periods and to aging management programs (US NRC, 2026). In the United Kingdom, interim storage is likewise an established part of the management system for high-level RW prior to final disposal and may continue for several decades (NWS, 2025).

No alternatives to the cementation and incineration of radioactive waste are considered In EIA Report, even within the selected waste management approach. For example, different technologies for cementing liquid radioactive waste evaporator concentrates are currently used in practice.

The foregoing, together with the failure to properly consider the zero alternative as a complete, rather than temporary, discontinuation of the activity, violates the requirements of paragraph 32.4 of the applicable EIA Regulation (Council of Ministers of the Republic of Belarus, 2017). Under this provision, the EIA Report must include a description of alternative options, including the option of not implementing the proposed activity (the zero alternative).

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DETALŪS METADUOMENYS

Dokumento sudarytojas (-ai)	Lietuvos Respublikos aplinkos ministerija 188602370, A. Jakšto g. 4, LT-01105 Vilnius
Dokumento pavadinimas (antraštė)	COMMENTS AND PROPOSALS BY LITHUANIA ON THE EIA REPORT FOR THE CONSTRUCTION OF A RADIOACTIVE WASTE DISPOSAL AND TEMPORARY STORAGE FACILITY IN BELARUS
Dokumento registracijos data ir numeris	2026-09-10 Nr. D8(E)-3656
Dokumento gavimo data ir dokumento gavimo registracijos numeris	–
Dokumento specifikacijos identifikavimo žymuo	ADOC-V1.0
Parašo paskirtis	Pasirašymas
Parašą sukūrusio asmens vardas, pavardė ir pareigos	Giedrė Ričkutė, Viceministras
Sertifikatas išduotas	GIEDRĖ RIČKUTĖ, Lietuvos Respublikos aplinkos ministerija LT
Parašo sukūrimo data ir laikas	2026-09-10 10:28:44 (GMT+03:00)
Parašo formatas	XAdES-T
Laiko žymoje nurodytas laikas	2026-09-10 10:28:53 (GMT+03:00)
Informacija apie sertifikavimo paslaugų teikėją	MD CA, Migracijos departamentas prie LR VRM LT
Sertifikato galiojimo laikas	2026-07-27 09:35:40 – 2030-07-26 09:35:40
Informacija apie būdus, naudotus metaduomenų vientisumui užtikrinti	"Registravimas" paskirties metaduomenų vientisumas užtikrintas naudojant "RCSC IssuingCA-2, VI Registru Centras - i.k. 124110246 LT" išduotą sertifikatą "DBSIS, Informatikos ir ryšių departamentas prie Lietuvos Respublikos vidaus reikalų ministerijos, į.k.188774822 LT", sertifikatas galioja nuo 2025-05-16 11:31:08 iki 2028-05-15 11:31:08
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Pagrindinio dokumento pridedamų dokumentų skaičius	–
Priedamo dokumento sudarytojas (-ai)	–
Priedamo dokumento pavadinimas (antraštė)	–
Priedamo dokumento registracijos data ir numeris	–
Programinės įrangos, kuria naudojantis sudarytas elektroninis dokumentas, pavadinimas	DBSIS, versija 3.5.90.5
Informacija apie elektroninio dokumento ir elektroninio (-ių) parašo (-ų) tikrinimą (tikrinimo data)	Atitinka specifikacijos keliamus reikalavimus. Visi dokumente esantys elektroniniai parašai galioja (2026-09-10 13:22:02)
Paieškos nuoroda	–
Papildomi metaduomenys	Nuorašą suformavo 2026-09-10 13:22:02 DBSIS