

**HEAD OF THE STATE NUCLEAR POWER SAFETY
INSPECTORATE**

**ORDER
APPROVING THE NUCLEAR SAFETY REQUIREMENTS BSR-1.8.10-2021
"ANALYSIS OF CONSEQUENCES OF HYPOTHETICAL NUCLEAR AND
RADIOLOGICAL ACCIDENTS AT NUCLEAR INSTALLATION"**

27 July 2021 No. 22.3-124
Vilnius

Pursuant to Articles 22(1)(3) and 30(3)(4) of the Republic of Lithuania Law on Nuclear Energy, and Articles 4(4), 11(1) and Article 30(3) of the Republic of Lithuania Law on Nuclear Safety, I hereby:

1. Approve the Nuclear Safety Requirements BSR-1.8.10-2021 " Analysis of consequences of hypothetical nuclear and radiological accidents at nuclear installation" (attached).
2. Establish that this Order shall enter into force on 1 November 2021.

Deputy Head for General Nuclear Safety,
Acting Head

Sigitas Šlepavičius

APPROVED by
Order No. 22.3-124 of the Head of
the State Nuclear Power Safety
Inspectorate of 27 July 2021

NUCLEAR SAFETY REQUIREMENTS

BSR-1.8.10-2021 " ANALYSIS OF CONSEQUENCES OF HYPOTHETICAL NUCLEAR AND RADIOLOGICAL ACCIDENTS AT NUCLEAR INSTALLATION "

CHAPTER I GENERAL PROVISIONS

1. The Nuclear Safety Requirements BSR-1.8.10-2021 "Analysis of consequences of hypothetical nuclear and radiological accidents at nuclear installation " (hereinafter referred to as the "Requirements") shall regulate:

1.1. the aims and methodology for the analysis of hypothetical nuclear and radiological accident consequences in a nuclear installation (hereinafter referred to as the "Consequences Analysis");

1.2. the procedure for documenting and coordinating the Consequences Analysis with the State Nuclear Power Safety Inspectorate (hereinafter referred to as the "VATESI");

1.3. revision and periodic review of the Consequences Analysis.

2. The Requirements shall apply to nuclear installations (hereinafter referred to as "NIs") and shall be binding on economic entities holding the licences referred to in Article 22(1)(1) to (5) of the legal act referred to in subparagraph 3.2 of the Requirements, and on economic entities applying for such licences and/or permits referred to in Article 22(2)(3) and (4) of the legal act referred to in subparagraph 3.2 of the Requirements in the manner prescribed in subparagraph 3.5 of the Requirements (hereinafter referred to as the "licence holder" or "applicant").

CHAPTER II REFERENCES

3. The Requirements refer to the following legal acts:

3.1. Republic of Lithuania Law on Nuclear Energy;

3.2. Republic of Lithuania Law on Nuclear Safety;

3.3. Republic of Lithuania Law on Radiation Protection;

3.4. Republic of Lithuania Law on Special Land Use Conditions;

3.5. Rules for the issuance of licences and permits for activities in the field of nuclear energy, approved by Resolution No. 722 of the Government of the Republic of Lithuania of 20 June 2012 approving the Rules for the issuance of licences and permits for activities in the field of nuclear energy;

3.6. Nuclear Safety Requirements BSR-1.3.1-2020 "Ensuring emergency preparedness at nuclear installations", approved by Order No 22.3-18 of the Head of the VATESI of 21 January 2020 approving the Nuclear Safety Requirements BSR-1.3.1-2020 "Ensuring emergency preparedness at nuclear installations";

3.7. Lithuanian Hygiene Standard HN 73:2018 "Basic radiation protection standards", approved by Order No. 663 of the Minister of Health of the Republic of Lithuania of 21 December 2001 approving Lithuanian Hygiene Standard HN 73:2018 "Basic radiation protection standards";

3.8. Lithuanian Hygiene Standard HN 99:2019 "Protection of the population in the event of a nuclear or radiological accident", approved by Order No. V-1040 of the Minister of Health of the Republic of Lithuania of 7 December 2011 approving Lithuanian Hygiene Standard HN 99:2019 "Protection of the population in the event of a nuclear or radiological accident";

3.9. Nuclear Safety Requirements BSR-1.8.7-2020 "Safety of licensed activities with nuclear and fissile materials regulated by the State Nuclear Power Safety Inspectorate", approved by Order No. 22.3-15 of the Head of the State Nuclear Power Safety Inspectorate of 17 January 2020 approving the Nuclear Safety Requirements BSR-1.8.7-2020 "Safety of licensed activities with nuclear and fissile materials regulated by the State Nuclear Power Safety Inspectorate".

CHAPTER III DEFINITIONS

For the purposes of the Requirements:

4.1. **Site area** shall mean an area comprising the site of a nuclear installation and its sanitary protection zone.

4.2. **Emergency preparedness category** shall mean a classification group of nuclear installations for which the same criteria for determining the emergency preparedness category are established and to which the same requirements for preparedness for and response to nuclear and radiological accidents apply.

4.3. **Source term** shall mean the actual or potential activity and composition of radionuclides released from a nuclear installation into the environment in the event of a nuclear or radiological accident.

4.4. **Mitigatory actions**, hereinafter referred to as "mitigatory actions", shall mean the immediate actions taken by the license holder or other persons in the event of a nuclear or radiological accident in a nuclear installation, the purpose of which is to limit the release of radionuclides into the environment and, in the event of release into the environment, to mitigate the potential effects on human life, health, property and the environment, thereby reducing the need for emergency response at the site area or the off-site area.

4.5. **Off-site area** shall mean the area around a site area which is not under the management or control of the license holder and all or part of which may be used to initiate emergency response in the event of a nuclear or radiological accident in a nuclear installation.

5. The terms "emergency preparedness", "nuclear power plant", "nuclear accident", "nuclear power unit", "nuclear installation", "nuclear installation site", "nuclear installation operator", "nuclear reactor", "license holder", "non-power reactor", "spent fuel" and "applicant" shall have the meanings given to them in the legal act referred to in subparagraph 3.1 of the Requirements.

6. The terms "nuclear material" and "fissile material" shall be understood as defined in the legal act referred to in subparagraph 3.2 of the Requirements.

7. The terms "activity (A)", "protective actions", "exposure", "ionising radiation", "source of ionising radiation", "radioactive material" and "radiological accident" shall have the meanings given to them in the legal act referred to in subparagraph 3.3 of the Requirements.

8. The terms "accidental radiation effects", "dose", "radiation-induced effects", "representative" and "severe radiation-induced effects" shall have the meanings given to them in the legal act referred to in subparagraph 3.7 of the Requirements.

9. The terms "criteria for determining the emergency preparedness category", "emergency response", "nuclear or radiological accident response" and the abbreviation "A/D₂" shall have the meanings given to them in the legal act referred to in subparagraph 3.8.

10. The terms "validation" and "verification" shall be understood as defined in the legal act referred to in subparagraph 3.9 of the Requirements.

11. The term "sanitary protection zone" shall have the meaning given to it in the legal act referred to in subparagraph 3.4 of the Requirements.

CHAPTER IV AIMS OF THE CONSEQUENCES ANALYSIS

12. The license holder or applicant shall carry out a Consequences Analysis with the aims to:
- 12.1. identify and select events that could lead to nuclear or radiological accidents (hereinafter referred to as "accidents") at the NI that could lead to radiological effects in the off-site area;
 - 12.2. carry out an analysis of the accidents that would be caused by the events referred to in subparagraph 12.1 of the Requirements;
 - 12.3. carry out an assessment of radiological effects of the accidents referred to in subparagraph 12.1 of the Requirements;
 - 12.4. determine the emergency preparedness category of the NI;
 - 12.5. obtain the data necessary to ensure emergency preparedness in accordance with the legal act referred to in subparagraph 3.6 of the Requirements.

CHAPTER V METHODOLOGY FOR CONDUCTING CONSEQUENCES ANALYSIS

SECTION ONE IDENTIFICATION AND SELECTION OF EVENTS LIKELY TO HAVE RADIOLOGICAL IMPACT TO OFF-SITE AREA

13. The license holder or applicant shall identify and select events which, irrespective of their low recurrence frequency (a frequency which is lower than the frequency selected in the NI safety analysis report used as the selection criterion for the initiating events), result in an accident at the NI under evaluation (hereinafter referred to as "postulated events"), which could lead to radiological effects in an off-site area.
14. The postulated events shall be identified by:
- 14.1. assessing the potential failures of structures, systems and components in the NI design;
 - 14.2. assessing human error (e.g. in the operation of NI equipment, in the performance of the actions set out in the procedure descriptions);
 - 14.3. assessing internal and external hazards.
15. The following internal hazards shall be considered when identifying postulated events:
- 15.1. internal fires;
 - 15.2. internal explosions;
 - 15.3. internal flooding;
 - 15.4. internal missiles;
 - 15.5. structural collapse;
 - 15.6. falling objects;
 - 15.7. liquid and gas leaks;
16. The following external hazards shall be considered when identifying postulated events:
- 16.1. seismic events and other geological phenomena;
 - 16.2. meteorological phenomena;
 - 16.3. external flooding (e.g. floods or flooding due to extreme precipitation);
 - 16.4. external fires;
 - 16.5. explosions caused by the activities of surrounding civil installations;
 - 16.6. air and land transport accidents.
17. Events related to military actions and intentional acts by individuals shall not be considered.
18. The postulated events shall be selected by assessing:

18.1. the state of the NI that could cause the most severe radiological effects in the event of an accident (e.g. the state of the NI in which the maximum amount of radioactive materials is stored in this NI);

18.2. the characteristics of the NI building structures and the equipment contained;

18.3. the technological processes taking place in the NI (e.g. the energy generated by the NI equipment);

18.4. the quantity (mass), chemical and physical properties, radionuclide composition and activity of radioactive materials in the NI;

18.5. the possible evolution of the accident, which may affect the source term and other aspects of the release of radionuclides to the environment from the NI under evaluation (e.g. an increase in the activity of the radionuclides released to the environment as a result of a fire during the accident).

19. In accordance with paragraphs 13 to 18 of the Requirements, once the postulated events have been identified and selected, the license holder or applicant shall compile a list of postulated events.

20. The list of postulated events shall include, but not be limited to, the following events, except as provided in paragraph 21 of the Requirements:

20.1. the crash of a civil aircraft, the assumptions for the assessment of which are set out in paragraphs 26 and 27 of the Requirements;

20.2. an extreme seismic event for which the assessment assumptions are specified in paragraph 28 of the Requirements.

21. When assessing the potential impact of a civil aircraft crash and an extreme seismic event on the same NI, only one postulated event describing the boundary case (civil aircraft crash or extreme seismic event) may be selected for the list of postulated events. A postulated event describing a boundary case may be selected when, after taking into account the aspects referred to in paragraph 18 of the Requirements, the radiological effects of one event are likely to be greater than the radiological effects of another event at the same NI (for example, in the case of assessment of a NI where solid combustible radioactive materials are stored or contained, in the event of a civil aircraft crash, the radiological effects of this event, due to the spillage and combustion of aviation fuel, would be greater than the radiological effects of an extreme seismic event at the same NI).

22. The assessments referred to in paragraphs 13 to 21 of the Requirements shall be carried out using specialised analytical methods (e.g. hazard and operability study, failure modes and effect analysis) or expert judgment (e.g. postulation of failures in the structures, systems or components of the NI). The following shall be used to identify and select postulated events:

22.1. the information contained in the NI safety justification documents (e.g. site evaluation report, safety analysis report and periodic safety review report);

22.2. their own experience and the experience of other persons in the nuclear power sector, including experience contained in international standards;

22.3. knowledge of engineering and natural sciences;

22.4. information on the possibility of limiting the radiological effects by organisational and technical measures.

SECTION TWO ANALYSIS OF ACCIDENTS CAUSED BY POSTULATED EVENTS

23. The license holder or applicant shall carry out an analysis of accidents caused by postulated events, a list of which shall be drawn up in accordance with paragraphs 19 and 20 of the Requirements (hereinafter referred to as "postulated event analysis"). The postulated event analysis shall identify the accident scenarios (hereinafter referred to as "accident scenarios"), the magnitude of the damage to the NI and the source term.

24. The analysis of postulated events shall use conservative assumptions or assumptions reasonably chosen in the analysis.

25. In determining the assumptions for the postulated event analysis, the most unfavourable state of the NI, which could lead to the most severe radiological effects in the event of an accident (e.g. when the NI stores the maximum amount of radioactive materials, when the structures, systems and components provided for in the NI design to contain radionuclides from entering the environment or to ensure the safety in handling or storing radioactive materials are dismantled during the NI decommissioning process), shall be assessed.

26. The following assumptions shall be made when conducting a civil aircraft crash analysis:

26.1. the maximum take-off weight of the aircraft is 200 tonnes;

26.2. the amount of aviation fuel on board is 91 000 litres;

26.3. the speed of the aircraft at the time of impact with the NI is not less than 150 m/s;

26.4. in the event of an aircraft crash, aviation fuel is spilled and ignited;

26.5. the assessment of NIs with spent fuel (SF) pools shall assume that the occurring damages of the SF pools result in a water release for which the measures provided for in the license holder's or applicant's emergency management and mitigation documents are insufficient to compensate;

26.6. other assumptions and parameters used in the civil aircraft crash analysis (e.g. crash location, angle of crash, aviation fuel characteristics, effect of individual aircraft components (e.g. aircraft engines) on the NI structures) shall be reasonably conservative or determined during the analysis.

27. The license holder or applicant may choose assumptions other than those set out in subparagraphs 26.1–26.3 of the Requirements. In the case of other assumptions, the license holder or applicant shall justify that, taking into account the considerations referred to in paragraph 18 of the Requirements, the assumptions chosen for the civil aircraft crash analysis are still conservative compared to the assumptions referred to in subparagraphs 26.1–26.3 of the Requirements.

28. The following assumptions shall be made when analysing an extreme seismic event:

28.1. the magnitude of the extreme seismic event exceeds the magnitude of the seismic event assessed in the NI design;

28.2. damage to the structures and systems provided for in the design of the NI to contain radionuclides from entering the environment or to ensure the safety in handling or storing radioactive materials;

28.3. the assessment of NIs containing SF pools shall assume that heavy objects or equipment (e.g. a crane operating in the SF pool hall) will fall on the SF pool in the event of an extreme seismic event;

28.4. the assessment of NIs SF pools shall assume that the occurring damages of the SF pools result in a water release for which the measures provided for in the license holder's or applicant's emergency management and mitigation documents are insufficient to compensate;

28.5. other parameters and assumptions used in the extreme seismic event analysis (e.g. the location of the crane fall in the SF pool hall) shall be reasonably conservative or determined in the analysis.

29. The postulated event analysis shall include the following:

29.1. a scenario for the development of an accident resulting from the specific postulated event shall be identified. This analysis shall consider the direct and indirect mechanical effects of the postulated event (e.g. the development of a critical condition in the SF pools due to the dropping of heavy objects or equipment on the SF pools; the additional release of radionuclides from the SF pool hall due to the possible tipping of containers with SF in the hall and the damage to the SF that has fallen out of them), as well as the cases referred to in subparagraphs 29.3 and 29.4 of the Requirements. If the postulated event to be analysed is likely to lead to different accident scenarios and source terms, all possible accident scenarios shall be assessed;

29.2. the extent of the NI damage shall be determined. This analysis shall include an assessment of the condition of the affected NI structures, systems and components and of the equipment within the NI at the time of the postulated event, the location and circumstances of the release of radionuclides (e.g. height of the release, method of release (to the atmosphere or water)) and the amount of radioactive materials affected by the accident (e.g. amount of burnt combustible radioactive materials or mechanically damaged SF assemblies or containers with radioactive materials). If several hypothetical accident scenarios have been assessed in accordance with subparagraph 29.1 of the Requirements, the extent of the NI damage shall be assessed for each accident scenario;

29.3. the potential for fire shall be assessed. If the postulated event is determined to be likely to cause a fire, or, in accordance with subparagraph 26.4 of the Requirements, if a fire is assumed, the characteristics of the fire (e.g. duration, area, power and flame height) shall be assessed;

29.4. the possibility to use the measures provided for in the license holder's or applicant's emergency management and mitigation documents shall be assessed. This assessment shall take into account the circumstances of the accident scenario (e.g. ionising radiation levels or temperatures at the accident site, access to the accident site due to the collapse of the NI structure) and the capacity of the envisaged measures (e.g. availability of specialised equipment or techniques, fire-fighting capacity). If the postulated event results in a fire, it is assumed that fire-fighting, if the circumstances of the accident scenario permit, shall be initiated within 2 hours of the onset of the postulated event;

29.5. the characteristics of the accident scenario shall be identified. This assessment shall also take into account parameters affecting the dispersion of radionuclides in ambient air (e.g. duration and/or rate of release). If several hypothetical accident scenarios have been assessed in accordance with subparagraph 29.1 of the Requirements, the source term shall be evaluated for each accident scenario;

29.6. other aspects that may be relevant to the Consequences Analysis.

30. The assessments referred to in paragraph 29 of the Requirements may be carried out by expert judgment and/or deterministic methods (e.g. structural analysis of the NI structure, SF heat removal analysis, fire analysis).

31. Specialised software used to analyse postulated events shall be verified and validated.

SECTION THREE RADIOLOGICAL EFFECT ASSESSMENT

32. The license holder or applicant shall carry out an assessment of the dispersion of radionuclides released into environment and the exposure of residents in case of accidents caused by postulated events, and shall draw up maps of radioactive contamination and of the exposure of residents in the off-site area.

33. For the assessment of the dispersion of radionuclides into environment, a dispersion calculation model (e.g. a Gaussian dispersion model (hereinafter referred to as the "dispersion model")) shall be selected. For the accident scenarios identified, two scenarios for the dispersion of radionuclides into environment shall be examined using a dispersion model, in accordance with paragraph 34 of the Requirements: a conservative and a realistic scenario.

34. If several hypothetical accident scenarios have been assessed in accordance with subparagraph 29.1 of the Requirements, the accident scenario that is likely to result in the highest potential exposure of residents in the off-site area may be selected for the assessment of the dispersion of radionuclides into environment.

35. The assessment of the conservative radionuclide dispersion scenario shall use meteorological conditions and other data (e.g. terrain, simulated distance, time step, influence of structures) that would result in the highest possible exposure to representatives in the off-site area in the event of an accident.

36. The assessment of a realistic radionuclide dispersion scenario shall use average climatic conditions and other data (e.g. terrain, simulated distance, time step, influence of structures) that would be most likely to result in the exposure of the representatives in the off-site area in the event of an accident. The average climatic conditions shall be determined by assessing the average values of the meteorological parameters characterising the meteorological events for the NI site in question over a period of at least the last five calendar years.

37. In assessing the exposure of residents, a methodology for assessing the exposure of representative persons shall be established to assess the potential for severe radiation-induced events and accidental radiation-induced events in representative persons. This methodology shall include:

37.1. the selection of the general criteria for determining protective actions and emergency response actions set out in the legal act referred to in subparagraph 3.8 of the Requirements and a description of the methods for calculating the dose rates corresponding to those criteria;

37.2. a description of the exposure pathways used to estimate representative exposures and their mathematical models;

37.3. a description of the representative persons (for example, a description of the activities carried out, the living environment, behaviour, consumption and other parameters and characteristics necessary to assess exposure);

38. The summarised results of the assessment of the dispersion of radionuclides into environment and of the exposure of residents shall be presented in digitally generated maps of radioactive contamination, which shall indicate the concentration levels of radionuclides in environment and of radionuclides deposited on the ground surface, and in maps of the exposure of residents, which shall indicate the doses calculated for representatives.

39. The maps referred to in paragraph 38 of the Requirements shall be supported by tables showing the specific concentration levels of radionuclides into environment and the concentration levels of radionuclides deposited on the ground surface, and the values of representative doses calculated at these locations remote from the site of the release:

39.1. at the boundary of the NI site;

39.2. at the boundary of the NI sanitary protection zone;

39.3. at the nearest residential points (towns);

39.4. at the national borders of other states.

40. The specialised software used for the assessment of the dispersion of radionuclides into environment and the exposure of residents shall be verified and validated.

SECTION FOUR

DETERMINATION OF NI EMERGENCY PREPAREDNESS CATEGORIES

41. The license holder or applicant shall determine the emergency preparedness categories of the NIs they operate or plan to operate.

42. The results of the postulated event analysis and radiological effect assessment, which are carried out in accordance with the provisions of paragraphs 23 to 40 of the Requirements, shall be used to determine the emergency preparedness categories of the NI.

43. A license holder or applicant operating multiple NIs shall determine the emergency preparedness category for each NI.

44. NIs for which more than one emergency preparedness category may be specified in accordance with the provisions of paragraphs 46 to 48 of the Requirements shall be assigned the highest of the specified emergency preparedness categories.

45. The determination of the emergency preparedness category of a NI, when assessing the value of the ratio A/D_2 between the activity of radioactive materials dispersed in the environment and the dangerous quantity of radionuclides of concern (hereinafter referred to as the " A/D_2 ratio") shall be guided by the legal act referred to in subparagraph 3.8 of the Requirements.

NIs classified as Emergency Preparedness Category I

46. The following NIs shall be classified as Emergency Preparedness Category I:

46.1. a power unit or non-power nuclear reactor of a nuclear power plant with a thermal input greater than 100 MW;

46.2. NIs containing SF water pools with a total ^{137}Cs radionuclide activity greater than 0.1 EBq;

46.3. A NI that has SF water pools and requires cooling to keep the SF within safe limits and, in the event of an accident, the temperature of the SF casings exceeds $1000\text{ }^{\circ}\text{C}$ in the event of failure of SF cooling;

46.4. a NI other than a NI referred to in subparagraphs 46.1 to 46.3 of the Requirements, if the characteristics of the NI site, the amount of radioactive materials, the physical and chemical state of the NI and/or the energy generated by the NI equipment are such that, in the event of an accident, without protective actions and without containment and mitigation actions, the exposure of residents in the off-site area due to an accident may exceed the general criteria laid down in the legal act referred to in subparagraph 3.8 of the Requirements for the prevention or reduction of severe radiation-induced effects;

46.5. a NI, other than a NI referred to in subparagraphs 46.1 to 46.4 of the Requirements, in which the calculated A/D_2 ratio for the radioactive materials is equal to or greater than 10 000, assuming that in the event of an accident 10 percent of the activity of the radionuclides in the NI would be released into the environment.

NIs classified as Emergency Preparedness Category II

47. The following NIs shall be classified as Emergency Preparedness Category II:

47.1. a power unit or a non-power nuclear reactor of a nuclear power plant with a thermal input greater than 2 MW but less than or equal to 100 MW;

47.2. A NI that has SF water pools and requires cooling to keep the SF within safe limits and, in the event of an accident, the temperature of the SF casings is less than $1000\text{ }^{\circ}\text{C}$ in the event of failure of SF cooling;

47.3. A NI or its equipment, other than a nuclear reactor and a non-power nuclear reactor, where nuclear or fissile materials are used or handled and a self-sustaining fission chain reaction may occur in the event of an accident, and the distance from the NI to the boundary of its site area is less than 0,5 kilometres;

47.4. a NI other than a NI referred to in subparagraphs 47.1 to 47.3 of the Requirements, if the characteristics of the NI site, the amount of radioactive materials, the physical and chemical state of the radioactive materials contained in the NI, and/or the energy generated by the NI equipment are such that, in the event of an accident, without protective actions and containment and mitigation actions, the exposure of residents in the off-site area due to an accident would not exceed the general criteria laid down in the legal act referred to in subparagraph 3.8 of the Requirements, for preventing or minimising the occurrence of severe radiation-induced effects, but may exceed the dose limits for residents laid down in the legal act referred to in subparagraph 3.7 of the Requirements;

47.5. a NI, other than a NI referred to in subparagraphs 47.1 to 47.4 of the Requirements, in which the calculated A/D_2 ratio for the radioactive materials is equal to or greater than 10 000, assuming that in the event of an accident 10 percent of the activity of the radionuclides in the NI would be released into the environment.

NIs classified as Emergency Preparedness Category III

48. The following NIs shall be classified as Emergency Preparedness Category III:

48.1. a power unit or non-power nuclear reactor of a nuclear power plant with a thermal input equal to or less than 2 MW;

48.2. A NI or its equipment, other than a nuclear reactor and a non-power nuclear reactor, where nuclear or fissile materials are used or handled and a self-sustaining fission chain reaction may occur in the event of an accident, and the distance from the NI to the boundary of its site area is more than 0,5 kilometres;

48.3. A NI installation with an ionising radiation source where a failure of radiation suppression can result in an external dose rate greater than 100 mGy/hr within 1 m of the ionising radiation source;

48.4. a NI other than a NI referred to in subparagraphs 48.1 to 48.3 of the Requirements, if the characteristics of the NI site, the amount of radioactive materials, the physical and chemical state of the NI, and/or the energy generated by the NI equipment are such that, in the event of an accident, the exposure of residents in the off-site area will not exceed the dose limits set out in the legal act referred to in subparagraph 3.3 of the Requirements in the absence of protective, limiting and mitigation actions. However, the exposure of persons (staff members, trainees, students or residents) present in the site area may exceed the dose limits for such persons laid down in the legal act referred to in subparagraph 3.7 of the Requirements;

48.5. a NI, other than a NI referred to in subparagraphs 48.1 to 48.4 of the Requirements, in which the calculated A/D₂ ratio for the radioactive materials is equal to or greater than 0.01, assuming that in the event of an accident 10 percent of the activity of the radionuclides in the NI would be released into the environment.

CHAPTER VI USING THE INFORMATION CONTAINED IN THE NI SAFETY JUSTIFICATION DOCUMENTS FOR CONSEQUENCES ANALYSIS

49. The license holder or applicant, having considered the information contained in the NI safety justification documents (e.g. NI safety analysis report, fire analysis report, safety justification of the beyond design basis accident management guidelines) and having determined that the accidents analysed in these documents and the assessment of their radiological effects are in accordance with the provisions in paragraphs 23 to 40 of the Requirements, may, in the manner specified in paragraph 50 of the Requirements, use the information in its Consequences Analysis and not carry out the accident analysis and the assessment of the radiological effects of the individual postulated events.

50. The license holder or applicant, when submitting to the VATESI the results of the consequences analysis of hypothetical nuclear and radiological accidents at a nuclear installation, shall demonstrate the compliance of the information contained in the NI safety justification documents with the provisions of paragraphs 23 to 40 of the Requirements by presenting this information or by providing appropriate references to specific parts of the NI safety justification documents, and shall provide the conclusions of this assessment. The following information shall be provided when submitting to the VATESI the results of the accident analysis of hypothetical nuclear and radiological accidents at a nuclear installation:

50.1. a description of the NI and the activities carried out in this NI;

50.2. the maximum possible quantity (mass), chemical and physical properties, radionuclide composition and activity of the radioactive materials to be handled and/or stored, as provided for in the NI design;

50.3. a description of the postulated event scenario;

50.4. the results of the assessment of the extent of damage to the NI structures and the radioactive materials contained therein;

50.5. the results of a fire analysis if the postulated event causes a fire;

50.6. the source term resulting from the accident scenario;

50.7. the assumptions and results of the assessment of the dispersion of radionuclides into environment and the exposure of residents;

50.8. other aspects that may be relevant to the results of the Consequences Analysis.

51. The Head of the VATESI shall take a decision on the justification referred to in paragraph 50 of the Requirements in accordance with the deadlines specified in Article 34(2) of the legal act referred to in subparagraph 3.2 of the Requirements. The Head of the VATESI shall take a positive decision on the agreement of the document referred to in paragraph 50 of the Requirements, if the information contained therein complies with these Requirements, other normative technical documents on nuclear safety and the factual circumstances.

CHAPTER VII DOCUMENTING AND COORDINATING CONSEQUENCES ANALYSIS

52. The Consequences Analysis shall be documented and coordinated with the VATESI in two stages:

52.1. a description of the methodology for the Accident Analysis shall be prepared and submitted to the VATESI for approval;

52.2. an Accident Analysis Report shall be prepared and submitted to the VATESI for approval and, taking into account paragraph 54 of the Requirements, a revised description of the methodology for the Consequences Analysis, if necessary.

53. The description of the methodology for the Consequences Analysis shall contain the following information:

53.1. a description of the NI and the activities carried out in this NI;

53.2. a description of the NI state which could lead the most severe radiological effects in an accident;

53.3. a description and justification of the assumptions and input data for the assessment of the quantity (by mass), chemical and physical properties, radionuclide composition and activity of radioactive materials in the NI;

53.4. a justification for the identification and selection of postulated events and a list of postulated events. In the case of the Consequences Analysis for several NIs, a common list of postulated events shall be compiled, which shall include the postulated events for each NI under assessment;

53.5. a description of each postulated accident scenario or possible variations thereof, if more than one hypothetical accident scenario is to be assessed, and a justification of the assumptions used;

53.6. a description and justification of the methodology, input data and assumptions used to assess the extent of the NI damage;

53.7. a description and justification of the fire analysis methodology, input data and assumptions;

53.8. a description and justification of the methodology for assessing the source term;

53.9. a description and justification of the methodology, input data and assumptions used for the assessment of the dispersion of radionuclides into environment;

53.10. a description and justification of the methodology, input data and assumptions used to assess the exposure of residents;

53.11. a description and justification of the input data and assumptions for the determination of the NI emergency preparedness category;

53.12. a description of the specialised software tools used to perform the assessments and information on their suitability for performing these calculations (references to verification and validation documents);

53.13. a description and justification of other analyses/assessments, methodologies, input data and assumptions used for the Consequences Analysis (e.g. description and justification of the analysis of heat removal from the SF stored in the SF pools to assess the potential for damage to the SF

assemblies from the heating of the SF casings; (e.g. description and justification of a criticality analysis to assess the potential for an additional source of radionuclide release to the environment; description and justification of an assessment of the level of ionising radiation at the site area to assess the feasibility of the use of the accident management and mitigation measures foreseen by the license holder or the applicant);

53.14. references to the documents on which the description of the methodology for the Consequences Analysis is based.

54. If, in accordance with the provisions of paragraphs 23 to 48 of the Requirements, unassessed circumstances have been identified during the postulated accident analysis, radiological impact assessment and determination of the emergency preparedness category, the description of the methodology for the Consequences Analysis shall be revised and, in accordance with subparagraph 52.2 of the Requirements, submitted to the VATESI for approval, together with the Consequences Analysis Report.

55. The Consequences Analysis Report shall contain the following information:

55.1. the justification and results of the identification of the accident scenario or hypothetical scenarios for each postulated event identified in the list of postulated events, if several hypothetical accident scenarios have been assessed;

55.2. an assessment of the extent of the NI damage and its results;

55.3. fire analysis and its results;

55.4. an assessment of the source term and its results;

55.5. an assessment of the dispersion of radionuclides into environment and its results;

55.6. an assessment of the exposure of residents and its results, including maps of radioactive contamination and exposure of residents;

55.7. NI emergency preparedness category assessment and results;

55.8. in accordance with subparagraph 53.13 of the Requirements, other analyses and/or assessments carried out and its results, as provided for in the description of the methodology for the Consequences Analysis;

55.9. references to the documents on which the Consequences Analysis Report is based.

56. In accordance with Article 30(3) of the legal act referred to in subparagraph 3.2 of the Requirements, the license holder or applicant shall carry out an independent verification of the results of the Consequences Analysis.

57. The Head of the VATESI shall take a decision on the description of the methodology for the Consequences Analysis and the Consequences Analysis Report in accordance with the deadlines set out in Article 34(2) of the legal act referred to in subparagraph 3.2 of the Requirements. The Head of the VATESI shall take a positive decision on the approval of the description of the methodology for the Consequences Analysis and the Consequences Analysis Report, provided that the information contained in these documents is in accordance with these Requirements, other normative technical documents on nuclear safety and the factual circumstances.

CHAPTER VIII REVISION OF THE CONSEQUENCES ANALYSIS

58. In the event of modifications to the NI and circumstances that were not considered during the design, construction, commissioning, operation and decommissioning of the NI, the Consequences Analysis shall be revised and the Consequences Analysis Report shall be updated in the following cases:

58.1. postulated events other than those specified in the NI list of postulated events have been identified;

58.2. there have been changes in the assumptions of the postulated event analysis (e.g. parameters of the postulated events, the amount (mass) or total activity of the radioactive materials), or other aspects which, in accordance with the provisions of paragraph 29 of the Requirements, may

significantly change the results of the postulated event analysis in the assessment of the exposure of residents carried out in accordance with the provisions of paragraph 37 of the Requirements, or may lead to a change in the emergency preparedness category of the NI under assessment, in accordance with paragraphs 41 to 48 of the Requirements;

58.3. the license holder or applicant has identified the need to revise the Consequences Analysis (for example, as a result of changes in the methodology used to analyse postulated accidents or radiological effects, changes in the results of recent research, changes in international nuclear safety standards and international best practice, changes in the assessment of the results of the analysis of their own and other persons operating experience in the nuclear power sector).

CHAPTER IX PERIODIC REVIEW OF THE CONSEQUENCES ANALYSIS

59. The periodic safety review of the NI at the frequency specified in Article 32(7¹) of the legal act referred to in point subparagraph 3.2 of the Requirements shall be accompanied by a periodic review of the NI Consequences Analysis and the results shall be documented in the emergency preparedness section of the NI periodic safety review report.

60. The periodic review of the Consequences Analysis shall assess the aspects referred to in subparagraphs 58.1 to 58.3 of the Requirements.

61. In accordance with Article 32(7)(1) of the legal act referred to in subparagraph 3.2 of the Requirements, the license holder operating the NI shall identify corrective measures in the periodic safety review report for the NI if the assessment of the aspects referred to in subparagraphs 58.1 to 58.3 of the Requirements has identified cases which require a revision of the Consequences Analysis and updating of the Consequences Analysis Report.

CHAPTER X FINAL PROVISIONS

62. Any person who violates these Requirements shall be liable in accordance with the procedure laid down in the legal act referred to in subparagraph 3.2 of the Requirements and/or in the Republic of Lithuania Code of Administrative Offences.
