LITHUANIAN ANSWERS TO QUESTIONS PRESENTED BY THE IMPLEMENTATION COMMITTEE OF THE ESPOO CONVENTION FOR DISCUSSION ON 15 MARCH 2015

I. STEPS FOLLOWING DECISION VI/2

1. **Please explain the reasons, indicating the relevant provisions of the Convention, why you consider that the steps taken following Decision VI/2 warrant/do not warrant the conclusion that Belarus is in compliance with the provisions of the Convention?**

Detailed argumentation why the steps taken by Belarus since Committee's 27th session do not warrant the conclusion that Belarus is in compliance with the provisions of the Convention is presented in the yearly reports of Lithuania submitted in 2013, 2014 and 2015.
To sum up, the Republic of Belarus, unfortunately, has not taken any constructive steps to implement the Committee's Findings and recommendations, which were endorsed by MOP6 decision VI/2, and in our opinion remains in non-compliance with the following obligations under the Espoo Convention:

Article 2, paragraph 6: the Republic of Belarus constantly ignored numerous Lithuania's requests (for the first time such a motivated request was submitted in May 2010, right after the failed event of 2 March 2010 in Vilnius) to co-arrange a public hearing in the territory of Lithuania in order to allow for meaningful public hearings for Lithuanian public in the areas likely to be affected. Therefore, the event of 17 August 2013 in Ostrovets, which was hastily and unilaterally organized by Belarus, was a failed presentation of the EIA report to the Lithuanian public, in conflict with the provisions of the Espoo Convention. It was an attempt to get a formal approval of the EIA report without due respect for the rights of Lithuanian public. After the event in Ostrovets, Lithuanian authorities received appeals from Lithuanian public regarding the event and the violations of their rights that are guaranteed by the Espoo and Aarhus Conventions. Lithuanian authorities have no reasons to consider the facts that were disclosed by Lithuanian public as unjustified.
Moreover, EIA report submitted to Lithuania on 11 June 2013 by Belarus (drawn up in 2010) was translated into incomprehensible Lithuanian language, most probably using a computer-based translation software (Google translate, etc.). It was impossible to understand the text, sentences made no sense, some of the key words were lost in translation, e.g. in "nuclear power plant" the word "plant" was translated into Lithuanian as "herb" rather than "factory" or "enterprise", while the description of the transboundary EIA process mentioned Uzbekistan instead of Lithuania.

Article 4, paragraph 2: the EIA documentation submitted to Lithuania with the letter of 11 June 2013 was dated as of 6 July 2010 (after a thorough analysis Lithuanian experts concluded that it was not a technical mistake). It means that it had already been assessed by Lithuanian experts and the IC before the adoption of the aforementioned Findings and recommendations and was found to be non-compliant with the provisions of the Espoo Convention. The documentation sent on 11 June 2013 did not take into account Lithuanian questions and comments and the Findings and recommendations of the IC. The IC at its 27th session recommended Belarus to continue the procedure of transboundary EIA on the basis of the final EIA documentation. For this purpose, Belarus was requested to agree with Lithuania on the steps to be followed, to answer all Lithuania's questions and to take into consideration Lithuanian comments. Although the Espoo Convention does not contain a notion of an updated EIA report, the IC stated that the EIA report had to be supplemented by the information, requested by Lithuania, in order to implement the provisions of the Espoo Convention. In paragraphs 68 and 69 of the Findings and recommendations of the IC, it is stressed that, when an activity is planned near a city, the description of locational alternatives to be included in the EIA documentation in line with Appendix II (b) should be especially required. The definition of "impact", according to the Espoo Convention, specifically includes considerations of human health and safety and socioeconomic conditions among the impacts to be considered in the preparation of

the transboundary EIA documentation. It should be noted that the letter of 11 June 2013 of Belarus did not include any new information regarding questions and comments that Lithuania had been raising from the very beginning of the EIA process in 2009. The documentation (about 1000 pages) submitted to Lithuania included only an extremely low quality translation of EIA documentation dated as of 6 July 2010, a compendium of Belarus letters submitted to Lithuania earlier. EIA report lacks equal and thorough assessment of locational alternatives (including the no-action alternative) and essential information regarding environmental and nuclear safety aspects of the Belarus NPP (site survey, site selection, external hazards, design provisions, radiological impact to Lithuanian population and environment, management of spent nuclear fuel and radioactive waste, etc.). The lack of information suggests that appropriate surveys were not carried out. Therefore, Belarus statements that the current version of the EIA report addresses the aspects of transboundary environmental impacts are unfounded.

Article 5, paragraph (a): in Paragraph 53 of the Findings and recommendations of the IC of the Espoo Convention, adopted during 27th session on 12-14 March 2013, the IC pointed out that, in accordance with article 5 of the Convention, consultations should not be only a mere formality, but should concern the measures to "reduce or eliminate" (article 5, paragraph 1) the potential transboundary impact of the proposed activity and allow thorough examination of its possible alternatives. Lithuania has repeatedly expressed its willingness to enter into meaningful consultations with Belarus and proposed Belarus to provide missing information (answers to the key questions and updated EIA report) and co-arrange public hearings in the territory of Lithuania prior to bilateral expert consultations. Such an approach is in line with the requirements of the Espoo Convention and is necessary to define the scope of remaining issues and helps experts to prepare for consultations in a comprehensive manner.

Article 6, paragraphs 1 and 2: according to the written statement of Belarus (letter of the Ministry of Natural resources and Environmental Protection of Belarus dated 23 September 2011), the Decree of the President of Belarus No. 418 "Concerning the site of the NPP in Belarus and development of the NPP project signed 15 September 2011" determined the Ostrovets site for the location and project development of the NPP and was the final decision in accordance with the Article 6 of the Espoo Convention and with the national legislation of Belarus. The decision contradicts the provisions of the Espoo Convention, as the final decision must be the outcome of the transboundary EIA procedure and cannot precede it. Moreover, contrary to the requirements outlined in the Article 6 Paragraph 2 of the Espoo Convention, Lithuania did not receive the decision itself, as well as the reasons and considerations, on which the decision on selecting the site in Ostrovets was based.
In the letter of 18 November 2014, Belarus noted that the Decree No. 499 dated 2 November 2013 was the final decision on construction of the NPP according to the Espoo Convention. However, it did not take due account of the outcome of the EIA including the EIA documentation as well as the comments received. The adopted decision cannot reflect the EIA procedure, as the EIA documentation do not comply with the endorsed Findings and recommendations of the IC of the Espoo Convention, the key questions of Lithuania remain unanswered, public hearings in the Affected Party (Lithuania) have not been arranged, expert consultations have not been held.
The IC of the Espoo Convention in its Findings and recommendations further to a submission by Lithuania regarding Belarus, adopted at its 27th session, noted that for the Ostrovets NPP, Belarus split the final decision into two parts: (a) the decision on the location; and (b) the decision on permitting the construction in that specific location. The IC found that when Parties split their final decisions into several parts, all of these parts of the final decision have to comply with article 6 of the Convention.

2. **Please list the issues on which you continue to disagree with Lithuania/Belarus**.

Lithuania is seriously concerned about the project of Belarus NPP, because it is being developed in violation to the Espoo Convention. Since 2009 Lithuania has been raising questions regarding nuclear and environmental safety of the Belarus NPP project: site selection, evaluation of locational alternatives, seismic assessment, impact to the river Neris (Vilija), cooling of the NPP, performance of "stress-tests", International Atomic Energy Agency's (hereinafter – IAEA) Site and External Events Design (hereinafter – SEED) mission, impact to Lithuanian public and environment, emergency preparedness, etc. There is a list of 15 questions, that remain without answers up until now.

Moreover, Lithuania continuously requests to follow the chronological sequence of procedural steps that are embedded in the Espoo Convention, however Belarus ignores them. The Espoo Convention requires to evaluate all possible reasonable alternatives, including locational, in the process of the transboundary EIA and to make the final choice considering the results of the EIA procedure. The construction site in Ostrovets district was chosen in 2008, well before the notification of Lithuania – its closest neighbour. It should be stressed once again, that Ostrovets NPP will be situated only 50 km away from Lithuanian capital Vilnius. The construction works on Ostrovets site started in 2009 and preceded the start of the EIA as well as the final decision on site selection (Presidential Decree of 2011-09-15) and regarding the main construction phase of the Ostrovets NPP (Presidential Decree of 2013-11-02).

Belarus has been trying to imitate the procedural steps of the transboundary environmental impact assessment (EIA), ignoring the substance of documents and actions. A formal submission of EIA report doesn't mean that the content of it conforms to the provisions of the Espoo Convention and the Findings and recommendations of the Implementation Committee. Organising an event to the public does not automatically mean that the right of the public to get information or to take part in decision-making is guaranteed. Therefore, Lithuania strongly supports the initiative of the Implementation Committee to propose to Lithuania and Belarus to establish an expert body to provide support to the Implementation Committee on scientific and technical matters.

Main topics of disagreement with Belarus:

1. **Site selection and its distance to Lithuanian capital Vilnius.** The site in Ostrovets for the construction of NPP was selected well before the notification and commencement of transboundary EIA for Belarus NPP. The Presidential Decree of 15 September 2011 was an attempt to legalize a decision that was taken in 2008. Despite that the Presidential Decree of 2011 was in non-compliance with the Espoo Convention, as it was acknowledged by the Implementation Committee of the Espoo Convention on its 27th session on 12-14 March 2013. The Ostrovets site was selected prior to evaluation of transboundary impact and without proper geological and seismic researches. IAEA recommends to invite SEED mission for evaluation of possible sites at an early stage, however Belarus has been ignoring this. Another important issue is that Belarus did not take into account the distance from the NPP to the capital of Lithuania during site selection. Emergency preparedness and contingency planning are especially important in this regard. Belarus states that the international documents do not require consideration of distance from large settlements to NPP sitting. However, the IAEA standards require to evaluate the effects of external events occurring in the region of the particular site, the characteristics of the site and its environment that could influence the transfer of radioactive material that has been released to persons and the environment. The IAEA standards also require to evaluate the population density, population distribution and other characteristics of the external zone as far as they may affect the possibility of implementing emergency measures and the need to evaluate the risks to individuals and the population. Regarding risk acceptance, risks from all three potential sites were not analysed. Construction of a NPP ~50 km away from the biggest city and the capital of Lithuania with population of more than half a million people, would pose an unjustifiably high risk posed by this facility to Lithuania. Only after resolving of this, the most important question for Lithuania, we can proceed with the remaining questions.

Hereinafter mentioned safety issues are related with Vienna Declaration on Nuclear Safety, particularly with provisions that new nuclear power plants are to be designed, sited and constructed consistent with the objective of preventing accidents in the commissioning and operation and, should an accident occur, mitigating possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.

2. **Seismic safety assessment.** Belarus stated that seismic safety assessment was carried out in accordance with the national legislation and the IAEA safety standards, however there is no information how exactly seismic hazard was assessed in terms of obtaining ground motion values (SL-1 and SL-2) for design basis such as the design earthquake and maximum design earthquake for Ostrovets and other sites. Furthermore, the selection of Ostrovets site is not justified, as the seismological investigations, as described by Belarus, used for seismic hazard assessment, doesn't provide clear justification of probabilistic and complementary deterministic seismic hazard assessment according to IAEA safety standards SSG-9 "Seismic hazards in site evaluation for nuclear installations". The expressions of the design basis earthquake and maximum design basis earthquake in terms of IAEA requirements (SL-1, SL-2, peak ground acceleration) should be provided. IAEA mission SEED was not carried out in Belarus as well.

3. **Implementation of "stress tests".** "Stress-tests" according to the methodology of the European Union and in line with Belarus' commitments made in 2011 should be carried out without any delay and in any case before commissioning of the first unit of NPP. However, up until now Belarus has not provided dates of schedules when the "stress-tests" will be performed.

4. **Resistance of the NPP in case of a heavy airplane crash.** Ensuring resistance of the NPP in case of a heavy airplane crash Belarus should use the common approach of European countries (including EU, Switzerland and Ukraine) stated in the positions of Western European Nuclear Regulators' Association (WENRA) or similar approach. One of the positions is established in the WENRA Reactor Harmonization Working Group study "Safety of new NPP designs", March 2013. The study states "Despite measures taken to prevent the intentional crash of the commercial airplane (i. e. characterized by load/time curves), this event should be considered in the design of new reactors". This issue was also raised in previous WENRA documents: the WENRA Reactor Harmonization working Group study "Safety objectives for New power reactors", October 2009; "WENRA statement on safety objectives for new nuclear power plants", November, 2010. Safety functions that would bring and maintain the plant in a safe state after an airplane crash shall be designed and protected adequately. Direct and indirect effects of the airplane crash shall be considered as well.

5. **Impact to the river Neris and consequently to the Nemunas basin.** The river Neris is envisaged as the main cooling source for the NPP. The distance from the NPP to the cooling source – 11-13 km. The river Neris flows through the Lithuanian capital Vilnius and belongs to the Nemunas river basin, which covers 72 percent of Lithuanian territory. Water intakes from the river Neris plays an important role in the balance of drinking water resources for the Vilnius region.

   A special study „Evaluation of possible impact of Astravas nuclear power plant to groundwater resources of well fields located on riverside Neris" was prepared in 2014 (References – *Požeminio vandens būklė ir jo sąveika su paviršinio vandens telkiniais Vilniaus, Kauno bei Kuršių nerijos ir pamario požeminio vandens baseinuose/Gregorauskas M., Klimas A.; UAB "Vilniaus hidrogeologija". - Vilnius, 2014. - 142 p.: 66 pav. - (LGT fondas; Nr.19704).* The reduction of exploitable resources of well fields located on riverside

of Neris in case of major accident in Ostrovec NPP was calculated based on detailed mathematical model. The study demonstrates that from 57% to 95% of exploitable resources in the cities of Vilnius, Kaunas and Jonava could become unusable. Therefore, there is a need for a special plan for drinking water supply in case of a major accident for Vilnius, Kaunas and Jonava cities.

3. **Please present the current state of works at the site.**

Belarus is constructing 1st and 2nd Units of the Belarus NPP. Works on site include construction of the main buildings of the NPP (cooling towers, reactor buildings etc.) of both Units and installation of main components/equipment (reactor vessel, steam generators, electro-technical equipment) for the 1st Unit. On 24 December 2015 reactor vessel for the 1st Unit was delivered to the construction site (installation will begin at the end of May 2016). At the end of 2017 nuclear fuel for the 1st Unit reactor and the reactor vessel for the 2nd Unit is expected.

Already in 2013, according to the presentation of the Head of the Office for International Cooperation Nuclear Energy Department Ministry of Energy of the Republic of Belarus[1], about 7.5 thousand tons of reinforcement rods were assembled and 29 thousand cubic meters of concrete were poured for the buildings of the 1st Unit. A molten core catcher was delivered to the construction site. In total, about 45.7 thousand square meters of housing were built in 2009-2013 in Ostrovets for construction workers and operators of the Belarus NPP.

In 2012 Belarus was working on the foundation pit for the 1st NPP Unit in Ostrovets site. In August 2012, a time capsule with a message addressed to future generations was placed at the construction site of the Belarusian nuclear power plant. Excavation of the foundation pit for the second power-generating unit started in February 2013[2] .

For more detailed information on the implementation of the Belarus NPP project, please, see a compilation of articles from Belarus media (attached).

II. ALTERNATIVES

4. **What conditions (environmental and economic) should a location satisfy in order to qualify as a reasonable alternative for placing a new nuclear power plant?**

According to IAEA, considering that each nuclear accident in any place may have transboundary effects and understanding that country operating a nuclear power plant is liable for damages in accordance with the international legislation, the site for nuclear power plant cannot be chosen in a place that in case of nuclear disaster the critical infrastructure of neighbouring country may be damaged. The site selection and evaluation regarding nuclear safety must be performed in accordance with IAEA safety standards and international expert missions for siting shall take place before decision on concrete site selection is made. It is important to place an NPP as far as possible from the largest cities in order to reduce possible negative impact to environment and residents and to assess site characteristics thoroughly. Safety of an NPP project begins with the selection of a proper site and extends throughout the whole nuclear cycle, including decommissioning.

[1] *https://www.iaea.org/NuclearPower/Downloadable/Meetings/2014/2014-02-04-02-07-TM-INIG/Presentations/12_S2_Belarus_Dulinets.pdf*

[2] *http://atom.belta.by/en/dosie_en/view/belarusian-nuclear-power-plant-project-ntimeline-208/*

5. **Please describe the national procedure for selecting a possible location for a new nuclear power plant.**

In theoretical case, where the nuclear power plant would be proposed as a green field investment (where such activity has not been carried before and there's no necessary infrastructure as well as research data in place), the site selection procedure would be initiated by preparation of the nuclear development program for which strategic environmental assessment (hereinafter – SEA) in a transboundary context would be carried out with the aim to identify reasonable locational alternatives for the construction of the nuclear power plant based on the international best practice on site selection criteria (necessary research studies, geological, hydrological and other would be carried it out in order to substantiate the SEA results). According to the SEA results reasonable locational alternative (at least two, quite probable 3-4 sites) would be identified, in the nuclear development program for further investigations. Environmental impact assessment (hereinafter – EIA) in a transboundary context would be carried out in accordance with the Law on EIA and the Espoo Convention. Based on national legislation, the EIA procedure first involves preparation of an EIA Program (scoping document), which has to give the structure of the EIA and a description of the topics that will be studied and the methods to be employed. Based on the EIA Program, EIA Report is prepared, which includes the description of the environment and assessment of the environmental and social impacts of the project. All identified reasonable locational alternatives as well as no action alternative have to be equally and thoroughly assessed during EIA. Prioritisation of sites would be identified in the EIA report taking into account their detailed comparison. The International Atomic Energy Agency (IAEA) mission would be organised to review the procedures of execution of EIA process and EIA report in order to assess compliance with the best international practices and procedures from radiation protection and environmental point of view. Having considered the EIA report, conclusions of entities of environmental impact assessment on the report and feasibility of the proposed economic activity (the state institutions in charge of health care, fire protection, protection of cultural properties as well municipal institutions, State Nuclear Power Safety Inspectorate, Radiation protection Centre, State Service for Protected Areas), public comments and transboundary consultations, the competent authority (Environment Protection Agency) would adopt decision on feasibility to construct nuclear power plant, which would specify its location and set necessary conditions for further development of nuclear power plant with due respect to its environmental impact assessment. One of the conditions would be to undertake the detailed assessment of the site(s) in line with the IAEA safety standard NS-R-3 "Site Evaluation for Nuclear Installations". The assessment of seismic hazard at the sites has to be carried out in line with the IAEA Safety Standard DS422 "Evaluation of Seismic Hazards for Nuclear Installations".
In case where there's existing infrastructure that can possibly be utilised by the new nuclear power plant (cooling water inlet and outlet channels, electric systems and transmission lines, monitoring systems and other), the formal site selection procedure would start with EIA. According to national legislation at least two locational as well as no action alternative would be assessed and necessary decision would be made in the manner described above. The transboundary EIA in such way was carried for the Visaginas nuclear power plant project. It should be noted that Implementation Committee of the Espoo Convention in its letter of 14 March 2014 to Lithuania confirmed that Visaginas nuclear power plant procedure was carried out in full compliance with the Espoo Convention.

6. **What conditions (environmental and economic) should a technology satisfy in order to qualify as a reasonable alternative for building a new nuclear power plant?**

The design must be in compliance with the modern international standards, attitudes for safety and approaches for demonstration of the compliance. The compliance with the requirements shall be demonstrated through transparently presented information, international expert missions and peer-reviews before taking the decision on design of the new nuclear power plant. Particularly the design

shall be in compliance with IAEA safety standards, Convention on Nuclear Safety (including Vienna Declaration on Nuclear Safety) through implementation of Western European Nuclear Regulator's Association (WENRA) or similar approaches for new nuclear power plants designs. The particular issue is the resistance of new nuclear power plants in case of large aircraft crash event. The internationally sound lessons learnt from Fukushima Daichi accident thoroughly shall be taken into account. The "stress test" study is requested to be performed in accordance with specification (http://www.ensreg.org/node/289/) and methodology approved by European Nuclear Safety Regulators Group (ENSREG) or similar methodology.

7. **Please describe the national procedure for selecting the technology for a nuclear power plant.**

For the development of the Visaginas NPP project Lithuania was seeking an experienced investor with strong credentials in the development of new generation technology and operation of nuclear power plants. It has to be noted that technological alternatives were evaluated in the EIA process and afterwards a tender was announced. For this purpose, a special Concession Tender Commission was established by the decree of the Minister of Energy of the Republic of Lithuania in December 2009, which has been delegated to organise a tender for the selection of a Strategic Investor for Visaginas NPP project. The open tender process was launched in 2009 by announcement in the official gazette of the Republic of Lithuania "Valstybės žinios" and Official Journal of European Union (the OJEU) to identify and select the Strategic Investor. In 2011 after consultations with Regional Partners (at that moment Estonia, Latvia, Poland) and the European Commission, Lithuania decided to commence the process of granting concession by way of direct negotiations. The law of Concessions foreseen the direct negotiations procedure option on the same tender conditions. Therefore, in May 2011, competitive proposals were received from the potential strategic investors Hitachi, Ltd. together with Hitachi GE Nuclear Energy Limited ("Hitachi") and Westinghouse Electric Company. In July 2011, Hitachi was selected as strategic investor as well as provider of the technology – Hitachi GE Advanced Boiling Water Reactor (ABWR).

8. **How would you fully address the no-action alternative in the case of the proposed building of a nuclear power plant?**

Following the analysis of the energy sector and evaluation of the main challenges, the national energy strategy is based on three interconnected principles:

i. **Energy independence**. Lithuania will cover its domestic energy demand from local and diversified sources. This is a necessary condition for continuous functioning of the energy system and prevention of energy supply interruptions.

ii. **Competitiveness**. The state will connect to European energy markets and will reform existing energy sector monopolies. This will guarantee favourable energy prices for the consumers and ensure sufficient investments into the energy sector to develop the missing energy infrastructure.

iii. **Sustainability.** Both production and consumption of energy must be based on the principles of sustainable development. Emissions of greenhouse gas and resource depletion will be reduced to make the energy sector sustainable. Nuclear energy and promotion of renewable energy sources will ensure sustainable energy production.

According to no-action, or zero option, no new nuclear power plant would be constructed in Lithuania and therefore, in this case the supply of energy from diverse, secure, sustainable energy sources which do not emit greenhouse gases and other pollutants will not be secured and the country's energy security will not be ensured.

In the environmental impact assessment report of new nuclear power plant in Lithuania (2009) it was assumed that the amount of electricity equal to the production of the new NPP would be partly produced in Lithuania in thermal power plants and part of it would be imported. Imported electricity was assumed to be produced in thermal power plants using coal and oil as a fuel and in hydro and nuclear power plants as well. Emissions of pollutants and greenhouse gasses were estimated for the zero-option and were presented in the EIA report.

III. IMPACT ON WATERCOURSES

9. How would you describe a watercourse that can be safely used as the exclusive source of water for cooling a new nuclear power plant?

According IAEA Safety Guide No. NS-G-1.9 "Design of the Reactor Coolant System and Associated System in Nuclear Power Plants", ultimate heat sink (A medium to which the residual heat can be always transferred, even if all means of removing the heat have been lost or are insufficient) should be capable of absorbing the heat in normal operation, anticipated operational occurrences or accident conditions.

When water is the medium selected as the ultimate heat sink, the following attributes should be considered:

- The size of the water supply;
- The type of cooling water supply (e.g. ocean, lake, natural or human made reservoir or river);
- Make-up sources to the ultimate heat sink;
- The capability of the heat sink to deliver the necessary flow of cooling water at appropriate temperatures for operational states, accident conditions or shutdown conditions of the reactor.

In determining the necessary capacity of the ultimate heat sink and its directly associated heat transport systems, design basis environmental parameters should be established. These parameters include the water temperature of the ultimate heat sink for once-through water cooling systems and the ambient air temperature (dry bulb temperature) for dry cooling towers. Both - the lowest temperature that can be obtained by evaporating water into the air (wet bulb temperature) and ambient air temperature (dry bulb temperature) are needed for wet cooling towers, cooling ponds or spray ponds, and for other heat transport systems that use evaporative cooling. Other parameters such as water quality (mud content and chemical impurities), wind speed and insulation factors should be included where necessary.

The long term capacity of the ultimate heat sink should be ensured by means of designs that provide immediate access to inexhaustible natural bodies of water or to the atmosphere. The ultimate heat sink should be capable of providing sufficient cooling for at least 30 days to permit simultaneous safe shutdown and cooldown of all nuclear reactor units that it serves and to maintain them in a safe shutdown condition, and in the event of an accident in one unit, to limit the effects of that accident safely, to permit simultaneous and safe shutdown of the remaining units, and to maintain them in a safe shutdown condition.

In determining the capacities demanded of the ultimate heat sink and its directly associated heat transport systems, the various heat sources and their time dependent behaviour should be precisely identified to ensure that the temperature of the coolant remains within specified limits. The heat loads that should be taken into consideration include the following:

- The residual heat of the reactor;

- The decay heat of the spent fuel with the storage system at its maximum capacity;
- The heat rejected from pumps and other components;
- Heat from other accident related sources (e.g. chemical reactions).

According to IAEA "Basic Safety Principles for Nuclear Power Plants 75-INSAG 3", the site selected for a nuclear power plant shall have a reliable long term heat sink that should remove energy generated in the plant after shutdown, both immediately after shutdown and over the longer term.

If the atmosphere is chosen as an ultimate heat sink, the design should ensure that the heat removal system would withstand any extreme event (such as earthquake, floods and tornadoes). Several aspects should also be taken into account, when the choice of a watercourse for cooling a new nuclear power plant is being done.

The main attention should be paid to potential thermal load, impact on water balance and possible changes of water quality. Radiological impact during normal operation usually is negligible, because discharges of radionuclides are controlled by applying of preventive measures.

Some watercourses cannot be safely used as the exclusive source of water for cooling a new nuclear power plant without additional measures. During planning of NPP possible thermal load should be carefully evaluated and additional measures for increasing of cooling capacity, such as cooling towers, should be planned, if it is a doubt that thermal impact will be noticeable.

Water usage for the cooling of the NPP causes water losses due to evaporation. For evaluation of this impact thorough hydrologic analysis of the watercourse at locations for surface water intake should be done. Measures should be planned to ensure that thermal and hydrologic regime of watercourse will not be changed, the pollution will not be increased and the quality of watercourse water will not be reduced. The demand of water supply to the NPP has to be always sufficient preserving the minimum permissible flow rate in the watercourse, taking into account emergency cases where the possible conflicts among various water users could occur. Therefore, to prove that the watercourse can be safely used as the exclusive source of water for cooling a new nuclear power plant, the assessment should include summer drought period when hydrological parameters of the watercourse are much worse than average annual, it should also take into account the climate change aspect as the air temperature increase and the reduction of the watercourse level may substantially affect the assessment results.

Significant radiological impact is possible as a consequence of a major accident, accident beyond the design-base or disaster at the NPP, because in such situations discharges of radionuclides are not controlled and can get into the watercourse through direct liquid discharges and from the air. Transfer of radionuclides in aquatic environment depends on many conditions (type of watercourse, accumulation zones, water flow, chemical and physical characteristics of certain radionuclide, etc.). This impact can be characterised as long term impact. During the time long-lived radionuclides usually settle down to the bottom sediments, where become the secondary source of pollution. Radiological pollution of watercourse causes the exposure of flora and fauna.

The other aspect that should be taken to account is possible filtration of contaminated water to underground water (for example, in water basin of river that is used for cooling), which is used as drinking water. Population gets exposure by using contaminated fish and drinking water.

The river Neris, flowing through the capital of Lithuania (Vilnius), is envisaged as the main cooling source for the NPP in Belarus. Water intakes from Neris River play an important role in the balance

of drinking water resources for the Vilnius region. The Nemunas river basin, which includes the river Neris, covers 72% of Lithuanian territory.

10. **What would be the impact on the watercourse described above and its water basin as a consequence of the normal operation of a nuclear power plant using water from the said watercourse?**

According to IAEA Safety Guide NS-G-1.9 “Design of the Reactor Coolant System and Associated System in Nuclear Power Plants”, ultimate heat sink should be capable of absorbing the heat generated under any plant condition without negative impact to the water basin.

In the selection of the type of ultimate heat sink and its directly associated heat transport systems for a plant, account should be taken of the specific site conditions in which the plant will operate and of its impact on the environment.
It is important to underline that Compilation of recommendations and suggestions were prepared (http://www.ensreg.eu/sites/default/files/Compilation%20of%20Recommendationsl_0.pdf) after Peer Review of stress tests performed on European nuclear power plants. One of suggestion is related with Large Volumes of Contaminated Water during Severe accident management (clause 3.3.11) and requires the conceptual preparations of solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water. This suggestion shall be incorporated in new NPP design and severe accident management guidelines.

Thermal pollution can have significant impacts on flora, fauna especially cold-water species, benthos and other water organisms of the watercourse. The heat clearly changes the aquatic ecosystem. These changes are often unpredictable and potentially disastrous. Heat can increase the chances of various types of diseases in fish, and restricts the types of fish that can exist in the warm water. Special attention should be paid for protection of endangered or protected species. Water losses due to evaporation cause a change in hydrologic regime of the watercourse. Discharges, changes of thermal regime and hydrological characteristics make impact on water quality of the watercourse.

The river Neris, flowing through the capital of Lithuania (Vilnius), is envisaged as the main cooling source for the NPP in Belarus. Water intakes from Neris River play an important role in the balance of drinking water resources for the Vilnius region. The Nemunas river basin, which includes the river Neris, covers 72% of Lithuanian territory.

IV. ACCIDENTS

11. **What would be the impact on the watercourse described above and its water basin as a consequence of a major accident, accident beyond the design-base or disaster at the nuclear power plant using water from the watercourse referred to above?**

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Transfer of radionuclides in aquatic environment depends on many conditions (type of watercourse, accumulation zones, water flow, chemical and physical characteristics of certain radionuclide, etc.). This impact can be characterised as long term impact. During the time long-lived radionuclides usually settle down to the bottom sediments, where become the secondary source of pollution. Radiological pollution of watercourse causes the exposure of flora and fauna.

The other aspect that should be taken to account is possible filtration of contaminated water to underground water (for example, in water basin of river that is used for cooling), which is used as drinking water. Population gets exposure by using contaminated fish and drinking water.

The river Neris, flowing through the capital of Lithuania (Vilnius), is envisaged as the main cooling source for the NPP in Belarus. Water intakes from Neris River play an important role in the balance of drinking water resources for the Vilnius region. The Nemunas river basin, which includes the river Neris, covers 72% of Lithuanian territory.

It is important to underline that Compilation of recommendations and suggestions were prepared (http://www.ensreg.eu/sites/default/files/Compilation%20of%20Recommendationsl_0.pdf) after Peer Review of stress tests performed on European nuclear power plants. One of the suggestions is related with Large Volumes of Contaminated Water during Severe accident management (clause 3.3.11) and requires the conceptual preparations of solutions for post-accident contamination and the treatment of potentially large volumes of contaminated water. This suggestion shall be incorporated in new NPP design and sever accident management guidelines.

Also the "stress test" study is requested to be performed. This study shall be performed in accordance with specification (http://www.ensreg.org/node/289/) and methodology approved by European Nuclear Safety Regulators Group (ENSREG). The study may reveal deficiencies of the design of NPP what can lead to disasters.

12. Please list incidents that you believe could lead to a major accident, accident beyond the design-base or disaster.

International standards require making studies/researches in order to find out how the NPP reacts to various incidents (earthquake, flood (including internal), drought, loss of electricity, large aircraft crash).

The impact of intentional crash of a large commercial aircraft has to be demonstrated as controllable accident that would not lead to a disaster. Such accident shall be taken into account in new nuclear power plant's designs and the limited radiological consequences of such accident shall be demonstrated in consistence, for example, with safety objective O5 as it is defined in the publications of Western European Nuclear Regulator's Association (WENRA) "Safety Objectives for New Power Reactors. Study by WENRA Reactor Harmonization Working Group", December 2009 and "Report. Safety of new NPP designs. Study by Reactor Harmonization Working Group RHWG", March 2013.
Also, the "stress test" study is requested to be performed. This study shall be performed in accordance with specification (http://www.ensreg.org/node/289/) and methodology approved by European Nuclear Safety Regulators Group (ENSREG) or similar methodology. The study may reveal deficiencies of the design of NPP that can lead to disasters.

Very low probability coincidental malfunctions of different safety related systems and elements (to be defined by the plant designer in the Probabilistic Safety Analysis) could also lead to a major accident.

13. How would you establish the maximum territorial extent of a significant impact from a major accident, accident beyond the design-base or disaster at a nuclear power plant?

According to IAEA safety standards („Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency" EPR – Method 2003, page 127, Appendix 5, table A5-II;

Actions to Protect the Public in an Emergency due to Severe Conditions at a Light Water Reactor", EPR – NPP Public Protective Actions, page 22, table 3; GS-G-2.1; GS-R-2, GS-R Part 7) the radius of territories for planning protective actions for public and environment in case of emergency at the NPP with reactors of more than 1000MW of thermal power, extends from 3 to 300 km. According to latest recommendations planning for protection actions shall be done in these zones (distance radius from facility):

- precautionary action zone (PAZ) – from 3 to 5 km;
- urgent protective action planning zone (UPZ) – from 15 to 30 km;
- extended planning distance (EPD) – up to 100 km;
- ingestion and commodities planning distance (ICPD) – up to 300 km.

Belarusian NPP is located ~ 20 km from the border of Lithuania and ~ 50 km from the capital of Lithuania – Vilnius. In the Lithuanian territory up to 30 km from above mentioned NPP the population is 33 thousand. This territory is named as urgent protective actions planning zone. In the territory of 100 km from Belarusian NPP (extended planning distance) lives about 900 thousand of individuals (including ~ 500 thousand of individuals in Vilnius). Almost the whole territory of Lithuania enters into ingestion and commodities planning distance extending to 300 km from Belarusian NPP.

14. What would be the measures that should be taken on the territory referred to above?

According to IAEA recommendations evacuation, sheltering and iodine prophylaxis shall be planned and applied in case of severe nuclear emergency in the precautionary action zone and urgent protective action planning zone.

In the territory up to 100 km (extended planning distance) from the NPP proper sheltering and iodine prophylaxis shall be planned and applied if necessary. Arrangements for possible evacuation of population located in hotspots of radioactive contamination at extended planning distance shall be considered in advance.

In the ingestion and commodities planning distance control of radioactive contamination of foodstuffs, drinking water and other items shall be planned and carried out.

According to Heads of the European Radiological protection Competent Authorities (HERCA) and WENRA approach for a better cross-border coordination of protective actions during the early phase of a nuclear accident, an accident comparable to the Fukushima one would require protective actions such as evacuation to around 20 km and sheltering to around 100 km. These actions would be combined with the intake of stable iodine. HERCA and WENRA consider that in Europe:

- evacuation should be prepared up to 5 km around nuclear power plants, and sheltering and stable iodine intake up to 20 km;
- a general strategy should be defined in order to be able to extend evacuation up to 20 km and sheltering and stable iodine intake up to 100 km.

V. RADIOACTIVE WASTE

15. **Please explain whether storage of radioactive waste on the premises of the nuclear power plant increases the risk/likelihood and consequences/impact of a major accident, accident beyond the design-base or disaster at such nuclear power plant?**

Long-term storage of radioactive waste is not considered as sustainable waste management solution and able to assure adequate safety requirements. Only waste emplacement into engineered disposal facilities, based on passive safety principle, minimises the potential risk.

The following radioactive waste management strategy has been specified in the documents presented regarding Belorussian NPP:

- The spent nuclear fuel (SNF) after a certain period in cooling pools at the nuclear reactor shall be transported to the Russian Federation for reprocessing “in accordance with the intergovernmental agreement”.
- High Level Waste resulting from the NPP operation will be stored in the NPP territory during the full operation life-time of the NPP.
- Low and Intermediate Level Waste resulting from the NPP operation will be stored in radioactive waste storage within the NPP territory during 10 years. After that period, the waste shall be transported to the new Belarusian radioactive waste storage facility, to be built.

It is obvious, that such approach to radioactive waste management cannot assure safety or sustainability. Of special concern is the management of SNF, which is the most dangerous waste, because unfortunately, the above mentioned intergovernmental agreement between Russia and Belarus on SNF reprocessing is still hypothetical. Russia prohibits import of SNF if the intergovernmental agreement is not signed. Therefore, two obvious questions occur: it is doubtful that such an agreement will be made and the conditions remain uncertain – there is high probability that High Level Long- Lived Waste from reprocessing of the SNF will be returned to Belarus. If the agreement in question is not concluded in time, or there is no agreement at all, without an alternative plan there is a real threat that the SNF is kept in the storage pools for an extended period of time. In case of a prolonged interruption of cooling due to emergency situations, the water in the spent fuel pools may boil off, possibly resulting in radionuclides being released into the atmosphere, like it was in Fukushima NPP in March 2011.

The presented outline of waste management system does not provide understanding how, when, and where the radioactive waste will be disposed of. Lithuanian part is requesting to provide the following information: waste disposal plans and measures to assure sustainable waste management without leaving undue burden of waste management on future generations, as it has been requested by the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.