**NUCLEAR SAFETY REQUIREMENTS**
**BSR-1.9.1-2017**
**STANDARDS OF RELEASE OF RADIONUCLIDES FROM NUCLEAR FACILITIES AND REQUIREMENTS FOR THE PLAN ON RELEASE OF RADIONUCLIDES**

## I. GENERAL PROVISIONS

1. Nuclear safety requirements BSR-1.9.1-2017 Standards of Release of Radionuclides from Nuclear Installations and Requirements for the Plan on Release of Radionuclides (hereinafter – 'Requirements') regulates the limitation of the release of radionuclides from nuclear facilities (hereinafter – 'NF') into the environment, establishes standards of the release of radionuclides from NI and the requirements for the plan on the release of the radionuclides and the control of the release of the radionuclides.

2. The provisions of the requirements are not applicable in cases of the nuclear and radiological accidents.

## CHAPTER II
## DEFINITIONS

3. Concepts used herein:

3.1. **Activity limits of released radionuclides** (hereinafter activity limits) refer to established permitted activity of the radionuclides released to air and water from a nuclear facility (NF) per year, leading to a dose for a representative person that is less than a dose constraint value (measure units – Bq/year).

3.2. **Monitoring of the environmental contamination with released radionuclides** (hereinafter contamination monitoring) refers to continuous or non-continuous measurement and assessment of the activity of the radionuclides released from NF performed by an operator engaged in nuclear energy activities.

3.3. **Operator engaged in nuclear energy activities** (hereinafter the operator) refers to a legal entity intending to perform or already performing activities in the area of nuclear energy that require licenses and permits referred to respectively in Article 22(1) (2) and (4) and Article 22(2) (2) and (3) of the Law on Nuclear Safety of the Republic of Lithuania (hereinafter licenses and permits).

3.4. **Anticipated operational occurrence** refers to a deviation from the normal operation of nuclear facility expected to occur with a period not shorter than the projected lifetime of the nuclear energy facility.

3.5. The other concepts used in the Requirements shall be interpreted as they are defined in the Law on Nuclear Energy of the Republic of Lithuania, in the Law on Nuclear Safety of the Republic of Lithuania, in the Law on Radiation Protection of the Republic of Lithuania, and in other legal acts regulating radiation protection.

## CHAPTER III
## LIMITATION OF RADIONUCLIDE RELEASE FROM NF

4. In order to ensure the protection of population and environment from the negative impact of ionising radiation, NF shall be designed, commissioned, operated and decommissioned in such a way that under the conditions of NF normal operation and the anticipated operational occurrence the annual effective dose of a representative person resulting from radionuclide releases from NF would not exceed the dose constraint.

5. To make a realistic assessment of population exposure doses, one or several representative persons shall be identified. The representative person shall be selected from a group of population

receiving the highest exposure dose and identified taking into account the actual routes of radionuclide dispersion determining the annual effective doses of representative persons well as the actual lifestyles and nutrition peculiarities of representative persons.

6. The determination of pathways through which radionuclides are released into the environment (to air and water) and the doses in case of different radionuclides may be performed for different representative persons. If, following the provisions of item 8 hereof, no representative person can be identified within the territory under evaluation, a hypothetical representative person who could potentially represent persons residing on that territory shall be defined for assessing the radiological impact of NF.

7. When radionuclides are released into the environment from several NF and through different pathways (to ambient air and water), a dose constraint shall be distributed for each NF and each radionuclide discharge in such a way that the dose constraint for representative persons affected by several NF located within the same territory should not be exceeded, irrespective of whether the same or different representative persons are affected by all NF.

8. When establishing the limits on radionuclide releases into the environment, all constituents of ionising radiation that determine the annual effective doze for the representative person, i.e. both internal and external exposure. The total (as concerns the release of radionuclides into the environment and the direct external ionising radiation) annual effective dose for the representative person shall not exceed the dose constraint.

## CHAPTER IV
## STANDARDS OF RELEASE OF RADIONUCLIDES FROM NF

9. The operator shall ensure that during the NF operation or decommissioning under the conditions of NF normal operation or anticipated operational occurrences the dose constraint for the representative person is not exceeded.

10. Prior to launching the operation or decommissioning of NF, the operator shall evaluate the activity limits of radionuclides released to ambient air or water. The activity limits shall be determined separately per each radionuclide that is dangerous in terms of radiation protection or each group of such radionuclides (e.g., noble radioactive gas). When determining the activity limits for a group of radionuclides, parameters of the radionuclide that is most dangerous in terms of radiation protection shall be applied.

11. If, following the resolution of the Government of the Republic of Lithuania, plans are made to start designing a new NF to be constructed nearby the existing operating NF, which affects the same representative person, the dose constraint shall not be exceeded by the dose the representative person receives from all NF.

12. Activity limits of the radionuclides are calculated taking into account internal (caused by inhaled and ingested radionuclides) and external (caused by airborne and deposited radionuclides) exposure doses and the fact that radionuclides released to air and water.

13. For assessing the possible doses of exposure it is suggested to apply internationally recognised scientific recommendations on the models of radionuclide dispersion in the environment provided by the International Atomic Energy Agency in its Safety Report Series No. 19 “Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment”, 2001, and the International Commission on Radiological Protection; in addition, account shall be taken of the results obtained by optimising radiation protection and of the actual peculiarities specific to the lifestyle and nutrition of representative persons and, as far as it is practically possible, realistic and site-specific parameters of radionuclide dispersion in the atmosphere, hydrosphere and lithosphere shall be applied.

14. When assessing the possible annual effective dose for the representative person, all radionuclides discharged from the source of contamination through all possible pathways that are dangerous from the point of view of radiation protection shall be taken into account.

15. When several radionuclides are released to the environment from the same NF through several pathways, their total impact shall be assessed and it shall meet the following condition:

$$\sum_i \sum_j \frac{Q_{ij}^a}{A_{ij}} \le 1 \quad ; (2)$$

where:

$Q_{ij}^a$ the activity of radionuclide *j* released to air and water from source *i* (Bq/year), $A_{ij}$ – the activity limit of the respective radionuclide (Bq/year). This condition shall be applied to the release of radionuclides separately to air and water.

16. When calculating the values of radionuclide activity limits $A_{ij}$, an assumption shall be made that radionuclides are emitted evenly. In the event of controlled environmental contamination increases, there shall be released not more than 1% per day and not more than 25% per month of the annual activity limits of radionuclides:

$$\sum_j Q_{ij}^d / A_{ij} \le 0{,}01 \quad ; (3)$$

$$\sum_j Q_{ij}^m / A_{ij} \le 0{,}25 \quad ; \quad (4)$$

where:

$Q_{ij}^d$ – the activity of daily release of radionuclide *j* (Bq); $Q_{ij}^m$ – the activity of monthly release of radionuclide *j* (Bq); $A_{ij}$ – the activity limit of radionuclide *j* (Bq/year), *i* – the pathway of radionuclides.

## CHAPTER V

## REQUIREMENTS FOR THE PLAN OF RELEASE OF RADIONUCLIDES INTO THE ENVIRONMENT

17. The operator may release radionuclides from the NF exclusively after preparation and coordination of the plan of release of radionuclides (hereinafter – 'Plan') according to the provisions of the Law on Nuclear Safety of the Republic of Lithuania.

18. The plan shall contain the following information:

18.1. The amount of materials containing radionuclides intended to release per year, physical and chemical properties, activity and composition of radionuclides;

18.2. The description of release points, pathways and methods and their layout.;

18.3. changes in the release of radionuclides as well as probability and reasons of controlled environmental contamination increases that may lead to the increase in the activity of released radionuclides;

18.4. the analysis of all pathways by which radionuclides that are dangerous from the point of view of radiation protection can reach population and increase the dose of their exposure, based on the results of measuring the natural background of ionising radiation, the experience acquired in the course of exploitation or on analogues of similar facilities;

18.5. the description of representative persons selected for the purpose of assessing the impact of NF;

18.6. the estimated annual effective dose for representative persons due to the planned activity and methods of estimation;

18.7. the description and analysis of exposure pathways used for evaluating the exposure of the representative person;

18.8. the description of how the activity limit of radionuclides planned to be released to air and water is estimated and the value of hence estimated activity limit;

18.9. if radionuclides are to be grouped in accordance with the provisions of item 10 hereof – the list of radionuclides planned to be released to ambient air and water per each source of release and the total list of radionuclides planned to be released to ambient air and water due to the activities of the operator.

19. The requirements for the content of the Plan are laid down in Annex 1 hereto.

20. When the Plan is revised, in addition to the information referred to in item 18 hereof, information on the reasons of revising the Plan shall be provided.

21. If release of radionuclides into the environment is not expected during operation of the intended activity, the Plan shall contain information to prove it.

22. When plans are made to start operating a new NF nearby the existing one that may affect the same representative person, the State Nuclear Power Safety Inspectorate (VATESI) shall inform the operator of the existing NF nearby which another operator intends to start operating a new NF about the revision of the Plan for its existing NF within 20 business days from the date of application for the issuance of licences or permits of that other operator.

23. If the same operator intends to start operating a new NF nearby the existing one that may affect the same representative person, the operator is allowed to draw and submit for approval a combined Plan for the existing NF and the one intended to be operated.

## CHAPTER VI

## CONTROL OF RADIONUCLIDE RELEASES INTO THE ENVIRONMENT

24. The operator shall ensure the control of the release of the radionuclides to the environment performing pollution monitoring**.**

25. Pollution monitoring of the NF is executed under provisions of the procedure established by the Law on Environmental Monitoring of the Republic of Lithuania and the monitoring of foodstuffs, raw materials and drinking water is performed under the procedure established by the Ministry of Health.

26. The operator shall collect and preserve data of pollution monitoring according to the procedure established by the Law on Documents and Archives and other legal acts that regulate document management.

27. In the course of operating or decommissioning NF, the operator shall seek to keep the activity of radionuclides released into the environment as low as possible. If in the course of contamination monitoring an increase in the activity of radionuclides released into the environment is identified, the operator shall determine the reasons of that increase and:

27.1. if release per day exceeds 1% of annual activity limits of radionuclides – shall inform VATESI, the Environmental Protection Agency and the Ministry of Health within 3 business days from the date of recording the aforementioned increase and submit a forecast of pollution, indicating the reasons of intensified contamination and the actions taken or to be taken to reduce it;

27.2. if release per month exceeds 25% of annual activity limits of radionuclides – shall take measures to reduce the release of radionuclides and, within 5 business days from the date of recording the above mentioned increase, shall submit information on the reasons of release and the measures taken to reduce it to VATESI, the Environmental Protection Agency and the Ministry of Health.

28. The operator, after identification that the activity limits of the radionuclides indicated in the Plan are exceeded, or detection of the radionuclides that are not indicated in the Plan, shall:

28.1. Analyse the reasons and consequences of the exceeding of the activity limits of the radionuclides indicated in the Plan, or the release of the radionuclides that were not indicated in the Plan;

28.2. Take measures to eliminate the causes of the exceeding of the activity limits of the radionuclides indicated in the Plan or the release of the radionuclides that were not indicated in the Plan and to ensure that such situation will not recur thereinafter;

28.3. within 5 business days after the identification that the activity limits of radionuclides indicated in the Plan are exceeded and/or the detection of radionuclides not indicated in the Plan shall inform VATESI, the Environmental Protection Agency and the Ministry of Health on the reasons of exceeding the activity limits indicated in the Plan or the release of radionuclides not indicated in the Plan, their elimination and preventive measures being or to be taken so that the cases of exceeding the activity limits or releasing radionuclides not indicated in the Plan would never recur in the future.

29. VATESI after receiving the information mentioned in paragraphs 27.1-27.2 hereto, sets a deadline for elimination of the causes of the exceeding of the activity limits of the radionuclides indicated in the Plan or the release of the radionuclides that were not indicated in the Plan and inform the operator, the Environmental Protection Agency and the Ministry of Health hereof. The deadline shall be specified considering the reasons of the increased pollution but not less than 14 days. That deadline is effective from the day on which the information referred to in this paragraph is sent to the operator.

30. If the operator did not eliminate within the set deadline the exceeding of the activity limits of the radionuclides indicated in the Plan or the release of the radionuclides that were not indicated in the Plan VATESI impose sanctions established by the Law on Nuclear Safety.

31. If after performance of analysis of the release of radionuclides that were not indicated in the Plan and the reasons hereto, the operator submits VATESI the documentation proving that the release of radionuclides that were not indicated in the Plan is not caused by NF activity, the provisions of subparagraphs 28.2, 28.3, 29 and 30 herein are not applicable. The operator submits the information that the release of radionuclides that were not indicated in the Plan is not caused by NF activity and the results of the release analysis to the Environmental Protection Agency and the Ministry of Health.

32. In those cases, when the operator, after performing the analysis of the release of radionuclides that were not indicated in the Plan and the reasons hereto, submits VATESI the documentation proving that there is a possibility hereafter of the release of radionuclides that were not indicated in the Plan, the operator, following the procedure established by the Law on Nuclear Safety, shall revise and submit for coordination the Plan.

33. The assumptions, parameters and their values used in identifying and selecting a representative person shall be reviewed and evaluated at least every 10 years.

## CHAPTER VII

## SUPERVISION OF RELEASE CONTROL PREFORMED BY THE OPERATOR

34. At the beginning of the following month, but not later than in 10 working days the operator shall submit data to VATESI, the Environmental Protection Agency and the Ministry of Health regarding activities of the release of radionuclides per month, except $^{3}H$ and $^{14}C$ the data of which shall be submitted every three month.

35. Annual report regarding the activities of the release of the radionuclides released into the environment shall be submitted by 1 April of the following calendar year to VATESI and the Ministry of Health.

36. In the annual report, regarding the activities of the radionuclides released into the environment, it shall be indicated:

36.1. The activity of radionuclides released to air and water (monthly) and total annual activity of radionuclides;

36.2. Comparison of the activity of the radionuclides released to the environment and activity limits;

36.3. The tendencies and analysis of the pollution and its change;

36.4. Estimated effective doses for the representative person caused by radionuclides released per year (for each radionuclide, radionuclide pathway, groups of radionuclides and total for NF), and comparison of them with dose constraint;

36.5. The reasons of the release of unplanned radionuclides into the environment, the analysis of the releases, if there are identified radionuclides that were not indicated in the Plan.

36.6. The reasons of the exceeding of doses for the representative persons, if the exposure dose exceeds or may exceed the dose constraint for the representative persons;

## CHAPTER VIII

## FINAL PROVISIONS

37. The operator shall be liable for the breach of these Requirements in accordance with the procedure established by Laws of the Republic of Lithuania.

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Annex 1

## STANDARD CONTENT OF THE PLAN OF RADIONUCLIDE RELEASES INTO THE ENVIRONMENT

1. The description on how the responsibilities for ensuring the control over release of radionuclides are distributed among employees of the operator engaged in nuclear energy activities.

2. Concepts used in the Plan of radionuclide releases into the environment.

3. The description of release points, pathways and methods and their layout.

4. Changes in the release of radionuclides as well as probability and reasons of controlled environmental contamination increases that may lead to the increase in the activity of released radionuclides.

5. The analysis of all pathways by which radionuclides that are dangerous from the point of view of radiation protection can reach population and increase the dose of their exposure, based on the results of measuring the natural ionising radiation background, the experience acquired in the course of exploitation or on analogues of similar facilities.

6. The description of planned radionuclide releases to ambient air and their activity.

7. The description of planned radionuclide releases to water and their activity.

8. The description on how activity limits of planned radionuclide releases to ambient air are estimated and information on the results of estimation.

9. The description on how the activity limit of radionuclides planned to be released to ambient water are estimated and information on the results of estimation.

10. The description of representative persons.

11. The description on how the annual effective dose for representative persons is estimated (methods and information on the results of estimation).

12. The description and an analysis of exposure pathways used for evaluating the exposure of the representative person.